

Tree Crops' CO₂ Removal Capacity

Report

Action C.4



LIFE CLIMATREE

(LIFE14 CCM/GR/000635) A novel approach for accounting & monitoring carbon sequestration of tree crops and their potential as carbon sink areas

Athens, November 2020

TERRANOVa





INTRODUCTION

The current Report is the Deliverable of **Action C.4** which was implemented in the framework of the LIFE CLIMATREE project (LIFE14 CCM/GR/000635) [www.lifeclimatree.eu].

The LIFE CLIMATREE project was co-financed by the European Commission in the framework of the Programme LIFE Climate Change Mitigation.

In the context of the LIFE CLIMATREE project, a specialized algorithm (**CO₂RCA**: CO₂ Removal Capacity Algorithm) was designed and developed to efficiently and accurately calculate the tree crops' capacity to remove CO₂ from atmosphere. CO₂RCA's design principles provide calculation of the tree crop's carbon balance which is strictly related to atmosphere's CO₂ (CO₂ related carbon). More specifically, it calculates the annual balance between the mass of CO₂ which is captured from atmosphere throughout the biological cycle of the tree to produce new wood biomass as well as fruits biomass, and the mass of CO₂ which is emitted to atmosphere by the applied agricultural practices. Moreover, it calculates and takes into account in the calculation of the CO₂ balance, the annual CO₂ gain which results from the application of "green" agricultural practices.

CO₂RCA was designed and formulated by the scientific team of TERRA NOVA Ltd.:

Ioannis Spanos	Chemical Engineer, MSc. (Action C.4 Leader)
Andreas Sotiropoulos	Environmental Scientist, MSc.
Leta Karava	Forester, MSc.

Based on the CO₂RCA, a tree crops' CO₂ Removal Capacity Calculation Tool (**CO₂RCCT**) was designed, developed and tested.

CO₂RCCT was applied at pilot scale to 5 tree species [Olive (*Olea europaea*), Apple (*Malus domestica*), Orange (*Citrus sinensis*), Peach (*Prunus persica*) and Almond (*Amygdalus communis*)] in three countries [Greece, Italy, Spain].

CO₂RCCT was designed and developed by the scientific team of TERRA NOVA Ltd.:

Ioannis Spanos	Chemical Engineer, MSc. (Action C.4 Leader)
Andreas Sotiropoulos	Environmental Scientist, MSc.
Leta Karava	Forester, MSc.
Stavroula Barafaka	Chemical Engineer, MSc.
Roula Chandrinou	Environmental Scientist, MSc.
Kostis Dramitinos	Environmental Scientist
Dimitris Ntinopoulos	Environmental Engineer





in close collaboration with:

a. The scientific team of the Agricultural University of Athens (AUA) regarding the currently applied cultivation practices for the 5 pilot tree species, as well as regarding best, "green", practices that could be alternatively applied:

Serko Haroutounian, Professor at the Department of Nutritional Physiology and Feeding, School of Agriculture, Engineering and Environment

Petros Roussos, Associate Professor at the Department of Crop Science, Laboratory of Pomology Epameinondas Evergetis, Scientific Assistant at the Department of Nutritional Physiology and Feeding, School of Agriculture, Engineering and Environment

b. The Institute of Urban Environment and Human Resources of the Panteion University of Athens (UEHR) regarding the development of the equations supporting the Soil section:
 Angelos Mimis, Associate Professor at the Department of Economic and Regional Development

The operation of the CO₂RCCT is supported by an extended <u>back-end database</u>, which was specifically developed for the purpose to provide data and coefficients to the CO₂RCA. This database was developed by:

- A. The above scientific team of TERRA NOVA
- B. The above scientific team of the Agricultural University of Athens
- C. The scientific team of the University of Basilicata (UNIBAS) regarding coefficients for the specific tree crops' cultivation in Italy as well as statistical data at national scale:

Giuseppe Montanaro	Associate Professor
Teodoro Berloco	Post doc fellowship
Giuseppe Acinapura	Post lauream fellowship

D. The scientific team of the Spanish National Research Council (CSIC) regarding coefficients for the specific tree crops' cultivation in Spain as well as statistical data at national scale:
 Diego Intrigliolo Agriculture Engineer, PhD, Senior Scientist at CSIC

The current Report presents:

- i. the CO₂ Removal Capacity Algorithm (CO₂RCA)
- ii. the CO₂ Removal Capacity Calculation Tool (CO₂RCCT)
- iii. the results of various CO₂RCCT runs
- iv. the analysis of the results and the extracted conclusions
- v. the emerging potentials derived for the further use of the CO₂RCA and the CO₂RCCT





1. TREE CROPS CO₂ REMOVAL CAPACITY ALGORITHM (CO₂RCA)

1.1 ALGORITHM'S DESIGN PRINCIPLES AND CHARACTERISTICS

The scope of the CO_2 Removal Capacity Algorithm (CO_2RCA) is to efficiently and accurately calculate the tree crops' capacity to remove CO_2 from atmosphere.

The Algorithm (CO₂RCA) was designed to calculate the balance between:

- the mass of CO₂ which is removed from atmosphere by tree crops to produce new biomass, and
- the mass of CO₂ which is emitted to atmosphere by the applied agricultural practices.

CO₂RCA takes into account:

- ✓ the biological cycle of the tree
- ✓ the practices applied for its cultivation, maintenance, protection and harvesting.

It is underlined that CO_2RCA calculates the carbon balance which is strictly related to atmosphere's CO_2 (CO_2 related carbon).

The calculations boundaries of the CO_2RCA are:

- a) <u>Investigated subject</u>: the tree itself and subsequently the tree crop land in terms of a specific farm or broader areas which are exclusively used for the cultivation of tree crops.
- b) <u>Time period</u>: 1 entire calendar year (e.g., 2019) taking into account that within a year a full cultivation cycle can be considered as a completed one and thus a full productive cycle of the tree crop will be performed.





1.2 ALGORITHM DESCRIPTION

Algorithm's structure

The Algorithm (CO₂RCA) consists of a backbone set of equations, which are divided in 4 sections:

- i. CO₂ Removal from the atmosphere for the development of tree's new biomass
- ii. CO₂ Storage into the soil beneath and around the tree
- iii. CO2 Emissions to the atmosphere due to the currently applied cultivation practices
- iv. CO2 Gain as a result of the application of "green" agricultural practices

CO₂RCA is described by the following main equation:

$ARC = TAR - TAE + TAG = AR_B + AS_S - TAE + TAG$ [1]

where:

ARC: CO2 Annual Removal Capacity [in tn of CO2 per year]

TAR: CO₂ Total Annual Removals [in *tn of CO₂ per year*]

TAE: CO₂ Total Annual Emissions [in *tn of CO₂ per year*]

TAG: CO₂ Total Annual Gain [in *tn of CO₂ per year*]

AR_B: CO₂ Annual Removal due to the biomass change of the tree [in *tn of CO₂ per year*]

ASs: CO2 Annual Storage in soil as carbon of the fallen biomass [in tn of CO2 per year]

It has to be underlined an important difference between ARC and TAR; ARC is the result of the CO_2 mass balance between (a) the total quantity of CO_2 which is abstracted from the atmosphere [=TAR] by the tree in order to create biomass and (b) the total quantity of CO_2 which is emitted to the atmosphere due to the agricultural practices which are applied for the cultivation of the tree.

CO2 Removal Capacity due to the production of new biomass

The biomass change of the tree is analysed into 2 main categories:

- ✓ the annual production of fruits
- \checkmark the annual production of new trunk, branches and roots.

$\mathbf{AR}_{\mathbf{B}} = \mathbf{AR}_{\mathbf{BF}} + \mathbf{AR}_{\mathbf{BW}}$

where:

AR_{BF}: CO₂ Annual Removal due to the production of fruits biomass [in *tn of CO₂ per year*] AR_{BW}: CO₂ Annual Removal due to the production of wood biomass [in *tn of CO₂ per year*]

[2]





(a) CO₂ removal from atmosphere for the production of fruits biomass

The quantity of CO_2 which is absorbed by the tree from the surrounding atmosphere to be used for the production of the fruits' biomass, is calculated by the following equation:

$\mathbf{AR}_{\mathsf{BF}} = \mathbf{C}_{\mathsf{f}} \times \mathbf{K}_{1} \times \mathbf{Y} = \mathbf{C}_{\mathsf{f}} \times \mathbf{K}_{1} \times \top \mathbf{Y} \mathbf{D} \times \mathbf{S} \times (\mathbf{1} + \mathbf{I}_{\mathsf{Y}})$

[3]

where:

AR_{BF}: CO₂ Annual Removal due to the production of fruits biomass [in tn of CO₂ per year]

C_f: carbon content of fresh fruit [in *tn C per tn of fresh fruit*]

K₁: mass conversion coefficient from C to $CO_2 = 3.66419$

Y: total yield of the farm or the broader area regarding fruit production [in tn per year]

TYD: typical yield density of the tree crop cultivation [in *tn per ha per year*]

S: surface of the tree crop cultivation [in ha]

I_Y: increase of yield due to the application of an alternative agricultural practice [in %]

(b) CO_2 removal from atmosphere for the production of wood biomass

The quantity of CO_2 which is annually absorbed by the tree from the surrounding atmosphere to be utilized for the production of new woody biomass (new trunk, branches and roots), is calculated by the following equation:

$\mathbf{AR}_{BW} = (\mathbf{JP} \times \mathbf{PD} \times \mathbf{S} \times \mathbf{ADR}_1 \times \mathbf{C}_w \times \mathbf{K}_1) + (\mathbf{MP} \times \mathbf{PD} \times \mathbf{S} \times \mathbf{ADR}_2 \times \mathbf{C}_w \times \mathbf{K}_1) + \mathbf{AR}_{BPr} \quad [4]$

where:

AR_{BW}: CO₂ Annual Removal due to the production of wood biomass [in tn of CO₂ per year]

JP: percentage of the orchard's trees that are in the Juvenile Phase [in %]

MP: percentage of the orchard's trees that are in the Mature Phase [in %]

PD: planting density of the tree crop cultivation [in *number of trees per ha*]

S: surface of the tree crop cultivation [in ha]

ADR₁: annual development rate of tree's biomass (trunk, branches, roots) in Juvenile Phase [in *tn of dry wood per tree per year*]

ADR₂: annual development rate of tree's biomass (trunk, branches, roots) in Mature Phase [in *tn of dry wood per tree per year*]

 C_w : carbon content of dry wood = 0.475 tn C per tn of dry wood

(this is an average value applicable to practically all types of wood)

 K_1 : mass conversion coefficient from C to $CO_2 = 3.66419$

AR_{BPr}: CO₂ Annual Removal due to the management of prunings biomass [in tn of CO₂ per year]





The trees of an orchard are developed in time through 2 Development Phases:

- ☑ The Juvenile Phase, which initiates at time point T_0 when the tree is transferred from the nursery and it is planted in the farm. The Juvenile Phase ends at time point T_1 when the full production period of the tree initiates.
- The Mature Phase, which follows the Juvenile Phase. It initiates at time point T_1 and lasts until time point T_2 . It is the period through which the tree achieves its full production performance. T_2 is the time point that the tree's life in the orchard ends and the tree is replaced by a young one transferred from the nursery. At this point it has to be noted that for specific species, like olive trees, there isn't a predefined T_2 time point, since these trees can extend their full productive life span almost indefinitely.

Each Development Phase is characterized by an individual Annual Development Rate of tree's woody biomass:

- \rightarrow ADR₁ for the Juvenile Phase
- \rightarrow ADR₂ for the Mature Phase.

Thus, the knowledge of the age of the trees in an orchard is important for the calculation of the AR_{BW} , since the appropriate ADR factor must be selected to be used in equation [4].

A significant assumption regarding the development process of the tree is that the ADRs of each Phase (Juvenile and Mature respectively) are considered each to be represented by a constant value, meaning that the development of the tree through each Phase is illustrated by a linear line and not a curve.

Furthermore, it is underlined that ADR exclusively refers to the annual change of the woody biomass of the tree (trunk, branches, roots including rootlets). It does not include the biomass of the produced fruits.





[5]

 AR_{BPr} is a correction factor of the AR_{BW} equation regarding the CO_2 related to the biomass of the branch prunings, which is actually included in the first 2 sections (Juvenile and Mature Phase) of equation [4]. More specifically the value of AR_{BPr} depends on the practice which is applied for the management of prunings, as it is presented in the following set of equations [5]:

	AR _{BPr}	
Prunings are left in the field		it is deducted because the CO_2 quantity related to the specific biomass returns to the atmosphere except of this taken into account in the equations of the Soil section (AS _S)
Prunings are burnt in the field		it is deducted because the CO ₂ quantity related
Prunings are used as a solid		to the specific biomass returns to the
fuel outside the field		atmosphere
Prunings have another use	0	it is already calculated in the first 2 parts of
different than burning	0	equation [5]

where:

AR_{BPr}: CO₂ Annual Removal due to the management of prunings biomass [in tn of CO₂ per year]

M_{Pr}: annual mass of produced prunings [in *tn of fresh wood per tree per year*]

DW/FW: coefficient indicating wood moisture [in tn of dry wood per tn of fresh wood]

MP: percentage of the orchard's trees that are in the Mature Phase [in %]

<u>Important note</u>: the MP coefficient is used because the prunings process is applied mainly to trees being in the Mature Phase

PD: planting density of the tree crop cultivation [in *number of trees per ha*]

S: surface of the tree crop cultivation [in *ha*]

 C_w : carbon content of dry wood = 0.475 tn C per tn of dry wood

(this is an average value applicable to practically all types of wood)

 K_1 : mass conversion coefficient from C to $CO_2 = 3.66419$





CO2 Storage in soil as carbon of the fallen biomass

The specific section of the CO_2RCA is based on the RothC model (*version 26.3*). It calculates the quantity of atmosphere's CO_2 that is eventually stored into the soil in form of carbon through the decomposition of tree's fallen biomass.

The following parts of the tree are considered as Fallen Biomass:

- ✓ fruits from thinning processes (tree self-thinning or/and intentionally by the farmer)
- ✓ leaves from both types of trees (the whole quantity of leaves from deciduous trees and percentage of the annually replaced leaves in evergreen trees)
- ✓ hulls left in the field after harvesting (e.g. almond hulls)
- \checkmark prunings left in the field.

An additional parameter affecting the above calculation is the existence or not of soil cover crops (surface vegetation) underneath the trees. This particular practice actually increases the quantity of CO_2 that eventually is removed from atmosphere due to the storage of a part of that carbon, which initially has been used for the development of this type of vegetation, into the soil.

$AS_{S} = C_{FB} \times K_{1} \times e^{-a \times b \times c \times k \times t}$

where:

ASs: CO₂ Annual Storage in soil as carbon of the fallen biomass [in *tn of CO₂ per year*]

CFB: carbon content of fallen biomass [in *tn of C per year*]

 K_1 : mass conversion coefficient from C to $CO_2 = 3.66419$

a: rate for temperature, given by $a = 47.9/(1 + e^{106/(T+18.3)})$

b: rate for moisture, which is a function of rainfall, pan evaporation and clay content of the soil

c: retainment factor [0.6 when the soil is vegetated, otherwise 1.0]

- k: decomposition rate
- t: 1, since k represents an annual decomposition rate.

T: Mean annual temperature of the cultivated area [in $\,^{\circ}\!\mathcal{C}$]

$$C_{FB} = C_{FB_fruits} + C_{FB_leaves} + C_{FB_hulls} + C_{FB_Pr_lf} [in th of C per year]$$
where:
$$(6.1)$$

C_{FB_fruits}: carbon content of fallen fruits [in *tn of C per year*]

CFB_leaves: carbon content of fallen leaves [in tn of C per year]

[6]



 C_{FB_hulls} : carbon content of hulls remaining in the field after harvesting [in *tn of C per year*] $C_{FB_Pr_lf}$: carbon content of prunings left in the field [in *tn of C per year*]

$C_{FB_fruits} = (Z_{fruits}/(1-Z_{fruits})) \times Y \times C_f$

where:

 C_{FB_fruits} : carbon content of fallen fruits [in *tn of C per year*] Z_{fruits} : the percentage of total product losses (thinning) throughout a full cultivation cycle [in %] <u>Important note</u>: Z_{fruits} is not a percentage of the Yield, but a percentage of the Total Potential fruits biomass, meaning that $Y = Total Potential fruits biomass x (1 - Z_{fruits})$ Y: total yield of the farm or the broader area regarding fruit production [in *tn per year*] C_{f} : carbon content of fresh fruit's biomass [in *tn C per tn of fresh fruit*]

$C_{FB_leaves} = M_{leaves} \times PD \times S \times C_w$

where:

CFB_leaves: carbon content of fallen leaves [in *tn of C per year*]

M_{leaves}: annual mass (dry matter) of fallen leaves or newly generated leaves per tree [in *tn dry matter of leaves per tree per year*]

<u>Important note</u>: At the mature phase of the tree, approximately the annual mass of fallen leaves is equal to the mass of the new leaves generated. This is applicable to both types of trees (evergreen & deciduous). The total mass of leaves in evergreen trees is fully renewed within a period of approximately 3 years, while in deciduous trees it is fully renewed annually.

PD: planting density of the tree crop cultivation [in number of trees per ha]

S: surface of the tree crop cultivation [in ha]

 C_w : carbon content of dry wood = 0.475 tn C per tn of dry wood

Assumption: the dry matter of leaves approximates dry wood in terms of carbon content

CFB_hulls = Mhulls x Zhulls x PD x S x Cw

where:

C_{FB_hulls}: carbon content of hulls remaining in the field after harvesting [in *tn of C per year*]

M_{hulls}: mass of hulls of the produced fruits [in *tn of hulls per tree per year*]

 Z_{hulls} : percentage of hulls remaining in the field after harvesting [in %]

PD: planting density of the tree crop cultivation [in *number of trees per ha*]

S: surface of the tree crop cultivation [in ha]

 C_w : carbon content of dry wood = 0.475 tn C per tn of dry wood

(this is an average value applicable to practically all types of wood)



[6.2]

[6.3]

[6.4]





$C_{FB_Pr_lf} = Z_{Pr_lf} \times M_{Pr} \times DW/FW \times MP \times PD \times S \times C_w$	[6.5]
where:	
C _{FB_Pr_If} : carbon content of prunings left in the field [in <i>tn of C per year</i>]	
Z_{Pr_lf} : percentage of prunings left in the field [in %]	
M _{Pr} : annual mass of produced prunings [in <i>tn of fresh wood per tree per year</i>]	
DW/FW: coefficient indicating wood moisture [in tn of dry wood per tn of fresh wood]	
MP: percentage of the orchard's trees that are in the Mature Phase [in $\%$]	
Important note: the MP coefficient is used because the prunings process is applied mainly	to trees being
in the Mature Phase	
PD: planting density of the tree crop cultivation [in number of trees per ha]	
S: surface of the tree crop cultivation [in <i>ha</i>]	
C _w : carbon content of dry wood = 0.475 <i>tn C per tn of dry wood</i>	
(this is an average value applicable to practically all types of wood)	

CO₂ Emissions due to the currently applied cultivation practices

The CO_2 emissions which are attributed to the applied agricultural practices are analysed into 3 categories:

- use of fertilizers
- use of pesticides
- consumption of fossil fuels and electricity.

The third category (fossil fuels and electricity) represents the actual use of mechanical (internal combustion and electrical respectively) equipment and machinery, which are used through the various cultivation activities (tillage, trimming, spaying, irrigation, harvesting, etc.).

$TAE = AE_f + AE_p + AE_{ff\&e}$

where:

TAE: CO₂ Total Annual Emissions [in *tn of CO₂ per year*]
AE_f: CO₂ Annual Emissions due to the use of fertilizers [in *tn of CO₂ per year*]
AE_p: CO₂ Annual Emissions due to the use of pesticides [in *tn of CO₂ per year*]
AE_{ff&e}: CO₂ Annual Emissions due to the use of fossil fuels & electricity [in *tn of CO₂ per year*]

[7]





Each category of emissions is illustrated respectively by the following equations:

$AE_{f} = ((R_{N} \times M_{N} \times EF_{N}) + (R_{K} \times M_{K} \times EF_{K}) + (R_{P} \times M_{P} \times EF_{P})) \times K_{1} \times S$ where: [8]

AE_f: CO₂ Annual Emissions due to the use of fertilizers [in tn of CO₂ per year]

R_N, R_K, R_P: content of fertilizer in Nitrogen (N), Potassium (K), Phosphorus (P) respectively [in %]

 M_N , M_K , M_P : quantity (mass) of the N-fertilizer, K-fertilizer, P-fertilizer respectively, used within a year [in *tn of fertilizer per ha per year*]

 EF_N , EF_K , EF_P : emission factor regarding the carbon emissions (equivalent) for the production, transportation, storage and transfer of the N-fertilizer, K-fertilizer, P-fertilizer respectively [in *tn of C per tn of N, K, P respectively*]

 K_1 : mass conversion coefficient from C to $CO_2 = 3.66419$

S: surface of the tree crop cultivation [in ha]

 $AE_{p} = ((M_{H_{ai}} \times ED_{H_{ai}}) + (M_{I_{ai}} \times ED_{I_{ai}}) + (M_{F_{ai}} \times ED_{F_{ai}}) + (M_{GR_{ai}} \times ED_{GR_{ai}})) \times EF_{GE} \times K_{2} \times S$ [9] where:

AE_p: CO₂ Annual Emissions due to the use of pesticides [in *tn of CO₂ per year*]

M_{H_ai}, M_{I_ai}, M_{F_ai}, M_{GR_ai}: quantity (mass) of the active ingredient (ai) of the Herbicide, Insecticide, Fungicide, Growth Regulator respectively, used within a year [in *tn of pesticide ai per ha per year*] ED_{H_ai}, ED_{I_ai}, ED_{F_ai}, ED_{GR_ai}: energy demand for the production, formulation, packaging and transportation of Herbicide, Insecticide, Fungicide, Growth Regulator respectively [in *MJ per tn of ai*] EF_{GE}: emission factor representing the global carbon intensity of electricity generated [in *tn of CO₂ per KWh*]

K₂: conversion coefficient from MJ to KWh = 0.27778 KWh/MJ

S: surface of the tree crop cultivation [in ha]

<u>Note</u>: the global carbon intensity of electricity generated is used as carbon emission factor since it is not always known the specific country where each pesticide was produced.





$AE_{ff&e} = AE_D + AE_G + AE_{EL} = (M_D \times EF_D \times S) + (M_G \times EF_G \times S) + (M_{EL} \times EF_{EL} \times S)$ [10] where: AE_{ff&e}: CO₂ Annual Emissions due to the use of fossil fuels & electricity [in tn of CO₂ per year] AE_D: CO₂ Annual Emissions due to the use of diesel [in *tn of CO₂ per year*] AE_G: CO₂ Annual Emissions due to the use of gasoline [in *tn of CO₂ per year*] AE_{EL}: CO₂ Annual Emissions due to the use of electricity [in *tn of CO₂ per year*] M_D: annual consumption of diesel [in *lt per ha per year*] M_G: annual consumption of gasoline [in *lt per ha per year*] M_{EL}: annual consumption of electricity [in *KWh per ha per year*] EF_D: emission factor regarding the CO₂ emissions due to the production (Well to Tank) and combustion of diesel [in *tn CO₂ per lt of diesel*] EF_G: emission factor regarding the CO₂ emissions due to the production (Well to Tank) and combustion of gasoline [in *tn CO₂ per lt of gasoline*] EFEL: emission factor regarding the CO₂ emissions due to the production and transportation of electricity [in tn CO2 per KWh of electricity] S: surface of the tree crop cultivation [in *ha*]

CO2 Gain due to the application of "green" cultivation practices

Depending on the application of potential "green" cultivation practices, a CO₂ gain can result which subsequently leads to the reduction of the CO₂ Total Annual Emission (TAE). By this way the overall performance of the tree crop cultivation in terms of CO₂ can be further improved (the CO₂ Annual Removal Capacity, ARC, is increased).

A set of promising "green" cultivation practices was selected and the respective equations for the calculation of the CO₂ gain of each individual practice were designed, formulated and incorporated as separate factors in the Total Annual Gain (TAG) equation:

$TAG = AG_{N-f_LCC} + AG_{f_FGT} + AG_{H_cC/m} + AG_{I_im/mt} + AG_{WF} + AG_{RES} + AG_{EL_m} + AG_{D_FGT} [11]$ where:

TAG: CO₂ Total Annual Gain

AG_{N-f_LCC}: CO₂ Annual Gain due to Nitrogen-fertilizers reduction (use of Leguminosae cover crops) AG_{f_FGT}: CO₂ Annual Gain due to fertilizers reduction (use of fertigation)





AG_{H_cc/m}: CO₂ Annual Gain due to herbicides reduction (use of cover crops/mulching) AG_{I_im/mt}: CO₂ Annual Gain due to insecticides reduction (insects monitoring/mass trapping) AG_{WF}: CO₂ Annual Gain due to the use of wood fuel instead of diesel to produce the same calorific result AG_{RES}: CO₂ Annual Gain due to the use of Renewable Energy Sources AG_{EL_m}: CO₂ Annual Gain due to electricity reduction (use of mulching) AG_{D_FGT}: CO₂ Annual Gain due to diesel reduction (use of fertigation) All above are expressed in [*tn of CO₂ per year*]

Below, the equations of each particular CO_2 gain factor are presented:

$AG_{N-f_LCC} = N_L \times EF_N \times K_1 \times S$

[12]

where:

AG_{N-f_LCC}: CO₂ Annual Gain due to N-fertilizer reduction (use of Leguminosae cover crops) [in *tn of CO₂ per year*]

N_L: mean value of nitrogen provided by the Leguminosae cover crops [in *tn of N per ha per year*] EF_N: emission factor regarding the carbon emissions (equivalent) for the production, transportation, storage and transfer of N-fertilizer [in *tn of C per tn of N*] K₁: mass conversion coefficient from C to $CO_2 = 3.66419$

S: surface of the tree crop cultivation [in ha]

$AG_{f_FGT} = RF_{f_FGT} \times ((R_N \times TM_N \times EF_N) + (R_K \times TM_K \times EF_K) + (R_P \times TM_P \times EF_P)) \times K_1 \times S$ [13] where:

AG_{f_FGT}: CO₂ Annual Gain due to fertilizers reduction (use of fertigation) [in *tn of CO₂ per year*] RF_{f_FGT}: reduction factor of fertilizers demands due to the application of fertigation [in %] R_N, R_K, R_P: content of fertilizer in Nitrogen (N), Potassium (K), Phosphorus (P) respectively [in %] TM_N, TM_K, TM_P: typical quantity (mass) of N-fertilizer, K-fertilizer, P-fertilizer respectively, used within a year [in *tn of fertilizer per ha per year*] EF_N, EF_K, EF_P: emission factor regarding the carbon emissions (equivalent) for the production, transportation, storage and transfer of the N-fertilizer, K-fertilizer, P-fertilizer respectively [in *tn of C per tn of N, K, P respectively*]

 K_1 : mass conversion coefficient from C to $CO_2 = 3.66419$

S: surface of the tree crop cultivation [in ha]





[14] $AG_{H_{cc/m}} = RF_{H} \times TM_{H_{ai}} \times ED_{H_{ai}} \times EF_{GE} \times K_{2} \times S$ where: AGH_cc/m: CO2 Annual Gain due to Herbicides reduction (use of cover crops and/or mulching) [in tn of *CO*₂ *per year*] RF_H: reduction factor of Herbicides consumption if cover crops and/or mulching are used [in %] TM_{H_ai}: typical quantity (mass) of active ingredient (ai) of Herbicide used within a year [in *tn of pesticide* ai per ha per year ED_{H_ai}: energy demand for the production, formulation, packaging and transportation of Herbicide [in *MJ per tn of ai* EF_{GE} : emission factor representing the global carbon intensity of electricity generated [in *tn of CO₂ per* KWh] K_2 : conversion coefficient from MJ to KWh = 0.27778 KWh/MJ S: surface of the tree crop cultivation [in ha] Note: the global carbon intensity of electricity generated is used as carbon emission factor since it is not always known the specific country where each pesticide was produced.

$AG_{I_{im}/mt} = RF_{I} \times TM_{I_{ai}} \times ED_{I_{ai}} \times EF_{GE} \times K_{2} \times S$

[15]

where:

AG_{I_im/mt}: CO₂ Annual Gain due to Insecticides reduction (insects monitoring or/and mass trapping) [in *tn of CO₂ per year*]

RF_I: reduction factor of Insecticides consumption if insects monitoring or/and mass trapping is applied [in %]

TM_{I_ai}: typical quantity (mass) of active ingredient (ai) of Insecticide used within a year [in *tn of pesticide ai per ha per year*]

ED_{I_ai}: energy demand for the production, formulation, packaging and transportation of Insecticide [in *MJ per tn of ai*]

 EF_{GE} : emission factor representing the global carbon intensity of electricity generated [in *tn of CO₂ per KWh*]

K₂: conversion coefficient from MJ to KWh = 0.27778 KWh/MJ

S: surface of the tree crop cultivation [in ha]

<u>Note</u>: the global carbon intensity of electricity generated is used as carbon emission factor since it is not always known the specific country where each pesticide was produced.





AGwF = $Z_{Pr_wF} \times M_{Pr} \times PD \times S \times 1,000,000 \times NCV_w \times EF_b/(NCV_b \times d_b)$ [16]where:AGwF: CO2 Annual Gain due to the use of wood fuel instead of diesel to produce the same calorificresult [in *tn of CO2 per year*] Z_{Pr_wF} : percentage of prunings used as wood fuel [in %] M_{Pr} : annual mass of produced prunings [in *tn of fresh wood per tree per year*]PD: planting density of the tree crop cultivation [in *number of trees per ha*]S: surface of the tree crop cultivation [in *GJ/tn*]NCVw: Net Calorific Value of fresh wood [in *GJ/tn*]NCV_D: Net Calorific Value of diesel [in *GJ/tn*]do: density of diesel [in *Kg/m³*]EF_D: emission factor regarding the CO2 emissions due to the production (Well to Tank) and combustion of diesel [in *tn CO2 per lt of diesel*]

AGRES = RFRES X TMEL X EFEL X S

where:

AG_{RES}: CO₂ Annual Gain due to the use of Renewable Energy Sources [in *tn of CO₂ per year*] RF_{RES}: percentage of the farm's electricity needs covered by RES [in %] TM_{EL}: typical annual consumption of electricity [in *KWh per ha per year*] EF_{EL}: emission factor regarding the CO₂ emissions due to the production and transportation of electricity [in *tn CO₂ per KWh of electricity*] S: surface of the tree crop cultivation [in *ha*]

$AG_{EL_m} = RF_{EL_m} \times TM_{EL} \times EF_{EL} \times S$

where:

AG_{EL_m}: CO₂ Annual Gain due to electricity reduction (use of mulching) [in *tn of CO₂ per year*] RF_{EL_m}: reduction factor of the consumption of irrigation water [in %] TM_{EL}: typical annual consumption of electricity [in *KWh per ha per year*] EF_{EL}: emission factor regarding the CO₂ emissions due to the production and transportation of electricity [in *tn CO₂ per KWh of electricity*] S: surface of the tree crop cultivation [in *ha*] *Note*: electricity is mainly used for the operation of the irrigation pumps, thus when the irrigation needs are reduced, the electricity consumption is reduced by approximately the same percentage

[18]

[17]





$AG_{D_{FGT}} = RF_{D_{FGT}} \times TM_{D} \times EF_{D} \times S$

where:

AGD_FGT: CO2 Annual Gain due to diesel reduction (use of fertigation) [in tn of CO2 per year] RF_{D_FGT}: reduction factor of the consumption of diesel due to the application of fertigation [in %] TM_D: typical annual consumption of diesel [in *It per ha per year*] EF_D: emission factor regarding the CO₂ emissions due to the production (Well to Tank) and combustion of diesel [in *tn CO₂ per lt of diesel*]

S: surface of the tree crop cultivation [in *ha*]







2. TREE CROPS CO₂ REMOVAL CAPACITY CALCULATION TOOL (CO₂RCCT)

Based on the CO_2RCA , an e-tool (Tree crops' CO_2 Removal Capacity Calculation Tool [CO_2RCCT]) was developed incorporating CO_2RCA 's equations and enabling the calculation of tree crops CO_2 removal capacity under different scenarios (e.g., cultivation practices, trees protection, fuels, energy, etc.).

CO₂RCCT was developed within Action C.4 in excel format. Moreover, a web-based e-tool was developed in the context of Action C.3, which was based on the CO₂RCCT. Both versions are available at the official web-site of the LIFE CLIMATREE project [www.lifeclimatree.eu].

CO₂RCCT was developed at a pilot scale incorporating 5 tree species:

- ✓ Orange [*Citrus sinensis*]
- ✓ Apple [*Malus domestica*]
- Peach [*Prunus persica*]
- ✓ Almond [*Amygdalus communis* or *Prunus dulcis*]
- ✓ Olive [Olea europaea]
- in 3 countries:
- ✓ Greece
- Italy
- ✓ Spain.

It is operational in 4 languages:

- English
- Greek
- Italian
- Spanish.

CO₂RCCT is designed and developed in such a way to be able to operate and extract reliable and accurate results even if the user has no knowledge of all requested input data. Thus, the CO₂RCCT can be used equal effectively by both; users having the technical know-how a specific cultivation (e.g., the farmer, the agronomist) as well as by users having a general aspect of the issue (e.g., decision/ policy makers).





The CO_2RCCT results can be useful tools for:

- ☑ policy makers to evaluate agricultural policies, assess them and improve them or modify them accordingly towards the direction of promoting "green" and environmentally friendly agricultural practices and enhancing the sustainability of the agricultural sector while simultaneously combating climate change.
- ✓ farmers and agronomists to analyse the agricultural practices that are applied to real case studies tree crop farms and determine the specific points that require improvement or modification towards the increase of the "climate" performance of these cultivations.

In Annex I of the current Report, the CO_2RCCT User Manual is presented which includes instructions on how to use and operate effectively the tool.

CO2RCCT back-end database

The operation of CO_2RCCT is supported by an extended back-end database, which includes data and coefficients appropriate to be used in the CO_2RCA equations. More specifically, the sources of these data are presented below:

Type of data and coefficients	Source
Cultivation performance data (e.g., yield,	Official statistical data of each country for the last 5
planting density, cultivated surface)	successive years (2012-2016)
Wood biomass data	• Field experiments performed during the previous 4
	years by the team of the Agricultural University of
	Athens
Fertilizers and pesticides data	 International literature
Fossil fuels data	Greenhouse Gas Protocol Tool - Mobile Combustion
	GHG Emissions Calculation Tool, Version 2.6, World
	Resources Institute (2015)
Electricity data	 European Environment Agency
	International Energy Agency, "Global Energy & CO ₂
	Status Report, The latest trends in energy and
	emissions in 2018", 2019
Agricultural practices data	Information collected and analyzed by the team of
	the Agricultural University of Athens through a
	questionnaire survey which was addressed to over
	300 Greek farmers.

In Annex II, the back-end database of the currently uploaded version (r.14) of the CO_2RCCT , is presented.





CO2Removal Capacity Indexes (RCI)

Through a series of appropriately designed Indexes (CO₂ Removal Capacity Indexes - **RCI**), CO₂RCCT produces results that can be used to efficiently compare alternative cultivation scenarios as well as the actual impact of potentially applied "green" agricultural practices.

RCIs consist of 3 categories:

- ☑ CO₂ per unit of cultivated area [in *tn CO₂/hectare/year*]
- ☑ CO₂ per unit of harvested fruits [in *tn CO₂/tn of yield/year*]
- \square CO₂ per tree unit [in *tn CO₂/tree/year*]

These Indexes were proved substantial tools to assess the performance of a tree crop cultivation in terms of Climate Change as well as to investigate and determine the reasons why a specific cultivation does not perform efficiently or/and it presents a significant deviation from the expected performance.

CO₂RCCT optimization

CO₂RCCT was run and tested by a multidisciplinary pool of users and it was optimized based on their remarks and comments.

51 draft versions of CO₂RCCT were developed prior to its launching on the project's website. Even then, CO₂RCCT was kept on being optimized. Today the 14^{th} released version of the CO₂RCCT (.xlsx) is uploaded to the project's website and is freely available to any interested scientist, stakeholder or policy maker.





3. RUNS OF THE CO₂RCCT

The tree crops CO₂RCCT was operated for a series of different scenarios (runs) based on:

- ✓ the country
- ✓ the tree crops species.

Moreover, a series of "green" alternative agricultural practices were examined by using the CO₂RCCT:

- ✓ use of cover crops
- ✓ use of Leguminosae cover crops
- ✓ application of mulching
- application of fertilizers via fertigation
- ✓ application of insects monitoring and/or mass trapping
- ✓ valorization of prunings as solid fuel instead of diesel
- ✓ use of Renewable Energy Sources,

and their impact on tree crops' "climate" performance was analyzed in depth.

Indicative runs of various case studies are presented below. The detailed results of each run are presented in Annex III of the current Report.

run#	Country	Tree species	Agricultural practice
1	Greece	orange	conventional
2	Greece	apple	conventional
3	Greece	peach	conventional
4	Greece	almond	conventional
5	Greece	olive	conventional
6	Italy	orange	conventional
7	Italy	apple	conventional
8	Italy	peach	conventional
9	Italy	almond	conventional
10	Italy	olive	conventional
11	Spain	orange	conventional
12	Spain	apple	conventional
13	Spain	peach	conventional
14	Spain	almond	conventional
15	Spain	olive	conventional
16	Greece	olive	use of cover crops
17	Greece	olive	use of cover crops of the Leguminosae family
18	Greece	olive	application of fertilizers through fertigation
19	Greece	orange	use of cover crops of the Leguminosae family





run#	Country	Tree species	Agricultural practice
20	Greece	apple	use of cover crops of the Leguminosae family
21	Greece	peach	use of cover crops of the Leguminosae family
22	Greece	almond	use of cover crops of the Leguminosae family
23	Greece	olive	use of prunings as wood fuel
24	Greece	orange	use of prunings as wood fuel
25	Greece	apple	use of prunings as wood fuel
26	Greece	peach	use of prunings as wood fuel
27	Greece	almond	use of prunings as wood fuel
28	Greece	orange	cover of electricity needs by 100% RES
29	Greece	orange	use of insects' mass trapping
30	Greece	orange	use of cover crops





4. Analysis of the Results of the CO_2RCCT Runs

The following Table summarizes the comparative results of the CO₂RCCT runs for the 5 tree species (orange, apple, peach, almond, olive) per each of the 3 countries (Greece, Italy, Spain), when they are cultivated by using conventional agricultural practices (runs 1 to 15 of Annex III).

Table 1

CO₂RCCT results for the conventional cultivation of the pilot trees in Greece, Italy and Spain

Greece		Orange	Apple	Peach	Almond	Olive
ARC	tn CO ₂ /year	218,437	9,768	280,022	70,437	3,047,921
AR _{BW}	tn CO ₂ /year	300,878	58,443	403,408	101,011	4,549,120
AS _S	tn CO ₂ /year	7,224	2,069	2,719	2,305	54,879
AE _f	tn CO ₂ /year	37,063	15,213	32,746	9,047	635,916
AEp	tn CO ₂ /year	25,353	5,981	32,739	11,609	492,126
AE _{ff&e}	tn CO ₂ /year	27,248	29,550	60,620	12,223	428,037
ARCarea	tn CO ₂ /hectare/year	6.44625	0.87465	7.12835	5.29610	3.73945
ARCproduct	tn CO ₂ /tn of yield/year	0.27844	0.03866	0.45389	2.29570	0.89183
ARCtree	tn CO ₂ /tree/year	0.01446	0.00118	0.01623	0.01899	0.02157
TAE/TAR		0.29102	0.83857	0.31051	0.31824	0.33798

Italy		Orange	Apple	Peach	Almond	Olive
ARC	tn CO ₂ /year	544,000	144,815	-45,766	-81,653	-432,427
AR _{BW}	tn CO ₂ /year	791,664	313,581	136,115	33,706	1,765,111
ASs	tn CO ₂ /year	20,505	35,737	18,578	19,144	135,218
AE _f	tn CO ₂ /year	72,709	32,607	41,374	38,250	602,340
AEp	tn CO ₂ /year	63,163	28,041	56,860	50,760	681,448
AE _{ff&e}	tn CO ₂ /year	132,296	143,854	102,226	45,492	1,048,968
ARCarea	tn CO ₂ /hectare/year	6.44393	2.76564	-0.67081	-1.40407	-0.38314
ARCproduct	tn CO ₂ /tn of yield/year	0.30873	0.06122	-0.03219	-1.03453	-0.15651
ARCtree	tn CO ₂ /tree/year	0.02685	0.00205	-0.00103	-0.00520	-0.00246
TAE/TAR		0.33019	0.58544	1.29585	2.54502	1.22755

Spain		Orange	Apple	Peach	Almond	Olive
ARC	tn CO ₂ /year	1,072,597	21,311	-53,901	55,887	13,717,511
AR _{BW}	tn CO ₂ /year	1,364,264	138,480	78,832	1,074,843	16,840,922
ASs	tn CO ₂ /year	41,335	5,469	5,433	100,949	592,428
AE _f	tn CO ₂ /year	134,041	33,189	35,081	251,313	985,823
AEp	tn CO ₂ /year	102,510	15,350	37,156	432,868	1,466,719
AE _{ff&e}	tn CO ₂ /year	96,451	74,098	65,929	435,723	1,263,297
ARCarea	tn CO ₂ /hectare/year	7.82865	0.74348	-1.20901	0.11269	5.64687
ARCproduct	tn CO ₂ /tn of yield/year	0.32876	0.03891	-0.04626	0.29248	2.13593
ARCtree	tn CO ₂ /tree/year	0.01879	0.00150	-0.00242	0.00047	0.01227
TAE/TAR		0.23691	0.85195	1.63965	0.95247	0.21315





General results

The apparent conclusion of the figures presented in Table 1 is that tree crops present a significant CO_2 Annual Removal Capacity (ARC) and thus they can have an important role as a mitigation measure in confronting Climate Change. More specifically, the total ARC of the 5 types of tree crops that were examined in the 3 countries sum up to 18,568,959 tn CO_2 /year.

Nevertheless, there are cultivation cases that can be improved either to increase their "climate" performance (blue values) or to reverse their negative carbon balance (red values).

The performance of a tree crop cultivation is represented by the TAE/TAR Index (Total Annual Emissions divided by the Total Annual Removals). This is a very important Index, which indicates in a direct way the percentage of the CO₂ emissions which actually "consumes" the profit derived by the CO₂ removals and thus leads to the decrease of the CO₂ Removal Capacity. High TAE/TAR values give a clear signal that measures have to be taken to decrease the CO₂ emissions of the applied agricultural practices.

Especially when the value of TAE/TAR is greater than 1, this means that the quantity of CO_2 emitted due to the applied agricultural practices is larger than the CO_2 quantity absorbed by the atmosphere to create the tree's woody biomass. This is an alarming indication that immediate drastic measures must be taken to reverse this negative condition.

Results of the Greece case

Specifically regarding the results presented in Table 1 for Greece, it is concluded that:

- ✓ Peach and orange are the trees presenting the highest ARC_{area} Index, a fact that is mainly attributed to the intensive cultivation practices applied which demand high values of Planting Densities (439,32 trees/ha and 445,91 trees/ha respectively. Nevertheless, apple cultivation although applied at the highest Planting Density (PD: 739 trees/ha), it presents the lowest ARC_{area}, which is due to the high value of the TAE/TAR Index. This particular Index although is lower than 1, reveals that the CO₂ emissions due to the applied cultivation practices are significantly high leading by this way to the substantial diminishing of any significant carbon profit that could be extracted.
- ✓ Olive presents the highest ARC_{tree} Index mainly due to the typical size of olive trees which are considerably larger than the trees of the rest examined species.





Regarding the TAE/TAR Index, all four tree species (orange, peach, almond, olive) present similar values fluctuating at a close range, except of the apple which demonstrates a TAE/TAR value almost 2.5 times higher.

The role of soil

Another important result extracted by the above runs is that although AS_s values do not constitute soil as a principal component of the CO_2 Annual Removal Capacity (ARC), still it participates consistently in storing CO_2 as carbon of the fallen biomass.

More specifically, regarding the 5 tree species examined in Greece, Italy and Spain, every year 1,043,992 tn CO_2 (total AS_S) are stored into the soil beneath the trees of these orchards. This quantity corresponds to the 3.74% of the quantity of CO_2 which is removed from atmosphere to create the wood biomass of the trees (total AR_{BW}: 27,950,378 tn CO_2).

Table 2 presents the respective AS_s Index per tree (AS_{S_tree}), e.g., for the cultivation of olive. The differences in the values are mainly attributed to the way the tree is cultivated (growth, formulation, prunings management) since the quantity of the carbon stored into the soil is directly depended on the quantity of the fallen biomass.

Table 2

CO2 storage in soil in olive farms conventionally cultivated in Greece, Italy and Spain

		Greece	Italy	Spain
ASs_tree	tn CO ₂ /tree/year	0.00039	0.00077	0.00053





Use of Leguminosae cover crops

As far as concerning various alternative cultivation practices, the results of the CO₂RCCT runs 5, 16, 17 and 18 for the cultivation of olive in Greece (conventional, use of cover crops, use of Leguminosae cover crops, application of fertilizers via fertigation respectively), presented in the following Table 3, lead to interesting conclusions in terms of "climate" performance vs cultivation practices.

Table 3

ARC, TAR and TAE for alternative olive cultivation practices in Greece

Cultivation practice	ARC (tn CO ₂ /year)	Increase	TAR (tn CO ₂ /year)	Increase	TAE (tn CO ₂ /year)	Reduction
Conventional	3,047,921		4,604,000		1,556,079	
Use of cover crops	3,402,006	11.62%	4,648,405	0.96%	1,246,399	19.90%
Use of Leguminosae cover crops	3,712,610	21.81%	4,648,405	0.96%	935,795	39.86%
Use of fertigation	3,194,791	4.82%	4,604,331	0.01%	1,409,540	9.42%

More specifically:

- There is a substantial increase of ARC in the case of using cover crops and even higher when these cover crops belong to the Leguminosae family (nitrogen slow releasers), while on the other hand the respective increase in the case of fertigation is not that impressive. This is a useful conclusion when a decision process is in progress to plan investments for the improvement of the "climate" performance of this cultivation. It is apparent that the use of cover crops, or even better the use of Leguminosae cover crops, a practice of significantly lower capital cost compared to fertigation, can lead to impressive results regarding the increase of ARC.
- Another interesting conclusion derived by the above values is that the respective increase of ARC is
 not attributed to a substantial increase of TAR, but to the significant decrease of TAE due to the
 CO₂ Annual Gain (AG_{N-f_LCC}) because of the reduction on the use of Nitrogen-fertilizers.

Respectively, the use of Leguminosae cover crops in the cultivation of orange, apple, peach and almond can lead to significant increase of ARC, as it is resulted by CO₂RCCT runs 19-22 (see Table 4 below).





Table 4

Positive impact of the use of Leguminosae cover crops in orange, apple, peach and almond cultivations in Greece

ARC	Orange	Apple	Peach	Almond
(tn CO ₂ /year)				
Conventional	218,437	9,768	280,022	70,437
Use of Leguminosae cover crops	250,031	18,518	315,093	82,419
Increase	14.46%	89.58%	12.52%	17.01%

At this point it has to be clarified that apparently the ARC increase percentage is not following the same pattern for all 5 tree species, since their needs in Nitrogen fertilization vs Potassium and Phosphorus fertilization are not the same, thus affecting dissimilarly the TAE reduction.

Use of prunings as solid fuel

Another important result derived by CO_2RCCT is the significant contribution of the applied prunings management practice in the values of ARC. Specifically, the use of prunings as a solid fuel (wood fuel) outside the field instead of conventional fossil fuels (i.e., diesel), is a Climate Change mitigation measure acknowledged by FAO. The Annual CO_2 Gain (AG_{WF}) that derives by this particular management practice is incorporated in the Annual CO_2 Removal due to the production of wood biomass (AR_{BW}), which in its turn is incorporated in the calculation of ARC.

Table 5 presents the percentages of the current main prunings management practices applied in Greece, while Table 6 proposes an alternative distribution of the respective management practices.

Table 5

Currently applied prunings management practices in Greece

Current Management practices	Orange	Apple	Peach	Almond	Olive
left in the field	40.00%	80.00%	40.00%	20.00%	
burnt in the field			40.00%	20.00%	20.00%
use as a solid fuel outside the field	60.00%	20.00%	20.00%	60.00%	70.00%
other use different than burning					10.00%
Total	100.00%	100.00%	100.00%	100.00%	100.00%





<u>Table 6</u>

Proposed distribution of prunings management practices in Greece

Proposed Management practices	Orange	Apple	Peach	Almond	Olive
left in the field	10.00%	10.00%	10.00%	10.00%	
burnt in the field					
use as a solid fuel outside the field	90.00%	90.00%	90.00%	90.00%	90.00%
other use different than burning					10.00%
Total	100.00%	100.00%	100.00%	100.00%	100.00%

The above proposed change in the prunings management practices leads to a significant increase of AG_{WF} as it is presented in the following Table 7, and subsequently to increase of ARC.

Table 7

Alteration of AG_{WF} at country level (Greece) based on the proposed management practices of Table 6

AG _{WF} (tn CO ₂ /year)	Orange	Apple	Peach	Almond	Olive
Current status	80,021	12,246	23,147	16,335	1,028,170
Proposed scheme	120,032	55,105	104,161	24,503	1,321,932
Increase	50.00%	349.98%	350.00%	50.00%	28.57%

Comparative analysis of alternative "green" agricultural practices

CO₂RCCT can be used to compare alternative "green" agricultural practices regarding their "climate" performance vs investment requirements. A characteristic example is the examination of the application of a Renewable Energy Sources plant (e.g., photovoltaic) specifically dedicated to cover the electricity needs of a particular tree crop farm.

For the purposes of this example, the orange cultivation in Greece will be used as a case study, since the specific cultivation is the most demanding in terms of electricity consumption compared to the cultivation of other tree species (Table 8).





Table 8

Typical annual mean consumption of electricity

	TM_{EL} (KWh/ha/year)
Orange	280.00
Apple	170.00
Peach	180.00
Almond	113.00
Olive	14.29

The electricity needs will be covered by 100% by RES (run 28). This scenario will be compared in terms of CO_2 Annual Gain to the application of insects' mass trapping (run 29) and to the application of cover crops (run 30). The extracted comparative results are presented in the following Table 9.

<u>Table 9</u>

Comparison of alternative "green" agricultural practices

	Conventional	RES 100%	Insects' mass	Use of cover
			trapping	crops
ARC (tn CO ₂ /year)	218,437	224,348	227,660	237,118
TAE (tn CO ₂ /year)	89,664	83,753	80,442	76,790
CO ₂ Annual (Gain (tn CO ₂ /year)	5,911	9,223	12,874
Increase of Co	O ₂ Annual Gain com	56.03%	117.80%	

Based on the above results, it is apparent that simpler to apply and by far more economical, regarding the required capital cost, agricultural practices can deliver significantly higher CO_2 Annual Gains compared to the application of RES.





The role of fruits biomass for regulating climate

Although the fruits' biomass is not taken into account by the current official systems for the calculation of agriculture's CO_2 budgeting due to the short life cycle of the fruit as a product, it is apparent that the amounts of CO_2 that are removed from atmosphere, even temporarily, to create the fruits' biomass are considerably high.

More specifically, concerning the 5 types of tree crops examined within the project, the mass of CO_2 which is removed from atmosphere to create the fruits' biomass (AR_{BF}) has been calculated by the CO₂RCCT and it is presented in the following Table 10:

<u>Table 10</u>

CO2 Annu	CO ₂ Annual Removal due to the production of fruit biomass					
AR _{BF} tn CO ₂ /year	Orange	Apple	Peach	Almond	Olive	Total per country
Greece	55,365	18,746	29,229	66,792	1,889,674	2,059,806
Italy	56,979	228,564	220,123	21,922	713,386	1,240,974
Spain	230,246	40,640	55,205	415,962	3,551,048	4,293,101
Total per tree crop	342,590	287,950	304,557	504,676	6,154,108	7,593,881

The total mass of CO₂ which is removed from atmosphere to create the fruits' biomass (AR_{BF}) sum up to 7,593,881 tn CO₂/year, which, although with a limited life span in terms of being outside the system of the atmosphere, offers a 40.90% overplus above the total CO₂ Annual Removal Capacity (ARC) of the 5 tree crops in the 3 countries (18,568,959 tn CO₂/year).

Examining this issue from another angle, every year the 5 examined tree crops in the 3 pilot countries absorb from the atmosphere 36,588,251 tn CO₂ of which:

- \rightarrow 76.40% (27,950,378 tn CO₂) is used to create the new wood biomass of the trees (AR_{BW})
- \rightarrow 20.75% (7,593,881 tn CO₂) is used to create the fruits' biomass (AR_{BF})
- \rightarrow 2.85% (1,043,992 tn CO₂) is stored into the soil beneath the trees as carbon of the fallen biomass (AS_s).

It is revealed by the above analysis that the, even temporary, contribution of the fruits in the confrontation of Climate Change through the removal of CO_2 from the atmosphere, can be considered as a substantial one.





The important role of the fruits' biomass in the issue of the current analysis, can be illustrated in a micro scale if considering the carbon content of the mass of the fruits (see Table 11), which is directly attributed to the CO_2 removed from the atmosphere by the trees.

<u>Table 11</u>

Carbon content of fresh fruits' biomass

	[g C / Kg fresh fruit]	[g CO ₂ absorbed from atmosphere / Kg fresh fruit]*
Orange	19.26	70.57
Apple	20.25	74.20
Peach	12.93	47.38
Almond	594.10	2,176.90
Olive	150.90	552.93

*To calculate the CO_2 mass by the respective carbon (C) content, the K_1 coefficient (3.66419) is used.

All the above mentioned data substantiate the importance of fruits and consequently the importance of the corresponding tree crop farms as a significant Climate Change mitigation measure. Tree crops through their fruits' biomass can serve as a <u>Climate Regulator</u>.

The specific CO_2 mass can be considered as a "<u>short-term climate loan</u>", which enables the planet, instead of dealing with an X₁ quantity of CO_2 steadily existing in the atmosphere and thus contributing to the formulation of the climate, to deal with a smaller quantity X₂ fluctuating gradually throughout a calendar year from X₁ to 0 and then back to X₁ when the fruits will be consumed, depending on the product after a period of 1 month to 4 years (during the period between harvesting and final consumption, X₂ is constantly 0) [*see* Diagram 1].

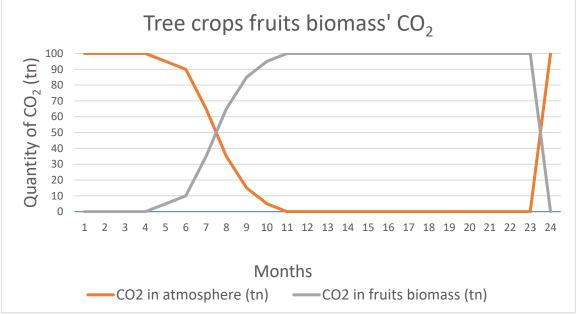


Diagram 1: Transfer of CO_2 between atmosphere and fruits biomass





5. CONCLUSIONS REGARDING THE TREE CROPS CO₂ REMOVAL CAPACITY

Concluding, based on all the above, tree crops are proved to be of significant importance for the regulation of the climate, acting as a Climate Change mitigation measure.

In this context, the expansion of areas covered by tree crops combined with the adoption of "green" cultivation practices that entail lower CO_2 emissions, appears to be of paramount importance towards the achievement of the Climate Change goals.

On top of that, an expansion of the area used for tree crop cultivation could further contribute substantially to the sector of Food Security providing adequate quantities of food of good quality to cover the needs of more people.

Prerequisite for accomplishing the above mentioned (tree crops areas expansion, adoption of "green" cultivation practices), is the respective decision making for planning of policies and strategies that will aim at mobilizing the farmers towards this direction through:

- extended awareness raising
- ✓ provision of financial incentives
- elimination of bureaucratic barriers and speed-up of licensing procedures.





6. Emerging Potentials for Using the CO₂RCA and the CO₂RCCT

A series of rising potentials for using the CO₂RCA and the CO₂RCCT appear to be significantly promising regarding the expected impacts on the climate, the sustainable agricultural development and the economy.

The quantified results regarding the tree crops' CO₂ Annual Removal Capacity as well as its constituting parameters, can provide the necessary data:

- to the farmers, as well as to the consulting agronomists, towards the improvement of the "climate" performance of their tree crop farms through the adoption of best/ "green" agricultural practices.
- to the policy/decision makers towards the improvement of the relevant agricultural climate change indexes through the effective planning, organization and promotion of the appropriate required policies, strategies and measures (e.g., financial incentives, "green" subsidies, supporting infrastructure, etc.) to enhance the development of the agricultural sector in a sustainable and simultaneously viable way.
- to the financial institutions to develop "green" banking products for the agricultural sector that will be based on a CO₂ reduction incentive concept (e.g., lower "green" interest rate) by taking into account the "climate" performance of the specific tree crop farm for which the farmer requests financing.
- to a voluntary carbon off-setting market through which the farmers themselves will be able to financially exploit the CO₂ credits of their own tree crop farms.

The above potential uses of the CO₂RCA and the CO₂RCCT can lead to a series of significant advantages:

- ☑ Financial support to the European Union's agricultural sector.
- ☑ Development of financial incentives (e.g., "green" subsidies, "green" loans, etc.) for the farmers towards the adoption of "green" agricultural practices, which can lead to less CO₂ emissions and consequently to increased CO₂ Annual Removal Capacity of their orchards.
- Avoidance of currency export to third, non-EU countries for purchasing CO₂ credits in the case of the voluntary carbon off-setting market.
- ☑ Development of a new market of services within EU that will provide:
 - ✓ consultation to the farmers for "greening" the applied agricultural practices
 - ✓ calculation of the CO₂ Annual Removal Capacity of the orchards
 - ✓ certification of the calculated CO₂ credits
 - ✓ brokering of the certified CO₂ credits.





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The most representative references, which were studied during the process for the design and development of the CO_2RCA and the CO_2RCCT , are listed below:

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- European Environment Agency, 'Greenhouse gas emission intensity of electricity generation', <u>https://www.eea.europa.eu/data-and-maps/daviz/co2-emission-intensity</u>





<u>Annex I</u> CO₂RCCT User Manual

	Instructions for using the Tree crops' CO ₂ Removal Capacity Calculation Tool (CO ₂ RCCT)
Tool settings	The first step is the User to enter worksheet "Tool settings" (light green colour tab) and select the Country (Greece, Italy or Spain) on which CO ₂ RCCT will be applied and then the language that will be used by CO ₂ RCCT. The available language options depend on the selected Country (English is a common option to all 3 Countries).
Input	In the worksheet "Input" (coral colour tab) the User has to insert information and data for the tree crop cultivation of interest. Questions Q1 and Q2 are mandatory and must be answered prior to the rest Questions. Regarding the rest Questions (Q3 to Q13.5), even if the User has no available data or knowledge to answer them, the design of CO ₂ RCCT ensures the extraction of reliable results by retrieving the non filled-in, missing data by the back-end supporting Database. If fields Q9.1, Q10.1, Q10.3, Q10.5, Q10.7 are not filled-in by the User, CO ₂ RCCT will consider the corresponding answer as an affirmative one (e.g. yes fertilizers are used) and it will proceed to the calculations using data that will be retrieved by the back-end Database. In case the User decides to change the Country option in worksheet "Tool settings" while there is in progress an on-going "run" of CO ₂ RCCT, he must change respectively the selection of the geographical area in Question Q2 otherwise CO ₂ RCCT will not continue to operate appropriately. Finally, it has to be underlined that the User is important to read and follow the instructions which are included in each individual Question of worksheet "Input".

The overall results are presented (CO₂ Annual Removal Capacity, CO₂ Total Annual Removals, CO₂ Total Annual Emissions) as well as the results of the sub-sections of the CO₂RCA (CO₂ Annual Removal due to Biomass of Fruits, CO₂ Annual Storage in soil as carbon of the fallen biomass, CO₂ Annual Emissions due to the use of fertilizers, pesticides, fossil fuels and electricity). For each sub-section, the constituent parameters are also calculated and presented.

Results Furthermore, the CO_2 Gain due to the application of "green" agricultural practices, is calculated and presented per case.

For all the above results, the respective CO₂ Removal Capacity Indexes (per unit of cultivated area, per unit of harvested fruits, per tree unit) are calculated and presented.

Note: if #DIV/0! appears instead of a numerical result, this means that one or more of the corresponding statistical data YD (Yield Density), PD (Planting Density) and S (Surface of tree crop plantation) for the specific selected geographical area are not available in the back-end Database.

	The back-end Database that supports the operation of CO ₂ RCCT contains various coefficients and data that have been acquired by several sources which are referenced accordingly.
	This Database is included in the worksheets of the current .xlsx file with the black colour tabs.
Database	These worksheets also include the equations, assumptions and logical paths that constitute the CO ₂ Removal Capacity Algorithm (CO ₂ RCA) based on which CO ₂ RCCT performs its calculations.
	Although these worksheets are accessible by the User, it is strongly adviced not to alter or modify any data or equations because in such a case the CO ₂ RCCT may not operate appropriately.
	The only data that the User could replace with other probably more suitable for his case study, are the ones included in the black cells with the white characters.





Annex II CO₂RCCT backend database

	Species
Orange	Citrus sinensis
Apple	Malus domestica
Peach	Prunus persica
Almond	Amygdalus communis*
Olive	Olea europaea
*synonym:	Prunus dulcis

	Trunk, branches and roots biomass development					
	T ₁	T ₂	ADR ₁	ADR ₂	% Juvenile Phase (Phase 1)	% Mature Phase (Phase 2)
Creater			the stars are sta			
Greece	· · ·	ars	-	er/tree/year		nal level)
Orange	6	50	0.00380	0.01220	12.00%	88.00%
Apple	4	20	0.00360	0.00572	20.00%	80.00%
Peach	4	15	0.00572	0.01760	26.67%	73.33%
Almond	5	30	0.00887	0.01680	16.67%	83.33%
Olive	7	150	0.00970	0.01859	4.67%	95.33%
	_	•				
Italy	(ye	ars)	tn dry matt	<mark>er</mark> /tree/year	(at natio	nal level)
Orange	6	40	0.00500	0.02870	15.00%	85.00%
Apple	3	20	0.00169	0.00530	15.00%	85.00%
Peach	3	10	0.00100	0.00451	30.00%	70.00%
Almond	5	25	0.00590	0.00290	20.00%	80.00%
Olive	8	100	0.00875	0.01000	8.00%	92.00%
Spain	(ye	ars)	tn dry matt	<mark>er</mark> /tree/year	(at natio	nal level)
Orange	6	40	0.02000	0.01220	15.00%	85.00%
Apple	4	25	0.01300	0.00572	16.00%	84.00%
Peach	4	15	0.00572	0.00200	26.67%	73.33%
Almond	5	25	0.00887	0.00400	20.00%	80.00%
Olive	7	100	0.01224	0.00800	7.00%	93.00%

	C _f				
Carbon content of fresh fruits					
	biomass				
Greece	[g C / Kg fresh fruit]				
Orange	19.260				
Apple	20.250				
Peach	12.930				
Almond	594.100				
Olive	150.900				
Italy	[g C / Kg fresh fruit]				
Orange	8.825				
Apple	26.370				
Peach	42.252				
Almond	75.800				
Olive	70.465				
Spain	[g C / Kg <mark>fresh</mark> fruit]				
Orange	19.260				
Apple	20.250				
Peach	12.930				
Almond	594.100				
Olive	150.900				

Annual Prunings Biomass						
	M _{Pr} Kg dry matter/tree/year					
	Greece	Italy	Spain			
Orange	3.17500	3.17500	3.32500			
Apple	2.60000	2.60000	2.50000			
Peach	2.41667	2.41667	2.31657			
Almond	2.83333	2.83333	2.75000			
Olive	4.50000	4.50000	3.90000			

	Prunings DW/FW	
Orange	0.4983	
Apple	0.4855	
Peach	0.4992	
Almond	0.5347	
Olive	0.5998	

	Prunings management						
	r runngs management	_	Greece				
	Management practices (%)		Orange	Apple	Peach	Almond	Olive
	left in the field		40.00%	80.00%	40.00%	20.00%	
	burnt in the field				40.00%	20.00%	20.00%
Z _{Pr_WF}	use as a solid fuel outside the field		60.00%	20.00%	20.00%	60.00%	70.00%
	other use different than burning						10.00%
		Total	100.00%	100.00%	100.00%	100.00%	100.00%
		-					
	Management practices (%)		Italy Orange	Apple	Peach	Almond	Olive
	left in the field		80.00%	80.00%	80.00%	80.00%	20.00%
	burnt in the field		20.00%	20.00%	20.00%	20.00%	80.00%
Z_{Pr_WF}	use as a solid fuel outside the field						
	other use different than burning						
		Total	100.00%	100.00%	100.00%	100.00%	100.00%
			Spain				
	Management practices (%)		Orange	Apple	Peach	Almond	Olive
	left in the field		40.00%	80.00%	40.00%	20.00%	
	burnt in the field				40.00%	20.00%	20.00%
\mathbf{Z}_{Pr_WF}	use as a solid fuel outside the field		60.00%	20.00%	20.00%	60.00%	70.00%
	other use different than burning						10.00%
		Total	100.00%	100.00%	100.00%	100.00%	100.00%

Product losses throughout a full cultivation cycle				
<u>Note</u> : the intentional thinning	is included			
7.	Percentage of <u>total</u>	Note: NOT percentage of		
Z _{fruits}	potential fruits biomass	the yield		
i Orange	20.00%			
ii Apple	20.00%			
iii Peach	20.00%			
iv Almond	10.00%			
v Olive	10.00%			
Sources:	i, ii, iii: FAO 2011 / SIK 2013, Table	33		
	iv, v: P. Roussos/Agricultural Unive	rsity of Athens		

Annual biomass (dry matter) of fallen leaves					
	M _{leaves} Kg dry matter/tree/year				
	Greece	Italy	Spain		
Orange	7.05357	7.05357	7.05357		
Apple	2.57143	2.57143	2.57143		
Peach	1.91453	1.91453	1.91453		
Almond	2.56604	2.56604	2.56604		
Olive	6.21103	6.21103	6.21103		

Hulls mass (M _{hulls}):	10.16667	Kg/tree/year
70.00%	of which, remain in the field	

GREECE

Processed data obtained originally by ELSTAT (Ελληνική Στατιστική Αρχή/ Hellenic Statistical Authority)

Mean values of years:
YD (in th of fruits produced per ha)
PD (in trees planted per ha)
S (in ha)

2012 to 2016 [Yield Density] [Planting Density] [Surface of tree crop plantation]

- ·	0	range trees			Annia traas			Peach trees			Almond trees			Olive trees	
Regions		range trees D (trees/ha)	S (ha)	YD (tn/ha)	Apple trees PD (trees/ha)	S (ha)	YD (tn/ha)	Peach trees PD (trees/ha)	S (ha)	YD (tn/ha)	PD (trees/ha)	S (ha)	YD (tn/ha)	Olive trees PD (trees/ha)	S (ha)
GREECE (total)	23.15	445.91	33,885.94	22.62	739.00	5 (na) 11,168.26	15.70	439.32	39,282.78	2.31	278.87	5 (na) 13,299.76	4.19	173.39	S (na) 815,072.90
EASTERN MACEDONIA & THRACE (total)	5.63	243.75	0.32	13.19	755.49	11,108.20	7.83	439.52	206.26	3.95	283.95	1,259.02	4.69	192.70	16,070.40
Rodopi	5.05	243.75	0.52	14.09	427.65	37.84	6.70	266.17	12.32	3.56	219.17	68.76	6.62	207.04	955.22
Drama				15.95	495.72	25.72	7.23	352.65	11.24	2.02	254.36	41.32	5.53	258.15	694.96
Evros	1.00	190.00	0.20	9.92	1,217.64	60.18	2.69	578.19	36.52	1.72	264.04	108.06	1.95	180.87	2,251.86
Thasos				5.77	218.79	2.98	4.34	205.00	9.40	1.48	237.39	15.38	1.03	137.36	7,289.40
Kavala	13.33	333.33	0.12	21.26	563.94	34.76	11.12	302.96	83.58	4.46	292.42	1,007.72	12.33	280.26	4,132.28
Xanthi				5.67	737.47	25.98	8.16	585.36	53.20	2.03	284.48	17.78	2.96	204.83	746.68
CENTRAL MACEDONIA (total)	4.98	251.49	3.50	24.52	711.47	3,105.20	14.85	429.59	34,772.80	2.76	254.01	2,708.10	6.31	218.54	41,089.18
Thessaloniki	0.00	710.00	0.02	13.88	456.52	61.36	12.92	344.77	65.78	2.08	277.61	315.40	3.70	215.33	3,377.92
Imathia				27.01	754.91	1,404.50	17.32	421.65	15,480.78	6.43	337.48	65.42	10.74	262.60	304.76
Kilkis	0.00	200.00	0.02	4.70	339.46	14.32	8.48	331.99	37.84	2.23	261.47	149.88	4.44	271.66	449.14
Pella				23.38	681.16	1,412.66	12.77	436.48	18,865.04	1.76	292.03	69.60	4.73	301.62	800.76
Pieria	15.00	100.00	0.04	23.56	811.03	144.80	21.31	454.55	235.62	2.79	261.27	102.80	5.10	288.66	3,375.46
Serres	15.00 4.84	400.00 247.37	0.04 3.42	17.34 6.37	734.59 245.53	40.56 27.00	10.45 11.59	514.13 264.32	42.42 45.32	2.84 2.56	245.75 234.10	1,933.34 71.66	3.66 7.27	265.19 197.72	5,231.68 27,549.46
Chalkidiki	4.84	247.37 500.00	3.42 0.04	33.10			27.21	627.86		3.60	234.10 549.84	490.60	7.00	277.09	
WESTERN MACEDONIA (total) Kozani	0.00	500.00	0.04	36.25	1,325.70 1,880.84	2,483.92 955.62	27.21 22.12	648.87	1,731.78 783.40	4.04	716.09	291.48	7.00	277.34	232.76 232.02
Grevena	0.00	500.00	0.04	13.03	703.01	42.04	3.15	250.42	783.40	0.99	155.42	291.48 58.08	0.00	196.22	0.74
Kastoria				35.54	966.70	1,155.66	17.57	544.80	1.44	3.51	322.98	11.48	0.00	150.22	0.74
Florina				18.26	1,055.12	330.60	31.60	611.12	945.94	3.88	372.72	129.56			
EPIRUS (total)	22.60	439.11	4,273.20	4.37	263.84	75.46	8.01	334.22	35.24	1.75	181.92	70.88	5.26	121.60	24,648.44
Ioannina	5.75	273.53	0.34	3.48	225.03	14.68	6.57	301.19	18.80	1.97	190.31	16.84	3.95	159.52	60.48
Arta	22.23	436.94	3,724.08	3.45	250.36	50.04	9.19	419.54	6.90	1.64	189.28	8.58	5.92	200.35	4,951.90
Thesprotia	32.67	491.10	336.52	12.74	335.95	8.24	11.19	340.46	6.12	1.24	186.29	27.46	4.99	87.11	11,080.64
Preveza	13.56	395.09	212.26	6.94	523.68	2.50	7.55	332.46	3.42	2.00	163.89	18.00	5.19	120.43	8,555.42
THESSALY (total)	6.37	286.04	23.42	20.09	526.29	3,732.66	23.64	464.57	1,906.98	2.32	302.97	6,099.78	3.56	228.41	34,034.10
Larissa	29.55	322.00	0.10	28.36	791.03	1,804.68	24.94	474.35	1,745.58	2.79	321.95	3,943.32	6.21	275.15	8,173.26
Karditsa	5.45	300.00	0.22	4.36	365.75	32.48	6.18	289.16	5.72	0.44	138.12	44.22	2.88	202.83	116.88
Magnesia	6.63	285.94	22.98	12.89	268.40	1,736.32	11.44	334.02	87.92	1.51	271.85	2,048.12	2.67	207.62	21,664.34
Sporades Islands	4.07	250.00	0.12	4.46	304.76	0.84				0.96	211.55	30.00	0.66	234.68	2,531.16
Trikala				11.57	370.95	158.34	10.82	397.00	67.76	2.73	272.40	34.12	5.94	264.19	1,548.46
CENTRAL GREECE (total)	9.53	341.80	169.76	13.40	540.26	221.70	10.12	307.23	118.62	0.99	196.34	1,054.56	3.24	159.91	90,209.90
Pthiotida	4.22	222.22	1.26	22.88	856.09	118.36	11.79	321.42	78.98	1.89	268.97	409.78	3.84	189.93	37,980.90
Viotia	12.23	377.55	0.98	2.92	106.26	6.36	8.48	395.63	2.88	0.43	143.94	168.28	1.61	137.11	17,484.52
Evia	9.64	361.41	123.76	6.73	188.93	59.92	8.20	269.64	36.30	1.51	193.59	127.70	4.16	139.15	27,197.70
Evritania	0.07	200.05	10.70	2.62	234.46	11.48	2.73	257.89	0.38	1.28	187.27	1.10	0.26	138.57	678.38
Fokida	9.87 10.22	288.96 344.88	43.76	1.12	147.01	25.58	4.05	412.50	0.08	0.18	137.15	347.70	0.63	136.19	6,868.40
IONIAN ISLANDS (total)	11.12	344.88	334.10 245.40	4.96 5.39	256.26 269.37	35.30 32.26	4.31 4.22	277.73 279.77	14.10 13.20	1.47 1.74	225.96 236.78	135.62 89.62	5.72 4.53	147.08 149.24	38,315.30 19,214.12
Corfu Zakynthos	12.08	310.54	243.40	3.85	166.67	0.12	5.30	228.85	0.52	2.08	191.58	1.90	4.55	149.24	8,454.04
Ithaka	2.85	300.20	29.22	0.57	100.00	0.12	5.50	220.03	0.52	0.34	125.00	2.84	0.84	103.46	1,102.64
Kefallonia	7.92	272.43	40.56	1.38	109.40	2.34	3.88	273.68	0.38	1.27	214.50	31.88	1.84	123.81	3,919.50
Lefkada	2.48	263.67	16.90	1.29	140.74	0.54	5.00	2, 5.00	0.50	0.73	199.10	9.38	0.39	126.12	5,625.00
WESTERN GREECE (total)	14.38	351.94	5,430.24	8.08	306.72	120.08	10.91	347.09	75.70	2.24	196.65	383.58	4.92	186.89	70,083.12
Achaia	11.25	320.38	298.02	8.04	278.78	87.92	10.41	294.83	27.36	2.08	196.30	103.06	7.33	170.18	13,721.74
Etoloakarnania	12.26	301.50	2,701.98	9.31	402.87	26.50	9.20	307.92	16.28	2.20	196.26	235.74	3.13	186.29	22,840.44
Ilia	17.24	411.89	2,430.24	8.37	290.53	5.66	12.66	411.57	32.06	2.69	199.51	44.78	5.11	194.14	33,520.94
PELOPONNESE (total)	27.67	474.00	18,856.58	15.04	411.66	883.54	14.37	414.82	303.54	1.30	189.20	490.30	4.94	168.24	209,369.84
Arkadia	15.05	376.96	73.48	18.48	463.75	613.60	6.62	269.48	22.94	0.58	155.46	213.22	4.61	147.26	16,946.64
Argolida	32.62	496.55	9,344.32	13.76	613.14	8.22	18.61	477.22	172.68	2.59	277.31	59.30	3.12	136.39	27,908.94
Korinthia	9.68	347.04	807.76	8.85	301.44	215.18	9.48	314.84	92.30	1.25	204.04	135.06	2.73	143.20	20,882.96
Lakonia	24.79	470.99	8,150.36	4.43	215.62	20.98	14.97	674.85	10.18	1.59	181.50	61.28	3.09	176.66	65,878.92
Mesinia	14.56	315.05	480.66	4.30	185.45	25.56	7.77	256.73	5.44	2.59	209.65	21.44	7.95	183.85	77,752.38
ATTICA (total)	10.31	338.45	70.26	6.94	340.00	0.10	15.76	377.38	9.30	1.74	253.18	116.68	1.56	122.23	23,155.22
Athens Central Section															
Athens North Section	1.50	66.67	0.06							0.66	135.00	0.40	1.70	181.01	11.44
Athens West Section													1.01	125.67	13.40
Athens South Section															
Athens East Section	4.51	196.03	29.96	6.98	340.00	0.10	22.76	441.27	6.44	2.16	267.29	70.68	1.68	130.66	9,273.12

West Attica	3.06	194.78	0.46			- I	2.81	238.27	2.66	2.40	263.98	20.28	1.24	124.98	4,763.54
Piraeus													0.00	94.00	0.30
Attica Islands	16.15	447.79	39.78				2.47	170.00	0.20	0.80	207.01	25.32	1.66	112.12	9,093.42
NORTHERN AEGEAN (total)	9.47	550.31	387.12	3.70	240.54	55.90	2.78	254.03	11.02	0.92	226.08	252.60	1.30	172.41	57,972.60
Lesvos	3.93	231.85	84.54	3.60	235.19	42.20	2.32	191.04	5.36	2.21	198.99	25.10	1.54	183.33	43,779.50
Ikaria	9.13	264.76	5.42	9.02	179.59	2.94	2.78	175.00	1.68	0.72	113.63	32.00	0.91	122.65	1,997.16
Limnos	2.72	216.67	0.18	4.97	219.33	0.60	0.81	62.58	1.86	0.87	270.84	91.18	0.87	200.83	85.68
Samos	6.33	292.45	81.74	2.69	281.63	10.16	4.84	694.77	1.72	1.74	354.29	2.94	1.02	142.21	8,305.88
Chios	12.47	780.79	215.24				3.28	425.00	0.40	0.27	224.30	101.38	0.27	138.25	3,804.38
SOUTHERN AEGEAN (total)	5.46	390.68	598.88	13.25	600.96	3.54	24.92	543.94	74.22	2.17	198.31	36.72	2.16	132.47	18,258.80
Syros	6.94	302.35	3.40							3.60	273.08	3.90	5.29	235.71	40.60
Andros	13.96	388.39	4.48	3.73	280.00	0.02				1.91	264.71	0.68	5.81	172.04	186.88
Santorini	5.08	268.18	0.22							4.30	645.64	0.78	2.19	169.97	150.86
Kalimnos	7.78	411.44	17.12	5.31	1,121.43	0.28	12.22	1,675.00	0.28	0.78	304.00	1.00	1.33	117.97	602.78
Karpathos	2.17	233.67	1.20	3.87	266.67	0.18	3.08	254.55	0.66	0.65	149.17	2.18	0.23	99.52	1,105.58
Kythnos	8.41	279.76	1.68				7.45	450.00	0.12	3.09	149.14	11.60	2.93	126.22	86.66
Kos	10.11	288.03	17.98	2.91	400.00	0.08	10.50	371.62	1.48	3.48	275.52	0.58	2.57	197.34	2,082.12
Milos	5.98	267.46	5.04				1.50	250.00	0.10	0.68	297.62	0.84	1.14	143.43	495.80
Mykonos	3.80	212.00	1.00										4.84	217.51	5.94
Naxos	12.23	332.44	49.10	7.52	413.48	0.46	2.86	134.72	2.50	4.03	205.47	2.74	2.64	153.85	1,038.24
Paros	5.09	257.09	5.92	3.00	150.00	0.04	2.40	236.36	0.44	1.33	211.05	3.62	2.58	241.07	623.86
Rhodes	3.70	404.65	490.66	29.48	701.70	2.12	28.78	563.99	68.52	1.25	160.36	8.44	2.17	114.46	11,707.68
Tinos	4.40	200.56	1.08	1.52	122.22	0.36	2.32	166.67	0.12	1.67	233.33	0.36	1.79	195.85	131.80
CRETE (total)	22.14	463.45	3,738.52	5.34	304.41	263.40	5.80	305.18	29.03	0.96	163.72	201.32	4.08	181.53	191,633.24
Heraklion	23.72	420.59	404.82	4.57	212.84	191.20	7.77	318.28	5.22	2.38	373.86	12.44	3.40	173.59	87,939.56
Lasithi	12.56	733.92	43.82	10.62	669.11	40.22	4.62	300.54	1.84	0.74	147.52	180.96	3.29	196.09	33,068.60
Rethymno	8.85	426.96	173.30	3.75	272.71	11.80	3.68	308.98	1.96	0.84	222.20	5.36	2.62	160.22	27,744.10
Chania	23.39	467.24	3,116.58	7.68	463.60	20.18	8.61	425.20	14.20	1.25	165.63	2.56	7.07	200.35	42,880.98

ITALY

Processed data obtained originally by ISTAT (Istituto Nazionale di Statistica/ Italian National Institute of Statistics)

 Mean values of years:
 2012
 to
 2016

 YD (in the of fruits produced per ha [Yield Density]
 PD (in trees planted per ha)
 [Planting Density]

S (in ha) [Surface of tree crop plantation]

Regions		ORANGE TREES			APPLE TREES			PEACH TREES			ALMOND TREES			OLIVE TREES	
	YD (tn/ha)	PD (trees/ha)	S (ha)	YD (tn/ha)	PD (trees/ha)	S (ha)	YD (tn/ha)	PD (trees/ha)	S (ha)	YD (tn/ha)	PD (trees/ha)	S (ha)	YD (tn/ha)	PD (trees/ha)	S (ha)
ITALIA (total)	20.87	240.00	84,420.60	45.18	1,350.00	52,362.00	20.84	650.00	68,225.60	1.36	270.00	58,154.60	2.45	156.00	1,128,634.20
PIEMONTE (total)				32.91	1,350.00	4,553.60	27.98	650.00	3,791.00				1.91	156.00	76.80
Torino				28.90	1,350.00	472.60	19.33	650.00	158.60				1.91	156.00	16.00
Vercelli				18.52	1,350.00	12.40	14.18	650.00	120.80						
Novara				27.57	1,350.00	28.00	15.00	650.00	9.00				2.11	156.00	15.20
Cuneo				34.61	1,350.00	3,739.60	30.19	650.00	2,987.40				1.72	156.00	20.00
Asti				14.94	1,350.00	159.60	14.76	650.00	93.60				2.00	156.00	10.00
Alessandria				24.90	1,350.00	125.40	22.87	650.00	415.60				1.90	156.00	12.60
Biella				18.27	1,350.00	13.40	14.45	650.00	4.40				2.34	156.00	1.40
Verbano Cusio Ossola				11.83	1,350.00	2.60	10.64	650.00	1.60 0.80				1.64	156.00	1.60
VALLE D' AOSTA (total) Aosta				17.25 17.25	1,350.00 1,350.00	306.00 306.00	12.50 12.50	650.00 650.00	0.80						
LOMBARDIA (total)				28.35	1,350.00 1,350.00	1,651.60	20.09	650.00	403.00	1.89	270.00	2.60	1.95	156.00	2,313.20
Varese				22.00	1,350.00	9.00	12.27	650.00	11.40	1.09	270.00	2.00	3.43	156.00	1.20
Como				23.40	1,350.00	13.00	12.27	050.00	11.40				1.13	156.00	64.40
Sondrio				31.53	1,350.00	1,123.00	12.50	650.00	0.80				0.40	156.00	1.60
Milano				16.84	1,350.00	5.00	9.08	650.00	3.60				0110	100100	1.00
Bergamo				11.57	1,350.00	49.00	13.42	650.00	11.40				1.57	156.00	126.40
Brescia				15.65	1,350.00	72.20	10.61	650.00	60.80				2.03	156.00	2,036.00
Pavia				21.73	1,350.00	213.20	19.92	650.00	82.60	1.69	270.00	2.20	0.52	156.00	7.00
Cremona				24.71	1,350.00	16.80	17.72	650.00	11.60						
Mantova	1			27.78	1,350.00	142.60	24.01	650.00	217.80				1.30	156.00	19.20
Lecco				11.00	1,350.00	1.20							1.08	156.00	57.40
Lodi				12.80	1,350.00	2.00	12.18	650.00	2.20						
Monza e della Brianza				18.93	1,350.00	4.60	13.00	650.00	0.80	3.00	270.00	0.40			
LIGURIA (total)	10.21	240.00	14.00	9.24	1,350.00	56.40	9.84	650.00	110.60				1.65	156.00	15,396.00
Imperia	10.53	240.00	3.80	6.29	1,350.00	7.00	11.39	650.00	3.60				2.31	156.00	5,880.00
Savona	10.00	240.00	9.20	8.77	1,350.00	23.40	10.46	650.00	72.80				1.60	156.00	2,196.00
Genova				8.67	1,350.00	12.00	8.51	650.00	31.60				0.89	156.00	6,200.00
La Spezia	11.00	240.00	1.00	12.00	1,350.00	14.00	6.54	650.00	2.60				2.43	156.00	1,120.00
TRENTINO ALTO ADIGE (total)				58.13	1,350.00	27,478.00	9.14	650.00	6.40				4.41	156.00	383.40
Bolzano/Bozen				61.32	1,350.00	17,788.00	0.14	650.00	C 40					150.00	202.40
Trento				52.27 42.02	1,350.00	9,690.00	9.14 19.03	650.00 650.00	6.40	0.99	270.00	2.00	4.41 3.07	156.00 156.00	383.40
VENETO (total) Verona				42.02	1,350.00 1,350.00	5,553.40 4,327.80	18.95	650.00		0.99	270.00	2.00	3.07	156.00	4,140.80 3,078.80
Vicenza				35.89	1,350.00	4,327.80 88.00	16.95	650.00	2,551.80	0.20	270.00	0.40	3.56	156.00	462.80
Belluno				29.18	1,350.00	64.60	14.00	650.00	0.20	0.20	270.00	0.40	3.50	150.00	402.80
Treviso				33.88	1,350.00	109.60	19.44	650.00	69.20				3.06	156.00	284.80
Venezia				38.94	1,350.00	193.60	20.12	650.00	58.80				2.38	156.00	1.60
Padova	1			43.13	1,350.00	333.80	18.31	650.00	152.20	1.19	270.00	1.60	2.99	156.00	311.60
Rovigo				32.02	1,350.00	436.00	21.16	650.00	129.20			2.00	3.02	156.00	1.20
FRIULLI VENEZIA GIULIA (total)				32.34	1,350.00	706.60	23.79	650.00	188.60	5.71	270.00	1.60	2.69	156.00	204.00
Udine				32.54	1,350.00	406.40	24.22	650.00	106.80	6.83	270.00	1.20	2.90	156.00	68.80
Gorizia	1			25.59	1,350.00	15.00	24.10	650.00	21.00				2.68	156.00	42.60
Trieste	1			16.03	1,350.00	2.40	18.85	650.00	5.20				2.87	156.00	38.60

Pordenone				32.54	1,350.00	282.80	23.30	650.00	55.60	2.35	270.00	0.40	2.30	156.00	54.00
EMILIA ROMAGNA (total)				37.97	1,350.00	3,979.80	24.56	650.00	15,286.40				1.70	156.00	3,134.00
Piacenza				21.07	1,350.00	49.80	19.64	650.00	27.20				0.74	156.00	11.60
Parma				17.27	1,350.00	24.80	17.61	650.00	11.40				0.44	156.00	9.00
Reggio nell' Emilia				30.02	1,350.00	81.40	25.45	650.00	29.40				0.97	156.00	12.40
Modena				34.05	1,350.00	376.80	18.99	650.00	220.80				1.06	156.00	15.00
Bologna				42.84	1,350.00	411.40	24.37	650.00	1,601.20				1.86	156.00	245.00
Ferrara				39.69	1,350.00	1,796.80	19.60	650.00	857.60						
Ravenna				37.14	1,350.00	933.00	27.22	650.00	8,101.20				2.14	156.00	381.80
Forlì Cesena				35.40	1,350.00	296.20	21.02	650.00	4,305.00				1.37	156.00	902.80
Rimini				30.00	1,350.00	9.60	22.53	650.00	132.60				1.78	156.00	1,556.40
TOSCANA (total)	17.46	240.00	8.20	24.81	1,350.00	884.80	17.01	650.00	1,190.00	2.69	270.00	25.80	1.19	156.00	85,560.80
Massa Carrara				10.47	1,350.00	41.40	7.35	650.00	11.40				1.73	156.00	660.20
Lucca	13.47	240.00	2.00	20.22	1,350.00	54.80	21.34	650.00	53.40				2.74	156.00	2,625.00
Pistoia				7.37	1,350.00	21.00	7.48	650.00	10.60				0.83	156.00	7,566.60
Firenze				32.29	1,350.00	73.00	28.32	650.00	116.00	6.00	270.00	3.00	1.64	156.00	18,086.00
Livorno	25.11	240.00	3.60	24.46	1,350.00	35.00	15.13	650.00	236.60				1.36	156.00	4,560.60
Pisa				12.89	1,350.00	63.60	10.85	650.00	299.80	2.69	270.00	2.80	0.70	156.00	7,407.40
Arezzo				28.46	1,350.00	482.00	20.11	650.00	202.80				1.27	156.00	10,383.80
Siena				12.97	1,350.00	52.80	11.79	650.00	20.40	3.60	270.00	1.00	1.10	156.00	14,994.60
Grosseto	9.92	240.00	2.60	30.24	1,350.00	59.60	18.86	650.00	239.00	2.11	270.00	19.00	0.85	156.00	17,180.00
Prato				12.05	1,350.00	1.60							1.06	156.00	2,096.60
UMBRIA (total)				13.58	1,350.00	236.00	10.83	650.00	135.20	1.05	270.00	4.00	1.41	156.00	27,183.00
Perugia				13.52	1,350.00	233.00	10.82	650.00	127.00				1.47	156.00	18,138.40
Terni				18.00	1,350.00	3.00	10.98	650.00	8.20	1.05	270.00	4.00	1.31	156.00	9,044.60
MARCHE (total)				20.14	1,350.00	186.20	18.11	650.00	797.40	1.34	270.00	23.00	2.76	156.00	9,533.00
Pesaro e Urbino				11.37	1,350.00	12.20	8.11	650.00	140.80	1.34	270.00	23.00	1.28	156.00	764.20
Ancona				9.08	1,350.00	62.60	8.35	650.00	148.20				2.32	156.00	1,730.00
Macerata				20.09	1,350.00	42.60	15.50	650.00	69.60				2.15	156.00	2,369.00
Ascoli Piceno				32.57	1,350.00	41.60	25.32	650.00	230.80				3.47	156.00	3,016.20
Fermo				30.63	1,350.00	27.20	24.71	650.00	208.00				3.47	156.00	1,653.60
LAZIO (total)	8.89	240.00	515.40	16.31	1,350.00	481.20	12.29	650.00	1,921.20	0.55	270.00	20.60	1.93	156.00	79,693.00
Viterbo				21.60	1,350.00	109.60	13.33	650.00	165.00				2.11	156.00	13,422.00
Rieti	8.30	240.00	5.00	6.35 10.30	1,350.00 1,350.00	55.00 163.00	5.63 11.78	650.00 650.00	60.00 1,254.80	0.53	270.00	20.20	1.28 1.91	156.00 156.00	11,320.00 23,856.00
Roma Latina			503.60		,		11.78	650.00		0.55	270.00	20.20	2.08	156.00	,
	8.72 22.21	240.00 240.00	503.60 6.80	26.23 14.21	1,350.00	105.60 48.00	9.21	650.00	361.20	1.50	270.00	0.40	2.08	156.00	12,735.00 18.360.00
Frosinone ABRUZZO (total)	13.50	240.00 240.00	5.60	24.85	1,350.00 1,350.00	48.00 552.60	9.21 15.51	650.00	80.20 2,397.60	0.24	270.00	142.60	2.11	156.00 156.00	41,837.20
L'Aquila	13.50	240.00	5.00	29.98	1,350.00	150.20	10.08	650.00	2,397.60 55.80	0.24	270.00	130.00	1.31	156.00	2,084.00
Teramo				29.98	1,350.00	95.40	21.59	650.00	429.40	1.80	270.00	4.80	3.12	156.00	5,776.20
Pescara				26.42	1,350.00	95.40 143.60	19.54	650.00	429.40	2.93	270.00	4.80 7.80	3.54	156.00	10,376.00
Chieti	13.50	240.00	5.60	20.42	1,350.00	163.40	12.69	650.00	1,462.00	2.55	270.00	7.00	2.49	156.00	23,601.00
MOLISE (total)	15.50	240.00	5.00	15.53	1,350.00	430.00	8.74	650.00	573.20	3.50	270.00	15.00	3.48	156.00	14,307.60
Campobasso				16.00	1,350.00	400.00	9.58	650.00	454.00	3.50	270.00	15.00	3.53	156.00	11,640.40
Isernia				9.20	1,350.00	30.00	5.55	650.00	119.20	5.50	270.00	15.00	3.28	156.00	2,667.20
CAMPANIA (total)	18.62	240.00	1,027.00	20.01	1,350.00	3,298.60	19.82	650.00	19,276.00	2.53	270.00	13.00	2.66	156.00	74,442.60
Caserta	17.99	240.00	334.00	20.01	1,350.00	2,346.80	19.82	650.00	14,823.60	2.55	270.00	13.00	2.56	156.00	8,864.60
Benevento	17.55	240.00	554.00	16.93	1,350.00	333.80	16.42	650.00	14,823.00				2.50	156.00	13,550.00
Napoli	19.34	240.00	253.60	20.83	1,350.00	274.20	19.86	650.00	2,872.20				4.72	156.00	2,114.00
Avellino	20.16	240.00	233.00	17.36	1,350.00	93.80	16.81	650.00	2,872.20	2.67	270.00	10.40	2.21	156.00	8,060.00
Salerno	18.66	240.00	432.00	20.24	1,350.00	250.00	19.48	650.00	1,381.00	1.96	270.00	2.60	2.72	156.00	41,854.00
PUGLIA (total)	26.41	240.00	4.024.20	17.77	1.350.00	228.00	20.26	650.00	4.121.80	1.10	270.00		2.72	156.00	376.406.00
Foggia	16.57	240.00	429.60	12.89	1,350.00	76.00	19.79	650.00	670.00	1.96	270.00	1,466.00	3.22	156.00	51,280.00
Bari	18.75	240.00	64.00	20.15	1,350.00	54.00	21.14	650.00	312.00	0.93		12,780.00	2.44	156.00	99,690.00
· ·	·	2.0.00	000	20.20	_,000.00	500		000.00		0.00	2, 0.00				,

Taranto	28.99	240.00	3,080.00	21.44	1,350.00	57.00	17.98	650.00	102.00	2.86	270.00	504.00	3.00	156.00	35,804.00
Brindisi	23.76	240.00	59.00	22.11	1,350.00	18.00	20.48	650.00	920.00	1.09	270.00	4,760.00	2.72	156.00	63,680.00
Lecce	18.60	240.00	382.00	15.07	1,350.00	18.00	18.43	650.00	203.80	1.51	270.00	78.80	2.51	156.00	93,154.00
Barletta Andria Trani	16.52	240.00	9.60	18.60	1,350.00	5.00	20.50	650.00	1,914.00	1.16	270.00	790.00	3.90	156.00	32,798.00
BASILICATA (total)	20.73	240.00	4,920.60	20.13	1,350.00	375.00	20.14	650.00	3,213.20	4.76	270.00	71.40	1.24	156.00	26,650.00
Potenza	13.29	240.00	21.40	20.24	1,350.00	349.80	16.05	650.00	223.60	4.34	270.00	19.40	1.18	156.00	11,106.60
Matera	20.76	240.00	4,899.20	18.52	1,350.00	25.20	20.44	650.00	2,989.60	4.91	270.00	52.00	1.29	156.00	15,543.40
CALABRIA (total)	26.92	240.00	16,542.40	15.01	1,350.00	536.40	27.98	650.00	3,038.80	4.37	270.00	166.60	3.38	156.00	182,633.40
Cosenza	35.26	240.00	2,545.60	15.73	1,350.00	183.60	29.75	650.00	2,270.40	2.28	270.00	16.60	3.21	156.00	53,497.40
Catanzaro	29.48	240.00	2,415.80	14.40	1,350.00	171.40	26.57	650.00	530.80	2.74	270.00	54.00	1.92	156.00	41,774.20
Reggio di Calabria	26.19	240.00	9,000.60	19.19	1,350.00	108.60	16.43	650.00	108.00	6.08	270.00	81.40	5.00	156.00	49,791.20
Crotone	17.06	240.00	1,236.00	10.64	1,350.00	36.40	7.27	650.00	69.40	3.56	270.00	12.80	2.01	156.00	21,204.80
Vibo Valentia	20.47	240.00	1,344.40	6.15	1,350.00	36.40	18.01	650.00	60.20	1.30	270.00	1.80	4.51	156.00	16,365.80
SICILIA (total)	19.05	240.00	54,288.80	18.80	1,350.00	682.00	18.94	650.00	6,749.80	1.56	270.00	33,423.60	1.91	156.00	157,028.20
Trapani	17.71	240.00	276.00				10.20	650.00	70.00	3.67	270.00	11.60	2.43	156.00	25,500.00
Palermo	15.81	240.00	393.60	17.00	1,350.00	50.00	15.07	650.00	872.40	1.59	270.00	2,266.00	2.77	156.00	21,356.00
Messina	17.45	240.00	2,040.00	12.14	1,350.00	112.00	13.89	650.00	610.00	1.40	270.00	400.00	0.69	156.00	35,473.20
Agrigento	22.66	240.00	4,855.20	25.48	1,350.00	75.00	20.21	650.00	2,469.80	1.30	270.00	10,606.00	1.86	156.00	24,521.00
Caltanissetta	9.00	240.00	172.00	4.00	1,350.00	4.00	22.24	650.00	1,640.00	1.05	270.00	4,770.00	1.57	156.00	8,208.00
Enna	17.80	240.00	2,902.00	18.00	1,350.00	19.00	15.00	650.00	234.20	1.62	270.00	5,560.00	1.52	156.00	11,820.00
Catania	17.32	240.00	24,870.00	19.76	1,350.00	422.00	20.66	650.00	534.40	1.11	270.00	2,520.00	3.19	156.00	13,610.00
Ragusa	26.49	240.00	1,880.00				18.45	650.00	71.00	1.99	270.00	2,230.00	2.39	156.00	6,240.00
Siracusa	20.34	240.00	16,900.00				13.18	650.00	248.00	2.57	270.00	5,060.00	1.94	156.00	10,300.00
SARDEGNA (total)	16.27	240.00	3,074.40	14.60	1,350.00	185.80	12.13	650.00	2,059.80	0.76	270.00	3,864.00	0.96	156.00	27,711.20
Sassari	15.12	240.00	74.80	12.74	1,350.00	27.80	12.28	650.00	175.40	0.68	270.00	40.40	1.00	156.00	6,983.40
Nuoro	17.01	240.00	266.40	16.49	1,350.00	38.20	10.52	650.00	114.20	0.74	270.00	912.20	1.09	156.00	4,025.60
Cagliari	16.16	240.00	1,952.60	12.86	1,350.00	43.80	11.49	650.00	938.00	0.72	270.00	1,639.40	0.83	156.00	6,759.80
Oristano	17.50	240.00	324.00	13.64	1,350.00	15.40	13.24	650.00	111.60	0.72	270.00	377.40	0.90	156.00	3,747.40
Olbia Tempio	15.90	240.00	33.40	17.14	1,350.00	10.80	10.98	650.00	71.20	0.92	270.00	6.60	1.08	156.00	492.60
Ogliastra	15.55	240.00	235.80	11.34	1,350.00	17.40	11.33	650.00	209.60	0.86	270.00	256.40	1.19	156.00	1,847.60
Medio Campidano	15.70	240.00	93.20	11.84	1,350.00	14.60	14.23	650.00	401.40	0.88	270.00	608.00	0.78	156.00	2,263.60
Carbonia Iglesias	15.62	240.00	94.20	22.46	1,350.00	17.80	12.91	650.00	38.40	0.88	270.00	23.60	1.11	156.00	1,591.20

SPAIN

Processed data obtained originally by Ministerio de Agricultura Pesca y Alimentación (MAPA) - Anuario de Estadística Agraria/ Spanish Ministry of Agriculture, Fishery and Food - Agrarian statistics yearbook

2016

Mean values of years:	2012	to	
YD (in th of fruits produced per ha)	[Yield Density	1	
PD (in trees planted per ha)	[Planting Den	sity]	
S (in ha)	[Surface of tro	ee crop plantati	on]

Regions	ORANGE TREES		5	APPLE TREES			PEACH TREES			ALMOND TREES			OLIVE TREES		
	YD (tn/ha)	PD (trees/ha)	S (ha)	YD (tn/ha)	PD (trees/ha)	S (ha)	YD (tn/ha)	PD (trees/ha)	S (ha)	YD (tn/ha)	PD (trees/ha)	S (ha)	YD (tn/ha)	PD (trees/ha)	S (ha)
ESPANA (total)	23.81	416.68	137,009.20	19.11	495.28	28,663.60	26.14	500.00	44,582.40	0.39	238.10	495,924.40	2.64	460.21	2,429,222.20
GALICIA (total)	6.73	416.67	94.60	13.60	500.00	6,165.40	5.13	500.00	1,120.20				0.97	476.19	225.20
A Coruna	7.00	416.67	60.40	11.44	500.00	2,524.80	5.45	500.00	561.40						
Lugo	6.13	416.67	2.00	12.93	500.00	1,903.00	4.22	500.00	184.60				0.90	476.19	208.00
Ourense	12.43	416.67	1.00	18.11	500.00	792.80	5.62	500.00	177.20				1.28	476.19	5.00
Pontevedra	5.88	416.67	31.20	16.50	500.00	944.80	4.38	500.00	197.00				2.13	476.19	12.20
PAIS VASCO (total)				5.84	500.00	1,727.40	3.70	500.00	11.20	0.77	238.10	75.00	0.43	141.47	919.60
Alava				5.25	500.00	81.20	4.38	500.00	1.00	57.52	238.10	75.00	1.46	476.19	270.20
Guipuzcoa				5.67	500.00	1,385.20							0.18	476.19	3.00
Vizcaya				6.60	500.00	261.00	3.05	500.00	10.20						
P. DE ASTURIAS (total)				3.16	500.00	4,170.40									
CANTABRIA (total)	2.78	416.67	0.60	0.00	0.00	6.40				1.50	238.10	2.00			
NAVARRA (total)				25.04	500.00	557.80	27.98	500.00	510.80	0.84	238.10	3,408.60	3.71	476.19	5,765.00
LA RIOJA (total)						349.40		500.00	390.40	0.45	238.10	6,089.60	2.35	476.19	4,558.60
ARAGON (total)				27.46	500.00	3,144.80	20.31	500.00	11,682.60	0.60	238.10	63,974.40	1.30	475.34	46,512.60
Huesca					500.00	661.60		500.00	5,595.00	6,945.20	238.10	9,632.00	1.29	475.50	7,329.60
Teruel					500.00	26.00		500.00	1,741.40	10,078.40	238.10	20,850.40	0.80	476.19	24,001.20
Zaragoza					500.00	2,457.20		500.00	4,346.20	21,100.60	238.10	33,492.00	2.11	473.93	15,181.80
CATALUNA (total)	11.67	416.67	1,970.40	31.33	500.00	8,563.20	20.87	500.00	10,032.80	0.40	238.10	37,496.40	1.28	475.07	112,565.20
Barcelona		416.67	2.00	112.62	500.00	70.20	52.23	500.00	534.20	358.13	238.10	815.80	1.23	476.19	2,782.20
Girona					500.00	2,197.20		500.00	105.60	16.00	238.10	27.00	1.19	476.16	3,368.20
Lleida				145.81	500.00	6,228.00	131.82	500.00	7,790.40	6,661.93	238.10	16,832.40	1.03	476.19	40,561.60
Tarragona		416.67	1,968.40		500.00	67.80		500.00	1,602.60	8,100.20	238.10	19,821.20	1.45	474.27	65,853.20
DALEADEC (LALAN)															
BALEARES (total)	7.89	416.67	1,450.00	27.41	500.00	67.00	26.03	500.00	51.00	0.40	238.10	18,151.80	0.57	469.98	6,060.20
BALEARES (total) CASTILLA Y LEON (total)	7.89 8.99	416.67 416.67	1,450.00 2.80	22.54	500.00 500.00	1,723.60	26.03 5.70	500.00 500.00	51.00 64.40	0.40 0.48	238.10 238.10	18,151.80 1,308.40	1.47	452.54	6,060.20 7,334.80
			· · · · · · · · · · · · · · · · · · ·		500.00 500.00	1,723.60 118.40						1,308.40 13.40			
CASTILLA Y LEON (total)			· · · · · · · · · · · · · · · · · · ·	22.54	500.00	1,723.60	5.70	500.00	64.40	0.48	238.10	1,308.40	1.47	452.54	7,334.80
CASTILLA Y LEON (total) Avila			· · · · · · · · · · · · · · · · · · ·	22.54 5.56	500.00 500.00	1,723.60 118.40	5.70	500.00	64.40	0.48 11.26 33.95 14.11	238.10 238.10	1,308.40 13.40	1.47	452.54	7,334.80
CASTILLA Y LEON (total) Avila Burgos			· · · · · · · · · · · · · · · · · · ·	22.54 5.56 5.26	500.00 500.00 500.00	1,723.60 118.40 392.20	5.70 6.04	500.00 500.00	64.40 25.00	0.48 11.26 33.95	238.10 238.10 238.10	1,308.40 13.40 71.00	1.47	452.54	7,334.80
CASTILLA Y LEON (total) Avila Burgos Leon			· · · · · · · · · · · · · · · · · · ·	22.54 5.56 5.26 13.86	500.00 500.00 500.00 500.00	1,723.60 118.40 392.20 408.60	5.70 6.04	500.00 500.00	64.40 25.00	0.48 11.26 33.95 14.11	238.10 238.10 238.10 238.10	1,308.40 13.40 71.00 15.00	1.47	452.54	7,334.80
CASTILLA Y LEON (total) Avila Burgos Leon Palencia	8.99	416.67	2.80	22.54 5.56 5.26 13.86 14.81	500.00 500.00 500.00 500.00 500.00	1,723.60 118.40 392.20 408.60 16.80	5.70 6.04 7.11	500.00 500.00 500.00	64.40 25.00 5.00	0.48 11.26 33.95 14.11 3.90	238.10 238.10 238.10 238.10 238.10 238.10	1,308.40 13.40 71.00 15.00 6.80	1.47 1.52	452.54 476.19	7,334.80 3,510.80
CASTILLA Y LEON (total) Avila Burgos Leon Palencia Salamanca	8.99	416.67	2.80	22.54 5.56 5.26 13.86 14.81 1.31	500.00 500.00 500.00 500.00 500.00 500.00	1,723.60 118.40 392.20 408.60 16.80 26.00	5.70 6.04 7.11	500.00 500.00 500.00	64.40 25.00 5.00	0.48 11.26 33.95 14.11 3.90 223.82	238.10 238.10 238.10 238.10 238.10 238.10 238.10	1,308.40 13.40 71.00 15.00 6.80 652.00	1.47 1.52	452.54 476.19	7,334.80 3,510.80
CASTILLA Y LEON (total) Avila Burgos Leon Palencia Salamanca Segovia	8.99	416.67	2.80	22.54 5.56 5.26 13.86 14.81 1.31	500.00 500.00 500.00 500.00 500.00 500.00 500.00	1,723.60 118.40 392.20 408.60 16.80 26.00 20.20	5.70 6.04 7.11	500.00 500.00 500.00	64.40 25.00 5.00	0.48 11.26 33.95 14.11 3.90 223.82 28.10	238.10 238.10 238.10 238.10 238.10 238.10 238.10 238.10	1,308.40 13.40 71.00 15.00 6.80 652.00 23.60	1.47 1.52	452.54 476.19	7,334.80 3,510.80
CASTILLA Y LEON (total) Avila Burgos Leon Palencia Salamanca Segovia Soria Valladolid Zamora	8.99	416.67	2.80	22.54 5.56 5.26 13.86 14.81 1.31 3.46 6.84	500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00	1,723.60 118.40 392.20 408.60 16.80 26.00 20.20 481.60 21.40 238.40	5.70 6.04 7.11 1.80	500.00 500.00 500.00 500.00 500.00 500.00	64.40 25.00 5.00 5.00 2.40 27.00	0.48 11.26 33.95 14.11 3.90 223.82 28.10 185.00 40.80 85.00	238.10 238.10 238.10 238.10 238.10 238.10 238.10 238.10 238.10 238.10 238.10	1,308.40 13.40 71.00 6.80 652.00 23.60 370.40 32.40 123.80	1.47 1.52 0.98 2.68 1.55	452.54 476.19 413.19 476.19 476.19 476.19	7,334.80 3,510.80 2,753.40 834.80 235.80
CASTILLA Y LEON (total) Avila Burgos Leon Palencia Salamanca Segovia Soria Valladolid Zamora MADRID (total)	8.99	416.67	2.80	22.54 5.56 5.26 13.86 14.81 1.31 3.46 6.84 9.39	500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00	1,723.60 118.40 392.20 408.60 16.80 26.00 20.20 481.60 21.40 238.40 6.80	5.70 6.04 7.11 1.80 8.32	500.00 500.00 500.00 500.00 500.00 500.00 500.00	64.40 25.00 5.00 5.00 2.40 27.00 1.00	0.48 11.26 33.95 14.11 3.90 223.82 28.10 185.00 40.80 85.00 0.84	238.10 238.10 238.10 238.10 238.10 238.10 238.10 238.10 238.10 238.10 238.10 238.10	1,308.40 13.40 71.00 15.00 6.80 652.00 23.60 370.40 32.40 123.80 552.40	1.47 1.52 0.98 2.68 1.55 1.10	452.54 476.19 413.19 476.19 476.19 476.19 476.70	7,334.80 3,510.80 2,753.40 834.80 235.80 17,748.80
CASTILLA Y LEON (total) Avila Burgos Leon Palencia Salamanca Segovia Soria Valladolid Zamora	8.99	416.67	2.80	22.54 5.56 5.26 13.86 14.81 1.31 3.46 6.84	500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00	1,723.60 118.40 392.20 408.60 16.80 26.00 20.20 481.60 21.40 238.40 6.80 283.60	5.70 6.04 7.11 1.80	500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00	64.40 25.00 5.00 5.00 2.40 27.00 1.00 1,518.20	0.48 11.26 33.95 14.11 3.90 223.82 28.10 185.00 40.80 85.00 0.84 0.44	238.10 238.10 238.10 238.10 238.10 238.10 238.10 238.10 238.10 238.10 238.10 238.10 238.10	1,308.40 13.40 71.00 15.00 6.80 652.00 23.60 370.40 32.40 123.80 552.40 57,078.60	1.47 1.52 0.98 2.68 1.55 1.10 1.39	452.54 476.19 413.19 476.19 476.19 476.19 474.70 476.00	7,334.80 3,510.80 2,753.40 834.80 235.80 17,748.80 347,046.40
CASTILLA Y LEON (total) Avila Burgos Leon Palencia Salamanca Segovia Soria Valladolid Zamora MADRID (total) CASTILLA-LA MANCHA (total) Albacete	8.99	416.67	2.80	22.54 5.56 5.26 13.86 14.81 1.31 3.46 6.84 9.39 9.82	500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00	1,723.60 118.40 392.20 408.60 16.80 26.00 20.20 481.60 21.40 238.40 6.80 283.60 17.80	5.70 6.04 7.11 1.80 8.32 64.11	500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00	64.40 25.00 5.00 5.00 2.40 27.00 1.00 1,518.20 902.00	0.48 11.26 33.95 14.11 3.90 223.82 28.10 185.00 40.80 85.00 0.84 0.44 10,147.60	238.10 238.10 238.10 238.10 238.10 238.10 238.10 238.10 238.10 238.10 238.10 238.10 238.10 238.10	1,308.40 13.40 71.00 15.00 6.80 652.00 23.60 370.40 32.40 123.80 552.40 552.40 57,078.60 32,272.60	1.47 1.52 0.98 2.68 1.55 1.10 1.39 1.44	452.54 476.19 413.19 476.19 476.19 476.70 476.00 474.40	7,334.80 3,510.80 2,753.40 834.80 235.80 17,748.80 347,046.40 33,259.00
CASTILLA Y LEON (total) Avila Burgos Leon Palencia Salamanca Segovia Soria Valladolid Zamora MADRID (total) CASTILLA-LA MANCHA (total)	8.99	416.67	2.80	22.54 5.56 5.26 13.86 14.81 1.31 3.46 6.84 9.39 9.82 13.39	500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00	1,723.60 118.40 392.20 408.60 16.80 26.00 20.20 481.60 21.40 238.40 6.80 283.60 17.80 89.00	5.70 6.04 7.11 1.80 8.32 64.11 3.77	500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00	64.40 25.00 5.00 5.00 2.40 27.00 1.518.20 902.00 36.40	0.48 11.26 33.95 14.11 3.90 223.82 28.10 185.00 40.80 85.00 0.84 0.44 10,147.60 4,593.61	238.10 238.10 238.10 238.10 238.10 238.10 238.10 238.10 238.10 238.10 238.10 238.10 238.10 238.10 238.10	1,308.40 13.40 71.00 15.00 6.80 652.00 23.60 370.40 32.40 123.80 552.40 557,078.60 32,272.60 4,386.60	1.47 1.52 0.98 2.68 1.55 1.10 1.39 1.44 1.73	452.54 476.19 413.19 476.19 476.19 476.19 476.00 474.40 476.19	7,334.80 3,510.80 2,753.40 834.80 235.80 17,748.80 347,046.40 33,259.00 141,256.40
CASTILLA Y LEON (total) Avila Burgos Leon Palencia Salamanca Segovia Soria Valladolid Zamora MADRID (total) CASTILLA-LA MANCHA (total) Albacete Ciudad Real Cuenca	8.99	416.67	2.80	22.54 5.56 5.26 13.86 14.81 1.31 3.46 6.84 9.39 9.82 13.39 5.68	500.00 500.00	1,723.60 118.40 392.20 408.60 16.80 26.00 20.20 481.60 21.40 238.40 6.80 283.60 17.80 89.00 92.60	5.70 6.04 7.11 1.80 8.32 64.11	500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00	64.40 25.00 5.00 5.00 2.40 27.00 1.00 1,518.20 902.00	0.48 11.26 33.95 14.11 3.90 223.82 28.10 185.00 40.80 85.00 0.84 0.44 10,147.60 4,593.61 5,190.25	238.10 238.10 238.10 238.10 238.10 238.10 238.10 238.10 238.10 238.10 238.10 238.10 238.10 238.10 238.10	1,308.40 13.40 71.00 15.00 6.80 652.00 23.60 370.40 32.40 123.80 52.40 57,078.60 32,272.60 4,386.60 12,442.00	1.47 1.52 0.98 2.68 1.55 1.10 1.39 1.44 1.73 0.49	452.54 476.19 413.19 476.19 476.19 476.19 476.00 474.40 476.19 476.03	7,334.80 3,510.80 2,753.40 834.80 235.80 17,748.80 347,046.40 33,259.00 141,256.40 36,725.60
CASTILLA Y LEON (total) Avila Burgos Leon Palencia Salamanca Segovia Soria Valladolid Zamora MADRID (total) CASTILLA-LA MANCHA (total) Albacete Ciudad Real Cuenca Guadalajara	8.99	416.67	2.80	22.54 5.56 5.26 13.86 14.81 1.31 3.46 6.84 9.39 9.82 13.39 5.68 4.99	500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00	1,723.60 118.40 392.20 408.60 16.80 26.00 20.20 481.60 21.40 238.40 6.80 283.60 17.80 89.00 92.60 38.00	 5.70 6.04 7.11 1.80 8.32 64.11 3.77 4.00 	500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00	64.40 25.00 5.00 5.00 2.40 27.00 1.518.20 902.00 36.40 0.60	0.48 11.26 33.95 14.11 3.90 223.82 28.10 185.00 40.80 85.00 0.84 0.44 10,147.60 4,593.61 5,190.25 93.00	238.10 238.10 238.10 238.10 238.10 238.10 238.10 238.10 238.10 238.10 238.10 238.10 238.10 238.10 238.10 238.10 238.10	1,308.40 13.40 71.00 15.00 6.80 652.00 23.60 370.40 32.40 123.80 552.40 552.40 552.40 552.40 552.40 552.40 123.80 32 ,272.60 32 ,272.60 32 ,272.60 32 ,272.60 32 ,472.60 12 ,442.00 11 9.60	1.47 1.52 0.98 2.68 1.55 1.10 1.39 1.44 1.73 0.49 0.61	452.54 476.19 413.19 476.19 476.19 476.19 474.40 476.19 476.03 476.19	7,334.80 3,510.80 2,753.40 834.80 235.80 17,748.80 347,046.40 33,725.60 141,256.40 36,725.60 17,322.00
CASTILLA Y LEON (total) Avila Burgos Leon Palencia Salamanca Segovia Soria Valladolid Zamora MADRID (total) CASTILLA-LA MANCHA (total) Albacete Ciudad Real Cuenca Guadalajara Toledo	8.99 10.42	416.67 416.67	2.80	22.54 5.56 5.26 13.86 14.81 1.31 3.46 6.84 9.39 9.82 13.39 5.68 4.99 13.29	500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00	1,723.60 118.40 392.20 408.60 16.80 26.00 20.20 481.60 21.40 238.40 6.80 283.60 17.80 89.00 92.60 38.00 46.20	 5.70 6.04 7.11 1.80 8.32 64.11 3.77 4.00 3.25 	500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00	64.40 25.00 5.00 2.40 27.00 1.518.20 902.00 36.40 0.60 579.20	0.48 11.26 33.95 14.11 3.90 223.82 28.10 185.00 40.80 85.00 0.84 0.44 10,147.60 4,593.61 5,190.25 93.00 4,795.62	238.10 238.10 238.10 238.10 238.10 238.10 238.10 238.10 238.10 238.10 238.10 238.10 238.10 238.10 238.10 238.10 238.10 238.10 238.10	1,308.40 13.40 71.00 15.00 6.80 652.00 23.60 370.40 32.40 123.80 552.40 552.40 552.40 552.40 552.40 552.40 552.40 552.40 552.40 552.40 552.40 552.40 552.40 552.40 552.40 552.40 552.40 552.40 552.40 552.40 552.40 552.40 552.40 552.40 552.40 552.40 552.40 552.40 552.40 552.40 552.40 552.40 552.40 552.40 552.40 552.40 552.40 552.40 552.40 552.40 552.40 552.40 552.40 552.40 552.40 552.40 552.40 552.40 552.40 552.40 552.40 552.40 552.40 552.40 552.40 552.40 552.40 552.40 552.40 552.40 552.40 552.40 552.40 552.40 552.40 552.40 552.40 552.40 552.40 552.40 552.40 552.40 552.40 552.40 552.40 552.40 552.40 552.40 552.40 552.40 552.40 552.40 552.50 552.50 552.50 552.50 552.50 552.50 552.50 552.50 552.50 552.50 552.50 552.50 552.50 552.50 552.50 552.50 552.50 552.50 552.50 552.50 552.50 552.50 552.50 552.50 552.50 552.50 552.50 552.50 552.50 552.50 552.50 552.50 552.50 552.50 552.50 552.50 552.50 552.50 552.50 552.50 552.50 552.50 552.50 552.50 552.50 552.50 552.50 552.50 552.50 552.50 552.50 552.50 552.50 552.50 552.50 552.50 552.50 552.50 552.50 552.50 552.50 552.50 552.50 552.50 552.50 552.50 552.50 552.50 552.50 552.50 552.50 552.50 552.50 552.50 552.50 552.50 552.50 552.50 552.50 552.50 552.50 552.50 552.50 552.50 552.50 552.50 552.50 552.50 552.50 552.50 552.50 552.50 552.50 552.50 552.50 552.50 552.50 552.50 552.50 552.50 552.50 552.50 552.50 552.50 552.50 552.50 552.50 552.50 552.50 552.50 552.50 552.50 552.50 552.50 552.50 	1.47 1.52 0.98 2.68 1.55 1.10 1.39 1.44 1.73 0.49 0.61 1.35	452.54 476.19 413.19 476.19 476.19 476.19 474.40 476.19 476.03 476.19 476.03 476.19 476.19 476.19	7,334.80 3,510.80 2,753.40 834.80 235.80 17,748.80 347,046.40 33,2259.00 141,256.40 36,725.60 17,322.00 118,483.40
CASTILLA Y LEON (total) Avila Burgos Leon Palencia Salamanca Segovia Soria Valladolid Zamora MADRID (total) CASTILLA-LA MANCHA (total) Albacete Ciudad Real Cuenca Guadalajara Toledo C. VALENCIANA (total)	8.99	416.67 416.67 416.67	2.80 2.80 65,325.60	22.54 5.56 5.26 13.86 14.81 1.31 3.46 6.84 9.39 9.82 13.39 5.68 4.99 13.29 16.76	500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00	1,723.60 118.40 392.20 408.60 16.80 26.00 20.20 481.60 21.40 238.40 6.80 283.60 17.80 89.00 92.60 38.00 46.20 889.80	5.70 6.04 7.11 1.80 8.32 64.11 3.77 4.00 3.25 35.43	500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00	64.40 25.00 5.00 2.40 27.00 1.00 1,518.20 902.00 36.40 0.60 579.20 1,985.60	0.48 11.26 33.95 14.11 3.90 223.82 28.10 185.00 40.80 85.00 0.84 0.44 10,147.60 4,593.61 5,190.25 93.00 4,795.62 0.35	238.10 238.10 238.10 238.10 238.10 238.10 238.10 238.10 238.10 238.10 238.10 238.10 238.10 238.10 238.10 238.10 238.10 238.10 238.10	1,308.40 13.40 71.00 15.00 6.80 652.00 23.60 370.40 32.40 12.80 552.40 57,078.60 32,272.60 4,386.60 12,442.00 119.60 7,857.80 89,677.40	1.47 1.52 0.98 2.68 1.55 1.10 1.39 1.44 1.73 0.49 0.61 1.35 1.15	452.54 476.19 413.19 476.19 476.19 476.19 476.00 474.40 476.19 476.03 476.19 476.19 476.19 476.19	7,334.80 3,510.80 2,753.40 834.80 235.80 17,748.80 33,259.00 141,256.40 36,725.60 17,322.00 118,483.40 86,135.80
CASTILLA Y LEON (total) Avila Burgos Leon Palencia Salamanca Segovia Soria Valladolid Zamora MADRID (total) CASTILLA-LA MANCHA (total) Albacete Ciudad Real Cuenca Guadalajara Toledo C. VALENCIANA (total) Alicante	8.99 10.42	416.67 416.67 416.67 416.67	2.80 2.80 65,325.60 12,880.20	22.54 5.56 5.26 13.86 14.81 1.31 3.46 6.84 9.39 9.82 13.39 5.68 4.99 13.29	500.00 500.00	1,723.60 118.40 392.20 408.60 16.80 26.00 20.20 481.60 21.40 238.40 6.80 238.40 6.80 283.60 17.80 89.00 92.60 38.00 46.20 889.80 613.80	 5.70 6.04 7.11 1.80 8.32 64.11 3.77 4.00 3.25 	500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00	64.40 25.00 5.00 2.40 27.00 1,518.20 902.00 36.40 0.60 579.20 1,985.60 365.40	0.48 11.26 33.95 14.11 3.90 223.82 28.10 185.00 40.80 85.00 0.84 0.44 10,147.60 4,593.61 5,190.25 93.00 4,795.62 0.35 13,023.83	238.10 238.10	1,308.40 13.40 71.00 15.00 6.80 652.00 23.60 370.40 32.40 123.80 552.40 552.40 552.40 32,272.60 4,386.60 12,442.00 119.60 7,857.80 89,677.40 23,150.60	1.47 1.52 0.98 2.68 1.55 1.10 1.39 1.44 1.73 0.49 0.61 1.35 1.15 1.26	452.54 476.19 413.19 476.19 476.19 476.19 476.00 474.40 476.19 476.03 476.19 476.19 476.19 476.19 476.19	7,334.80 3,510.80 2,753.40 834.80 235.80 17,748.80 33,259.00 141,256.40 36,725.60 173,22.00 118,483.40 86,135.80 26,801.40
CASTILLA Y LEON (total) Avila Burgos Leon Palencia Salamanca Segovia Soria Valladolid Zamora MADRID (total) CASTILLA-LA MANCHA (total) Albacete Ciudad Real Cuenca Guadalajara Toledo C. VALENCIANA (total) Alicante Castellon	8.99 10.42	416.67 416.67 416.67 416.67 416.67	2.80 2.80 65,325.60 12,880.20 5,149.80	22.54 5.56 5.26 13.86 14.81 1.31 3.46 6.84 9.39 9.82 13.39 5.68 4.99 13.29 16.76	500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00	1,723.60 118.40 392.20 408.60 16.80 20.20 481.60 21.40 238.40 6.80 283.60 17.80 89.00 92.60 38.00 46.20 889.80 613.80 96.00	5.70 6.04 7.11 1.80 8.32 64.11 3.77 4.00 3.25 35.43	500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00	64.40 25.00 5.00 5.00 2.40 27.00 1,518.20 902.00 36.40 0.60 579.20 1,985.60 365.40 344.80	0.48 11.26 33.95 14.11 3.90 223.82 28.10 185.00 40.80 85.00 0.84 0.44 10,147.60 4,593.61 5,190.25 93.00 4,795.62 0.35 13,023.83 9,182.20	238.10 238.10 238.10 238.10 238.10 238.10 238.10 238.10 238.10 238.10 238.10 238.10 238.10 238.10 238.10 238.10 238.10 238.10 238.10	1,308.40 13.40 71.00 15.00 6.80 652.00 23.60 370.40 32.40 123.80 552.40 557,078.60 32,272.60 4,386.60 12,442.00 119.60 7,857.80 89,677.40 23,150.60 36,238.80	1.47 1.52 0.98 2.68 1.55 1.10 1.39 1.44 1.73 0.49 0.61 1.35 1.15 1.26 0.91	452.54 476.19 413.19 476.19 476.19 476.19 476.00 474.40 476.19 476.03 476.19 476.19 476.19 476.19 475.03 473.19 476.00	7,334.80 3,510.80 2,753.40 834.80 235.80 17,748.80 347,046.40 33,259.00 141,256.40 36,725.60 17,322.00 118,483.40 86,135.80 26,801.40 31,835.80
CASTILLA Y LEON (total) Avila Burgos Leon Palencia Salamanca Segovia Soria Valladolid Zamora MADRID (total) CASTILLA-LA MANCHA (total) Albacete Ciudad Real Cuenca Guadalajara Toledo C. VALENCIANA (total) Alicante Castellon Valencia	8.99 10.42	416.67 416.67 416.67 416.67 416.67 416.67	2.80 2.80 65,325.60 12,880.20	22.54 5.56 5.26 13.86 14.81 1.31 3.46 6.84 9.39 9.82 13.39 5.68 4.99 13.29 16.76	500.00 500.00	1,723.60 118.40 392.20 408.60 16.80 26.00 20.20 481.60 21.40 238.40 283.60 17.80 89.00 92.60 38.00 46.20 889.80 613.80 96.00 180.00	5.70 6.04 7.11 1.80 8.32 64.11 3.77 4.00 3.25 35.43 8.74	500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00	64.40 25.00 5.00 5.00 2.40 27.00 1,518.20 902.00 36.40 0.60 579.20 1,985.60 365.40 344.80 1,275.40	0.48 11.26 33.95 14.11 3.90 223.82 28.10 185.00 40.80 85.00 40.80 85.00 185.00 40.84 0.44 10,147.60 4,593.61 5,190.25 93.00 4,795.62 93.00 4,795.62 13,023.83 9,182.20 9,329.60	238.10 238.10	1,308.40 13.40 71.00 15.00 6.80 652.00 23.60 370.40 32.40 123.80 552.40 552.40 552.40 32,272.60 4,386.60 12,442.00 119.60 7,857.80 89,677.40 23,150.60	1.47 1.52 0.98 2.68 1.55 1.10 1.39 1.44 1.73 0.49 0.61 1.35 1.15 1.26 0.91 1.30	452.54 476.19 413.19 476.19 476.19 476.19 476.19 476.00 474.40 476.19 476.03 476.19 476.03 475.03 473.19 475.03	7,334.80 3,510.80 2,753.40 834.80 235.80 17,748.80 347,046.40 33,259.00 141,256.40 36,725.60 17,322.00 118,483.40 86,135.80 26,801.40 31,835.80 27,498.60
CASTILLA Y LEON (total) Avila Burgos Leon Palencia Salamanca Segovia Soria Valladolid Zamora MADRID (total) CASTILLA-LA MANCHA (total) Albacete Ciudad Real Cuenca Guadalajara Toledo C. VALENCIANA (total) Alicante Castellon Valencia R. DE MURCIA (total)	8.99 10.42 12.92	416.67 416.67 416.67 416.67 416.67 416.67 416.67 416.67	2.80 2.80 65,325.60 12,880.20 5,149.80 47,295.60 8,710.60	22.54 5.56 5.26 13.86 14.81 1.31 3.46 6.84 9.39 9.82 13.39 5.68 4.99 13.29 16.76 11.57	500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00	1,723.60 118.40 392.20 408.60 16.80 26.00 20.20 481.60 21.40 238.40 283.60 17.80 89.00 92.60 38.00 46.20 889.80 613.80 96.00 180.00 180.00	 5.70 6.04 7.11 1.80 8.32 64.11 3.77 4.00 3.25 35.43 8.74 56.54 	500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00	64.40 25.00 5.00 2.40 27.00 1,518.20 902.00 36.40 0.60 579.20 1,985.60 365.40 344.80 1,275.40 9,221.40	0.48 11.26 33.95 14.11 3.90 223.82 28.10 185.00 40.80 85.00 40.80 85.00 40.80 85.00 40.80 85.00 40.80 85.00 40.80 85.00 10.45 10.45 10.45 13.023.83 13.023.83 9.482.20 9.329.60 0.35	238.10 238.10	1,308.40 13.40 71.00 15.00 6.80 652.00 23.60 370.40 32.40 123.80 57,078.60 32,272.60 4,386.60 12,442.00 119.60 7,857.80 89,677.40 23,150.60 36,238.80 30,288.00 67,864.60	1.47 1.52 0.98 2.68 1.55 1.10 1.39 1.44 1.73 0.49 0.61 1.35 1.15 1.26 0.91 1.30 2.69	452.54 476.19 413.19 476.19 476.19 476.19 476.19 476.00 474.40 476.19 476.03 476.19 476.19 476.19 476.03 476.19 476.00 475.71 465.29	7,334.80 3,510.80 2,753.40 834.80 235.80 17,748.80 347,046.40 33,259.00 141,256.40 36,725.60 17,322.00 118,483.40 86,135.80 26,801.40 31,835.80 27,498.60 19,604.60
CASTILLA Y LEON (total) Avila Burgos Leon Palencia Salamanca Segovia Soria Valladolid Zamora MADRID (total) CASTILLA-LA MANCHA (total) Albacete Ciudad Real Cuenca Guadalajara Toledo C. VALENCIANA (total) Alicante Castellon Valencia	8.99 10.42	416.67 416.67 416.67 416.67 416.67 416.67	2.80 2.80 65,325.60 12,880.20 5,149.80 47,295.60	22.54 5.56 5.26 13.86 14.81 1.31 3.46 6.84 9.39 9.82 13.39 5.68 4.99 13.29 16.76	500.00 500.00	1,723.60 118.40 392.20 408.60 16.80 26.00 20.20 481.60 21.40 238.40 283.60 17.80 89.00 92.60 38.00 46.20 889.80 613.80 96.00 180.00	5.70 6.04 7.11 1.80 8.32 64.11 3.77 4.00 3.25 35.43 8.74	500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00 500.00	64.40 25.00 5.00 5.00 2.40 27.00 1,518.20 902.00 36.40 0.60 579.20 1,985.60 365.40 344.80 1,275.40	0.48 11.26 33.95 14.11 3.90 223.82 28.10 185.00 40.80 85.00 40.80 85.00 185.00 40.84 0.44 10,147.60 4,593.61 5,190.25 93.00 4,795.62 93.00 4,795.62 13,023.83 9,182.20 9,329.60	238.10 238.10	1,308.40 13.40 71.00 15.00 6.80 652.00 23.60 370.40 32.40 123.80 57,078.60 32,272.60 4,386.60 12,442.00 119.60 7,857.80 89,677.40 23,150.600 36,238.80 30,288.00	1.47 1.52 0.98 2.68 1.55 1.10 1.39 1.44 1.73 0.49 0.61 1.35 1.15 1.26 0.91 1.30	452.54 476.19 413.19 476.19 476.19 476.19 476.19 476.00 474.40 476.19 476.03 476.19 476.03 475.03 473.19 475.03	7,334.80 3,510.80 2,753.40 834.80 235.80 17,748.80 347,046.40 33,259.00 141,256.40 36,725.60 17,322.00 118,483.40 86,135.80 26,801.40 31,835.80 27,498.60

Caceres		416.67	2.60		500.00	8.60		500.00	511.00	301.20	238.10	377.40	0.99	391.64	74,344.60
ANDALUCIA (total)	819.39	416.67	58,340.80	26.21	500.00	570.40	88.50	500.00	4,228.80	0.28	238.10	147,118.00	3.41	461.06	1,516,060.80
Almeria		416.67	4,646.20		500.00	28.60		500.00	40.60	9,250.60	238.10	54,610.40	3.14	475.13	18,109.00
Cadiz		416.67	2,016.00		500.00	15.00		500.00	67.40	177.00	238.10	201.40	2.22	476.16	21,883.00
Cordoba		416.67	10,641.20		500.00	77.80		500.00	331.20	678.40	238.10	801.40	3.82	473.43	338,550.20
Granada	7.71	416.67	867.80	18.26	500.00	292.00	15.20	500.00	720.60	23,122.03	238.10	71,544.20	2.58	476.17	184,185.60
Huelva		416.67	11,312.00		500.00	25.00		500.00	722.00	315.20	238.10	368.60	1.16	447.34	32,622.80
Jaen	7.52	416.67	4.80	20.08	500.00	64.80	19.40	500.00	203.20	1,577.78	238.10	3,030.20	3.48	475.99	581,771.80
Malaga		416.67	4,464.40		500.00	52.40		500.00	120.20	3,504.20	238.10	14,837.60	2.90	464.12	124,778.40
Sevilla		416.67	24,388.40		500.00	14.80		500.00	2,023.60	2,527.20	238.10	1,724.20	4.03	385.52	214,160.00
CANARIAS (total)	5.98	416.67	1,075.20	5.55	500.00	321.20	7.31	500.00	117.60	0.23	238.10	203.00	1.76	406.41	217.00
Las Palmas	7.20	416.67	637.80	9.65	500.00	137.40	10.46	500.00	51.20	9.73	238.10	40.40	1.65	394.29	181.40
S.C. de Tenerife	4.42	416.67	437.40	3.15	500.00	183.80	5.33	500.00	66.40	35.68	238.10	162.60	2.40	468.16	35.60

Mean Annual Temperature (°C)

Greece	
GREECE (total)	14.00
EASTERN MACEDONIA & THRACE (total)	12.00
Rodopi	12.00
Drama	11.00
Evros	12.00
Thasos	13.00
Kavala	13.00
Xanthi	12.00
CENTRAL MACEDONIA (total)	12.00
Thessaloniki	13.00
Imathia	12.00
Kilkis	13.00
Pella	12.00
Pieria	12.00
Serres	12.00
Chalkidiki	13.00
WESTERN MACEDONIA (total)	10.00
Kozani	11.00
Grevena	11.00
Kastoria	9.00
Florina	10.00
EPIRUS (total)	13.00
Ioannina	11.00
Arta	14.00
Thesprotia	14.00
Preveza	14.00
THESSALY (total)	12.00
Larissa	12.00
Karditsa	12.00
Magnesia	13.00
Sporades Islands	13.00
Trikala	12.00
CENTRAL GREECE (total)	12.00
Pthiotida	12.00
Viotia	13.00
Evia	14.00
Evritania	10.00
Fokida	11.00
IONIAN ISLANDS (total)	16.00
Corfu	16.00
Zakynthos	16.00
Ithaka	16.00
Kefallonia	16.00

Lefkada	16.00
WESTERN GREECE (total)	14.00
Achaia	13.00
Etoloakarnania	14.00
llia	16.00
PELOPONNESE (total)	13.00
Arkadia	12.00
Argolida	12.00
Korinthia	12.00
Lakonia	15.00
Mesinia	15.00
ATTICA (total)	14.00
Athens Central Section	14.00
Athens North Section	14.00
Athens West Section	14.00
Athens South Section	13.00
Athens East Section	14.00
West Attica	14.00
Piraeus	16.00
Attica Islands	16.00
NORTHERN AEGEAN (total)	15.00
Lesvos	14.00
Ikaria	15.00
Limnos	14.00
Samos	15.00
Chios	15.00
SOUTHERN AEGEAN (total)	16.00
Syros	16.00
Andros	16.00
Santorini	16.00
Kalimnos	16.00
Karpathos	16.00
Kythnos	16.00
Kos	16.00
Milos	16.00
Mykonos	16.00
Naxos	16.00
Paros	16.00
Rhodes	16.00
Tinos	16.00
CRETE (total)	14.00
Heraklion	15.00
Lasithi	14.00
Rethymno	14.00
Chania	15.00

Mean Annual Temperature (°C)

Italy	1
ITALIA (total)	9.00
PIEMONTE (total)	9.00
Torino	7.00
Vercelli	8.00
Novara	10.00
Cuneo	8.00
Asti	10.00
Alessandria	10.00
Biella	9.00
Verbano Cusio Ossola	6.00
VALLE D' AOSTA (total)	4.00
Aosta	4.00
LOMBARDIA (total)	9.00
Varese	10.00
Como	9.00
Sondrio	4.00
Milano	10.00
Bergamo	8.00
Brescia	9.00
Pavia	10.00
Cremona	10.00
Mantova	11.00
Lecco	9.00
Lodi	10.00
Monza e della Brianza	10.00
LIGURIA (total)	11.00
Imperia	11.00
Savona	10.00
Genova	10.00
La Spezia	11.00
TRENTINO ALTO ADIGE (total)	6.00
Bolzano/Bozen	5.00
Trento	6.00
VENETO (total)	10.00
Verona	10.00
Vicenza	10.00
Belluno	6.00
Treviso	11.00
Venezia	11.00
Padova	11.00
Rovigo	11.00
FRIULLI VENEZIA GIULIA (total)	10.00
Udine	9.00

Storizia11.00Trieste11.00Pordenone10.00EMILIA ROMAGNA (total)10.00Piacenza9.00Reggio nell' Emilia9.00Modena10.00Bologna10.00Ferrara11.00Ravenna11.00Forli Cesena10.00Rimini10.00TOSCANA (total)11.00Massa Carrara11.00Lucca11.00Pistoia10.00Firenze11.00Livorno13.00Pisa12.00Arezzo10.00Siena11.00Grosseto13.00Prato11.00UMBRIA (total)12.00Perugia11.00MARCHE (total)11.00Macerata11.00Arczo10.00Fermo11.00Chora11.00Marcha11.00Perugia11.00Marcha11.00Marcha11.00Perugia11.00Marcha11.00Marcha11.00Marcha11.00Marcha11.00Marcha11.00Marcha11.00Fermo11.00Carpo10.00Frosinone13.00Albuizzo (total)13.00Frosinone13.00Albuizzo (total)10.00Frosinone13.00Prosinone13.00Prosinone13.00Prosinone1	Gorizia	11.00
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Viterbo 13.00 Rieti 11.00 Roma 14.00 Latina 15.00 Frosinone 13.00 ABRUZZO (total) 10.00 L'Aquila 9.00 Teramo 10.00 Pescara 11.00 Chieti 11.00 MOLISE (total) 12.00	Fermo	11.00
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ABRUZZO (total) 10.00 L'Aquila 9.00 Teramo 10.00 Pescara 11.00 Chieti 11.00 MOLISE (total) 12.00	Latina	15.00
L'Aquila 9.00 Teramo 10.00 Pescara 11.00 Chieti 11.00 MOLISE (total) 12.00	Frosinone	13.00
L'Aquila 9.00 Teramo 10.00 Pescara 11.00 Chieti 11.00 MOLISE (total) 12.00	ABRUZZO (total)	10.00
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Pescara11.00Chieti11.00MOLISE (total)12.00		
Chieti11.00MOLISE (total)12.00	Pescara	
MOLISE (total) 12.00		
	MOLISE (total)	

Isernia	11.00
CAMPANIA (total)	13.00
Caserta	13.00
Benevento	13.00
Napoli	15.00
Avellino	12.00
Salerno	13.00
PUGLIA (total)	14.00
Foggia	13.00
Bari	13.00
Taranto	14.00
Brindisi	14.00
Lecce	14.00
Barletta Andria Trani	13.00
BASILICATA (total)	
	13.00
Potenza	12.00
Matera	14.00
CALABRIA (total)	14.00
Cosenza Catanzaro	13.00 14.00
Reggio di Calabria	14.00
Crotone Vibo Valentia	14.00 14.00
SICILIA (total)	14.00
	15.00
Trapani Palermo	
Messina	14.00 14.00
	14.00
Agrigento Caltanissetta	16.00
Enna Catapia	14.00
Catania	15.00
Ragusa Siracusa	16.00
	16.00
SARDEGNA (total)	14.00
Sassari	14.00
Nuoro	13.00
Cagliari Oristano	15.00
	15.00
Olbia Tempio	14.00
Ogliastra	13.00
Medio Campidano	15.00
Carbonia Iglesias	15.00

Mean Annual Temperature (°C)

Spain	
ESPANA (total)	11.00
GALICIA (total)	12.00
A Coruna	13.00
Lugo	12.00
Ourense	12.00
Pontevedra	13.00
PAIS VASCO (total)	12.00
Alava	11.00
Guipuzcoa	12.00
Vizcaya	13.00
P. DE ASTURIAS (total)	11.00
CANTABRIA (total)	12.00
NAVARRA (total)	11.00
LA RIOJA (total)	11.00
ARAGON (total)	11.00
Huesca	11.00
Teruel	11.00
Zaragoza	12.00
CATALUNA (total)	12.00
Barcelona	12.00
Girona	12.00
Lleida	10.00
Tarragona	13.00
BALEARES (total)	16.00
CASTILLA Y LEON (total)	11.00
Avila	11.00
Burgos	10.00
Leon	9.00
Palencia	10.00
Salamanca	12.00
Segovia	11.00
Soria	10.00
Valladolid	12.00
Zamora	11.00
MADRID (total)	12.00
CASTILLA-LA MANCHA (total)	12.00
Albacete	12.00
Ciudad Real	14.00
Cuenca	12.00
Guadalajara	11.00
Toledo	14.00
C. VALENCIANA (total)	13.00
Alicante	15.00

Castellon	12.00
Valencia	13.00
R. DE MURCIA (total)	14.00
EXTREMADURA (total)	15.00
Badajoz	15.00
Caceres	14.00
ANDALUCIA (total)	16.00
Almeria	14.00
Cadiz	18.00
Cordoba	16.00
Granada	13.00
Huelva	17.00
Jaen	15.00
Malaga	15.00
Sevilla	17.00
CANARIAS (total)	11.00
Las Palmas	11.00
S.C. de Tenerife	11.00

l _Y	
Increase of yield due to:	5%
only fertigation	5.00%
only mulching	5.00%
only cover crops	5.00%
fertigation & mulching	10.00%
fertigation & cover crops	10.00%
cover crops & mulching	8.00%
fertigation & mulching & cover crops	12.00%

23.4

		Content	t	1
		R _N , R _K , R	l _P	I
Nitrogen fertilizers	Ammonium bicarbonate	17.718%	N	
	Ammonium nitrate	34.998%	Ν	
	Ammonium sulphate	21.200%	Ν	
	Ammonium sulphate nitrate (ASN)	nium sulphate nitrate (ASN) 26.000% N rous ammonia 82.245% N n ammonium nitrate (CAN) 27.000% N n nitrate 15.000% N 46.646% N mmonium nitrate solution (UAN) 32 32.000% N		
	Anhydrous ammonia	82.245%	Ν	
	Calcium ammonium nitrate (CAN)	27.000%	Ν	
	Calcium nitrate	15.000%	Ν	
	Urea	46.646%	Ν	
	Urea ammonium nitrate solution (UAN) 32	32.000%	Ν	
	Urea ammonium nitrate solution (UAN) 30	30.000%	Ν	
	Urea ammonium nitrate solution (UAN) 28	28.000%	Ν	
Potassium fertilizers	Potassium sulphate	54.055%	K ₂ O	
	Muriate of potash (MOP) / Potassium chloride	60.000%	K ₂ O	
Phosphorus fertilizers	Rock Phosphate	28.000%	P_2O_5	
	Single super phosphate (SSP)	20.000%	P_2O_5	
	Triple super phosphate (TSP)	45.000%	P_2O_5	
Complex fertilizers	Diammonium phosphate (DAP)	18.000%	Ν	
	Monoammonium phosphate (MAP)	12.000%	Ν	

EF _N 1.3	00 4.763	tn CO ₂ /tn of fertilizer
D₅ ΕF κ 0.2	00 0.733	tn CO ₂ /tn of fertilizer
0 EF _P 0.1	50 0.550	tn CO ₂ /tn of fertilizer
CE Source:	Carbon Equiva	alent

Fertilization strategy									
	Greece		Italy			Spain			
ΤM _N	range	e	mean value	rang	e	mean value	range		mean value
N	(tn/ha/y	ear)	(tn/ha/year)	(tn/ha/	/ear)	(tn/ha/year)	(tn/ha/yea	ar)	(tn/ha/year)
Orange	0.1200	0.3000	0.2100	0.1400	0.1700	0.1550	0.1200	0.2500	0.1850
Apple	0.2000	0.3000	0.2500	0.0850	0.1350	0.1100	0.2000	0.2200	0.2100
Peach	0.1000	0.2000	0.1500	0.0800	0.1300	0.1050	0.1000	0.2000	0.1500
Almond	0.1000	0.1500	0.1250	0.0900	0.1400	0.1150	0.0750	0.1250	0.1000
Olive	0.0867	0.1734	0.1300	0.0700	0.1150	0.0925	0.0800	0.0900	0.0850
	Greece		Italy		Spain				
TM _P	range	e	mean value	rang	e	mean value	range		mean value
P ₂ O ₅	(tn/ha/y	ear)	(tn/ha/year)	(tn/ha/year)		(tn/ha/year)	(tn/ha/year)		(tn/ha/year)
Orange	0.0600	0.0900	0.0750	0.0180	0.0250	0.0215	0.0600	0.1000	0.0800
Apple	0.0500	0.0800	0.0650	0.0070	0.0300	0.0185	0.0500	0.0800	0.0650
Peach	0.0400	0.0600	0.0500	0.0500	0.0900	0.0700	0.0400	0.0600	0.0500
Almond	0.0200	0.0240	0.0220	0.0200	0.0400	0.0300	0.0200	0.0240	0.0220
Olive	0.0173	0.0312	0.0243	0.0450	0.0950	0.0700	0.0001	0.0002	0.0001
		Greece			Italy			Spain	
τм _κ	range	e	mean value	rang	e	mean value	range		mean value
K ₂ O	(tn/ha/y	ear)	(tn/ha/year)	(tn/ha/	/ear)	(tn/ha/year)	(tn/ha/yea	ar)	(tn/ha/year)
Orange	0.0500	0.0900	0.0700	0.1400	0.2500	0.1950	0.0500	0.0900	0.0700
Apple	0.1500	0.3000	0.2250	0.1250	0.1850	0.1550	0.1500	0.2500	0.2000
Peach	0.1000	0.2000	0.1500	0.0700	0.1300	0.1000	0.0600	0.0700	0.0650
Almond	0.1000	0.1500	0.1250	0.1200	0.2000	0.1600	0.0200	0.0320	0.0260
Olive	0.1734	0.3468	0.2601	0.0420	0.1100	0.0760	0.0010	0.0020	0.0015

If cover crops by the Leguminosae family are used, the requirements for Nitrogen-fertilizers are reduced by: 0.08

 N_{L}

tn N/ha/year for all species

	$\mathbf{RF}_{\mathbf{f}_{\mathbf{FGT}}}$	
If fertigation is used, there is a	15.00%	reduction (average value) on the quantity of fertilizers used

Pesticides categories		
Herbicides	н	include herbicides, dessicants, defoliants
Insecticides	L. L.	include insecticides, acaricides, nematocides, mineral
Fungicides	F	include fungicides, bactericides, seed treatment
Plant Growth Regulators	GR	

References

[1] Lal, R., "Carbon emission from farm operations", Environment International, Elsevier, pp. 981-990, 2004 (doi:10.1016/j.envint.2004.03.005)

Audsley, E., Stacey, K., Parsons, D.J., Williams, A.G., Cranfield University, "Estimation of the greenhouse gas emissions from agricultural pesticide manufacture and use", August 2009

[3] Green, M.B., "Energy in pesticide manufacture, distribution and use", Energy in Plant Nutrition and Pest Control, Elsevier, Amsterdam, p.165-177, 1987

ED _{H_ai} , ED _{I_ai} , E	D _{F_ai} , ED _{GR_ai}	Value of CO ₂ emis and transportation	sions due to production, formulation n of pesticides	, packaging
MJ/Kg a.i.	Source	Kg CO ₂ /Kg a.i.	Active Ingredient (a.i.)	Category
		24.550	Herbicides (general)	н
107.00	[2] (Table 8)	14.118	2,4-D	н
155.00	[2] (p. 13)	20.451	2,4,5-T	н
297.50	[2] (p. 13)	39.253	Alachlor	н
453.60	[2] (p. 13)	59.850	Bentazon	н
160.80	[2] (p. 13)	21.217	Butylate	н
190.00	[2] (p. 13)	25.069	Chloramben	н
385.40	[2] (p. 13)	50.851	Chlorsulfuron	н
221.00	[2] (Table 8)	29.160	Cyanazine	н
315.00	[2] (p. 13)	41.563	Dicamba	н
100.00	[2] (p. 13)	13.194	Dinoseb	н
420.00	[2] (Table 8)	55.417	Diquat	н
294.50	[2] (p. 13)	38.858	Diuron	н
179.80	[2] (p. 13)	23.724	EPTC	н
538.00	[2] (p. 13)	70.986	Fluazifop-butyl	н
374.60	[2] (p. 13)	49.426	Fluometuron	н
474.00	[2] (Table 8)	62.542	Glyphosate	н
310.00	[2] (Table 8)	40.903	Linuron	н
148.00	[2] (Table 8)	19.528	МСРА	н
295.80	[2] (p. 13)	39.029	Metolachlor	н
479.40	[2] (p. 13)	63.254	Paraquat	н
310.00	[2] (p. 13)	40.903	Propachlor	н
171.00	[2] (Table 8)	22.563	Trifluralin	н
240.00	[2] (p. 13)	31.667	Propanil	н
302.00	[2] (Table 8)	39.847	Bromoxynil	н
302.00	[2] (Table 8)	39.847	Carbetamide	н
291.00	[2] (Table 8)	38.396	Chloridazon	н
367.00	[2] (Table 8)	48.424	Chlorotoluron	н
432.00	[2] (Table 8)	57.000	Clopyralid	н
540.00	[2] (Table 8)	71.250	Diflufenican	н
367.00	[2] (Table 8)	48.424	Ethofumesate	н
691.00	[2] (Table 8)	91.174	Florasulam	н
648.00	[2] (Table 8)	85.500	Flufenacet	н
518.00	[2] (Table 8)	68.347	Fluroxypyr	н
691.00	[2] (Table 8)	91.174	Iodosulfuron-methyl-sodium	н
378.00	[2] (Table 8)	49.875	Isoproturon	н
194.00	[2] (Table 8)	25.597	Mecoprop-P	н
659.00	[2] (Table 8)	86.951	Mesosulfuron-methyl	н
691.00	[2] (Table 8)	91.174	Mesotrione	н
432.00	[2] (Table 8)	57.000	Metamitron	н
388.00	[2] (Table 8)	51.194	Metazachlor	н
518.00	[2] (Table 8)	68.347	Metsulfuron-methyl	н
594.00	[2] (Table 8)	78.375	Nicosulfuron	н
421.00	[2] (Table 8)	55.549	Pendimethalin	н
345.00	[2] (Table 8)	45.521	Phenmedipham	н
561.00	[2] (Table 8)	74.021	Propaquizafop	н
410.00	[2] (Table 8)	54.097	Propyzamide	н

626.00	[2] (Table 8)	82.597	Prosulfuron	н
540.00	[2] (Table 8)	71.250	Thifensulfuron-methyl	н
270.00	[2] (Table 8)	35.625	Tri-allate	н
540.00	[2] (Table 8)	71.250	Tribenuron-methyl	н
		57.000	,	
432.00	[2] (Table 8)		Triclopyr	н
680.00	[2] (Table 8)	89.722	Trifloxystrobin	н
		20.153	Insecticides (general)	
180.00	[2] (p. 13)	23.750	Methyl parathion	
229.00	[2] (p. 13)	30.215	Phorate	
474.00	[2] (p. 13)	62.542	Carbofuran	
173.00	[2] (p. 13)	22.826	Carbaryl	
78.00	[2] (p. 13)	10.292	Toxaphene	
600.00	[2] (Table 8)	79.167	Cypermethrin	
270.20	[2] (p. 13)	35.651	Chlordimeform	
248.80	[2] (p. 13)	32.828	Malathion	I
158.00	[2] (p. 13)	20.847	Parathion	
89.80	[2] (p. 13)	11.849	Methoxychlor	
226.00	[2] (Table 8)	29.819	1,3-dichloropropene	
518.00	[2] (Table 8)	68.347	Alpha-cypermethrin	
324.00	[2] (Table 8)	42.750	Chlorpyrifos	<u> </u>
334.00	[2] (Table 8)	44.069	Ethoprophos	
529.00	[2] (Table 8)	69.799	Lambda-cyhalothrin	
148.00	[2] (Table 8)	19.528	Metaldehyde	
345.00	[2] (Table 8)	45.521	Oxamyl	
486.00	[2] (Table 8)	64.125	Tau-fluvalinate	
615.00	[2] (Table 8)	81.146	Zeta-cypermethrin	
		15.756	Fungicides (general)	F
101.00	[2] (p. 13)	13.326	Ferbam	F
119.00	[2] (p. 13)	15.701	Maneb	F
135.00	[2] (p. 13)	17.813	Captan	F
417.00	[2] (p. 13)	55.021	Benomyl	F
615.00	[2] (Table 8)	81.146	Azoxystrobin	F
713.00	[2] (Table 8)	94.076	Boscalid	F
410.00	[2] (Table 8)	54.097	Carbendazim	F
313.00	[2] (Table 8)	41.299	Chlorothalonil	F
442.00	[2] (Table 8)	58.319	Cymoxanil	F
551.00	[2] (Table 8)	72.701	Cyproconazole	F
637.00	[2] (Table 8)	84.049	Cyprodinil	F
626.00	[2] (Table 8)	82.597	Epoxiconazole	F
475.00	[2] (Table 8)	62.674	Fenpropimorph	F
594.00	[2] (Table 8)	78.375	Fluazinam	F
637.00	[2] (Table 8)	84.049	Fluoxastrobin	F
529.00	[2] (Table 8)	69.799	Flusilazole	F
518.00	[2] (Table 8)	68.347	Kresoxim-methyl	F
280.00	[2] (Table 8)	36.944	Mancozeb	F
659.00	[2] (Table 8)	86.951	Metalaxyl-M	F
615.00	[2] (Table 8)	81.146	Metconazole	F
713.00	[2] (Table 8)	94.076	Metrafenone	F
453.00	[2] (Table 8)	59.771	Prochloraz	F
464.00	[2] (Table 8)	61.222	Propamocarb hydrochloride	F
475.00	[2] (Table 8)	62.674	Prothioconazole	F

702.00	[2] (Table 8)	92.625	Pyraclostrobin	F
669.00	[2] (Table 8)	88.271	Spiroxamine	F
		15.756	Sulphur	F
551.00	[2] (Table 8)	72.701	Tebuconazole	F
264.00	[2] (Table 4)	34.833	Growth Regulators (general)	GR
270.00	[2] (Table 8)	35.625	Chlormequat	GR
194.00	[2] (Table 8)	25.597	Ethephon	GR
518.00	[2] (Table 8)	68.347	Imazaquin	GR
151.00	[2] (Table 8)	19.924	Maleic hydrazide	GR
583.00	[2] (Table 8)	76.924	Trinexapac-ethyl	GR

Currently applied pesticides practices

Orange		ТМ _{аі}				_
Type of pesticide	Active Ingredient (a.i.)	Total Annual Quantity of a.i. (Kg a.i./ha/year)	Kg CO ₂ /Kg a.i.	Kg CO ₂ /ha/year	tn CO ₂ /ha/year	-
н	Glyphosate	6.7500	62.542	422.156	0.42216	_
			Herbicides Total	422.156	0.42216	tn CO ₂ /ha/year
						_
I	Acetamiprid	0.2000	20.153	4.031	0.00403	_
I	Parrafinic oil	14.7750	20.153	297.761	0.29776	
	Abamectin	0.0180	20.153	0.363	0.00036	
l	Deltamethrin	0.0125	20.153	0.252	0.00025	_
			Insecticides Total	302.407	0.30241	tn CO₂/ha/year
						_
F	Copper	1.5000	15.756	23.634	0.02363	
			Fungicides Total	23.634	0.02363	tn CO ₂ /ha/year
GR					0.00000	
			Plant Growth Reg. Total	0.000	0.00000	tn CO ₂ /ha/year

Apple		TM _{ai}				
Type of pesticide	Active Ingredient (a.i.)	Total Annual Quantity of a.i. (Kg a.i./ha/year)	Kg CO ₂ /Kg a.i.	Kg CO ₂ /ha/year	tn CO ₂ /ha/year	_
н	Glyphosate	6.7500	62.542	422.156	0.42216	_
			Herbicides Total	422.156	0.42216	tn CO₂/ha/year
1	Acetamiprid	0.1400	20.153	2.821	0.00282	-
	Deltamethrin	0.0250	20.153	0.504	0.00050	_
	Beta-cyfluthrin	0.0250	20.153	0.504	0.00050	-
	Abamectin	0.0360	20.153	0.726	0.00073	_
1	Hexythiazox	0.0500	20.153	1.008	0.00101	-
			Insecticides Total	5.562	0.00556	tn CO ₂ /ha/year
						_
F	Difeconazole	0.2250	15.756	3.545	0.00355	_
F	Trifloxystrobin	0.1500	89.722	13.458	0.01346	_
F	Cyprodinil	0.5000	84.049	42.024	0.04202	_
F	Myclobutanil	0.1920	15.756	3.025	0.00303	_
F	Dodine	0.8000	15.756	12.605	0.01260	
F	Kresoxim methyl	0.3000	15.756	4.727	0.00473	_
F	Dithianon	0.4200	15.756	6.618	0.00662	_
F	Tebuconazole	0.3000	72.701	21.810	0.02181	_
			Fungicides Total	107.812	0.10781	tn CO ₂ /ha/year
CD					0.00000	_
GR			Plant Growth Reg. Total	0.000	0.00000 0.00000	tn CO ₂ /ha/year
			Fiant Growth Reg. Total	0.000	0.00000	th CO ₂ /ha/yea

Peach		TM _{ai}				
Type of pesticide	Active Ingredient (a.i.)	Total Annual Quantity of a.i. (Kg a.i./ha/year)	Kg CO₂/Kg a.i.	Kg CO₂/ha/year	tn CO₂/ha/year	
н	Glyphosate	8.1000	62.542	506.588	0.50659	_
			Herbicides Total	506.588	0.50659	tn CO ₂ /ha/year
						_
l	Paraffinic oil	9.8500	20.153	198.508	0.19851	_
I	Acetamiprid	0.0600	20.153	1.209	0.00121	_
I	Abamectin	0.0180	20.153	0.363	0.00036	_
	Chlorantraniliprole	0.1200	20.153	2.418	0.00242	
			Insecticides Total	202.498	0.20250	tn CO ₂ /ha/year
						_
F	Ziram	2.2800	15.756	35.924	0.03592	
F	Captan	2.4900	17.813	44.353	0.04435	
F	Thiophanate-methyl	0.7000	15.756	11.029	0.01103	
F	Myclobutanil	0.0960	15.756	1.513	0.00151	
F	Sulphur	2.0000	15.756	31.512	0.03151	_
			Fungicides Total	124.331	0.12433	tn CO₂/ha/year
					0.00000	-
GR						

Almond		TM _{ai}				
Type of pesticide	Active Ingredient (a.i.)	Total Annual Quantity of a.i. (Kg a.i./ha/year)	Kg CO ₂ /Kg a.i.	Kg CO ₂ /ha/year	tn CO₂/ha/year	_
н	Glyphosate	6.7500	62.542	422.156	0.42216	_
			Herbicides Total	422.156	0.42216	tn CO ₂ /ha/year
						_
I	Parrafinic oil	19.7000	20.153	397.015	0.39702	_
I	Deltamethrin	0.0250	20.153	0.504	0.00050	
			Insecticides Total	397.519	0.39752	tn CO ₂ /ha/year
						_
F	Copper	3.3750	15.756	53.177	0.05318	
			Fungicides Total	53.177	0.05318	tn CO ₂ /ha/year
						_
GR					0.00000	
			Plant Growth Reg. Total	0.000	0.00000	tn CO ₂ /ha/year

Olive		TM _{ai}				
Type of pesticide	Active Ingredient (a.i.)	Total Annual Quantity of a.i. (Kg a.i./ha/year)	Kg CO ₂ /Kg a.i.	Kg CO₂/ha/year	tn CO ₂ /ha/year	_
н	Glyphosate	6.7500	62.542	422.156	0.42216	_
			Herbicides Total	422.156	0.42216	tn CO ₂ /ha/year
						_
I	Lamda cyhalothrin	0.0400	20.153	0.806	0.00081	_
I	Pyriproxyfen	0.3000	20.153	6.046	0.00605	_
I	Thiacloprid	0.3600	20.153	7.255	0.00726	
			Insecticides Total	14.107	0.01411	tn CO ₂ /ha/year
						_
F	Dodine	1.6320	15.756	25.714	0.02571	_
F	Copper	9.0000	15.756	141.804	0.14180	_
			Fungicides Total	167.518	0.16752	tn CO₂/ha/year
						_
GR					0.00000	
			Plant Growth Reg. Total	0.000	0.00000	tn CO ₂ /ha/year

Reduction of Herbicides consumption if cover crops and/or mulching are used						
RF _H	cover crops	mulching				
Orange	90.00%	20.00%				
Apple	60.00%	20.00%				
Peach	90.00%	20.00%				
Almond	90.00%	20.00%				
Olive	90.00%	20.00%				

Reduction of Insecticides consumption if insects monitoring and/or mass trapping are applied						
RF	monitoring	mass trapping				
Orange	60.00%	90.00%				
Apple	50.00%	50.00%				
Peach	40.00%	50.00%				
Almond	70.00%	30.00%				
Olive	60.00%	70.00%				

	CO ₂ Emission Factors			
	Electricity generation (Greece 2016)	0.000623	tn CO ₂ /KWh	Source
EF _{EL}	Electricity generation (Italy 2016)	0.000256	tn CO ₂ /KWh	European Environment Agency
	Electricity generation (Spain 2016)	0.000265	tn CO ₂ /KWh	
	Electricity generation (input to Algorithm)	0.000623	tn CO ₂ /KWh	

Fossil Fuel	Diesel	Gasoline	Source
Net Calorific Value [NCV] (GJ/tn)	43.00	44.30	IPCC Guidelines for National Greenhouse Gas Inventories, Vol. 2, Chapter 1 [Table 1.2], 2006
Carbon content (Kg C/GJ)	20.20	18.90	IPCC Guidelines for National Greenhouse Gas Inventories, Vol. 2, Chapter 1 [Table 1.3], 2006
Density (Kg/m³)	832.00	745.00	JRC, TANK-TO-WHEELS (TTW) Report, Version 3, October 2008 [Table 2.1]
CO ₂ emissions			
Mobile combustion (Kg CO ₂ /TJ)	74,100.00	69,300.00	IPCC Guidelines for National Greenhouse Gas Inventories, Vol. 2, Chapter 3 [Table 3.2.1], 2006
Mobile combustion (Kg CO ₂ /GJ)	74.10	69.30	
WTT [Well To Tank] (Kg CO ₂ /GJ)	14.70	13.10	JRC, WELL-TO-TANK (WTT) Report, Version 4a, January 2014, doi:10.2790/95629
CO ₂ Emissions (Kg CO ₂ /lt)	3.18	2.72	
CO_2 Emissions (tn CO_2 /lt)	0.003177	0.002719	
	EF _D	EF _G	

Fuel	Wood	Diesel	Source
Net Calorific Value [NCV] (GJ/tn)	15.60	43.00	IPCC Guidelines for National Greenhouse Gas Inventories, Vol. 2, Chapter 1 [Table 1.2], 2006
Carbon content (Kg C/GJ)	30.50	20.20	IPCC Guidelines for National Greenhouse Gas Inventories, Vol. 2, Chapter 1 [Table 1.3], 2006
Density (Kg/m ³)		832.00	JRC, TANK-TO-WHEELS (TTW) Report, Version 3, October 2008 [Table 2.1]
<u>CO₂ emissions</u>			
Stationary combustion (Kg CO ₂ /TJ)	112,000.00	74,100.00	IPCC Guidelines for National Greenhouse Gas Inventories, Vol. 2, Chapter 2 [Tables 2.3, 2.4, 2.5], 2006
Stationary combustion (Kg CO ₂ /GJ)	112.00	74.10	
WTT [Well To Tank] (Kg CO ₂ /GJ)		14.70	JRC, WELL-TO-TANK (WTT) Report, Version 4a, January 2014, doi:10.2790/95629
CO ₂ Emissions (Kg CO ₂ /lt)		3.18	
CO ₂ Emissions (tn CO ₂ /lt)		0.003177	
1 tn of Wood is equal in terms of NCV to	0.3628	tn of Diesel	= 436.04651 lt of Diesel
Burning 1 tn of Wood* as solid fuel saves	1.38528	tn CO ₂	that would be emitted if Diesel was used

*Fresh Wood, not Dry Wood

EF_{GE}: Global ca	arbon intensity of electricity gene	475.000 gCO ₂ /KWh 0.475 KgCO ₂ /KWh					
Source : International Energy Agency, "Global Energy & CO ₂ Status Report, The latest trends in energy and emissions in 2018", 2019							
1.00	MJ	= 0.2777777777	8 KWh	K ₂			
K ₁	3.66419	mass conversion coefficient fro	m C to CO ₂				

	Typical Annu	al consumptions of fos	sil fuels & electricity
	TM _D	ΤΜ _G	TM _{EL}
Greece	Diesel (lt/ha/year)	Gasoline (lt/ha/year)	Electricity (KWh/ha/year)
Orange	187.50	12.50	280.00
Apple	758.45	47.97	170.00
Peach	433.33	20.00	180.00
Almond	250.00	20.00	113.00
Olive	141.10	25.00	14.29
Italy	Diesel (lt/ha/year)	Gasoline (It/ha/year)	Electricity (KWh/ha/year)
Orange	460.00	12.50	280.00
Apple	810.00	47.97	170.00
Peach	440.00	20.00	180.00
Almond	220.00	20.00	113.00
Olive	270.00	25.00	14.29
Spain	Diesel (lt/ha/year)	Gasoline (lt/ha/year)	Electricity (KWh/ha/year)
Orange	187.50	12.50	280.00
Apple	758.45	47.97	170.00
Peach	433.33	20.00	180.00
Almond	250.00	20.00	113.00
Olive	141.10	25.00	14.29

Reduction of Diesel consumption if fertigation is applied	
	RF _{D_FGT}
	%
Orange	12.00%
Apple	5.00%
Peach	12.00%
Almond	20.00%
Olive	14.00%

	RF _{EL_m}	
If mulching is applied, a	30.00%	reduction on the consumption of irrigation water is achieved and therefore the same reduction on the electricity demands (electricity is mainly used for the operation of the irrigation pumps)

Coefficients

Symbol	Value	Unit	Definition
C _w	0.47500	tn C/tn of dry wood	carbon content of wood
K ₁	3.66419		mass conversion coefficient from C to CO_2

Atomic Masses

Element	Symbol	Value
Carbon	С	12.01070
Oxygen	0	15.99940
Nitrogen	Ν	14.00670
Hydrogen	Н	1.00794
Sulfur	S	32.06500
Calcium	Са	40.07800
Potassium	К	39.09830
Phosphorus	Р	30.97376
Chlorine	Cl	35.45300

Molecular Masses

Molecule	Symbol	Value
Carbon dioxide	CO ₂	44.00950
Ammonium bicarbonate	NH ₄ HCO ₃	79.05530
Ammonium nitrate	NH ₄ NO ₃	80.04336
Ammonium sulphate	(NH ₄) ₂ SO ₄	132.13952
Ammonium sulphate nitrate (ASN)	2NH ₄ NO ₃ x (NH ₄) ₂ SO ₄	292.22624
Anhydrous ammonia	NH ₃	17.03052
Calcium ammonium nitrate (CAN)	$5Ca(NO_3)_2 \times NH_4NO_3 \bullet 10H_2O$	1,080.63516
Calcium nitrate	$Ca(NO_3)_2$	164.08780
Urea	CH ₄ N ₂ O	60.05526
Potassium sulphate	K ₂ SO ₄	174.25920
Potassium chloride	KCI	74.55130
Diammonium phosphate		





Annex III CO₂RCCT runs



Op

Tree crops' CO2 Removal Capacity Calculation Tool (CO2RCCT)



terra nova

Designed and developed by TERRA NOVA Ltd.

Results

Country where the Tool is applied:	Greece
Species of tree crop:	Orange
Geographical area of the cultivation:	GREECE (total)

Conventional

CO2 Annual Removal Capacity

R1.1	ARC	273,802.4302 tn CO2/year	CO2 Annual Removal Capacity	(BF is included)
R1.2	ARC	218,437.3456 tn CO2/year	CO2 Annual Removal Capacity	(BF is not included)
				6

The term "CO2 Removal" means the abstraction of CO2 from atmosphere

Agricultural practice:

BF: the fruits' biomass

Analysis

R2.1		AR _{BF}	55,365.0845 tn CO2/year	CO2 Annual Removal due to the production of fruit biomass	
R2.2	als	AR _{BW}	300,878.0321 tn CO2/year	CO2 Annual Removal due to the production of wood biomass	
R2.3	19 C	ASs	7,223.6095 tn CO2/year	CO2 Annual Storage in soil as carbon of the fallen biomass	
R2.4	Rei	TAR	363,466.7262 tn CO2/year	CO2 Total Annual Removals	(BF is included)
R2.5		TAR	308,101.6417 tn CO2/year	CO2 Total Annual Removals	(BF is not included)

a. It has to be underlined an important difference between ARC and TAR:

ARC is the result of the CO2 mass balance between (a) the total quantity of CO2 which is abstracted from the atmosphere [=TAR] by the tree in order to create biomass and (b) the total quantity of CO2 which is emitted to the atmosphere due to the agricultural practices which are applied for the cultivation of the tree.

R3.1	s	AE _f	37,063.1211 tn CO2/year	CO2 Annual Emissions due to the use of fertilizers
R3.2	22 sion	AEp	25,353.3549 tn CO2/year	CO2 Annual Emissions due to the use of pesticides
R3.3	uis C	AE _{ff&e}	27,247.8201 tn CO2/year	CO2 Annual Emissions due to the use of fossil fuels & electricity
R3.4		TAE	89,664.2960 tn CO2/year	CO2 Total Annual Emissions
		-		
	R4.1	AE _D	20,184.8514 tn CO2/year	CO2 Annual Emissions due to the use of diesel
	R4.2	AE _G	1,151.9053 tn CO2/year	CO2 Annual Emissions due to the use of gasoline
	R4.3	AE _{EL}	5,911.0634 tn CO2/year	CO2 Annual Emissions due to the use of electricity
	R4.4	AE _{ff&e}	27,247.8201 tn CO2/year	CO2 Annual Emissions due to the use of fossil fuels & electricity

R5.1		AG _{N-f_LCC}	0.0000 tn CO2/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (use of Leguminosae cover crops)
R5.2		AG _{f_FGT}	0.0000 tn CO2/year	CO2 Annual Gain due to fertilizers reduction (use of fertigation)
R5.3		AG _{H_cc/m}	0.0000 tn CO2/year	CO2 Annual Gain due to herbicides reduction (use of cover crops/mulching)
R5.4		AG _{I_im/mt}	0.0000 tn CO2/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping)
R5.5	ain 02	AG _{WF}	80,021.1785 tn CO2/year	CO2 Annual Gain due to the use of wood fuels instead of diesel
R5.6	0.0	AG _{RES}	0.0000 tn CO2/year	CO2 Annual Gain due to the use of Renewable Energy Sources
R5.7		AG _{EL_m}	0.0000 tn CO2/year	CO2 Annual Gain due to electricity reduction (use of mulching)
R5.8		AG _{D_FGT}	0.0000 tn CO2/year	CO2 Annual Gain due to diesel reduction (use of fertigation)
R5.9		TAG	80,021.1785 tn CO2/year	CO2 Total Annual Gain

	ARCproduct	0.34901	tn CO2/tn of yield/year	CO2 Annual Removal Capacity per unit of harvested fruits	(BF is included)
	ARCtree	0.01812	tn CO2/tree/year	CO2 Annual Removal Capacity per tree unit	
	ARCarea	6.44625	tn CO2/hectare/year	CO2 Annual Removal Capacity per unit of cultivated area	
	ARCproduct	0.27844	tn CO2/tn of yield/year	CO2 Annual Removal Capacity per unit of harvested fruits	(BF is not included)
	ARCtree	0.01446	tn CO2/tree/year	CO2 Annual Removal Capacity per tree unit	
	TAE/TAR	0.24669	Total Annual CO2 Emissions/ Total Ann		(BF is included)
	TAE/TAR	0.29102	Total Annual CO2 Emissions/ Total Ann	ual CO2 Removals	(BF is not included)
_					
	TAR _{area}	10.72618	tn CO2/hectare/year	CO2 Total Annual Removals per unit of cultivated area	
	TAR _{product}	0.46330	tn CO2/tn of yield/year	CO2 Total Annual Removals per unit of harvested fruits	(BF is included)
	TAR _{tree}	0.02405	tn CO2/tree/year	CO2 Total Annual Removals per tree unit	
_					
	TAR _{area}	9.09232	tn CO2/hectare/year	CO2 Total Annual Removals per unit of cultivated area	
-	TAR _{product}	0.39273	tn CO2/tn of yield/year	CO2 Total Annual Removals per unit of harvested fruits	(BF is not included)
	TAR _{tree}	0.02039	tn CO2/tree/year	CO2 Total Annual Removals per tree unit	
	4.0	1 (22207	to CO2/hostore/user	CO2 Appual Removal due to the production of fruit biomass new unit of sultivisted area	
	AR _{BF_area}	1.63387	tn CO2/hectare/year	CO2 Annual Removal due to the production of fruit biomass per unit of cultivated area CO2 Annual Removal due to the production of fruit biomass per unit of harvested fruits	
	AR _{BF_product}	0.07057	tn CO2/tn of yield/year		
	AR _{BF_tree}	0.00366	tn CO2/tree/year	CO2 Annual Removal due to the production of fruit biomass per tree unit	
	AR	8.87914	to CO2/bectare/year	CO2 Annual Removal due to the production of wood biomass per unit of cultivated area	
-	AR _{BW_area}	0.38352	tn CO2/hectare/year	CO2 Annual Removal due to the production of wood biomass per unit of cultivated area	
8	AR _{BW_product}	0.01991	tn CO2/tn of yield/year	CO2 Annual Removal due to the production of wood biomass per tree unit	
	AR _{BW_tree}	0.01991	tn CO2/tree/year	Co2 Annuar Removar due to the production of wood biomass per tree unit	
	AS _{S_area}	0.21317	tn CO2/hectare/year	CO2 Annual Storage in soil as carbon of the fallen biomass per unit of cultivated area	
H		0.00921	tn CO2/tn of yield/year	CO2 Annual Storage in soil as carbon of the fallen biomass per unit of harvested fruits	
H	AS _{S_product} AS _{S_tree}	0.00048	tn CO2/tried/year	CO2 Annual Storage in soil as carbon of the fallen biomass per tree unit	
	hus_tree	0.00040		een rannaar stordige in son as earbon or the ranker allonists per tree dant	
Г	TAEarea	2.64606	tn CO2/hectare/year	CO2 Total Annual Emissions per unit of cultivated area	
	TAEproduct	0.11429	tn CO2/tn of yield/year	CO2 Total Annual Emissions per unit of harvested fruits	
	TAE _{tree}	0.00593	tn CO2/tree/year	CO2 Total Annual Emissions per tree unit	
					· · · · · · · · · · · · · · · · · · ·
ιΓ	AE _{f area}	1.09376	tn CO2/hectare/year	CO2 Annual Emissions due to the use of fertilizers per unit of cultivated area	
2	AE _{f_product}	0.04724	tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of fertilizers per unit of harvested fruits	
3	AE _{f tree}	0.00245	tn CO2/tree/year	CO2 Annual Emissions due to the use of fertilizers per tree unit	
		0.00245			
_	AE _{p area}	0.74820	tn CO2/hectare/year	CO2 Annual Emissions due to the use of pesticides per unit of cultivated area	
	AE _{p_area} AE _{p_product}		tn CO2/hectare/year tn CO2/tn of yield/year		
	AE _{p_area} AE _{p_product} AE _{p_tree}	0.74820		CO2 Annual Emissions due to the use of pesticides per unit of cultivated area	
	AE _{p_product}	0.74820 0.03232	tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of pesticides per unit of cultivated area CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits	
	AE _{p_product}	0.74820 0.03232	tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of pesticides per unit of cultivated area CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits	
	AE _{p_product} AE _{p_tree} AE _{ff&e_area}	0.74820 0.03232 0.00168	tn CO2/tn of yield/year tn CO2/tree/year	CO2 Annual Emissions due to the use of pesticides per unit of cultivated area CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits CO2 Annual Emissions due to the use of pesticides per tree unit	
	AE _{p_product} AE _{p_tree}	0.74820 0.03232 0.00168 0.80410	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year	CO2 Annual Emissions due to the use of pesticides per unit of cultivated area CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits CO2 Annual Emissions due to the use of pesticides per tree unit CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area	
	AE _{p_product} AE _{p_tree} AE _{ff&e_area} AE _{ff&e_product}	0.74820 0.03232 0.00168 0.80410 0.03473	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of pesticides per unit of cultivated area CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits CO2 Annual Emissions due to the use of pesticides per tree unit CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits	
	AE _{p_product} AE _{p_tree} AE _{ff&e_area} AE _{ff&e_product} AE _{ff&e_tree} AE _{ff&e_area}	0.74820 0.03232 0.00168 0.80410 0.03473	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of pesticides per unit of cultivated area CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits CO2 Annual Emissions due to the use of pesticides per tree unit CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits	
	AE _{p_product} AE _{p_tree} AE _{ff&e_area} AE _{ff&e_product} AE _{ff&e_tree} AE _{ff&e_area}	0.74820 0.03232 0.00168 0.80410 0.03473 0.00180	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year	CO2 Annual Emissions due to the use of pesticides per unit of cultivated area CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits CO2 Annual Emissions due to the use of pesticides per tree unit CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per tree unit CO2 Annual Emissions due to the use of fossil fuels & electricity per tree unit CO2 Annual Emissions due to the use of diesel per unit of cultivated area CO2 Annual Emissions due to the use of diesel per unit of cultivated area CO2 Annual Emissions due to the use of diesel per unit of harvested fruits	
	AE _{p_product} AE _{p_tree} AE _{ff&e_area} AE _{ff&e_product} AE _{ff&e_tree}	0.74820 0.03232 0.00168 0.80410 0.03473 0.00180 0.59567	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year	CO2 Annual Emissions due to the use of pesticides per unit of cultivated area CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits CO2 Annual Emissions due to the use of pesticides per tree unit CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per tree unit CO2 Annual Emissions due to the use of fossil fuels & electricity per tree unit CO2 Annual Emissions due to the use of fossil fuels & electricity per tree unit	
	AE _{p_product} AE _{p_tree} AE _{ff&e_area} AE _{ff&e_product} AE _{ff&e_tree} AE _{ff&e_cree} AE _{D_area}	0.74820 0.03232 0.00168 0.80410 0.03473 0.00180 0.59567 0.02573 0.00134	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of pesticides per unit of cultivated area CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits CO2 Annual Emissions due to the use of pesticides per tree unit CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per tree unit CO2 Annual Emissions due to the use of diesel per unit of cultivated area CO2 Annual Emissions due to the use of diesel per unit of harvested fruits CO2 Annual Emissions due to the use of diesel per unit of harvested fruits CO2 Annual Emissions due to the use of diesel per unit of harvested fruits CO2 Annual Emissions due to the use of diesel per unit of harvested fruits CO2 Annual Emissions due to the use of diesel per unit of harvested fruits CO2 Annual Emissions due to the use of diesel per unit of harvested fruits CO2 Annual Emissions due to the use of diesel per unit of harvested fruits CO2 Annual Emissions due to the use of diesel per unit of harvested fruits	
	AE _{p_product} AE _{p_tree} AE _{ff&e_area} AE _{ff&e_product} AE _{ff&e_tree} AE _{ff&e_cree} AE _{D_area}	0.74820 0.03232 0.00168 0.80410 0.03473 0.00180 0.59567 0.02573	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of pesticides per unit of cultivated area CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits CO2 Annual Emissions due to the use of pesticides per tree unit CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per tree unit CO2 Annual Emissions due to the use of diesel per unit of cultivated area CO2 Annual Emissions due to the use of diesel per unit of harvested fruits CO2 Annual Emissions due to the use of diesel per unit of harvested fruits CO2 Annual Emissions due to the use of diesel per unit of cultivated area CO2 Annual Emissions due to the use of diesel per tree unit CO2 Annual Emissions due to the use of diesel per tree unit CO2 Annual Emissions due to the use of gasoline per unit of cultivated area CO2 Annual Emissions due to the use of gasoline per unit of cultivated area	
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	AE _{p_product} AE _{p_tree} AE _{ff&e_area} AE _{ff&e_product} AE _{ff&e_tree} AE _{D_area} AE _{D_broduct} AE _{D_tree} AE _{D_tree}	0.74820 0.03232 0.00168 0.80410 0.03473 0.00180 0.59567 0.02573 0.00134	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/tree/year tn CO2/tree/year	CO2 Annual Emissions due to the use of pesticides per unit of cultivated area CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits CO2 Annual Emissions due to the use of pesticides per tree unit CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per tree unit CO2 Annual Emissions due to the use of diesel per unit of cultivated area CO2 Annual Emissions due to the use of diesel per unit of harvested fruits CO2 Annual Emissions due to the use of diesel per unit of harvested fruits CO2 Annual Emissions due to the use of diesel per unit of cultivated area CO2 Annual Emissions due to the use of diesel per tree unit CO2 Annual Emissions due to the use of diesel per tree unit CO2 Annual Emissions due to the use of gasoline per unit of cultivated area CO2 Annual Emissions due to the use of gasoline per unit of cultivated area	
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R21.2	TAGproduct	0.10200	tn CO2/tn of yield/year	CO2 Total Annual Gain per unit of harvested fruits
R21.3	TAG _{tree}	0.00530	tn CO2/tree/year	CO2 Total Annual Gain per tree unit
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R22.1	AG _{N-f_LCC_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (Leguminosae cover crops) per unit of cultivated area
R22.2	AG _{N-f_LCC_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (Leguminosae cover crops) per unit of harvested fruits
R22.3	AG _{N-f_LCC_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (Leguminosae cover crops) per tree unit
R23.1	AG _{f_FGT_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to fertilizers reduction (fertigation) per unit of cultivated area
R23.2	AG _{f_FGT_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to fertilizers reduction (fertigation) per unit of harvested fruits
R23.3	AG _{f_FGT_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to fertilizers reduction (fertigation) per tree unit
R24.1	AG _{H_cc/m_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to herbicides reduction (cover crops/mulching) per unit of cultivated area
R24.2	AG _{H_cc/m_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to herbicides reduction (cover crops/mulching) per unit of harvested fruits
R24.3	AG _{H_cc/m_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to herbicides reduction (cover crops/mulching) per tree unit
R25.1	AG _{I_im/mt_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping) per unit of cultivated area
R25.2	AGI_im/mt_product	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping) per unit of harvested fruits
R25.3	AG _{I_im/mt_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping) per tree unit
R26.1	AG _{WF_area}	2.36149	tn CO2/hectare/year	CO2 Annual Gain due to the use of wood fuels instead of diesel per unit of cultivated area
R26.2	AG _{WF_product}	0.10200	tn CO2/tn of yield/year	CO2 Annual Gain due to the use of wood fuels instead of diesel per unit of harvested fruits
R26.3	AG _{WF_tree}	0.00530	tn CO2/tree/year	CO2 Annual Gain due to the use of wood fuels instead of diesel per tree unit
R27.1	AG _{RES_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to the use of RES per unit of cultivated area
R27.2	AG _{RES_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to the use of RES per unit of harvested fruits
R27.3	AG _{RES_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to the use of RES per tree unit

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Tree crops' CO2 Removal Capacity Calculation Tool (CO2RCCT)



terra nova

Designed and developed by TERRA NOVA Ltd.

Results

Country where the Tool is applied:	Greece
Species of tree crop:	Apple
Geographical area of the cultivation:	GREECE (total)

Conventional

CO2 Annual Removal Capacity

R1.1	ARC	28,514.7385 tn CO2/year	CO2 Annual Removal Capacity	(BF is included)
R1.2	ARC	9,768.3514 tn CO2/year	CO2 Annual Removal Capacity	(BF is not included)

The term "CO2 Removal" means the abstraction of CO2 from atmosphere

Agricultural practice:

BF: the fruits' biomass

Analysis

R2.1		AR _{BF}	18,746.3871 tn CO2/year	CO2 Annual Removal due to the production of fruit biomass	
R2.2	als	AR _{BW}	58,442.8502 tn CO2/year	CO2 Annual Removal due to the production of wood biomass	
R2.3	õ È	ASs	2,069.4325 tn CO2/year	CO2 Annual Storage in soil as carbon of the fallen biomass	
R2.4	- Ba	TAR	79,258.6698 tn CO2/year	CO2 Total Annual Removals	(BF is included)
R2.5		TAR	60,512.2827 tn CO2/year	CO2 Total Annual Removals	(BF is not included)

a. It has to be underlined an important difference between ARC and TAR:

ARC is the result of the CO2 mass alance between (a) the total quantity of CO2 which is abstracted from the atmosphere [=TAR] by the tree in order to create biomass and (b) the total quantity of CO2 which is emitted to the atmosphere due to the agricultural practices which are applied for the cultivation of the tree.

R3.1	s	AE _f	15,212.9910 tn CO2/year	CO2 Annual Emissions due to the use of fertilizers
R3.2	2 si	AEp	5,980.9490 tn CO2/year	CO2 Annual Emissions due to the use of pesticides
R3.3	uis C	AE _{ff&e}	29,549.9912 tn CO2/year	CO2 Annual Emissions due to the use of fossil fuels & electricity
R3.4		TAE	50,743.9312 tn CO2/year	CO2 Total Annual Emissions
	R4.1	AED	26,910.2182 tn CO2/year	CO2 Annual Emissions due to the use of diesel
	R4.2	AE _G	1,456.9426 tn CO2/year	CO2 Annual Emissions due to the use of gasoline
	R4.3	AE _{EL}	1,182.8304 tn CO2/year	CO2 Annual Emissions due to the use of electricity
	R4.4	AE _{ff&e}	29,549.9912 tn CO2/year	CO2 Annual Emissions due to the use of fossil fuels & electricity

R5.1		AG _{N-f_LCC}	0.0000 tn CO2/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (use of Leguminosae cover crops)
R5.2		AG _{f_FGT} AG _{H_cc/m} AG _{I_im/mt}	0.0000 tn CO2/year	CO2 Annual Gain due to fertilizers reduction (use of fertigation)
R5.3			0.0000 tn CO2/year	CO2 Annual Gain due to herbicides reduction (use of cover crops/mulching)
R5.4			0.0000 tn CO2/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping)
R5.5	ain 02	AG _{WF}	12,245.5992 tn CO2/year	CO2 Annual Gain due to the use of wood fuels instead of diesel
R5.6	0.0	AG _{RES}	0.0000 tn CO2/year	CO2 Annual Gain due to the use of Renewable Energy Sources
R5.7		AG _{EL_m}	0.0000 tn CO2/year	CO2 Annual Gain due to electricity reduction (use of mulching)
R5.8		AG _{D_FGT}	0.0000 tn CO2/year	CO2 Annual Gain due to diesel reduction (use of fertigation)
R5.9		TAG	12,245.5992 tn CO2/year	CO2 Total Annual Gain

2	ARCproduct	0.11286	tn CO2/tn of yield/year	CO2 Annual Removal Capacity per unit of harvested fruits	(BF is included)
3	ARCtree	0.00345	tn CO2/tree/year	CO2 Annual Removal Capacity per tree unit	
	ARCarea	0.87465	tn CO2/hectare/year	CO2 Annual Removal Capacity per unit of cultivated area	
2	ARCproduct	0.03866	tn CO2/tn of yield/year	CO2 Annual Removal Capacity per unit of harvested fruits	(BF is not included)
	ARCtree	0.00118	tn CO2/tree/year	CO2 Annual Removal Capacity per tree unit	
				· · ·	·
L	TAE/TAR	0.64023	Total Annual CO2 Emissions/ Total Ann	nual CO2 Removals	(BF is included)
2	TAE/TAR	0.83857	Total Annual CO2 Emissions/ Total Ann	nual CO2 Removals	(BF is not included)
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1	TAR _{area}	7.09678	tn CO2/hectare/year	CO2 Total Annual Removals per unit of cultivated area	
2	TAR _{product}	0.31371	tn CO2/tn of yield/year	CO2 Total Annual Removals per unit of harvested fruits	(BF is included)
3	TAR _{tree}	0.00960	tn CO2/tree/year	CO2 Total Annual Removals per tree unit	
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.1	TAR _{area}	5.41824	tn CO2/hectare/year	CO2 Total Annual Removals per unit of cultivated area	
.2	TAR _{product}	0.23951	tn CO2/tn of yield/year	CO2 Total Annual Removals per unit of harvested fruits	(BF is not included)
3	TAR _{tree}	0.00733	tn CO2/tree/year	CO2 Total Annual Removals per tree unit	
				CO2 Accord Descent due to the second attemptified of facility biogeneous with of subtracted energy	
.1	AR _{BF_area}	1.67854	tn CO2/hectare/year	CO2 Annual Removal due to the production of fruit biomass per unit of cultivated area	
2	AR _{BF_product}	0.07420	tn CO2/tn of yield/year	CO2 Annual Removal due to the production of fruit biomass per unit of harvested fruits	
3	AR _{BF_tree}	0.00227	tn CO2/tree/year	CO2 Annual Removal due to the production of fruit biomass per tree unit	
	4.0	5 22224			
.1	AR _{BW_area}	5.23294	tn CO2/hectare/year	CO2 Annual Removal due to the production of wood biomass per unit of cultivated area CO2 Annual Removal due to the production of wood biomass per unit of harvested fruits	
.2	AR _{BW_product}	0.23132	tn CO2/tn of yield/year		
.3	AR _{BW_tree}	0.00708	tn CO2/tree/year	CO2 Annual Removal due to the production of wood biomass per tree unit	
	40	0.40500		CO2 Annual Storage in soil as carbon of the fallen biomass per unit of cultivated area	
.1	AS _{S_area}	0.18530	tn CO2/hectare/year	CO2 Annual Storage in soil as carbon of the fallen biomass per unit of cultivated area	
3	AS _{S_product}	0.00819 0.00025	tn CO2/tn of yield/year	CO2 Annual Storage in soil as carbon of the fallen biomass per tinit of narvested indits	
	AS _{S_tree}	0.00025	tn CO2/tree/year	CO2 Annual storage in son as carbon of the ranen biomass per tree dint	
.1	TAE _{area}	4.54358	tn CO2/hectare/year	CO2 Total Annual Emissions per unit of cultivated area	
.2		0.20085	tn CO2/tn of yield/year	CO2 Total Annual Emissions per unit of calibrated area	
.3	TAE _{product}	0.00615	tn CO2/trie/year	CO2 Total Annual Emissions per tree unit	
	tree	0.00015		bez fotarrinnan zindsjons per dec unit	
.1	AE _{f area}		tn CO2/hectare/year	CO2 Annual Emissions due to the use of fertilizers per unit of cultivated area	· · · · · · · · · · · · · · · · · · ·
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.2	-	1.36216			
_	AE _{f_product}	0.06021	tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of fertilizers per unit of harvested fruits	
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.3	AE _{f_product} AE _{f_tree}	0.06021 0.00184	tn CO2/tn of yield/year tn CO2/tree/year	CO2 Annual Emissions due to the use of fertilizers per unit of harvested fruits CO2 Annual Emissions due to the use of fertilizers per tree unit	
.2 .3 .1 .2	AE _{f_product} AE _{f_tree} AE _{p_area}	0.06021 0.00184 0.53553	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year	CO2 Annual Emissions due to the use of fertilizers per unit of harvested fruits CO2 Annual Emissions due to the use of fertilizers per tree unit CO2 Annual Emissions due to the use of pesticides per unit of cultivated area	
.3 .1 .2	AE _{f_product} AE _{f_tree} AE _{p_area} AE _{p_product}	0.06021 0.00184	tn CO2/tn of yield/year tn CO2/tree/year	CO2 Annual Emissions due to the use of fertilizers per unit of harvested fruits CO2 Annual Emissions due to the use of fertilizers per tree unit	
.3	AE _{f_product} AE _{f_tree} AE _{p_area}	0.06021 0.00184 0.53553 0.02367	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of fertilizers per unit of harvested fruits CO2 Annual Emissions due to the use of fertilizers per tree unit CO2 Annual Emissions due to the use of pesticides per unit of cultivated area CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits	
.1 .2 .3	AE _{f_product} AE _{f_tree} AE _{p_area} AE _{p_product} AE _{p_tree}	0.06021 0.00184 0.53553 0.02367	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of fertilizers per unit of harvested fruits CO2 Annual Emissions due to the use of fertilizers per tree unit CO2 Annual Emissions due to the use of pesticides per unit of cultivated area CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits	
.3 .1 .2 .3	AE _{f product} AE _{f tree} AE _{p_area} AE _{p_product} AE _{p_tree}	0.06021 0.00184 0.53553 0.02367 0.00072	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year	CO2 Annual Emissions due to the use of fertilizers per unit of harvested fruits CO2 Annual Emissions due to the use of fertilizers per tree unit CO2 Annual Emissions due to the use of pesticides per unit of cultivated area CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits CO2 Annual Emissions due to the use of pesticides per tree unit	
.1 .2 .3 .1 .2 .3	AE _{f_product} AE _{f_tree} AE _{p_area} AE _{p_product} AE _{p_tree}	0.06021 0.00184 0.53553 0.02367 0.00072 2.64589	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/tree/year	CO2 Annual Emissions due to the use of fertilizers per unit of harvested fruits CO2 Annual Emissions due to the use of fertilizers per tree unit CO2 Annual Emissions due to the use of pesticides per unit of cultivated area CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits CO2 Annual Emissions due to the use of pesticides per tree unit CO2 Annual Emissions due to the use of pesticides per tree unit CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area	
.3 .2 .3 .1 .2	AE _{f_product} AE _{f_tree} AE _{p_area} AE _{p_product} AE _{p_tree} AE _{ff&e_area} AE _{ff&e_product}	0.06021 0.00184 0.53553 0.02367 0.00072 2.64589 0.11696	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year	C02 Annual Emissions due to the use of fertilizers per unit of harvested fruits C02 Annual Emissions due to the use of fertilizers per tree unit C02 Annual Emissions due to the use of pesticides per unit of cultivated area C02 Annual Emissions due to the use of pesticides per unit of harvested fruits C02 Annual Emissions due to the use of pesticides per unit of harvested fruits C02 Annual Emissions due to the use of pesticides per tree unit C02 Annual Emissions due to the use of pesticides per tree unit C02 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area C02 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits	
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.3 .1 .2 .3 .1 .2 .3 .1 .2 .3 .3 .1 .2 .2	AE _{L product} AE _{L tree} AE _{p_area} AE _{p_product} AE _{p_tree} AE _{ff&e_area} AE _{ff&e_product} AE _{ff&e_bree} AE _{ff&e_bree} AE _{D_product} AE _{D_product} AE _{D_tree}	0.06021 0.00184 0.53553 0.02367 0.00072 2.64589 0.11696 0.00358 2.40953 0.10651 0.00326 0.13045 0.00577	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tn of yield/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/tree/year tn CO2/tn of yield/year tn CO2/tn of yield/year tn CO2/tn of yield/year tn CO2/tn of yield/year tn CO2/tn of yield/year	C02 Annual Emissions due to the use of fertilizers per unit of harvested fruits C02 Annual Emissions due to the use of pesticides per unit of cultivated area C02 Annual Emissions due to the use of pesticides per unit of harvested fruits C02 Annual Emissions due to the use of pesticides per unit of harvested fruits C02 Annual Emissions due to the use of pesticides per unit of harvested fruits C02 Annual Emissions due to the use of pesticides per unit of cultivated area C02 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area C02 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits C02 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits C02 Annual Emissions due to the use of diesel per unit of cultivated area C02 Annual Emissions due to the use of diesel per unit of harvested fruits C02 Annual Emissions due to the use of diesel per unit of harvested fruits C02 Annual Emissions due to the use of diesel per tree unit C02 Annual Emissions due to the use of diesel per tree unit C02 Annual Emissions due to the use of gasoline per unit of cultivated area C02 Annual Emissions due to the use of gasoline per unit of cultivated area C02 Annual Emissions due to the use of gasoline per unit of cultivated area	
.3	AE _{L product} AE _{L tree} AE _{p_area} AE _{p_product} AE _{p_tree} AE _{ff&e_area} AE _{ff&e_product} AE _{ff&e_bree} AE _{ff&e_bree} AE _{D_product} AE _{D_product} AE _{D_tree}	0.06021 0.00184 0.53553 0.02367 0.00072 2.64589 0.11696 0.00358 2.40953 0.10651 0.00326 0.13045 0.00577	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tn of yield/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/tree/year tn CO2/tn of yield/year tn CO2/tn of yield/year tn CO2/tn of yield/year tn CO2/tn of yield/year tn CO2/tn of yield/year	C02 Annual Emissions due to the use of fertilizers per unit of harvested fruits C02 Annual Emissions due to the use of pesticides per unit of cultivated area C02 Annual Emissions due to the use of pesticides per unit of harvested fruits C02 Annual Emissions due to the use of pesticides per unit of harvested fruits C02 Annual Emissions due to the use of pesticides per unit of harvested fruits C02 Annual Emissions due to the use of pesticides per unit of cultivated area C02 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area C02 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits C02 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits C02 Annual Emissions due to the use of diesel per unit of cultivated area C02 Annual Emissions due to the use of diesel per unit of harvested fruits C02 Annual Emissions due to the use of diesel per unit of harvested fruits C02 Annual Emissions due to the use of diesel per tree unit C02 Annual Emissions due to the use of diesel per tree unit C02 Annual Emissions due to the use of gasoline per unit of cultivated area C02 Annual Emissions due to the use of gasoline per unit of cultivated area C02 Annual Emissions due to the use of gasoline per unit of cultivated area	
3 1 2 3 1 2 3 1 2 3 1 2 3 1 2 3 1 2 3 1 2 3 1 2 3 1	AE _L product AE _L tree AE _p product AE _p product AE _p product AE _{flac} product	0.06021 0.00184 0.53553 0.02367 0.00072 2.64589 0.11696 0.00358 2.40953 0.10651 0.00326 0.13045 0.00577 0.00018	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tro of yield/year tn CO2/tree/year tn CO2/tree/year tn CO2/tree/year tn CO2/tree/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/tree/year tn CO2/tn of yield/year tn CO2/tn of yield/year tn CO2/tn of yield/year	C02 Annual Emissions due to the use of fertilizers per unit of harvested fruits C02 Annual Emissions due to the use of pesticides per unit of cultivated area C02 Annual Emissions due to the use of pesticides per unit of harvested fruits C02 Annual Emissions due to the use of pesticides per unit of harvested fruits C02 Annual Emissions due to the use of pesticides per unit of harvested fruits C02 Annual Emissions due to the use of pesticides per tree unit C02 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area C02 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits C02 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits C02 Annual Emissions due to the use of fossil fuels & electricity per tree unit C02 Annual Emissions due to the use of fossil fuels & electricity per tree unit C02 Annual Emissions due to the use of diesel per unit of cultivated area C02 Annual Emissions due to the use of diesel per unit of harvested fruits C02 Annual Emissions due to the use of diesel per unit of cultivated area C02 Annual Emissions due to the use of gasoline per unit of cultivated area C02 Annual Emissions due to the use of gasoline per unit of cultivated area C02 Annual Emissions due to the use of gasoline per unit of cultivated area C02 Annual Emissions due to the use of gasoline per unit of harvested fruits	
3 1 2 3 1 2 3 1 2 3 1 2 3 1 2 3 1 2 3 1 2 3 1 2 3 1 2 3 1 3 1 2 3 3 1 3 1 3 1 3 1 3 1 1 1 1 1 1 1 1 1 1 1 1 1	AE _L product AE _L tree AE _p product AE _p product AE _p product AE _p tree AE _{ff8e_area} AE _{ff8e_area} AE _{ff8e_b} product AE _{f6_b} product AE _{6_b} product	0.06021 0.00184 0.53553 0.02367 0.00072 2.64589 0.11696 0.00358 2.40953 0.10651 0.00326 0.13045 0.00577 0.00018	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/tree/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tn of yield/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/tree/year tn CO2/tree/year	C02 Annual Emissions due to the use of fertilizers per unit of harvested fruits C02 Annual Emissions due to the use of pesticides per unit of cultivated area C02 Annual Emissions due to the use of pesticides per unit of harvested fruits C02 Annual Emissions due to the use of pesticides per unit of harvested fruits C02 Annual Emissions due to the use of pesticides per unit of harvested fruits C02 Annual Emissions due to the use of pesticides per tree unit C02 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area C02 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits C02 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits C02 Annual Emissions due to the use of fossil fuels & electricity per tree unit C02 Annual Emissions due to the use of fissil fuels & electricity per tree unit C02 Annual Emissions due to the use of diesel per unit of cultivated area C02 Annual Emissions due to the use of diesel per unit of harvested fruits C02 Annual Emissions due to the use of gasoline per unit of cultivated area C02 Annual Emissions due to the use of gasoline per unit of cultivated area C02 Annual Emissions due to the use of gasoline per unit of harvested fruits C02 Annual Emissions due to the use of gasoline per unit of harvested fruits C02 Annual Emissions due to the use of gasoline per unit of cultivated area <td></td>	

R21.2	TAGproduct	0.04847	tn CO2/tn of yield/year	CO2 Total Annual Gain per unit of harvested fruits
R21.3	TAG _{tree}	0.00148	tn CO2/tree/year	CO2 Total Annual Gain per tree unit
	ucc			
R22.1	AG _{N-f_LCC_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (Leguminosae cover crops) per unit of cultivated area
R22.2	AG _{N-f_LCC_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (Leguminosae cover crops) per unit of harvested fruits
R22.3	AG _{N-f_LCC_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (Leguminosae cover crops) per tree unit
R23.1	AG _{f_FGT_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to fertilizers reduction (fertigation) per unit of cultivated area
R23.2	AG _{f_FGT_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to fertilizers reduction (fertigation) per unit of harvested fruits
R23.3	AG _{f_FGT_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to fertilizers reduction (fertigation) per tree unit
R24.1	AG _{H_cc/m_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to herbicides reduction (cover crops/mulching) per unit of cultivated area
R24.2	AG _{H_cc/m_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to herbicides reduction (cover crops/mulching) per unit of harvested fruits
R24.3	AG _{H_cc/m_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to herbicides reduction (cover crops/mulching) per tree unit
R25.1	AG _{I_im/mt_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping) per unit of cultivated area
R25.2	AG _{I_im/mt_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping) per unit of harvested fruits
R25.3	AG _{I_im/mt_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping) per tree unit
R26.1	AG _{WF_area}	1.09646	tn CO2/hectare/year	CO2 Annual Gain due to the use of wood fuels instead of diesel per unit of cultivated area
R26.2	AG _{WF_product}	0.04847	tn CO2/tn of yield/year	CO2 Annual Gain due to the use of wood fuels instead of diesel per unit of harvested fruits
R26.3	AG _{WF_tree}	0.00148	tn CO2/tree/year	CO2 Annual Gain due to the use of wood fuels instead of diesel per tree unit
R27.1	AG _{RES_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to the use of RES per unit of cultivated area
R27.2	AG _{RES_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to the use of RES per unit of harvested fruits
R27.3	AG _{RES_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to the use of RES per tree unit

Openation
CUMATREE

Tree crops' CO2 Removal Capacity Calculation Tool (CO2RCCT)



terra nova

Designed and developed by TERRA NOVA Ltd.

Results

Country where the Tool is applied:	Greece
Species of tree crop:	Peach
Geographical area of the cultivation:	GREECE (total)

Conventional

CO2 Annual Removal Capacity

R1.1 AR			
11111	ARC 309,250.4976 tn CO2/year C	CO2 Annual Removal Capacity	(BF is included)
R1.2 AR	ARC 280,021.5420 tn CO2/year C	CO2 Annual Removal Capacity	(BF is not included)

The term "CO2 Removal" means the abstraction of CO2 from atmosphere

Agricultural practice:

BF: the fruits' biomass

Analysis

R2.1		AR _{BF}	29,228.9555 tn CO2/year	CO2 Annual Removal due to the production of fruit biomass	
R2.2	als	AR _{BW}	403,407.7541 tn CO2/year	CO2 Annual Removal due to the production of wood biomass	
R2.3	19 C	ASs	2,719.3361 tn CO2/year	CO2 Annual Storage in soil as carbon of the fallen biomass	
R2.4	Rei	TAR	435,356.0457 tn CO2/year	CO2 Total Annual Removals	(BF is included)
R2.5		TAR	406,127.0902 tn CO2/year	CO2 Total Annual Removals	(BF is not included)

a. It has to be underlined an important difference between ARC and TAR:

ARC is the result of the CO2 mass alance between (a) the total quantity of CO2 which is abstracted from the atmosphere [=TAR] by the tree in order to create biomass and (b) the total quantity of CO2 which is emitted to the atmosphere due to the agricultural practices which are applied for the cultivation of the tree.

R3.1	S	AE _f	32,746.2619 tn CO2/year	CO2 Annual Emissions due to the use of fertilizers
R3.2	2 Sior	AEp	32,738.8993 tn CO2/year	CO2 Annual Emissions due to the use of pesticides
R3.3	is C	AE _{ff&e}	60,620.3870 tn CO2/year	CO2 Annual Emissions due to the use of fossil fuels & electricity
R3.4		TAE	126,105.5482 tn CO2/year	CO2 Total Annual Emissions
	R4.1	AE _D	54,078.6348 tn CO2/year	CO2 Annual Emissions due to the use of diesel
	R4.2	AE _G	2,136.5813 tn CO2/year	CO2 Annual Emissions due to the use of gasoline
	R4.3	AE _{EL}	4,405.1709 tn CO2/year	CO2 Annual Emissions due to the use of electricity
	R4.4	AE _{ff&e}	60,620.3870 tn CO2/year	CO2 Annual Emissions due to the use of fossil fuels & electricity

R5.1		AG _{N-f_LCC}	0.0000 tn CO2/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (use of Leguminosae cover crops)
R5.2		AG _{f_FGT}	0.0000 tn CO2/year	CO2 Annual Gain due to fertilizers reduction (use of fertigation)
R5.3		AG _{H_cc/m}	0.0000 tn CO2/year	CO2 Annual Gain due to herbicides reduction (use of cover crops/mulching)
R5.4		AG _{I_im/mt}	0.0000 tn CO2/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping)
R5.5	CO2 Gain	AG _{WF}	23,146.9701 tn CO2/year	CO2 Annual Gain due to the use of wood fuels instead of diesel
R5.6	0.0	AG _{RES}	0.0000 tn CO2/year	CO2 Annual Gain due to the use of Renewable Energy Sources
R5.7		AG _{EL_m}	0.0000 tn CO2/year	CO2 Annual Gain due to electricity reduction (use of mulching)
R5.8		AG _{D_FGT}	0.0000 tn CO2/year	CO2 Annual Gain due to diesel reduction (use of fertigation)
R5.9		TAG	23,146.9701 tn CO2/year	CO2 Total Annual Gain

ARCproduct	0.50127	tn CO2/tn of yield/year	CO2 Annual Removal Capacity per unit of harvested fruits	(BF is included)
ARC _{tree}	0.01792	tn CO2/tree/year	CO2 Annual Removal Capacity per tree unit	
ARC _{area}	7.12835	tn CO2/hectare/year	CO2 Annual Removal Capacity per unit of cultivated area	
ARCproduct	0.45389	tn CO2/tn of yield/year	CO2 Annual Removal Capacity per unit of harvested fruits	(BF is not included)
ARC _{tree}	0.01623	tn CO2/tree/year	CO2 Annual Removal Capacity per tree unit	
TAE/TAR	0.28966	Total Annual CO2 Emissions/ Total An		(BF is included)
TAE/TAR	0.31051	Total Annual CO2 Emissions/ Total An	nual CO2 Removals	(BF is not included)
TAD	11.08262	to CO2 (bestere (veer	CO3 Takel Assure Demonster assure of authinsted area	
TAR _{area}		tn CO2/hectare/year	CO2 Total Annual Removals per unit of cultivated area	(BF is included)
	0.70568	tn CO2/tn of yield/year tn CO2/tree/year	CO2 Total Annual Removals per unit of harvested fruits CO2 Total Annual Removals per tree unit	(Br is included)
TAR _{tree}	0.02525	th coz/tree/year		
TAR _{area}	10.33855	tn CO2/hectare/year	CO2 Total Annual Removals per unit of cultivated area	
TAR _{product}	0.65830	tn CO2/tn of yield/year	CO2 Total Annual Removals per unit of harvested fruits	(BF is not included)
TAR _{tree}	0.02353	tn CO2/tree/year	CO2 Total Annual Removals per tree unit	
tree	0.02333			
AR _{BF area}	0.74407	tn CO2/hectare/year	CO2 Annual Removal due to the production of fruit biomass per unit of cultivated area	
AR _{BF_product}	0.04738	tn CO2/tn of yield/year	CO2 Annual Removal due to the production of fruit biomass per unit of harvested fruits	
	0.00169	tn CO2/tree/year	CO2 Annual Removal due to the production of fruit biomass per tree unit	
the brailee				
AR _{BW area}	10.26933	tn CO2/hectare/year	CO2 Annual Removal due to the production of wood biomass per unit of cultivated area	
AR _{BW_product}	0.65389	tn CO2/tn of yield/year	CO2 Annual Removal due to the production of wood biomass per unit of harvested fruits	
AR _{BW_tree}	0.02338	tn CO2/tree/year	CO2 Annual Removal due to the production of wood biomass per tree unit	
<u>ow</u> dee				
AS _{S_area}	0.06922	tn CO2/hectare/year	CO2 Annual Storage in soil as carbon of the fallen biomass per unit of cultivated area	
AS _{S_product}	0.00441	tn CO2/tn of yield/year	CO2 Annual Storage in soil as carbon of the fallen biomass per unit of harvested fruits	
AS _{s tree}	0.00016	tn CO2/tree/year	CO2 Annual Storage in soil as carbon of the fallen biomass per tree unit	
<u> </u>				
TAE _{area}	3.21020	tn CO2/hectare/year	CO2 Total Annual Emissions per unit of cultivated area	
TAEproduct	0.20441	tn CO2/tn of yield/year	CO2 Total Annual Emissions per unit of harvested fruits	
TAEtree	0.00731	tn CO2/tree/year	CO2 Total Annual Emissions per tree unit	
AE _{f_area}	0.83360	tn CO2/hectare/year	CO2 Annual Emissions due to the use of fertilizers per unit of cultivated area	
AE _{f_product}	0.05308	tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of fertilizers per unit of harvested fruits	
AE _{f_tree}	0.00190	tn CO2/tree/year	CO2 Annual Emissions due to the use of fertilizers per tree unit	
-				
AE _{p_area}	0.83342	tn CO2/hectare/year	CO2 Annual Emissions due to the use of pesticides per unit of cultivated area	
AE _{p_product}	0.05307	tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits	
AE _{p_tree}	0.00190	tn CO2/tree/year	CO2 Annual Emissions due to the use of pesticides per tree unit	
AE _{ff&e area}				
AE _{ff&e_area}	1.54318	tn CO2/hectare/year	CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area	
AE _{ff&e_product}	0.09826	tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits	
AE _{ff&e_tree}	0.00351	tn CO2/tree/year	CO2 Annual Emissions due to the use of fossil fuels & electricity per tree unit	
45		tr 602/h to 1	CO2 Annual Emissions due to the use of discal neg with of with the discal	
AE _{D_area}	1.37665	tn CO2/hectare/year	CO2 Annual Emissions due to the use of diesel per unit of cultivated area	
AE _{D_product}	0.08766	tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of diesel per unit of harvested fruits	
AE _{D_tree}	0.00313	tn CO2/tree/year	CO2 Annual Emissions due to the use of diesel per tree unit	
AE	0.05420	to CO2 (besters (vest	CO2 Appual Emissions due to the use of receipe per unit of cultivated area	
AE _{G_area}	0.05439	tn CO2/hectare/year	CO2 Annual Emissions due to the use of gasoline per unit of cultivated area	
AE _{G_product}	0.00346	tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of gasoline per unit of harvested fruits	
AE _{G_tree}	0.00012	tn CO2/tree/year	CO2 Annual Emissions due to the use of gasoline per tree unit	
AE _{FL area}	0.11214	th CO2/bestare/user	CO2 Annual Emissions due to the use of electricity per unit of cultivated area	
		th CO2/hectare/year		
product	0.00714	tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of electricity per unit of harvested fruits CO2 Annual Emissions due to the use of electricity per tree unit	
AE _{EL_tree}	0.00026	tn CO2/tree/year	CO2 Annual Emissions due to the use of electricity per tree unit	
TAG _{area}	0.58924	tn CO2/hectare/year	CO2 Total Annual Gain per unit of cultivated area	
	0.58924	th CO2/nectare/year	CO2 TOtal Annual Galli per unit of cultivated area	

R21.2	TAGproduct	0.03752	tn CO2/tn of yield/year	CO2 Total Annual Gain per unit of harvested fruits
R21.3	TAG _{tree}	0.00134	tn CO2/tree/year	CO2 Total Annual Gain per tree unit
R22.1	AG _{N-f_LCC_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (Leguminosae cover crops) per unit of cultivated area
R22.2	AG _{N-f_LCC_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (Leguminosae cover crops) per unit of harvested fruits
R22.3	AG _{N-f_LCC_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (Leguminosae cover crops) per tree unit
R23.1	AG _{f_FGT_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to fertilizers reduction (fertigation) per unit of cultivated area
R23.2	AG _{f_FGT_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to fertilizers reduction (fertigation) per unit of harvested fruits
R23.3	AG _{f_FGT_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to fertilizers reduction (fertigation) per tree unit
R24.1	AG _{H_cc/m_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to herbicides reduction (cover crops/mulching) per unit of cultivated area
R24.2	AG _{H_cc/m_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to herbicides reduction (cover crops/mulching) per unit of harvested fruits
R24.3	AG _{H_cc/m_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to herbicides reduction (cover crops/mulching) per tree unit
R25.1	AG _{l_im/mt_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping) per unit of cultivated area
R25.2	AGI_im/mt_product	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping) per unit of harvested fruits
R25.3	AG _{I_im/mt_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping) per tree unit
R26.1	AG _{WF_area}	0.58924	tn CO2/hectare/year	CO2 Annual Gain due to the use of wood fuels instead of diesel per unit of cultivated area
R26.2	AG _{WF_product}	0.03752	tn CO2/tn of yield/year	CO2 Annual Gain due to the use of wood fuels instead of diesel per unit of harvested fruits
R26.3	AG _{WF_tree}	0.00134	tn CO2/tree/year	CO2 Annual Gain due to the use of wood fuels instead of diesel per tree unit
R27.1	AG _{RES_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to the use of RES per unit of cultivated area
R27.2	AG _{RES_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to the use of RES per unit of harvested fruits
R27.3	AG _{RES_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to the use of RES per tree unit

Op
CLIMATREE

Tree crops' CO2 Removal Capacity Calculation Tool (CO2RCCT)



terra nova

Designed and developed by TERRA NOVA Ltd.

Results

Country where the Tool is applied:	Greece
Species of tree crop:	Almond
Geographical area of the cultivation:	GREECE (total)

Conventional

CO2 Annual Removal Capacity

R1.1	ARC	137,228.7802 tn CO2/year	CO2 Annual Removal Capacity	(BF is included)
R1.2	ARC	70,436.9178 tn CO2/year	CO2 Annual Removal Capacity	(BF is not included)

The term "CO2 Removal" means the abstraction of CO2 from atmosphere

Agricultural practice:

BF: the fruits' biomass

Analysis

R2.1		AR _{BF}	66,791.8624 tn CO2/year	CO2 Annual Removal due to the production of fruit biomass	
R2.2	als	AR _{BW}	101,010.9724 tn CO2/year	CO2 Annual Removal due to the production of wood biomass	
R2.3	S É	ASs	2,304.6118 tn CO2/year	CO2 Annual Storage in soil as carbon of the fallen biomass	
R2.4	Rei _	TAR	170,107.4467 tn CO2/year	CO2 Total Annual Removals	(BF is included)
R2.5		TAR	103,315.5843 tn CO2/year	CO2 Total Annual Removals	(BF is not included)

a. It has to be underlined an important difference between ARC and TAR:

ARC is the result of the CO2 mass balance between (a) the total quantity of CO2 which is abstracted from the atmosphere [=TAR] by the tree in order to create biomass and (b) the total quantity of CO2 which is emitted to the atmosphere due to the agricultural practices which are applied for the cultivation of the tree.

R3.1	s	AE _f	9,047.2559 tn CO2/year	CO2 Annual Emissions due to the use of fertilizers			
R3.2	22 Sion	AEp	11,608.7189 tn CO2/year	CO2 Annual Emissions due to the use of pesticides			
R3.3	uis C	AE _{ff&e}	12,222.6918 tn CO2/year	CO2 Annual Emissions due to the use of fossil fuels & electricity			
R3.4		TAE	32,878.6665 tn CO2/year	CO2 Total Annual Emissions			
	R4.1	AED	10,563.0311 tn CO2/year	CO2 Annual Emissions due to the use of diesel			
	R4.2	AE _G	723.3709 tn CO2/year	CO2 Annual Emissions due to the use of gasoline			
	R4.3	AE _{EL}	936.2898 tn CO2/year	CO2 Annual Emissions due to the use of electricity			
	R4.4	AE _{ff&e}	12,222.6918 tn CO2/year	CO2 Annual Emissions due to the use of fossil fuels & electricity			

R5.1		AG _{N-f_LCC}	0.0000 tn CO2/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (use of Leguminosae cover crops)
R5.2		AG _{f_FGT}	0.0000 tn CO2/year	CO2 Annual Gain due to fertilizers reduction (use of fertigation)
R5.3		AG _{H_cc/m}	0.0000 tn CO2/year	CO2 Annual Gain due to herbicides reduction (use of cover crops/mulching)
R5.4		AG _{I_im/mt}	0.0000 tn CO2/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping)
R5.5	ain 02	AG _{WF}	16,335.0994 tn CO2/year	CO2 Annual Gain due to the use of wood fuels instead of diesel
R5.6	00	AG _{RES}	0.0000 tn CO2/year	CO2 Annual Gain due to the use of Renewable Energy Sources
R5.7		AG _{EL_m}	0.0000 tn CO2/year	CO2 Annual Gain due to electricity reduction (use of mulching)
R5.8		AG _{D_FGT}	0.0000 tn CO2/year	CO2 Annual Gain due to diesel reduction (use of fertigation)
R5.9		TAG	16,335.0994 tn CO2/year	CO2 Total Annual Gain

C	CO2 Removal Capacity Indexes			
L 🗌	ARC _{area} 1	0.31814	tn CO2/hectare/year	CO2 Annual Removal Capacity per unit of cultivated area

.2	ARCproduct	4.47259	tn CO2/tn of yield/year	CO2 Annual Removal Capacity per unit of harvested fruits	(BF is included)
3	ARCtree	0.03700	tn CO2/tree/year	CO2 Annual Removal Capacity per tree unit	
_	uee				
	ARCarea	5.29610	tn CO2/hectare/year	CO2 Annual Removal Capacity per unit of cultivated area	
2	ARCproduct	2.29570	tn CO2/tn of yield/year	CO2 Annual Removal Capacity per unit of harvested fruits	(BF is not included)
3	ARCtree	0.01899	tn CO2/tree/year	CO2 Annual Removal Capacity per tree unit	
	-uce				L
1	TAE/TAR	0.19328	Total Annual CO2 Emissions/ Total Ann	ual CO2 Removals	(BF is included)
2	TAE/TAR	0.31824	Total Annual CO2 Emissions/ Total Ann	ual CO2 Removals	(BF is not included)
L _	TAR _{area}	12.79026	tn CO2/hectare/year	CO2 Total Annual Removals per unit of cultivated area	
2	TAR _{product}	5.54418	tn CO2/tn of yield/year	CO2 Total Annual Removals per unit of harvested fruits	(BF is included)
3	TAR _{tree}	0.04586	tn CO2/tree/year	CO2 Total Annual Removals per tree unit	
_					
.1	TAR _{area}	7.76823	tn CO2/hectare/year	CO2 Total Annual Removals per unit of cultivated area	
.2	TARproduct	3.36729	tn CO2/tn of yield/year	CO2 Total Annual Removals per unit of harvested fruits	(BF is not included)
.3	TAR _{tree}	0.02786	tn CO2/tree/year	CO2 Total Annual Removals per tree unit	
1	AR _{BF_area}	5.02204	tn CO2/hectare/year	CO2 Annual Removal due to the production of fruit biomass per unit of cultivated area	
2	AR _{BF_product}	2.17690	tn CO2/tn of yield/year	CO2 Annual Removal due to the production of fruit biomass per unit of harvested fruits	
3	AR _{BF_tree}	0.01801	tn CO2/tree/year	CO2 Annual Removal due to the production of fruit biomass per tree unit	
.1	AR _{BW_area}	7.59495	tn CO2/hectare/year	CO2 Annual Removal due to the production of wood biomass per unit of cultivated area	
2.2	AR _{BW_product}	3.29217	tn CO2/tn of yield/year	CO2 Annual Removal due to the production of wood biomass per unit of harvested fruits	
.3	AR _{BW_tree}	0.02723	tn CO2/tree/year	CO2 Annual Removal due to the production of wood biomass per tree unit	
				CO2 Assess (Severe is called a school of the faller bissess or with faultions) does	
.1	AS _{S_area}	0.17328	tn CO2/hectare/year	CO2 Annual Storage in soil as carbon of the fallen biomass per unit of cultivated area	
2	AS _{S_product}	0.07511	tn CO2/tn of yield/year	CO2 Annual Storage in soil as carbon of the fallen biomass per unit of harvested fruits	
.3	AS _{S_tree}	0.00062	tn CO2/tree/year	CO2 Annual Storage in soil as carbon of the fallen biomass per tree unit	
. [TAEarea	2.47212	to CO2/bastars/usar	CO2 Total Annual Emissions per unit of cultivated area	
.1 .2		1.07159	tn CO2/hectare/year	CO2 Total Annual Emissions per unit of harvested fruits	
	TAE _{product}	0.00886	tn CO2/tn of yield/year tn CO2/tree/year	CO2 Total Annual Emissions per tree unit	
	Thetree	0.00880		CO2 rotar Animaar Chrissions per tree unit	
.1	AE _{f area}	0.68026	tn CO2/hectare/year	CO2 Annual Emissions due to the use of fertilizers per unit of cultivated area	· · · · · · · · · · · · · · · · · · ·
.2	AE _{f_product}	0.29487	tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of fertilizers per unit of harvested fruits	
.3	AE _{f tree}		tn CO2/tree/year	CO2 Annual Emissions due to the use of fertilizers per tree unit	
	r t_tree	() ()()/44			
		0.00244	,		
.1	AE _{n area}			CO2 Annual Emissions due to the use of pesticides per unit of cultivated area	
	AE _{p_area} AE _{p_area}	0.87285	tn CO2/hectare/year	CO2 Annual Emissions due to the use of pesticides per unit of cultivated area CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits	
.2	AE _{p_product}	0.87285 0.37835	tn CO2/hectare/year tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of pesticides per unit of cultivated area CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits CO2 Annual Emissions due to the use of pesticides per tree unit	
.2		0.87285	tn CO2/hectare/year	CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits	
.2 .3	AE _{p_product} AE _{p_tree}	0.87285 0.37835	tn CO2/hectare/year tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits	
.2 .3 .1	AE _{p_product} AE _{p_tree} AE _{ff&e_area}	0.87285 0.37835 0.00313	tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year	CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits CO2 Annual Emissions due to the use of pesticides per tree unit	
.2 .3 .1 .2	AE _{p_product} AE _{p_tree} AE _{ff&e_area} AE _{ff&e_product}	0.87285 0.37835 0.00313 0.91902	tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year	CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits CO2 Annual Emissions due to the use of pesticides per tree unit CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area	
.2 .3 .1 .2	AE _{p_product} AE _{p_tree} AE _{ff&e_area}	0.87285 0.37835 0.00313 0.91902 0.39836	tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits CO2 Annual Emissions due to the use of pesticides per tree unit CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits	
.2 .3 .1 .2 .3	AE _{p_product} AE _{p_tree} AE _{ff&e_area} AE _{ff&e_product}	0.87285 0.37835 0.00313 0.91902 0.39836	tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits CO2 Annual Emissions due to the use of pesticides per tree unit CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits	
.2 .3 .1 .2 .3 .3	AE _{p_product} AE _{p_tree} AE _{ff&e_area} AE _{ff&e_product} AE _{ff&e_tree} AE _{ff&e_area}	0.87285 0.37835 0.00313 0.91902 0.39836 0.00330	tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year	CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits CO2 Annual Emissions due to the use of pesticides per tree unit CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per tree unit	
.2 .3 .1 .2 .3 .1 .2	AE _{p_product} AE _{p_tree} AE _{ff&e_area} AE _{ff&e_product} AE _{ff&e_tree}	0.87285 0.37835 0.00313 0.91902 0.39836 0.00330 0.79423	tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year	C02 Annual Emissions due to the use of pesticides per unit of harvested fruits C02 Annual Emissions due to the use of pesticides per tree unit C02 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area C02 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits C02 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits C02 Annual Emissions due to the use of fossil fuels & electricity per tree unit C02 Annual Emissions due to the use of diesel per unit of cultivated area	
.2 .3 .2 .3 .1 .2 .3	AE _{p.product} AE _{p.tree} AE _{ff&e_area} AE _{ff&e_product} AE _{ff&e_tree} AE _{D_area} AE _{D_product}	0.87285 0.37835 0.00313 0.91902 0.39836 0.00330 0.79423 0.34427	tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/hof yield/year	C02 Annual Emissions due to the use of pesticides per unit of harvested fruits C02 Annual Emissions due to the use of pesticides per tree unit C02 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area C02 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits C02 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits C02 Annual Emissions due to the use of fossil fuels & electricity per tree unit C02 Annual Emissions due to the use of diesel per unit of cultivated area C02 Annual Emissions due to the use of diesel per unit of cultivated area C02 Annual Emissions due to the use of diesel per unit of harvested fruits	
2 3 1 2 3 1 2 3	AE _{p.product} AE _{p.tree} AE _{ff&e_area} AE _{ff&e_product} AE _{ff&e_tree} AE _{D_area} AE _{D_product}	0.87285 0.37835 0.00313 0.91902 0.39836 0.00330 0.79423 0.34427	tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/hof yield/year	C02 Annual Emissions due to the use of pesticides per unit of harvested fruits C02 Annual Emissions due to the use of pesticides per tree unit C02 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area C02 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits C02 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits C02 Annual Emissions due to the use of fossil fuels & electricity per tree unit C02 Annual Emissions due to the use of diesel per unit of cultivated area C02 Annual Emissions due to the use of diesel per unit of cultivated area C02 Annual Emissions due to the use of diesel per unit of harvested fruits	
.2 .3 .1 .2 .3 .3 .3 .3	AE _{p,product} AE _{p,tree} AE _{ff&e,area} AE _{ff&e,product} AE _{ff&e,product} AE _{ff&e,product} AE _{f0,area} AE _{D,product} AE _{D,tree}	0.87285 0.37835 0.00313 0.91902 0.39836 0.00330 	tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/tn of yield/year tn CO2/tree/year	CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits CO2 Annual Emissions due to the use of pesticides per tree unit CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per tree unit CO2 Annual Emissions due to the use of diesel per unit of cultivated area CO2 Annual Emissions due to the use of diesel per unit of harvested fruits CO2 Annual Emissions due to the use of diesel per unit of harvested fruits CO2 Annual Emissions due to the use of diesel per unit of harvested fruits CO2 Annual Emissions due to the use of diesel per unit of harvested fruits CO2 Annual Emissions due to the use of diesel per tree unit	
.2 .3 .1 .2 .3 .3 .1 .2 .3 .3 .1 .2 .2	AE _{p_product} AE _{p_tree} AE _{ff&e_area} AE _{ff&e_tree} AE _{fo_area} AE _{0_area} AE _{0_product} AE _{0_product} AE _{0_product}	0.87285 0.37835 0.00313 0.91902 0.39836 0.00330 	tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/tro of yield/year tn CO2/tree/year tn CO2/tree/year tn CO2/hectare/year	C02 Annual Emissions due to the use of pesticides per unit of harvested fruits C02 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area C02 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits C02 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits C02 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits C02 Annual Emissions due to the use of fossil fuels & electricity per tree unit C02 Annual Emissions due to the use of diesel per unit of cultivated area C02 Annual Emissions due to the use of diesel per unit of harvested fruits C02 Annual Emissions due to the use of diesel per unit of harvested fruits C02 Annual Emissions due to the use of diesel per unit of cultivated area C02 Annual Emissions due to the use of diesel per unit of cultivated fruits C02 Annual Emissions due to the use of gasoline per unit of cultivated area C02 Annual Emissions due to the use of gasoline per unit of cultivated area	
5.1 5.2 5.3 7.1 7.2 7.3 8.1 8.2 8.3 8.1 8.2 8.3 9.1 8.2 8.3 9.1 8.2 8.3 9.2 9.3 9.3	AE _{p_product} AE _{p_tree} AE _{ff&e_area} AE _{ff&e_product} AE _{ff&e_product} AE _{f_&_product} AE _{fproduct} AE _{fproduct} AE _{fproduct}	0.87285 0.37835 0.00313 0.91902 0.39836 0.00330 0.79423 0.34427 0.00285 0.00285	tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/hectare/year tn CO2/hectare/year tn CO2/hectare/year	C02 Annual Emissions due to the use of pesticides per unit of harvested fruits C02 Annual Emissions due to the use of pesticides per tree unit C02 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area C02 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits C02 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits C02 Annual Emissions due to the use of fossil fuels & electricity per tree unit C02 Annual Emissions due to the use of diesel per unit of cultivated area C02 Annual Emissions due to the use of diesel per unit of harvested fruits C02 Annual Emissions due to the use of diesel per unit of harvested fruits C02 Annual Emissions due to the use of diesel per unit of harvested fruits C02 Annual Emissions due to the use of diesel per tree unit C02 Annual Emissions due to the use of gasoline per unit of cultivated area C02 Annual Emissions due to the use of gasoline per unit of cultivated area C02 Annual Emissions due to the use of gasoline per unit of cultivated area C02 Annual Emissions due to the use of gasoline per unit of cultivated area C02 Annual Emissions due to the use of gasoline per unit of cultivated area C02 Annual Emissions due to the use of gasoline per unit of cultivated area C02 Annual Emissions due to the use of gasoline per unit of harvested fruits	
5.2 5.3 5.3 5.2 5.3 5.3 5.2 5.3 5.3 5.2 5.3 5.2 5.3 5.3 5.3 5.3 5.3 5.3 5.3 5.3 5.3 5.3	AE _{p,product} AE _{p,tree} AE _{ff&e,area} AE _{ff&e,product} AE _{ff&e,product} AE _{f0_area} AE _{0_area} AE _{0_product} AE _{6_area} AE _{6_product} AE _{6_product}	0.87285 0.37835 0.00313 0.91902 0.39836 0.00330 0.79423 0.34427 0.00285 0.00285	tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/hectare/year tn CO2/hectare/year tn CO2/hectare/year	C02 Annual Emissions due to the use of pesticides per unit of harvested fruits C02 Annual Emissions due to the use of pesticides per tree unit C02 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area C02 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits C02 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits C02 Annual Emissions due to the use of fossil fuels & electricity per tree unit C02 Annual Emissions due to the use of diesel per unit of cultivated area C02 Annual Emissions due to the use of diesel per unit of harvested fruits C02 Annual Emissions due to the use of diesel per unit of harvested fruits C02 Annual Emissions due to the use of diesel per unit of harvested fruits C02 Annual Emissions due to the use of diesel per tree unit C02 Annual Emissions due to the use of gasoline per unit of cultivated area C02 Annual Emissions due to the use of gasoline per unit of cultivated area C02 Annual Emissions due to the use of gasoline per unit of cultivated area C02 Annual Emissions due to the use of gasoline per unit of cultivated area C02 Annual Emissions due to the use of gasoline per unit of cultivated area C02 Annual Emissions due to the use of gasoline per unit of cultivated area C02 Annual Emissions due to the use of gasoline per unit of harvested fruits	
5.2 5.3 5.1 7.2 7.3 5.1 5.2 5.3 5.1 5.2 5.3 5.1 5.2 5.3 5.3 5.3 5.3 5.3 5.3 5.3 5.3 5.3 5.3	AE _{p_product} AE _{p_tree} AE _{ff&e_area} AE _{ff&e_product} AE _{ff&e_product} AE _{f_&_product} AE _{fproduct} AE _{fproduct} AE _{fproduct}	0.87285 0.37835 0.00313 0.91902 0.39836 0.00330 0.79423 0.34427 0.00285 0.00285 0.05439 0.02358 0.00020	tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/tn of yield/year tn CO2/tn of yield/year tn CO2/tn of yield/year	C02 Annual Emissions due to the use of pesticides per unit of harvested fruits C02 Annual Emissions due to the use of pesticides per tree unit C02 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area C02 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits C02 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits C02 Annual Emissions due to the use of fossil fuels & electricity per tree unit C02 Annual Emissions due to the use of diesel per unit of cultivated area C02 Annual Emissions due to the use of diesel per unit of harvested fruits C02 Annual Emissions due to the use of diesel per unit of harvested fruits C02 Annual Emissions due to the use of gasoline per unit of cultivated area C02 Annual Emissions due to the use of gasoline per unit of cultivated area C02 Annual Emissions due to the use of gasoline per unit of cultivated area C02 Annual Emissions due to the use of gasoline per unit of cultivated area C02 Annual Emissions due to the use of gasoline per unit of harvested fruits C02 Annual Emissions due to the use of gasoline per unit of harvested fruits C02 Annual Emissions due to the use of gasoline per unit of harvested fruits C02 Annual Emissions due to the use of gasoline per unit of harvested fruits C02 Annual Emissions due to the use of gasoline per tree unit <td></td>	
.2 .3 .1 .2 .3 .1 .2 .3 .3 .3 .2 .3	AE _{p,product} AE _{p,tree} AE _{ff&e,area} AE _{ff&e,product} AE _{ff&e,product} AE _{ff&e,product} AE _{ff,area} AE _{ff,area} AE _{ff,area} AE _{G,area} AE _{G,area} AE _{G,area} AE _{G,area} AE _{G,area} AE _{G,bree} AE _{G,tree} AE _{L,area}	0.87285 0.37835 0.00313 0.91902 0.39836 0.00330 	tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/hectare/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/hectare/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/hectare/year tn CO2/hectare/year	C02 Annual Emissions due to the use of pesticides per unit of harvested fruits C02 Annual Emissions due to the use of pesticides per tree unit C02 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area C02 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits C02 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits C02 Annual Emissions due to the use of fossil fuels & electricity per tree unit C02 Annual Emissions due to the use of diesel per unit of cultivated area C02 Annual Emissions due to the use of diesel per unit of harvested fruits C02 Annual Emissions due to the use of diesel per unit of harvested fruits C02 Annual Emissions due to the use of gasoline per unit of cultivated area C02 Annual Emissions due to the use of gasoline per unit of cultivated area C02 Annual Emissions due to the use of gasoline per unit of harvested fruits C02 Annual Emissions due to the use of gasoline per unit of harvested fruits C02 Annual Emissions due to the use of gasoline per unit of harvested fruits C02 Annual Emissions due to the use of gasoline per unit of harvested fruits C02 Annual Emissions due to the use of gasoline per unit of cultivated area C02 Annual Emissions due to the use of gasoline per unit of cultivated area C02 Annual Emissions due to the use of electricity per unit of cultivated area	

R21.2	TAGproduct	0.53240	tn CO2/tn of yield/year	CO2 Total Annual Gain per unit of harvested fruits
R21.3	TAG _{tree}	0.00440	tn CO2/tree/year	CO2 Total Annual Gain per tree unit
R22.1	AG _{N-f_LCC_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (Leguminosae cover crops) per unit of cultivated area
R22.2	AG _{N-f_LCC_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (Leguminosae cover crops) per unit of harvested fruits
R22.3	AG _{N-f_LCC_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (Leguminosae cover crops) per tree unit
R23.1	AG _{f_FGT_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to fertilizers reduction (fertigation) per unit of cultivated area
R23.2	AG _{f_FGT_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to fertilizers reduction (fertigation) per unit of harvested fruits
R23.3	AG _{f_FGT_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to fertilizers reduction (fertigation) per tree unit
R24.1	AG _{H_cc/m_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to herbicides reduction (cover crops/mulching) per unit of cultivated area
R24.2	AG _{H_cc/m_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to herbicides reduction (cover crops/mulching) per unit of harvested fruits
R24.3	AG _{H_cc/m_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to herbicides reduction (cover crops/mulching) per tree unit
R25.1	AG _{I_im/mt_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping) per unit of cultivated area
R25.2	AG _{I_im/mt_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping) per unit of harvested fruits
R25.3	AG _{I_im/mt_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping) per tree unit
R26.1	AG _{WF_area}	1.22823	tn CO2/hectare/year	CO2 Annual Gain due to the use of wood fuels instead of diesel per unit of cultivated area
R26.2	AG _{WF_product}	0.53240	tn CO2/tn of yield/year	CO2 Annual Gain due to the use of wood fuels instead of diesel per unit of harvested fruits
R26.3	AG _{WF_tree}	0.00440	tn CO2/tree/year	CO2 Annual Gain due to the use of wood fuels instead of diesel per tree unit
R27.1	AG _{RES_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to the use of RES per unit of cultivated area
R27.2	AG _{RES_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to the use of RES per unit of harvested fruits
R27.3	AG _{RES_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to the use of RES per tree unit

Opened

Tree crops' CO2 Removal Capacity Calculation Tool (CO2RCCT)



terra nova

Designed and developed by TERRA NOVA Ltd.

Results

Country where the Tool is applied:	Greece
Species of tree crop:	Olive
Geographical area of the cultivation:	GREECE (total)

Conventional

CO2 Annual Removal Capacity

R1.1	ARC	4,937,594.8670 tn CO2/year	CO2 Annual Removal Capacity	(BF is included)
R1.2	ARC	3,047,921.1645 tn CO2/year	CO2 Annual Removal Capacity	(BF is not included)

The term "CO2 Removal" means the abstraction of CO2 from atmosphere

Agricultural practice:

BF: the fruits' biomass

Analysis

R2.1		AR _{BF}	1,889,673.7025 tn CO2/year	CO2 Annual Removal due to the production of fruit biomass	7
R2.2	als	AR _{BW}	4,549,120.3612 tn CO2/year	CO2 Annual Removal due to the production of wood biomass	
R2.3	19 C	ASs	54,879.4248 tn CO2/year	CO2 Annual Storage in soil as carbon of the fallen biomass	
R2.4	Rei	TAR	6,493,673.4886 tn CO2/year	CO2 Total Annual Removals	(BF is included)
R2.5		TAR	4,603,999.7860 tn CO2/year	CO2 Total Annual Removals	(BF is not included)

a. It has to be underlined an important difference between ARC and TAR:

ARC is the result of the CO2 mass balance between (a) the total quantity of CO2 which is abstracted from the atmosphere [=TAR] by the tree in order to create biomass and (b) the total quantity of CO2 which is emitted to the atmosphere due to the agricultural practices which are applied for the cultivation of the tree.

R3.1	S	AE _f	635,915.8293 tn CO2/year	CO2 Annual Emissions due to the use of fertilizers			
R3.2	ŝ S	AEp	492,125.8637 tn CO2/year	CO2 Annual Emissions due to the use of pesticides			
R3.3	ji C	AE _{ff&e}	428,036.9286 tn CO2/year	CO2 Annual Emissions due to the use of fossil fuels & electricity			
R3.4		TAE	1,556,078.6215 tn CO2/year	CO2 Total Annual Emissions			
	R4.1	AE _D	365,366.0711 tn CO2/year	CO2 Annual Emissions due to the use of diesel			
	R4.2	AE _G	55,414.5324 tn CO2/year	CO2 Annual Emissions due to the use of gasoline			
	R4.3	AE _{EL}	7,256.3251 tn CO2/year	CO2 Annual Emissions due to the use of electricity			
	R4.4	AE _{ff&e}	428,036.9286 tn CO2/year	CO2 Annual Emissions due to the use of fossil fuels & electricity			

R5.1		AG _{N-f_LCC}	0.0000 tn CO2/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (use of Leguminosae cover crops)
R5.2		AG _{f_FGT}	0.0000 tn CO2/year	CO2 Annual Gain due to fertilizers reduction (use of fertigation)
R5.3		AG _{H_cc/m}	0.0000 tn CO2/year	CO2 Annual Gain due to herbicides reduction (use of cover crops/mulching)
R5.4		AG _{I_im/mt}	0.0000 tn CO2/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping)
	ain 02	AG _{WF}	1,028,169.7216 tn CO2/year	CO2 Annual Gain due to the use of wood fuels instead of diesel
R5.6	00	AG _{RES}	0.0000 tn CO2/year	CO2 Annual Gain due to the use of Renewable Energy Sources
R5.7		AG _{EL_m}	0.0000 tn CO2/year	CO2 Annual Gain due to electricity reduction (use of mulching)
R5.8		AG _{D_FGT}	0.0000 tn CO2/year	CO2 Annual Gain due to diesel reduction (use of fertigation)
R5.9		TAG	1,028,169.7216 tn CO2/year	CO2 Total Annual Gain

	ARCproduct	1.44476	tn CO2/tn of yield/year	CO2 Annual Removal Capacity per unit of harvested fruits	(BF is included)
	ARCtree	0.03494	tn CO2/tree/year	CO2 Annual Removal Capacity per tree unit	
Г	ARCarea	3.73945	tn CO2/hectare/year	CO2 Annual Removal Capacity per unit of cultivated area	
	ARCproduct	0.89183	tn CO2/tn of yield/year	CO2 Annual Removal Capacity per unit of harvested fruits	(BF is not included)
	ARCtree	0.02157	tn CO2/tree/year	CO2 Annual Removal Capacity per tree unit	
	TAE/TAR	0.23963	Total Annual CO2 Emissions/ Total Ann	ual CO2 Removals	(BF is included)
	TAE/TAR	0.33798	Total Annual CO2 Emissions/ Total Ann	ual CO2 Removals	(BF is not included)
	TAR _{area}	7.96698	tn CO2/hectare/year	CO2 Total Annual Removals per unit of cultivated area	
	TAR _{product}	1.90008	tn CO2/tn of yield/year	CO2 Total Annual Removals per unit of harvested fruits	(BF is included)
	TAR _{tree}	0.04595	tn CO2/tree/year	CO2 Total Annual Removals per tree unit	
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	TAR _{area}	5.64857	tn CO2/hectare/year	CO2 Total Annual Removals per unit of cultivated area	
L	TAR _{product}	1.34715	tn CO2/tn of yield/year	CO2 Total Annual Removals per unit of harvested fruits	(BF is not included)
	TAR _{tree}	0.03258	tn CO2/tree/year	CO2 Total Annual Removals per tree unit	
	AR _{BF_area}	2.31841	tn CO2/hectare/year	CO2 Annual Removal due to the production of fruit biomass per unit of cultivated area	
	AR _{BF_product}	0.55293	tn CO2/tn of yield/year	CO2 Annual Removal due to the production of fruit biomass per unit of harvested fruits	
	AR _{BF_tree}	0.01337	tn CO2/tree/year	CO2 Annual Removal due to the production of fruit biomass per tree unit	
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	AR _{BW_area}	5.58124	tn CO2/hectare/year	CO2 Annual Removal due to the production of wood biomass per unit of cultivated area	
2	AR _{BW_product}	1.33109	tn CO2/tn of yield/year	CO2 Annual Removal due to the production of wood biomass per unit of harvested fruits	
	AR _{BW_tree}	0.03219	tn CO2/tree/year	CO2 Annual Removal due to the production of wood biomass per tree unit	
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	AS _{S_area}	0.06733	tn CO2/hectare/year	CO2 Annual Storage in soil as carbon of the fallen biomass per unit of cultivated area	
	AS _{S_product}	0.01606	tn CO2/tn of yield/year	CO2 Annual Storage in soil as carbon of the fallen biomass per unit of harvested fruits	
	AS _{S_tree}	0.00039	tn CO2/tree/year	CO2 Annual Storage in soil as carbon of the fallen biomass per tree unit	
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	TAE _{area}	1.90913	tn CO2/hectare/year	CO2 Total Annual Emissions per unit of cultivated area	
-	TAEproduct	0.45532	tn CO2/tn of yield/year	CO2 Total Annual Emissions per unit of harvested fruits	
3	TAE _{tree}	0.01101	tn CO2/tree/year	CO2 Total Annual Emissions per tree unit	
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L	AE _{f_area}	0.78020	tn CO2/hectare/year	CO2 Annual Emissions due to the use of fertilizers per unit of cultivated area	
2	AE _{f_product}	0.18607	tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of fertilizers per unit of harvested fruits	
	AE _{f_tree}	0.00450	tn CO2/tree/year	CO2 Annual Emissions due to the use of fertilizers per tree unit	
3					
	AE _{p_area}	0.60378	tn CO2/hectare/year	CO2 Annual Emissions due to the use of pesticides per unit of cultivated area	
	AE _{p_product}	0.60378 0.14400	tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits	
		0.60378			
	AE _{p_product} AE _{p_tree}	0.60378 0.14400 0.00348	tn CO2/tn of yield/year tn CO2/tree/year	CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits CO2 Annual Emissions due to the use of pesticides per tree unit	
	AE _{p_product} AE _{p_tree} AE _{ff&e_area}	0.60378 0.14400 0.00348 0.52515	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year	CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits CO2 Annual Emissions due to the use of pesticides per tree unit CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area	
	AE _{p_product} AE _{p_tree} AE _{ff&e_area} AE _{ff&e_product}	0.60378 0.14400 0.00348 0.52515 0.12525	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits CO2 Annual Emissions due to the use of pesticides per tree unit CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits	
	AE _{p_product} AE _{p_tree} AE _{ff&e_area}	0.60378 0.14400 0.00348 0.52515	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year	CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits CO2 Annual Emissions due to the use of pesticides per tree unit CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area	
	AE _{p_product} AE _{p_tree} AE _{ff&e_area} AE _{ff&e_product} AE _{ff&e_tree}	0.60378 0.14400 0.00348 0.52515 0.12525 0.00303	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year	CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits CO2 Annual Emissions due to the use of pesticides per tree unit CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits	
	AE _{p_product} AE _{p_tree} AE _{ff&e_area} AE _{ff&e_product} AE _{ff&e_tree} AE _{ff&e_tree}	0.60378 0.14400 0.00348 0.52515 0.12525 0.00303 0.44826	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year	C02 Annual Emissions due to the use of pesticides per unit of harvested fruits C02 Annual Emissions due to the use of pesticides per tree unit C02 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area C02 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits C02 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits C02 Annual Emissions due to the use of fossil fuels & electricity per tree unit C02 Annual Emissions due to the use of fossil fuels & electricity per tree unit C02 Annual Emissions due to the use of diesel per unit of cultivated area	
	AE _{p_product} AE _{p_tree} AE _{ff&e_area} AE _{ff&e_product} AE _{ff&e_tree} AE _{ff&e_tree} AE _{D_area} AE _{D_product}	0.60378 0.14400 0.00348 0.52515 0.12525 0.00303 0.44826 0.10691	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year	C02 Annual Emissions due to the use of pesticides per unit of harvested fruits C02 Annual Emissions due to the use of pesticides per tree unit C02 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area C02 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits C02 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits C02 Annual Emissions due to the use of fossil fuels & electricity per tree unit C02 Annual Emissions due to the use of fossil fuels & electricity per tree unit C02 Annual Emissions due to the use of diesel per unit of cultivated area C02 Annual Emissions due to the use of diesel per unit of harvested fruits	
	AE _{p_product} AE _{p_tree} AE _{ff&e_area} AE _{ff&e_product} AE _{ff&e_tree} AE _{ff&e_tree}	0.60378 0.14400 0.00348 0.52515 0.12525 0.00303 0.44826	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year	C02 Annual Emissions due to the use of pesticides per unit of harvested fruits C02 Annual Emissions due to the use of pesticides per tree unit C02 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area C02 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits C02 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits C02 Annual Emissions due to the use of fossil fuels & electricity per tree unit C02 Annual Emissions due to the use of fossil fuels & electricity per tree unit C02 Annual Emissions due to the use of diesel per unit of cultivated area	
	AE _{p_product} AE _{p_tree} AE _{ff&e_area} AE _{ff&e_product} AE _{ff&e_tree} AE _{D_area} AE _{D_product} AE _{D_tree}	0.60378 0.14400 0.00348 0.52515 0.12525 0.00303 0.44826 0.10691 0.00259	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year	CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits CO2 Annual Emissions due to the use of pesticides per tree unit CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per tree unit CO2 Annual Emissions due to the use of fossil fuels & electricity per tree unit CO2 Annual Emissions due to the use of diesel per unit of cultivated area CO2 Annual Emissions due to the use of diesel per unit of harvested fruits CO2 Annual Emissions due to the use of diesel per unit of harvested fruits CO2 Annual Emissions due to the use of diesel per unit of harvested fruits CO2 Annual Emissions due to the use of diesel per tree unit	
	AE _{p_product} AE _{p_tree} AE _{ff&e_srea} AE _{ff&e_srea} AE _{ff&e_tree} AE _{0_srea} AE _{0_product} AE _{0_tree} AE _{0_tree}	0.60378 0.14400 0.00348 0.52515 0.12525 0.00303 0.44826 0.10691 0.00259 0.06799	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/tree/year	C02 Annual Emissions due to the use of pesticides per unit of harvested fruits C02 Annual Emissions due to the use of pesticides per tree unit C02 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area C02 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits C02 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits C02 Annual Emissions due to the use of fossil fuels & electricity per tree unit C02 Annual Emissions due to the use of diesel per unit of cultivated area C02 Annual Emissions due to the use of diesel per unit of harvested fruits C02 Annual Emissions due to the use of diesel per unit of harvested fruits C02 Annual Emissions due to the use of diesel per unit of cultivated area C02 Annual Emissions due to the use of diesel per unit of cultivated fruits C02 Annual Emissions due to the use of gasoline per unit of cultivated area C02 Annual Emissions due to the use of gasoline per unit of cultivated area	
	AE _{p_product} AE _{p_tree} AE _{ff&e_area} AE _{ff&e_product} AE _{ff&e_tree} AE _{D_area} AE _{D_product} AE _{D_tree} AE _{D_tree} AE _{G_area} AE _{G_product}	0.60378 0.14400 0.00348 0.52515 0.12525 0.00303 0.44826 0.10691 0.00259 0.06799 0.01621	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/tree/year tn CO2/tree/year tn CO2/tree/year	C02 Annual Emissions due to the use of pesticides per unit of harvested fruits C02 Annual Emissions due to the use of pesticides per tree unit C02 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area C02 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits C02 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits C02 Annual Emissions due to the use of fossil fuels & electricity per tree unit C02 Annual Emissions due to the use of diesel per unit of cultivated area C02 Annual Emissions due to the use of diesel per unit of harvested fruits C02 Annual Emissions due to the use of diesel per unit of harvested fruits C02 Annual Emissions due to the use of diesel per unit of cultivated area C02 Annual Emissions due to the use of gasoline per unit of cultivated area C02 Annual Emissions due to the use of gasoline per unit of cultivated area C02 Annual Emissions due to the use of gasoline per unit of cultivated area C02 Annual Emissions due to the use of gasoline per unit of cultivated area C02 Annual Emissions due to the use of gasoline per unit of cultivated area C02 Annual Emissions due to the use of gasoline per unit of cultivated area C02 Annual Emissions due to the use of gasoline per unit of cultivated area C02 Annual Emissions due to the use of gasoline per unit of cultivated area	
	AE _{p_product} AE _{p_tree} AE _{ff&e_srea} AE _{ff&e_srea} AE _{ff&e_tree} AE _{0_srea} AE _{0_product} AE _{0_tree} AE _{0_tree}	0.60378 0.14400 0.00348 0.52515 0.12525 0.00303 0.44826 0.10691 0.00259 0.06799	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/tree/year	C02 Annual Emissions due to the use of pesticides per unit of harvested fruits C02 Annual Emissions due to the use of pesticides per tree unit C02 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area C02 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits C02 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits C02 Annual Emissions due to the use of fossil fuels & electricity per tree unit C02 Annual Emissions due to the use of diesel per unit of cultivated area C02 Annual Emissions due to the use of diesel per unit of harvested fruits C02 Annual Emissions due to the use of diesel per unit of harvested fruits C02 Annual Emissions due to the use of diesel per unit of cultivated area C02 Annual Emissions due to the use of diesel per unit of cultivated fruits C02 Annual Emissions due to the use of gasoline per unit of cultivated area C02 Annual Emissions due to the use of gasoline per unit of cultivated area	
	AE _{p_product} AE _{p_tree} AE _{ff&e_product} AE _{ff&e_product} AE _{ff&e_tree} AE _{D_area} AE _{D_product} AE _{D_product} AE _{G_product} AE _{G_product}	0.60378 0.14400 0.00348 0.52515 0.12525 0.00303 0.44826 0.10691 0.00259 0.06799 0.01621 0.00039	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/tree/year tn CO2/tree/year tn CO2/tree/year tn CO2/tn of yield/year tn CO2/tree/year	C02 Annual Emissions due to the use of pesticides per unit of harvested fruits C02 Annual Emissions due to the use of pesticides per tree unit C02 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area C02 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits C02 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits C02 Annual Emissions due to the use of fossil fuels & electricity per tree unit C02 Annual Emissions due to the use of diesel per unit of cultivated area C02 Annual Emissions due to the use of diesel per unit of harvested fruits C02 Annual Emissions due to the use of diesel per unit of harvested fruits C02 Annual Emissions due to the use of gasoline per unit of cultivated area C02 Annual Emissions due to the use of gasoline per unit of cultivated area C02 Annual Emissions due to the use of gasoline per unit of cultivated area C02 Annual Emissions due to the use of gasoline per unit of cultivated area C02 Annual Emissions due to the use of gasoline per unit of harvested fruits C02 Annual Emissions due to the use of gasoline per unit of harvested fruits C02 Annual Emissions due to the use of gasoline per unit of harvested fruits C02 Annual Emissions due to the use of gasoline per unit of harvested fruits C02 Annual Emissions due to the use of gasoline per tree unit <td></td>	
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	AE _{p,product} AE _{p,tree} AE _{ff&e,area} AE _{ff&e,area} AE _{ff&e,area} AE _{D_area} AE _{D_area} AE _{D_broduct} AE _{D_broduct} AE _{G_product} AE _{G_product} AE _{G_tree} AE _{G_tree} AE _{G_tree}	0.60378 0.14400 0.00348 0.52515 0.12525 0.00303 0.44826 0.10691 0.00259 0.06799 0.01621 0.00039 0.00039	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/tree/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/tree/year tn CO2/tree/year	C02 Annual Emissions due to the use of pesticides per unit of harvested fruits C02 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area C02 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area C02 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits C02 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits C02 Annual Emissions due to the use of fossil fuels & electricity per tree unit C02 Annual Emissions due to the use of diesel per unit of cultivated area C02 Annual Emissions due to the use of diesel per unit of harvested fruits C02 Annual Emissions due to the use of diesel per unit of harvested fruits C02 Annual Emissions due to the use of gasoline per unit of cultivated area C02 Annual Emissions due to the use of gasoline per unit of harvested fruits C02 Annual Emissions due to the use of gasoline per unit of harvested fruits C02 Annual Emissions due to the use of gasoline per unit of harvested fruits C02 Annual Emissions due to the use of gasoline per unit of harvested fruits C02 Annual Emissions due to the use of electricity per unit of cultivated area C02 Annual Emissions due to the use of electricity per unit of cultivated area C02 Annual Emissions due to the use of electricity per unit of cultivated area C02 Annual Emissions due to the use of electricity per	
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R21.2	TAGproduct	0.30085	tn CO2/tn of yield/year	CO2 Total Annual Gain per unit of harvested fruits
R21.3	TAG _{tree}	0.00728	tn CO2/tree/year	CO2 Total Annual Gain per tree unit
R22.1	AG _{N-f_LCC_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (Leguminosae cover crops) per unit of cultivated area
R22.2	AG _{N-f_LCC_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (Leguminosae cover crops) per unit of harvested fruits
R22.3	AG _{N-f_LCC_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (Leguminosae cover crops) per tree unit
R23.1	AG _{f_FGT_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to fertilizers reduction (fertigation) per unit of cultivated area
R23.2	AG _{f_FGT_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to fertilizers reduction (fertigation) per unit of harvested fruits
R23.3	AG _{f_FGT_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to fertilizers reduction (fertigation) per tree unit
R24.1	AG _{H_cc/m_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to herbicides reduction (cover crops/mulching) per unit of cultivated area
R24.2	AG _{H_cc/m_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to herbicides reduction (cover crops/mulching) per unit of harvested fruits
R24.3	AG _{H_cc/m_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to herbicides reduction (cover crops/mulching) per tree unit
R25.1	AG _{I_im/mt_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping) per unit of cultivated area
R25.2	AG _{I_im/mt_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping) per unit of harvested fruits
R25.3	AG _{I_im/mt_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping) per tree unit
R26.1	AG _{WF_area}	1.26145	tn CO2/hectare/year	CO2 Annual Gain due to the use of wood fuels instead of diesel per unit of cultivated area
R26.2	AG _{WF_product}	0.30085	tn CO2/tn of yield/year	CO2 Annual Gain due to the use of wood fuels instead of diesel per unit of harvested fruits
R26.3	AG _{WF_tree}	0.00728	tn CO2/tree/year	CO2 Annual Gain due to the use of wood fuels instead of diesel per tree unit
R27.1	AG _{RES_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to the use of RES per unit of cultivated area
R27.2	AG _{RES_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to the use of RES per unit of harvested fruits
R27.3	AG _{RES_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to the use of RES per tree unit

Openation
CUMATREE

Tree crops' CO2 Removal Capacity Calculation Tool (CO2RCCT)



terra nova

Designed and developed by TERRA NOVA Ltd.

Results

Country where the Tool is applied:	Italy
Species of tree crop:	Orange
Geographical area of the cultivation:	ITALIA (total)

Conventional

CO2 Annual Removal Capacity

R1.1	ARC	600,979.7346 tn CO2/year	CO2 Annual Removal Capacity	(BF is included)
R1.2	ARC	544,000.5018 tn CO2/year	CO2 Annual Removal Capacity	(BF is not included)

The term "CO2 Removal" means the abstraction of CO2 from atmosphere

Agricultural practice:

BF: the fruits' biomass

Analysis

R2.1		AR _{BF}	56,979.2328 tn CO2/year	CO2 Annual Removal due to the production of fruit biomass	
R2.2	rals	AR _{BW}	791,664.1442 tn CO2/year	CO2 Annual Removal due to the production of wood biomass	
R2.3	107	ASs	20,504.5275 tn CO2/year	CO2 Annual Storage in soil as carbon of the fallen biomass	
R2.4	Rei	TAR	869,147.9045 tn CO2/year	CO2 Total Annual Removals	(BF is included)
R2.5		TAR	812,168.6717 tn CO2/year	CO2 Total Annual Removals	(BF is not included)

a. It has to be underlined an important difference between ARC and TAR:

ARC is the result of the CO2 mass balance between (a) the total quantity of CO2 which is abstracted from the atmosphere [=TAR] by the tree in order to create biomass and (b) the total quantity of CO2 which is emitted to the atmosphere due to the agricultural practices which are applied for the cultivation of the tree.

R3.1	Ś	AE _f	72,708.7712 tn CO2/year	CO2 Annual Emissions due to the use of fertilizers
R3.2	22 sion	AEp	63,163.2304 tn CO2/year	CO2 Annual Emissions due to the use of pesticides
R3.3	uis C	AE _{ff&e}	132,296.1683 tn CO2/year	CO2 Annual Emissions due to the use of fossil fuels & electricity
R3.4		TAE	268,168.1699 tn CO2/year	CO2 Total Annual Emissions
	R4.1	AED	123,370.4116 tn CO2/year	CO2 Annual Emissions due to the use of diesel
	R4.2	AE _G	2,869.7605 tn CO2/year	CO2 Annual Emissions due to the use of gasoline
	R4.3	AE _{EL}	6,055.9962 tn CO2/year	CO2 Annual Emissions due to the use of electricity
	R4.4	AE _{ff&e}	132,296.1683 tn CO2/year	CO2 Annual Emissions due to the use of fossil fuels & electricity

R5.1		AG _{N-f_LCC}	0.0000 tn CO2/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (use of Leguminosae cover crops)
R5.2		AG _{f_FGT}	0.0000 tn CO2/year	CO2 Annual Gain due to fertilizers reduction (use of fertigation)
R5.3		AG _{H_cc/m}	0.0000 tn CO2/year	CO2 Annual Gain due to herbicides reduction (use of cover crops/mulching)
R5.4		AG _{I_im/mt}	0.0000 tn CO2/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping)
R5.5	ain 02	AG _{WF}	0.0000 tn CO2/year	CO2 Annual Gain due to the use of wood fuels instead of diesel
R5.6	00	AG _{RES}	0.0000 tn CO2/year	CO2 Annual Gain due to the use of Renewable Energy Sources
R5.7		AG _{EL_m}	0.0000 tn CO2/year	CO2 Annual Gain due to electricity reduction (use of mulching)
R5.8		AG _{D_FGT}	0.0000 tn CO2/year	CO2 Annual Gain due to diesel reduction (use of fertigation)
R5.9		TAG	0.0000 tn CO2/year	CO2 Total Annual Gain

	CO2 Removal Cap	acity Indexes			
R6.1	ARC _{area}	7.11888	tn CO2/hectare/year	CO2 Annual Removal Capacity per unit of cultivated area	

2	ARCproduct	0.34106	tn CO2/tn of yield/year	CO2 Annual Removal Capacity per unit of harvested fruits	(BF is included)
3	ARCtree	0.02966	tn CO2/tree/year	CO2 Annual Removal Capacity per tree unit	
	üce				
	ARCarea	6.44393	tn CO2/hectare/year	CO2 Annual Removal Capacity per unit of cultivated area	
	ARCproduct	0.30873	tn CO2/tn of yield/year	CO2 Annual Removal Capacity per unit of harvested fruits	(BF is not included)
	ARCtree	0.02685	tn CO2/tree/year	CO2 Annual Removal Capacity per tree unit	
				· · ·	
L	TAE/TAR	0.30854	Total Annual CO2 Emissions/ Total Ann	ual CO2 Removals	(BF is included)
2	TAE/TAR	0.33019	Total Annual CO2 Emissions/ Total Ann	iual CO2 Removals	(BF is not included)
_					
L _	TAR _{area}	10.29545	tn CO2/hectare/year	CO2 Total Annual Removals per unit of cultivated area	
2	TAR _{product}	0.49325	tn CO2/tn of yield/year	CO2 Total Annual Removals per unit of harvested fruits	(BF is included)
3	TAR _{tree}	0.04290	tn CO2/tree/year	CO2 Total Annual Removals per tree unit	
-					
1	TAR _{area}	9.62050	tn CO2/hectare/year	CO2 Total Annual Removals per unit of cultivated area	
2	TAR _{product}	0.46091	tn CO2/tn of yield/year	CO2 Total Annual Removals per unit of harvested fruits	(BF is not included)
3	TAR _{tree}	0.04009	tn CO2/tree/year	CO2 Total Annual Removals per tree unit	
		0.07404		CO2 Associal Descent data to the construction of facility biogenergy with of cubic shad asso	
1	AR _{BF_area}	0.67494	tn CO2/hectare/year	CO2 Annual Removal due to the production of fruit biomass per unit of cultivated area	
2	AR _{BF_product}	0.03234	tn CO2/tn of yield/year	CO2 Annual Removal due to the production of fruit biomass per unit of harvested fruits	
3	AR _{BF_tree}	0.00281	tn CO2/tree/year	CO2 Annual Removal due to the production of fruit biomass per tree unit	
	4.0	0.07760		COD Accord Descent due to the and estimation of used biometry on with of within the large	
.1	AR _{BW_area}	9.37762	tn CO2/hectare/year	CO2 Annual Removal due to the production of wood biomass per unit of cultivated area CO2 Annual Removal due to the production of wood biomass per unit of harvested fruits	
.2	AR _{BW_product}	0.44928	tn CO2/tn of yield/year		
.3	AR _{BW_tree}	0.03907	tn CO2/tree/year	CO2 Annual Removal due to the production of wood biomass per tree unit	
	40	0.04000		CO2 Annual Storage in soil as carbon of the fallen biomass per unit of cultivated area	
.1	AS _{S_area}	0.24289	tn CO2/hectare/year	CO2 Annual Storage in soil as carbon of the fallen biomass per unit of cultivated area	
3	AS _{S_product}	0.01164 0.00101	tn CO2/tn of yield/year	CO2 Annual Storage in soil as carbon of the fallen biomass per unit of narvested indice	
	AS _{S_tree}	0.00101	tn CO2/tree/year	CO2 Annual storage in soir as tarboir of the fanen biomass per tree unit	
1	TAE _{area}	3.17657	tn CO2/hectare/year	CO2 Total Annual Emissions per unit of cultivated area	
.1		0.15219	tn CO2/tn of yield/year	CO2 Total Annual Emissions per unit of calibrated area	
.3	TAE _{product}	0.01324	tn CO2/trie/year	CO2 Total Annual Emissions per tree unit	
	tree	0.01324	th coz/tree/year		
1	AE _{f area}	0.86127	tn CO2/hectare/year	CO2 Annual Emissions due to the use of fertilizers per unit of cultivated area	
.2	AE _{f_product}	0.04126	tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of fertilizers per unit of harvested fruits	
.3	AE _{f tree}	0.00359	tn CO2/tree/year	CO2 Annual Emissions due to the use of fertilizers per tree unit	
	ree_tree	0.00000			
1	AE _{n area}	0.74820	tn CO2/hectare/year	CO2 Annual Emissions due to the use of pesticides per unit of cultivated area	
.1 .2	AE _{p_area}	0.74820	tn CO2/hectare/year tn CO2/tn of vield/year	CO2 Annual Emissions due to the use of pesticides per unit of cultivated area CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits	
2	AE _{p_product}	0.03585	tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of pesticides per unit of cultivated area CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits CO2 Annual Emissions due to the use of pesticides per tree unit	
2				CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits	
2 3	AE _{p_product} AE _{p_tree}	0.03585	tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits	
.2	AE _{p_product} AE _{p_tree} AE _{ff&e_area}	0.03585 0.00312	tn CO2/tn of yield/year tn CO2/tree/year	CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits CO2 Annual Emissions due to the use of pesticides per tree unit	
2 3 .1 2	AE _{p_product} AE _{p_tree}	0.03585 0.00312 1.56711	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year	CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits CO2 Annual Emissions due to the use of pesticides per tree unit CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area	
.2 .3 .1 .2	AE _{p_product} AE _{p_tree} AE _{ff&e_area} AE _{ff&e_product}	0.03585 0.00312 1.56711 0.07508	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/ho f yield/year	CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits CO2 Annual Emissions due to the use of pesticides per tree unit CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits	
2 3 1 2 3	AE _{p_product} AE _{p_tree} AE _{ff&e_area}	0.03585 0.00312 1.56711 0.07508	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/ho f yield/year	CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits CO2 Annual Emissions due to the use of pesticides per tree unit CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits	
2 3 1 2 3 1	AE _{p_product} AE _{p_tree} AE _{ff&e_area} AE _{ff&e_product} AE _{ff&e_tree} AE _{ff&e_area}	0.03585 0.00312 1.56711 0.07508 0.00653	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year	CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits CO2 Annual Emissions due to the use of pesticides per tree unit CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per tree unit	· · · · · · · · · · · · · · · · · · ·
2 3 1 2 3 3	AE _{p_product} AE _{p_tree} AE _{ff&e_area} AE _{ff&e_product} AE _{ff&e_tree}	0.03585 0.00312 1.56711 0.07508 0.00653 1.46138	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year	CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits CO2 Annual Emissions due to the use of pesticides per tree unit CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per tree unit CO2 Annual Emissions due to the use of fossil fuels & electricity per tree unit CO2 Annual Emissions due to the use of fossil fuels area CO2 Annual Emissions due to the use of diesel per unit of cultivated area	
2 3 1 2 3 1 2 1 2	AE _{p_product} AE _{p_tree} AE _{ff&e_area} AE _{ff&e_product} AE _{ff&e_tree} AE _{ff&e_cree} AE _{D_area}	0.03585 0.00312 1.56711 0.07508 0.00653 1.46138 0.07001	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year	C02 Annual Emissions due to the use of pesticides per unit of harvested fruits C02 Annual Emissions due to the use of pesticides per tree unit C02 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area C02 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits C02 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits C02 Annual Emissions due to the use of fossil fuels & electricity per tree unit C02 Annual Emissions due to the use of diesel per unit of cultivated area C02 Annual Emissions due to the use of diesel per unit of harvested fruits	
2 3 1 2 3 1 1 2 3	AE _{p_product} AE _{p_tree} AE _{ff&e_area} AE _{ff&e_product} AE _{ff&e_tree} AE _{ff&e_cree} AE _{D_area}	0.03585 0.00312 1.56711 0.07508 0.00653 1.46138 0.07001	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year	C02 Annual Emissions due to the use of pesticides per unit of harvested fruits C02 Annual Emissions due to the use of pesticides per tree unit C02 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area C02 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits C02 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits C02 Annual Emissions due to the use of fossil fuels & electricity per tree unit C02 Annual Emissions due to the use of diesel per unit of cultivated area C02 Annual Emissions due to the use of diesel per unit of harvested fruits	
2 3 1 2 3 3 1 2 3 3	AE _{p_product} AE _{p_tree} AE _{ff&e_area} AE _{ff&e_product} AE _{ff&e_tree} AE _{fo_area} AE _{D_area} AE _{D_tree}	0.03585 0.00312 1.56711 0.07508 0.00653 1.46138 0.07001 0.00609	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year	C02 Annual Emissions due to the use of pesticides per unit of harvested fruits C02 Annual Emissions due to the use of pesticides per tree unit C02 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area C02 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits C02 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits C02 Annual Emissions due to the use of fossil fuels & electricity per tree unit C02 Annual Emissions due to the use of fossil fuels & electricity per tree unit C02 Annual Emissions due to the use of diesel per unit of cultivated area C02 Annual Emissions due to the use of diesel per unit of harvested fruits C02 Annual Emissions due to the use of diesel per unit of harvested fruits C02 Annual Emissions due to the use of diesel per unit of harvested fruits C02 Annual Emissions due to the use of diesel per unit of harvested fruits C02 Annual Emissions due to the use of diesel per tree unit	
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	AE _{p_product} AE _{p_tree} AE _{ff&e_area} AE _{ff&e_product} AE _{ff&e_tree} AE _{D_area} AE _{D_product} AE _{D_bree} AE _{D_tree} AE _{G_area} AE _{G_product}	0.03585 0.00312 1.56711 0.07508 0.00653 1.46138 0.07001 0.00609 0.03399 0.00163	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/tree/year tn CO2/tree/year tn CO2/tn of yield/year	C02 Annual Emissions due to the use of pesticides per unit of harvested fruits C02 Annual Emissions due to the use of pesticides per tree unit C02 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area C02 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits C02 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits C02 Annual Emissions due to the use of fossil fuels & electricity per tree unit C02 Annual Emissions due to the use of diesel per unit of cultivated area C02 Annual Emissions due to the use of diesel per unit of harvested fruits C02 Annual Emissions due to the use of diesel per unit of harvested fruits C02 Annual Emissions due to the use of diesel per tree unit C02 Annual Emissions due to the use of diesel per tree unit C02 Annual Emissions due to the use of gasoline per unit of cultivated area C02 Annual Emissions due to the use of gasoline per unit of cultivated area C02 Annual Emissions due to the use of gasoline per unit of cultivated area C02 Annual Emissions due to the use of gasoline per unit of cultivated area C02 Annual Emissions due to the use of gasoline per unit of cultivated area C02 Annual Emissions due to the use of gasoline per unit of cultivated area	
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2 3 1 2 3 1 2 3 3 1 2 3 3	AE _{p_product} AE _{p_tree} AE _{ff&e_area} AE _{ff&e_product} AE _{ff&e_tree} AE _{0_area} AE _{0_area} AE _{0_area} AE _{0_area} AE _{6_area} AE _{6_tree} AE _{6_tree}	0.03585 0.00312 1.56711 0.07508 0.00653 1.46138 0.07001 0.00609 0.03399 0.00163 0.00014 0.0014	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/hof yield/year tn CO2/tree/year tn CO2/tree/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/tn of yield/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/tree/year	C02 Annual Emissions due to the use of pesticides per unit of harvested fruits C02 Annual Emissions due to the use of pesticides per tree unit C02 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area C02 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits C02 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits C02 Annual Emissions due to the use of fossil fuels & electricity per tree unit C02 Annual Emissions due to the use of diesel per unit of cultivated area C02 Annual Emissions due to the use of diesel per unit of harvested fruits C02 Annual Emissions due to the use of diesel per unit of harvested fruits C02 Annual Emissions due to the use of gasoline per unit of cultivated area C02 Annual Emissions due to the use of gasoline per unit of cultivated area C02 Annual Emissions due to the use of gasoline per unit of harvested fruits C02 Annual Emissions due to the use of gasoline per unit of harvested fruits C02 Annual Emissions due to the use of gasoline per unit of harvested fruits C02 Annual Emissions due to the use of gasoline per unit of cultivated area C02 Annual Emissions due to the use of gasoline per unit of cultivated area C02 Annual Emissions due to the use of gasoline per unit of cultivated area C02 Annual Emissions due to the use of gasoline per tree unit <td< td=""><td></td></td<>	

R21.2	TAGproduct	0.00000	tn CO2/tn of yield/year	CO2 Total Annual Gain per unit of harvested fruits
R21.3	TAG _{tree}	0.00000	tn CO2/tree/year	CO2 Total Annual Gain per tree unit
-				
R22.1	AG _{N-f_LCC_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (Leguminosae cover crops) per unit of cultivated area
R22.2	AG _{N-f_LCC_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (Leguminosae cover crops) per unit of harvested fruits
R22.3	AG _{N-f_LCC_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (Leguminosae cover crops) per tree unit
R23.1	AG _{f_FGT_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to fertilizers reduction (fertigation) per unit of cultivated area
R23.2	AG _{f_FGT_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to fertilizers reduction (fertigation) per unit of harvested fruits
R23.3	AG _{f_FGT_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to fertilizers reduction (fertigation) per tree unit
R24.1	AG _{H_cc/m_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to herbicides reduction (cover crops/mulching) per unit of cultivated area
R24.2	AG _{H_cc/m_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to herbicides reduction (cover crops/mulching) per unit of harvested fruits
R24.3	AG _{H_cc/m_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to herbicides reduction (cover crops/mulching) per tree unit
R25.1	AG _{l_im/mt_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping) per unit of cultivated area
R25.2	AG _{I_im/mt_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping) per unit of harvested fruits
R25.3	AG _{I_im/mt_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping) per tree unit
R26.1	AG _{WF_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to the use of wood fuels instead of diesel per unit of cultivated area
R26.2	AG _{WF_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to the use of wood fuels instead of diesel per unit of harvested fruits
R26.3	AG _{WF_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to the use of wood fuels instead of diesel per tree unit
R27.1	AG _{RES_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to the use of RES per unit of cultivated area
R27.2	AG _{RES_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to the use of RES per unit of harvested fruits
R27.3	AG _{RES_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to the use of RES per tree unit

E
CUMATREE

Tree crops' CO2 Removal Capacity Calculation Tool (CO2RCCT)



terra nova

Designed and developed by TERRA NOVA Ltd.

Results

Country where the Tool is applied:	Italy
Species of tree crop:	Apple
Geographical area of the cultivation:	ITALIA (total)

Conventional

CO2 Annual Removal Capacity

R1.1	ARC	373,378.7555 tn CO2/year	CO2 Annual Removal Capacity	(BF is included)
R1.2	ARC	144,814.5249 tn CO2/year	CO2 Annual Removal Capacity	(BF is not included)

The term "CO2 Removal" means the abstraction of CO2 from atmosphere

Agricultural practice:

BF: the fruits' biomass

Analysis

R2.1		AR _{BF}	228,564.2306 tn CO2/year	CO2 Annual Removal due to the production of fruit biomass	
R2.2	rals	AR _{BW}	313,581.0816 tn CO2/year	CO2 Annual Removal due to the production of wood biomass	
R2.3		AS _s	35,736.5972 tn CO2/year	CO2 Annual Storage in soil as carbon of the fallen biomass	
R2.4	Rei	TAR	577,881.9094 tn CO2/year	CO2 Total Annual Removals	(BF is included)
R2.5		TAR	349,317.6789 tn CO2/year	CO2 Total Annual Removals	(BF is not included)

a. It has to be underlined an important difference between ARC and TAR:

ARC is the result of the CO2 mass balance between (a) the total quantity of CO2 which is abstracted from the atmosphere [=TAR] by the tree in order to create biomass and (b) the total quantity of CO2 which is emitted to the atmosphere due to the agricultural practices which are applied for the cultivation of the tree.

R3.1	6	AE _f	32,607.3504 tn CO2/year	CO2 Annual Emissions due to the use of fertilizers
R3.2	S ü	AE	28,041.4722 tn CO2/year	CO2 Annual Emissions due to the use of pesticides
R3.3	nis C	AE _{ff&e}	143,854.3313 tn CO2/year	CO2 Annual Emissions due to the use of fossil fuels & electricity
R3.4	ū	TAE	204,503.1540 tn CO2/year	CO2 Total Annual Emissions
	R4.1	AE _D	134,742.9319 tn CO2/year	CO2 Annual Emissions due to the use of diesel
	R4.2	AE _G	6,830.8249 tn CO2/year	CO2 Annual Emissions due to the use of gasoline
	R4.3	AE _{EL}	2,280.5745 tn CO2/year	CO2 Annual Emissions due to the use of electricity
	R4.4	AE _{ff&e}	143,854.3313 tn CO2/year	CO2 Annual Emissions due to the use of fossil fuels & electricity

R5.1		AG _{N-f_LCC}	0.0000 tn CO2/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (use of Leguminosae cover crops)
R5.2		AG _{f_FGT}	0.0000 tn CO2/year	CO2 Annual Gain due to fertilizers reduction (use of fertigation)
R5.3		AG _{H_cc/m}	0.0000 tn CO2/year	CO2 Annual Gain due to herbicides reduction (use of cover crops/mulching)
R5.4		AG _{I_im/mt}	0.0000 tn CO2/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping)
R5.5	Gain	AG _{WF}	0.0000 tn CO2/year	CO2 Annual Gain due to the use of wood fuels instead of diesel
R5.6	00	AG _{RES}	0.0000 tn CO2/year	CO2 Annual Gain due to the use of Renewable Energy Sources
R5.7		AG _{EL_m}	0.0000 tn CO2/year	CO2 Annual Gain due to electricity reduction (use of mulching)
R5.8		AG _{D_FGT}	0.0000 tn CO2/year	CO2 Annual Gain due to diesel reduction (use of fertigation)
R5.9		TAG	0.0000 tn CO2/year	CO2 Total Annual Gain

		ity indexes	oval Capacity Indexes	CO2 Removal Ca	
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emoval Capacity per unit of harvested fruits (BF is not	T is not included
	T is not included
emoval Capacity per tree unit	r is not included
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	(BF is included)
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missions due to the use of gasoline per tree unit	
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missions due to the use of electricity per unit of cultivated area missions due to the use of electricity per unit of harvested fruits	
missions due to the use of electricity per unit of harvested fruits	_

R21.2	TAGproduct	0.00000	tn CO2/tn of yield/year	CO2 Total Annual Gain per unit of harvested fruits
R21.3	TAG _{tree}	0.00000	tn CO2/tree/year	CO2 Total Annual Gain per tree unit
-				
R22.1	AG _{N-f_LCC_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (Leguminosae cover crops) per unit of cultivated area
R22.2	AG _{N-f_LCC_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (Leguminosae cover crops) per unit of harvested fruits
R22.3	AG _{N-f_LCC_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (Leguminosae cover crops) per tree unit
R23.1	AG _{f_FGT_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to fertilizers reduction (fertigation) per unit of cultivated area
R23.2	AG _{f_FGT_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to fertilizers reduction (fertigation) per unit of harvested fruits
R23.3	AG _{f_FGT_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to fertilizers reduction (fertigation) per tree unit
R24.1	AG _{H_cc/m_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to herbicides reduction (cover crops/mulching) per unit of cultivated area
R24.2	AG _{H_cc/m_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to herbicides reduction (cover crops/mulching) per unit of harvested fruits
R24.3	AG _{H_cc/m_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to herbicides reduction (cover crops/mulching) per tree unit
R25.1	AG _{I_im/mt_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping) per unit of cultivated area
R25.2	AG _{I_im/mt_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping) per unit of harvested fruits
R25.3	AG _{I_im/mt_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping) per tree unit
R26.1	AG _{WF_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to the use of wood fuels instead of diesel per unit of cultivated area
R26.2	AG _{WF_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to the use of wood fuels instead of diesel per unit of harvested fruits
R26.3	AG _{WF_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to the use of wood fuels instead of diesel per tree unit
R27.1	AG _{RES_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to the use of RES per unit of cultivated area
R27.2	AG _{RES_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to the use of RES per unit of harvested fruits
R27.3	AG _{RES_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to the use of RES per tree unit

E
CUMATREE

Tree crops' CO2 Removal Capacity Calculation Tool (CO2RCCT)



terra nova

Designed and developed by TERRA NOVA Ltd.

Results

Country where the Tool is applied:	Italy
Species of tree crop:	Peach
Geographical area of the cultivation:	ITALIA (total)

Conventional

CO2 Annual Removal Capacity

R1.1 ARC 174,357.0409 tn CO2/year CO2 Annual Removal Capacity	(BE is included)
	(BF IS Included)
R1.2 ARC -45,766.2368 tn CO2/year CO2 Annual Removal Capacity	(BF is not included)

The term "CO2 Removal" means the abstraction of CO2 from atmosphere

Agricultural practice:

BF: the fruits' biomass

Analysis

R2.1		AR _{BF}	220,123.2777 tn CO2/year	CO2 Annual Removal due to the production of fruit biomass	
R2.2	als	AR _{BW}	136,114.8504 tn CO2/year	CO2 Annual Removal due to the production of wood biomass	
R2.3	102	AS _S	18,578.3688 tn CO2/year	CO2 Annual Storage in soil as carbon of the fallen biomass	
R2.4	Rei	TAR	374,816.4969 tn CO2/year	CO2 Total Annual Removals	(BF is included)
R2.5		TAR	154,693.2192 tn CO2/year	CO2 Total Annual Removals	(BF is not included)

a. It has to be underlined an important difference between ARC and TAR:

ARC is the result of the CO2 mass balance between (a) the total quantity of CO2 which is abstracted from the atmosphere [=TAR] by the tree in order to create biomass and (b) the total quantity of CO2 which is emitted to the atmosphere due to the agricultural practices which are applied for the cultivation of the tree.

R3.1	s	AE _f	41,373.6158 tn CO2/year	CO2 Annual Emissions due to the use of fertilizers
R3.2	22 Sion	AEp	56,860.3099 tn CO2/year	CO2 Annual Emissions due to the use of pesticides
R3.3	U Sig	AE _{ff&e}	102,225.5303 tn CO2/year	CO2 Annual Emissions due to the use of fossil fuels & electricity
R3.4		TAE	200,459.4560 tn CO2/year	CO2 Total Annual Emissions
	R4.1	AED	95,368.4640 tn CO2/year	CO2 Annual Emissions due to the use of diesel
	R4.2	AE _G	3,710.7746 tn CO2/year	CO2 Annual Emissions due to the use of gasoline
	R4.3	AE _{EL}	3,146.2918 tn CO2/year	CO2 Annual Emissions due to the use of electricity
	R4.4	AE _{ff&e}	102,225.5303 tn CO2/year	CO2 Annual Emissions due to the use of fossil fuels & electricity

R5.1		AG _{N-f_LCC}	0.0000 tn CO2/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (use of Leguminosae cover crops)
R5.2		AG _{f_FGT}	0.0000 tn CO2/year	CO2 Annual Gain due to fertilizers reduction (use of fertigation)
R5.3		AG _{H_cc/m}	0.0000 tn CO2/year	CO2 Annual Gain due to herbicides reduction (use of cover crops/mulching)
R5.4		AG _{I_im/mt}	0.0000 tn CO2/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping)
R5.5	ain 02	AG _{WF}	0.0000 tn CO2/year	CO2 Annual Gain due to the use of wood fuels instead of diesel
R5.6	00	AG _{RES}	0.0000 tn CO2/year	CO2 Annual Gain due to the use of Renewable Energy Sources
R5.7		AG _{EL_m}	0.0000 tn CO2/year	CO2 Annual Gain due to electricity reduction (use of mulching)
R5.8		AG _{D_FGT}	0.0000 tn CO2/year	CO2 Annual Gain due to diesel reduction (use of fertigation)
R5.9		TAG	0.0000 tn CO2/year	CO2 Total Annual Gain

.2 .3	ARCproduct	0.12263	tn CO2/tn of yield/year	CO2 Annual Removal Capacity per unit of harvested fruits	(BF is included)	
	ARCtree	0.00393	tn CO2/tree/year	CO2 Annual Removal Capacity per tree unit		
L	ARCarea	-0.67081	tn CO2/hectare/year	CO2 Annual Removal Capacity per unit of cultivated area		
2	ARCproduct	-0.03219	tn CO2/tn of yield/year	CO2 Annual Removal Capacity per unit of harvested fruits	(BF is not included)	
3	ARCtree	-0.00103	tn CO2/tree/year	CO2 Annual Removal Capacity per tree unit		
_						
L _	TAE/TAR	0.53482	Total Annual CO2 Emissions/ Total Ann		(BF is included)	
2	TAE/TAR	1.29585	1.29585 Total Annual CO2 Emissions/ Total Annual CO2 Removals (BF is not included)			
-						
	TAR _{area}	5.49378	tn CO2/hectare/year	CO2 Total Annual Removals per unit of cultivated area	(DE to include d)	
2	TAR	0.26362	tn CO2/tn of yield/year	CO2 Total Annual Removals per unit of harvested fruits	(BF is included)	
	TAR _{tree}	0.00845	tn CO2/tree/year	CO2 Total Annual Removals per tree unit		
1	TAR _{area}	2.26738	tn CO2/hectare/year	CO2 Total Annual Removals per unit of cultivated area		
2	TARproduct	0.10880	tn CO2/tn of yield/year	CO2 Total Annual Removals per unit of harvested fruits	(BF is not included)	
3	TAR _{tree}	0.00349	tn CO2/trie/year	CO2 Total Annual Removals per tint of narvested nuits		
• _	TAntree	0.00345		CO2 Total Alindar Removals per tree unit		
1	AR _{BF area}	3.22640	tn CO2/hectare/year	CO2 Annual Removal due to the production of fruit biomass per unit of cultivated area		
2	AR _{BF_product}	0.15482	tn CO2/tn of yield/year	CO2 Annual Removal due to the production of fruit biomass per unit of harvested fruits		
3	AR _{BF_tree}	0.00496	tn CO2/tree/year	CO2 Annual Removal due to the production of fruit biomass per time of indirected indirec		
	uee					
1	AR _{BW area}	1.99507	tn CO2/hectare/year	CO2 Annual Removal due to the production of wood biomass per unit of cultivated area		
.2	AR _{BW_product}	0.09573	tn CO2/tn of yield/year	CO2 Annual Removal due to the production of wood biomass per unit of harvested fruits		
.3	AR _{BW_tree}	0.00307	tn CO2/tree/year	CO2 Annual Removal due to the production of wood biomass per tree unit		
	<u> </u>					
.1	AS _{S_area}	0.27231	tn CO2/hectare/year	CO2 Annual Storage in soil as carbon of the fallen biomass per unit of cultivated area		
2	AS _{s_product}	0.01307	tn CO2/tn of yield/year	CO2 Annual Storage in soil as carbon of the fallen biomass per unit of harvested fruits		
.3	AS _{S_tree}	0.00042	tn CO2/tree/year	CO2 Annual Storage in soil as carbon of the fallen biomass per tree unit		
.1	TAE _{area}	2.93819	tn CO2/hectare/year	CO2 Total Annual Emissions per unit of cultivated area		
.2	TAEproduct	0.14099	tn CO2/tn of yield/year	CO2 Total Annual Emissions per unit of harvested fruits		
.3	TAE _{tree}	0.00452	tn CO2/tree/year	CO2 Total Annual Emissions per tree unit		
5.1	AE _{f_area}	0.60642	tn CO2/hectare/year	CO2 Annual Emissions due to the use of fertilizers per unit of cultivated area	CO2 Annual Emissions due to the use of fertilizers per unit of cultivated area	
		0.00042				
.2	AE _{f_product}	0.02910	tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of fertilizers per unit of harvested fruits		
	AE _{f_product} AE _{f_tree}			CO2 Annual Emissions due to the use of fertilizers per unit of harvested fruits CO2 Annual Emissions due to the use of fertilizers per tree unit		
.3	AE _{f_tree}	0.02910 0.00093	tn CO2/tn of yield/year tn CO2/tree/year	CO2 Annual Emissions due to the use of fertilizers per tree unit		
.2 .3 .1	AE _{f_tree} AE _{p_area}	0.02910 0.00093 0.83342	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year	CO2 Annual Emissions due to the use of fertilizers per tree unit CO2 Annual Emissions due to the use of pesticides per unit of cultivated area		
.3 .1 .2	AE _{f_tree} AE _{p_area} AE _{p_product}	0.02910 0.00093 0.83342 0.03999	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of fertilizers per tree unit CO2 Annual Emissions due to the use of pesticides per unit of cultivated area CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits		
.3 .1 .2	AE _{f_tree} AE _{p_area}	0.02910 0.00093 0.83342	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year	CO2 Annual Emissions due to the use of fertilizers per tree unit CO2 Annual Emissions due to the use of pesticides per unit of cultivated area		
.1 .2 .3	AE _{f_tree} AE _{p_area} AE _{p_product} AE _{p_tree}	0.02910 0.00093 0.83342 0.03999 0.00128	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year	CO2 Annual Emissions due to the use of fertilizers per tree unit CO2 Annual Emissions due to the use of pesticides per unit of cultivated area CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits CO2 Annual Emissions due to the use of pesticides per tree unit		
.3 .1 .2 .3	AE _{p_area} AE _{p_area} AE _{p_tree} AE _{fi&e_area}	0.02910 0.00093 0.83342 0.03999 0.00128 1.49835	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/tree/year	CO2 Annual Emissions due to the use of fertilizers per tree unit CO2 Annual Emissions due to the use of pesticides per unit of cultivated area CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits CO2 Annual Emissions due to the use of pesticides per tree unit CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area		
.3 .2 .3 .1 .2	AE _{L tree} AE _{p_area} AE _{p_product} AE _{p_tree} AE _{ff&e_area} AE _{ff&e_product}	0.02910 0.00093 0.83342 0.03999 0.00128 1.49835 0.07190	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of fertilizers per tree unit CO2 Annual Emissions due to the use of pesticides per unit of cultivated area CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits CO2 Annual Emissions due to the use of pesticides per ree unit CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits		
.1 .2 .3 .1 .2 .3	AE _{p_area} AE _{p_area} AE _{p_tree} AE _{fi&e_area}	0.02910 0.00093 0.83342 0.03999 0.00128 1.49835	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/tree/year	CO2 Annual Emissions due to the use of fertilizers per tree unit CO2 Annual Emissions due to the use of pesticides per unit of cultivated area CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits CO2 Annual Emissions due to the use of pesticides per tree unit CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area		
3 .1 .2 .3 .1 .2 .3 .3	AE _{f_tree} AE _{p_area} AE _{p_product} AE _{p_tree} AE _{ff&e_area} AE _{ff&e_area}	0.02910 0.00093 0.83342 0.03999 0.00128 1.49835 0.07190 0.00231	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year	CO2 Annual Emissions due to the use of fertilizers per tree unit CO2 Annual Emissions due to the use of pesticides per unit of cultivated area CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits CO2 Annual Emissions due to the use of pesticides per tree unit CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per tree unit		
3 1 2 3 1 2 3 3 1	AE _{f_tree} AE _{p_area} AE _{p_product} AE _{p_tree} AE _{ff&e_area} AE _{ff&e_product} AE _{ff&e_tree} AE _{ff&e_tree}	0.02910 0.00093 0.83342 0.03999 0.00128 1.49835 0.07190 0.00231 1.39784	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/tn of yield/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year	CO2 Annual Emissions due to the use of fertilizers per tree unit CO2 Annual Emissions due to the use of pesticides per unit of cultivated area CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits CO2 Annual Emissions due to the use of pesticides per tree unit CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per tree unit CO2 Annual Emissions due to the use of fossil fuels area		
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R21.2	TAGproduct	0.00000	tn CO2/tn of yield/year	CO2 Total Annual Gain per unit of harvested fruits
R21.3	TAG _{tree}	0.00000	tn CO2/tree/year	CO2 Total Annual Gain per tree unit
-				
R22.1	AG _{N-f_LCC_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (Leguminosae cover crops) per unit of cultivated area
R22.2	AG _{N-f_LCC_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (Leguminosae cover crops) per unit of harvested fruits
R22.3	AG _{N-f_LCC_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (Leguminosae cover crops) per tree unit
R23.1	AG _{f_FGT_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to fertilizers reduction (fertigation) per unit of cultivated area
R23.2	AG _{f_FGT_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to fertilizers reduction (fertigation) per unit of harvested fruits
R23.3	AG _{f_FGT_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to fertilizers reduction (fertigation) per tree unit
R24.1	AG _{H_cc/m_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to herbicides reduction (cover crops/mulching) per unit of cultivated area
R24.2	AG _{H_cc/m_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to herbicides reduction (cover crops/mulching) per unit of harvested fruits
R24.3	AG _{H_cc/m_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to herbicides reduction (cover crops/mulching) per tree unit
R25.1	AG _{I_im/mt_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping) per unit of cultivated area
R25.2	AG _{I_im/mt_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping) per unit of harvested fruits
R25.3	AG _{I_im/mt_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping) per tree unit
R26.1	AG _{WF_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to the use of wood fuels instead of diesel per unit of cultivated area
R26.2	AG _{WF_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to the use of wood fuels instead of diesel per unit of harvested fruits
R26.3	AG _{WF_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to the use of wood fuels instead of diesel per tree unit
R27.1	AG _{RES_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to the use of RES per unit of cultivated area
R27.2	AG _{RES_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to the use of RES per unit of harvested fruits
R27.3	AG _{RES_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to the use of RES per tree unit

Openation

Tree crops' CO2 Removal Capacity Calculation Tool (CO2RCCT)



terra nova

Designed and developed by TERRA NOVA Ltd.

Results

Country where the Tool is applied:	Italy
Species of tree crop:	Almond
Geographical area of the cultivation:	ITALIA (total)

Conventional

CO2 Annual Removal Capacity

R1.1	ARC	- 59,731.1118 tn CO2/year	CO2 Annual Removal Capacity	(BF is included)
R1.2	ARC	-81,652.8940 tn CO2/year	CO2 Annual Removal Capacity	(BF is not included)

The term "CO2 Removal" means the abstraction of CO2 from atmosphere

Agricultural practice:

BF: the fruits' biomass

Analysis

R2.1		AR _{BF}	21,921.7821 tn CO2/year	CO2 Annual Removal due to the production of fruit biomass	
R2.2	als	AR _{BW}	33,705.5152 tn CO2/year	CO2 Annual Removal due to the production of wood biomass	
R2.3	5 É	ASs	19,143.5479 tn CO2/year	CO2 Annual Storage in soil as carbon of the fallen biomass	
R2.4	- Be	TAR	74,770.8453 tn CO2/year	CO2 Total Annual Removals	(BF is included)
R2.5		TAR	52,849.0632 tn CO2/year	CO2 Total Annual Removals	(BF is not included)

a. It has to be underlined an important difference between ARC and TAR:

ARC is the result of the CO2 mass alance between (a) the total quantity of CO2 which is abstracted from the atmosphere [=TAR] by the tree in order to create biomass and (b) the total quantity of CO2 which is emitted to the atmosphere due to the agricultural practices which are applied for the cultivation of the tree.

R3.1		AE _f	38,249.5774 tn CO2/year	CO2 Annual Emissions due to the use of fertilizers		
K2.1	S	ALf	36,249.3774 th CO2/year			
R3.2	Si Si	AEp	50,760.3447 tn CO2/year	CO2 Annual Emissions due to the use of pesticides		
R3.3	mis C	AE _{ff&e}	45,492.0351 tn CO2/year	CO2 Annual Emissions due to the use of fossil fuels & electricity		
R3.4	Э	TAE	134,501.9571 tn CO2/year	CO2 Total Annual Emissions		
	R4.1	AE _D	40,645.4093 tn CO2/year	CO2 Annual Emissions due to the use of diesel		
	R4.2	AE _G	3,163.0152 tn CO2/year	CO2 Annual Emissions due to the use of gasoline		
	R4.3	AE _{EL}	1,683.6106 tn CO2/year	CO2 Annual Emissions due to the use of electricity		
	R4.4	AE _{ff&e}	45,492.0351 tn CO2/year	CO2 Annual Emissions due to the use of fossil fuels & electricity		

R5.1		AG _{N-f_LCC}	0.0000 tn CO2/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (use of Leguminosae cover crops)
R5.2		AG _{f_FGT}	0.0000 tn CO2/year	CO2 Annual Gain due to fertilizers reduction (use of fertigation)
R5.3		AG _{H_cc/m}	0.0000 tn CO2/year	CO2 Annual Gain due to herbicides reduction (use of cover crops/mulching)
R5.4		AG _{I_im/mt}	0.0000 tn CO2/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping)
R5.5	Gain Gain	AG _{WF}	0.0000 tn CO2/year	CO2 Annual Gain due to the use of wood fuels instead of diesel
R5.6	00	AG _{RES}	0.0000 tn CO2/year	CO2 Annual Gain due to the use of Renewable Energy Sources
R5.7		AG _{EL_m}	0.0000 tn CO2/year	CO2 Annual Gain due to electricity reduction (use of mulching)
R5.8		AG _{D_FGT}	0.0000 tn CO2/year	CO2 Annual Gain due to diesel reduction (use of fertigation)
R5.9		TAG	0.0000 tn CO2/year	CO2 Total Annual Gain

	CO2 Removal Capacity Indexes				
R6.1	ARCarea	-1.02711	tn CO2/hectare/year	CO2 Annual Removal Capacity per unit of cultivated area	

ARC _{product}	-0.75679	tn CO2/tn of yield/year	CO2 Annual Removal Capacity per unit of harvested fruits	(BF is included)
uee	0.00000		our removal capacity per tree and	
ARC	-1.40407	tn CO2/hectare/year	CO2 Annual Removal Capacity per unit of cultivated area	
				(BF is not included)
uee				
TAE/TAR	1.79886	Total Annual CO2 Emissions/ Total An	nual CO2 Removals	(BF is included)
TAE/TAR	2.54502	Total Annual CO2 Emissions/ Total An	nual CO2 Removals	(BF is not included)
TAR _{area}	1.28573	tn CO2/hectare/year	CO2 Total Annual Removals per unit of cultivated area	
TAR _{product}	0.94734	tn CO2/tn of yield/year	CO2 Total Annual Removals per unit of harvested fruits	(BF is included)
TAR _{tree}	0.00476	tn CO2/tree/year	CO2 Total Annual Removals per tree unit	
TAR _{area}	0.90877	tn CO2/hectare/year	CO2 Total Annual Removals per unit of cultivated area	
TAR _{product}	0.66959	tn CO2/tn of yield/year	CO2 Total Annual Removals per unit of harvested fruits	(BF is not included)
TAR _{tree}	0.00337	tn CO2/tree/year	CO2 Total Annual Removals per tree unit	
AR _{BF_area}	0.37696	tn CO2/hectare/year		
AR _{BF_product}		tn CO2/tn of yield/year		
AR _{BF_tree}	0.00140	tn CO2/tree/year	CO2 Annual Removal due to the production of fruit biomass per tree unit	
		tn CO2/hectare/year		
AR _{BW_tree}	0.00215	tn CO2/tree/year	CO2 Annual Removal due to the production of wood biomass per tree unit	
AS _{S_product}				
AS _{S_tree}	0.00122	tn CO2/tree/year	CO2 Annual Storage in soil as carbon of the fallen biomass per tree unit	
	2.24.202		COD Table Amount Facilities and with of a Winsteil and	
TAEtree	0.00857	th CO2/tree/year	CO2 Total Annual Emissions per tree unit	
AE	0 (577)	to CO2/hastara/usar	CO2 Appual Emissions due to the use of fartilizers per unit of cultivated area	
AL _{f_tree}	0.00244	til CO2/tree/year	CO2 Annual Emissions due to the use of refutizers per tree diff	
AF	0 87285	to CO2/bectare/year	CO2 Annual Emissions due to the use of nesticides per unit of cultivated area	
p_tree	0.00323	and of year		
AE	0 78226	tn CO2/bectare/year	CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area	
nae_tree	0.00230			
AE _{D area}	0.69892	tn CO2/hectare/vear	CO2 Annual Emissions due to the use of diesel per unit of cultivated area	
	0.51497		CO2 Annual Emissions due to the use of diesel per unit of harvested fruits	
AE _{D_tree}	0.00259	tn CO2/tree/year	CO2 Annual Emissions due to the use of diesel per tree unit	
5_0CC				
		tn CO2/hectare/year	CO2 Annual Emissions due to the use of gasoline per unit of cultivated area	
AE _{G area}	0.05439			
AE _{G_area}		· · · · · · · · · · · · · · · · · · ·	CO2 Annual Emissions due to the use of gasoline per unit of harvested fruits	
AE _{G_product}	0.05439 0.04008 0.00020	tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of gasoline per unit of harvested fruits CO2 Annual Emissions due to the use of gasoline per tree unit	
	0.04008	· · · · · · · · · · · · · · · · · · ·		
AE _{G_product} AE _{G_tree}	0.04008	tn CO2/tn of yield/year		
AE _{G_product} AE _{G_tree} AE _{EL_area}	0.04008 0.00020	tn CO2/tn of yield/year tn CO2/tree/year	CO2 Annual Emissions due to the use of gasoline per tree unit	
AE _{G_product} AE _{G_tree}	0.04008 0.00020 0.02895	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year	CO2 Annual Emissions due to the use of gasoline per tree unit CO2 Annual Emissions due to the use of electricity per unit of cultivated area	
	ARC _{tree} ARC _{area} ARC _{product} ARC _{tree} TAE/TAR TAE/TAR TAR_tree TAR _{area} TAR _{tree} TAR _{product} TAR _{tree}	ARC -0.00380 ARC -1.40407 ARC -1.03453 ARC -1.03453 ARC -0.00520 TAR -1.03453 ARC -0.00520 TAE/TAR 1.79886 TAE/TAR 1.28573 TAR 0.94734 TAR 0.90877 TAR 0.90877 TAR 0.66959 TAR/tree 0.00337 ARBF_product 0.66959 TAR 0.37696 ARBF_product 0.42705 ARBF_product 0.42705 ARBF_product 0.42705 ARBF_product 0.42705 ARBF_product 0.42705 ARBW_product 0.42705 ARBW_product 0.42705 ARBW_product 0.42705 ARBW_product 0.42705 ARBW_product 0.42705 AS_stree 0.00212 TAE 2.31283 TAE 0.008571 AE	ARC _{tree} -0.00380 tn CO2/tree/year ARC _{product} -1.40407 tn CO2/hectare/year ARC _{product} -1.03453 tn CO2/tr of yield/year ARC _{product} -0.00520 tn CO2/tree/year TAE/TAR 1.79886 Total Annual CO2 Emissions/ Total An TAE/TAR 2.54502 Total Annual CO2 Emissions/ Total An TAR _{product} 0.94734 tn CO2/hectare/year TAR _{product} 0.90476 tn CO2/hectare/year TAR _{product} 0.00476 tn CO2/hectare/year TAR _{product} 0.00476 tn CO2/hectare/year TAR _{product} 0.00337 tn CO2/hectare/year TAR _{product} 0.00337 tn CO2/hectare/year ARer_gree 0.37696 tn CO2/hectare/year ARer_gree 0.00140 tn CO2/hectare/year ARer_gree 0.0215 tn CO2/hectare/year ARew_product 0.22775 tn CO2/hectare/year ARer_gree 0.00215 tn CO2/hectare/year ARer_gree 0.00215 tn CO2/hectare/year ARer_gree	ARC_word 4.0000 tht CO2/hear/year CO2 Annual Removal Capacity per tree unit ARC_mode -1.0007 tht CO2/hear/year CO2 Annual Removal Capacity per unit of collowed area ARC_mode -0.00050 tht CO2/hear/year CO2 Annual Removal Capacity per unit of collowed area ARC_mode -0.00050 tht CO2/hear/year CO2 Annual Removal Capacity per unit of collowed area ARC_mode -0.00050 tht CO2/hear/year CO2 Annual Removal Capacity per unit of collowed area TAP_And -1.00050 Total Annual CO2 Intesion/ Total Annual CO2 Removals TAR_mode 0.000771 tht CO2/hear/year CO2 Total Annual Removals per unit of collowed area TAR_mode 0.0000771 tht CO2/hear/year CO2 Total Annual Removals per unit of fourteed area TAR_mode 0.0000771 tht CO2/hear/year CO2 Total Annual Removals per unit of collowed area TAR_mode 0.0000771 tht CO2/hear/year CO2 Total Annual Removals per unit of collowed area TAR_mode 0.0000771 tht CO2/hear/year CO2 Annual Removal area for the unit TAR_mode 0.0000771 tht CO2/hear/year CO2 Annual Removal area for the unit TAR_mode 0.0000771 tht CO2/hear/year CO2 Annual Removal area for the unit TAR_mode 0.0000771 tht CO2/hear/year CO2 Annual Re

R21.2	TAGproduct	0.00000	tn CO2/tn of yield/year	CO2 Total Annual Gain per unit of harvested fruits
R21.3	TAG _{tree}	0.00000	tn CO2/tree/year	CO2 Total Annual Gain per tree unit
-				
R22.1	AG _{N-f_LCC_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (Leguminosae cover crops) per unit of cultivated area
R22.2	AG _{N-f_LCC_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (Leguminosae cover crops) per unit of harvested fruits
R22.3	AG _{N-f_LCC_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (Leguminosae cover crops) per tree unit
R23.1	AG _{f_FGT_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to fertilizers reduction (fertigation) per unit of cultivated area
R23.2	AG _{f_FGT_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to fertilizers reduction (fertigation) per unit of harvested fruits
R23.3	AG _{f_FGT_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to fertilizers reduction (fertigation) per tree unit
R24.1	AG _{H_cc/m_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to herbicides reduction (cover crops/mulching) per unit of cultivated area
R24.2	AG _{H_cc/m_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to herbicides reduction (cover crops/mulching) per unit of harvested fruits
R24.3	AG _{H_cc/m_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to herbicides reduction (cover crops/mulching) per tree unit
R25.1	AG _{I_im/mt_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping) per unit of cultivated area
R25.2	AG _{I_im/mt_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping) per unit of harvested fruits
R25.3	AG _{I_im/mt_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping) per tree unit
R26.1	AG _{WF_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to the use of wood fuels instead of diesel per unit of cultivated area
R26.2	AG _{WF_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to the use of wood fuels instead of diesel per unit of harvested fruits
R26.3	AG _{WF_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to the use of wood fuels instead of diesel per tree unit
R27.1	AG _{RES_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to the use of RES per unit of cultivated area
R27.2	AG _{RES_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to the use of RES per unit of harvested fruits
R27.3	AG _{RES_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to the use of RES per tree unit

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CUMATREE

Tree crops' CO2 Removal Capacity Calculation Tool (CO2RCCT)



terra nova

Designed and developed by TERRA NOVA Ltd.

Results

Country where the Tool is applied:	Italy
Species of tree crop:	Olive
Geographical area of the cultivation:	ITALIA (total)

Conventional

CO2 Annual Removal Capacity

		capacity		
R1.1	ARC	280,958.5780 tn CO2/year	CO2 Annual Removal Capacity	(BF is included)
R1.2	ARC	-432,427.2651 tn CO2/year	CO2 Annual Removal Capacity	(BF is not included)

The term "CO2 Removal" means the abstraction of CO2 from atmosphere

Agricultural practice:

BF: the fruits' biomass

Analysis

R2.1		AR _{BF}	713,385.8431 tn CO2/year	CO2 Annual Removal due to the production of fruit biomass	
R2.2	als	AR _{BW}	1,765,110.9643 tn CO2/year	CO2 Annual Removal due to the production of wood biomass	
R2.3	102	ASs	135,218.3339 tn CO2/year	CO2 Annual Storage in soil as carbon of the fallen biomass	
R2.4	Rei	TAR	2,613,715.1412 tn CO2/year	CO2 Total Annual Removals	(BF is included)
R2.5		TAR	1,900,329.2981 tn CO2/year	CO2 Total Annual Removals	(BF is not included)

a. It has to be underlined an important difference between ARC and TAR:

ARC is the result of the CO2 mass alance between (a) the total quantity of CO2 which is abstracted from the atmosphere [=TAR] by the tree in order to create biomass and (b) the total quantity of CO2 which is emitted to the atmosphere due to the agricultural practices which are applied for the cultivation of the tree.

R3.1		AEf	602,340.1465 tn CO2/year	CO2 Annual Emissions due to the use of fertilizers
R3.2	Succession of the second se	AE	681,448.3471 tn CO2/year	CO2 Annual Emissions due to the use of restrictes
	Si G	P	,	
R3.3	0 Ē	AE _{ff&e}	1,048,968.0697 tn CO2/year	CO2 Annual Emissions due to the use of fossil fuels & electricity
R3.4		TAE	2,332,756.5632 tn CO2/year	CO2 Total Annual Emissions
	R4.1	AE _D	968,103.3389 tn CO2/year	CO2 Annual Emissions due to the use of diesel
	R4.2	AE _G	76,732.6904 tn CO2/year	CO2 Annual Emissions due to the use of gasoline
	R4.3	AE _{EL}	4,132.0404 tn CO2/year	CO2 Annual Emissions due to the use of electricity
	R4.4	AE _{ff&e}	1,048,968.0697 tn CO2/year	CO2 Annual Emissions due to the use of fossil fuels & electricity

R5.1		AG _{N-f_LCC}	0.0000 tn CO2/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (use of Leguminosae cover crops)
R5.2		AG _{f_FGT}	0.0000 tn CO2/year	CO2 Annual Gain due to fertilizers reduction (use of fertigation)
R5.3		AG _{H_cc/m}	0.0000 tn CO2/year	CO2 Annual Gain due to herbicides reduction (use of cover crops/mulching)
R5.4		AG _{I_im/mt}	0.0000 tn CO2/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping)
R5.5	Gain	AG _{WF}	0.0000 tn CO2/year	CO2 Annual Gain due to the use of wood fuels instead of diesel
R5.6	0.0	AG _{RES}	0.0000 tn CO2/year	CO2 Annual Gain due to the use of Renewable Energy Sources
R5.7		AG _{EL_m}	0.0000 tn CO2/year	CO2 Annual Gain due to electricity reduction (use of mulching)
R5.8		AG _{D_FGT}	0.0000 tn CO2/year	CO2 Annual Gain due to diesel reduction (use of fertigation)
R5.9		TAG	0.0000 tn CO2/year	CO2 Total Annual Gain

	apacity Indexes	D2 Removal Capacity Indexes	C
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	ARC _{product}	0.10169	tn CO2/tn of yield/year	CO2 Annual Removal Capacity per unit of harvested fruits	(BF is included)
	ARC _{tree}	0.00160	tn CO2/tree/year	CO2 Annual Removal Capacity per tree unit	
	ARC _{area}	-0.38314	tn CO2/hectare/year	CO2 Annual Removal Capacity per unit of cultivated area	
	ARC _{product}	-0.15651	tn CO2/tn of yield/year	CO2 Annual Removal Capacity per unit of harvested fruits	(BF is not included)
	ARC _{tree}	-0.00246	tn CO2/tree/year	CO2 Annual Removal Capacity per tree unit	
_					
	TAE/TAR	0.89251	Total Annual CO2 Emissions/ Total Annual		(BF is included)
	TAE/TAR	1.22755	Total Annual CO2 Emissions/ Total An	tual CO2 Removals	(BF is not included)
	TAR _{area}	2.31582	tn CO2/hectare/year	CO2 Total Annual Removals per unit of cultivated area	
	TAR _{product}	0.94598	tn CO2/tn of yield/year	CO2 Total Annual Removals per unit of harvested fruits	(BF is included)
	TAR	0.01485	tn CO2/tree/year	CO2 Total Annual Removals per tree unit	
	ucc				
	TAR _{area}	1.68374	tn CO2/hectare/year	CO2 Total Annual Removals per unit of cultivated area	
	TAR _{product}	0.68779	tn CO2/tn of yield/year	CO2 Total Annual Removals per unit of harvested fruits	(BF is not included)
	TAR _{tree}	0.01079	tn CO2/tree/year	CO2 Total Annual Removals per tree unit	
	AR _{BF_area}	0.63208	tn CO2/hectare/year	CO2 Annual Removal due to the production of fruit biomass per unit of cultivated area	
	AR _{BF_product}	0.25820	tn CO2/tn of yield/year	CO2 Annual Removal due to the production of fruit biomass per unit of harvested fruits	
	AR _{BF_tree}	0.00405	tn CO2/tree/year	CO2 Annual Removal due to the production of fruit biomass per tree unit	
	4.0			COD Association to the construction of second 11 and the first of the second 12 and	
	AR _{BW_area}	1.56394	tn CO2/hectare/year	CO2 Annual Removal due to the production of wood biomass per unit of cultivated area	
	AR _{BW_product}	0.63885	tn CO2/tn of yield/year	CO2 Annual Removal due to the production of wood biomass per unit of harvested fruits	
	AR _{BW_tree}	0.01003	tn CO2/tree/year	CO2 Annual Removal due to the production of wood biomass per tree unit	
	AS _{S_area}	0.11981	tn CO2/hectare/year	CO2 Annual Storage in soil as carbon of the fallen biomass per unit of cultivated area	
		0.04894	tn CO2/tn of yield/year	CO2 Annual Storage in soil as carbon of the fallen biomass per unit of harvested fruits	
	AS _{S_product} AS _{S_tree}	0.00077	tn CO2/trie/year	CO2 Annual Storage in soil as carbon of the fallen biomass per tree unit	
	S_tree	0.00077		eet inner starde in sones anon al die fallen sones per tree ante	
	TAEarea	2.06688	tn CO2/hectare/year	CO2 Total Annual Emissions per unit of cultivated area	
	TAEproduct	0.84430	tn CO2/tn of yield/year	CO2 Total Annual Emissions per unit of harvested fruits	
	TAE _{tree}	0.01325	tn CO2/tree/year	CO2 Total Annual Emissions per tree unit	
	AE _{f_area}	0.53369	tn CO2/hectare/year	CO2 Annual Emissions due to the use of fertilizers per unit of cultivated area	
	AE _{f_product}	0.21801	tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of fertilizers per unit of harvested fruits	
	AE _{f_tree}	0.00342	tn CO2/tree/year	CO2 Annual Emissions due to the use of fertilizers per tree unit	
	AE _{p_area}	0.60378	tn CO2/hectare/year	CO2 Annual Emissions due to the use of pesticides per unit of cultivated area	
	AE _{p_product}	0.24664	tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits	
	AE _{p_tree}	0.00387	tn CO2/tree/year	CO2 Annual Emissions due to the use of pesticides per tree unit	
	AE	0.02044	to CO2/hostors/	COD Appual Emissions due to the use of ferril fuels & electricity ner unit of sultivisted area	
	AE _{ff&e_area}	0.92941	tn CO2/hectare/year	CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits	
	AE _{ff&e_product}	0.37965	tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested traits	
	AE _{ff&e_tree}	0.00596	tn CO2/tree/year	coz sandar critissions due to the use or rossi rueis a electricity per tree unit	
	AE _{D_area}	0.85777	tn CO2/hectare/year	CO2 Annual Emissions due to the use of diesel per unit of cultivated area	
	AE _{D_area}	0.35039	tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of diesel per unit of barvested fruits	
	AE _{D tree}	0.00550	tn CO2/tree/year	CO2 Annual Emissions due to the use of diesel per tree unit	
	0_000				
	AE _{G_area}	0.06799	tn CO2/hectare/year	CO2 Annual Emissions due to the use of gasoline per unit of cultivated area	
	AE _{G_product}	0.02777	tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of gasoline per unit of harvested fruits	
	AE _{G_tree}	0.00044	tn CO2/tree/year	CO2 Annual Emissions due to the use of gasoline per tree unit	
	AE _{EL_area}	0.00366	tn CO2/hectare/year	CO2 Annual Emissions due to the use of electricity per unit of cultivated area	
		0.00150	tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of electricity per unit of harvested fruits	
	AE _{EL_product}				
	AE _{EL_product}	0.00002	tn CO2/tree/year	CO2 Annual Emissions due to the use of electricity per tree unit	

R21.2	TAGproduct	0.00000	tn CO2/tn of yield/year	CO2 Total Annual Gain per unit of harvested fruits
R21.3	TAG _{tree}	0.00000	tn CO2/tree/year	CO2 Total Annual Gain per tree unit
-				
R22.1	AG _{N-f_LCC_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (Leguminosae cover crops) per unit of cultivated area
R22.2	AG _{N-f_LCC_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (Leguminosae cover crops) per unit of harvested fruits
R22.3	AG _{N-f_LCC_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (Leguminosae cover crops) per tree unit
R23.1	AG _{f_FGT_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to fertilizers reduction (fertigation) per unit of cultivated area
R23.2	AG _{f_FGT_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to fertilizers reduction (fertigation) per unit of harvested fruits
R23.3	AG _{f_FGT_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to fertilizers reduction (fertigation) per tree unit
R24.1	AG _{H_cc/m_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to herbicides reduction (cover crops/mulching) per unit of cultivated area
R24.2	AG _{H_cc/m_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to herbicides reduction (cover crops/mulching) per unit of harvested fruits
R24.3	AG _{H_cc/m_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to herbicides reduction (cover crops/mulching) per tree unit
R25.1	AG _{I_im/mt_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping) per unit of cultivated area
R25.2	AG _{I_im/mt_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping) per unit of harvested fruits
R25.3	AG _{I_im/mt_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping) per tree unit
R26.1	AG _{WF_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to the use of wood fuels instead of diesel per unit of cultivated area
R26.2	AG _{WF_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to the use of wood fuels instead of diesel per unit of harvested fruits
R26.3	AG _{WF_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to the use of wood fuels instead of diesel per tree unit
R27.1	AG _{RES_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to the use of RES per unit of cultivated area
R27.2	AG _{RES_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to the use of RES per unit of harvested fruits
R27.3	AG _{RES_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to the use of RES per tree unit

Openation
CLIMATREE

Tree crops' CO2 Removal Capacity Calculation Tool (CO2RCCT)



terra nova

Designed and developed by TERRA NOVA Ltd.

Results

Country where the Tool is applied:	Spain
Species of tree crop:	Orange
Geographical area of the cultivation:	ESPANA (total)

Conventional

CO2 Annual Removal Capacity

R1.1	ARC	1,302,842.7452 tn CO2/year	CO2 Annual Removal Capacity	(BF is included)
R1.2	ARC	1,072,596.5436 tn CO2/year	CO2 Annual Removal Capacity	(BF is not included)

The term "CO2 Removal" means the abstraction of CO2 from atmosphere

Agricultural practice:

BF: the fruits' biomass

Analysis

R2.1		AR _{BF}	230,246.2016 tn CO2/year	CO2 Annual Removal due to the production of fruit biomass	1
R2.2	rals	AR _{BW}	1,364,264.0835 tn CO2/year	CO2 Annual Removal due to the production of wood biomass	
R2.3	107	ASs	41,334.9536 tn CO2/year	CO2 Annual Storage in soil as carbon of the fallen biomass	
R2.4	Rei	TAR	1,635,845.2386 tn CO2/year	CO2 Total Annual Removals	(BF is included)
R2.5		TAR	1,405,599.0370 tn CO2/year	CO2 Total Annual Removals	(BF is not included)

a. It has to be underlined an important difference between ARC and TAR:

ARC is the result of the CO2 mass alance between (a) the total quantity of CO2 which is abstracted from the atmosphere [=TAR] by the tree in order to create biomass and (b) the total quantity of CO2 which is emitted to the atmosphere due to the agricultural practices which are applied for the cultivation of the tree.

R3.1	s	AE _f	134,041.4468 tn CO2/year	CO2 Annual Emissions due to the use of fertilizers
R3.2	22 Sion	AEp	102,509.8573 tn CO2/year	CO2 Annual Emissions due to the use of pesticides
R3.3	З ŝ	AE _{ff&e}	96,451.1893 tn CO2/year	CO2 Annual Emissions due to the use of fossil fuels & electricity
R3.4		TAE	333,002.4934 tn CO2/year	CO2 Total Annual Emissions
	R4.1	AE _D	81,612.3250 tn CO2/year	CO2 Annual Emissions due to the use of diesel
	R4.2	AE _G	4,657.4366 tn CO2/year	CO2 Annual Emissions due to the use of gasoline
	R4.3	AE _{EL}	10,181.4277 tn CO2/year	CO2 Annual Emissions due to the use of electricity
	R4.4	AE _{ff&e}	96,451.1893 tn CO2/year	CO2 Annual Emissions due to the use of fossil fuels & electricity

R5.1		AG _{N-f_LCC}	0.0000 tn CO2/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (use of Leguminosae cover crops)
R5.2		AG _{f_FGT}	0.0000 tn CO2/year	CO2 Annual Gain due to fertilizers reduction (use of fertigation)
R5.3		AG _{H_cc/m}	0.0000 tn CO2/year	CO2 Annual Gain due to herbicides reduction (use of cover crops/mulching)
R5.4		AG _{I_im/mt}	0.0000 tn CO2/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping)
R5.5	Gain	AG _{WF}	316,618.9769 tn CO2/year	CO2 Annual Gain due to the use of wood fuels instead of diesel
R5.6	00	AG _{RES}	0.0000 tn CO2/year	CO2 Annual Gain due to the use of Renewable Energy Sources
R5.7		AG _{EL_m}	0.0000 tn CO2/year	CO2 Annual Gain due to electricity reduction (use of mulching)
R5.8		AG _{D_FGT}	0.0000 tn CO2/year	CO2 Annual Gain due to diesel reduction (use of fertigation)
R5.9		TAG	316,618.9769 tn CO2/year	CO2 Total Annual Gain

CO	D2 Removal Capacity Indexes		
	ARCarea 9.50916	tn CO2/hectare/year	CO2 Annual Removal Capacity per unit of cultivated area

2	ARCproduct	0.39933	tn CO2/tn of yield/year	CO2 Annual Removal Capacity per unit of harvested fruits	(BF is included)
3	ARCtree	0.02282	tn CO2/tree/year	CO2 Annual Removal Capacity per tree unit	
			,		
L	ARCarea	7.82865	tn CO2/hectare/year	CO2 Annual Removal Capacity per unit of cultivated area	
2	ARCproduct	0.32876	tn CO2/tn of yield/year	CO2 Annual Removal Capacity per unit of harvested fruits	(BF is not included)
3	ARCtree	0.01879	tn CO2/tree/year	CO2 Annual Removal Capacity per tree unit	
L _	TAE/TAR	0.20357	Total Annual CO2 Emissions/ Total Ann		(BF is included)
2	TAE/TAR	0.23691	Total Annual CO2 Emissions/ Total Ann	ual CO2 Removals	(BF is not included)
		44.00067			
_	TARarea	11.93967	tn CO2/hectare/year	CO2 Total Annual Removals per unit of cultivated area	(DE to include d)
2	TAR _{product}	0.50140	tn CO2/tn of yield/year	CO2 Total Annual Removals per unit of harvested fruits	(BF is included)
	TAR _{tree}	0.02865	tn CO2/tree/year	CO2 Total Annual Removals per tree unit	
1	TAR _{area}	10.25916	tn CO2/hectare/year	CO2 Total Annual Removals per unit of cultivated area	
2	TARproduct	0.43083	tn CO2/tn of yield/year	CO2 Total Annual Removals per unit of curtovated area	(BF is not included)
3	TARtree	0.02462	tn CO2/tree/year	CO2 Total Annual Removals per unit	
	tree	0.02402			
1	AR _{BF area}	1.68052	tn CO2/hectare/year	CO2 Annual Removal due to the production of fruit biomass per unit of cultivated area	
2	AR _{BF_product}	0.07057	tn CO2/tn of yield/year	CO2 Annual Removal due to the production of fruit biomass per unit of harvested fruits	
.3	AR _{BF_tree}	0.00403	tn CO2/tree/year	CO2 Annual Removal due to the production of fruit biomass per tree unit	
	or_uce		,		
.1	AR _{BW area}	9.95746	tn CO2/hectare/year	CO2 Annual Removal due to the production of wood biomass per unit of cultivated area	
.2	AR _{BW_product}	0.41816	tn CO2/tn of yield/year	CO2 Annual Removal due to the production of wood biomass per unit of harvested fruits	
.3	AR _{BW_tree}	0.02390	tn CO2/tree/year	CO2 Annual Removal due to the production of wood biomass per tree unit	
_					
.1	AS _{S_area}	0.30169	tn CO2/hectare/year	CO2 Annual Storage in soil as carbon of the fallen biomass per unit of cultivated area	
.2	AS _{S_product}	0.01267	tn CO2/tn of yield/year	CO2 Annual Storage in soil as carbon of the fallen biomass per unit of harvested fruits	
.3	AS _{S_tree}	0.00072	tn CO2/tree/year	CO2 Annual Storage in soil as carbon of the fallen biomass per tree unit	
.1	TAE _{area}	2.43051	tn CO2/hectare/year	CO2 Total Annual Emissions per unit of cultivated area	
.2	TAEproduct	0.10207	tn CO2/tn of yield/year	CO2 Total Annual Emissions per unit of harvested fruits	
.3	TAE _{tree}	0.00583	tn CO2/tree/year	CO2 Total Annual Emissions per tree unit	
.1	AE _{f_area}	0.97834	tn CO2/hectare/year	CO2 Annual Emissions due to the use of fertilizers per unit of cultivated area	
.2	AE _{f_product}	0.04108	tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of fertilizers per unit of harvested fruits CO2 Annual Emissions due to the use of fertilizers per tree unit	
.3	AE _{f_tree}	0.00235	tn CO2/tree/year	CO2 Annual Emissions due to the use of refunzers per tree unit	
1	AE _{p_area}	0.74820	tn CO2/hectare/year	CO2 Annual Emissions due to the use of pesticides per unit of cultivated area	
.2	AE _{p_area}	0.03142	tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits	
	AE _{p tree}		tn CO2/tree/year		
3					
.3		0.00180		CO2 Annual Emissions due to the use of pesticides per tree unit	
.1	AE _{ff&e_area}	0.70398	tn CO2/hectare/year	CO2 Annual Emissions due to the use of pesticides per tree unit CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits	
.1 .2	AE _{ff&e_area} AE _{ff&e_product}	0.70398		CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area	
.1 .2	AE _{ff&e_area}	0.70398 0.02956	tn CO2/hectare/year tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits	
.1 .2 .3	AE _{ff&e_area} AE _{ff&e_product}	0.70398 0.02956	tn CO2/hectare/year tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits	
.1 .2 .3	AE _{ff&e_area} AE _{ff&e_product} AE _{ff&e_tree} AE _{D_area}	0.70398 0.02956 0.00169	tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year	CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per tree unit	· · · · · · · · · · · · · · · · · · ·
.1 .2 .3 .1 .2	AE _{ff&e_area} AE _{ff&e_product} AE _{ff&e_tree}	0.70398 0.02956 0.00169 0.59567	tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year	CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per tree unit CO2 Annual Emissions due to the use of diesel per unit of cultivated area	
.1 .2 .3 .1 .2	AE _{ff&e_area} AE _{ff&e_product} AE _{ff&e_tree} AE _{D_area} AE _{D_product}	0.70398 0.02956 0.00169 0.59567 0.02501	tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per tree unit CO2 Annual Emissions due to the use of diesel per unit of cultivated area CO2 Annual Emissions due to the use of diesel per unit of cultivated area CO2 Annual Emissions due to the use of diesel per unit of harvested fruits	
.1 .2 .3 .1 .2 .3	AE _{ff&e_area} AE _{ff&e_product} AE _{ff&e_tree} AE _{D_area} AE _{D_product}	0.70398 0.02956 0.00169 0.59567 0.02501	tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per tree unit CO2 Annual Emissions due to the use of diesel per unit of cultivated area CO2 Annual Emissions due to the use of diesel per unit of cultivated area CO2 Annual Emissions due to the use of diesel per unit of harvested fruits	
.1 .2 .3 .1 .2 .3 .3	AE _{HBe_area} AE _{HBe_product} AE _{HBe_tree} AE _{D_area} AE _{D_product} AE _{D_tree}	0.70398 0.02956 0.00169 0.59567 0.02501 0.00143	tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year	CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per tree unit CO2 Annual Emissions due to the use of diesel per unit of cultivated area CO2 Annual Emissions due to the use of diesel per unit of harvested fruits CO2 Annual Emissions due to the use of diesel per unit of harvested fruits CO2 Annual Emissions due to the use of diesel per tree unit CO2 Annual Emissions due to the use of gasoline per unit of cultivated area CO2 Annual Emissions due to the use of gasoline per unit of cultivated area CO2 Annual Emissions due to the use of gasoline per unit of harvested fruits	
.1 .2 .3 .1 .2 .3 .1 .2	AE _{ff&e_area} AE _{ff&e_product} AE _{ff&e_tree} AE _{D_area} AE _{D_product} AE _{D_tree} AE _{G_area}	0.70398 0.02956 0.00169 0.59567 0.02501 0.00143 0.03399	tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year	CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per tree unit CO2 Annual Emissions due to the use of diesel per unit of cultivated area CO2 Annual Emissions due to the use of diesel per unit of harvested fruits CO2 Annual Emissions due to the use of diesel per unit of harvested fruits CO2 Annual Emissions due to the use of diesel per tree unit CO2 Annual Emissions due to the use of diesel per unit of cultivated area CO2 Annual Emissions due to the use of diesel per unit of cultivated area	
.1 .2 .3 .1 .2 .3 .3 .1 .2 .3 .3	AE _{HBe_area} AE _{FBe_product} AE _{HBe_tree} AE _{D_area} AE _{D_product} AE _{D_tree} AE _{G_area} AE _{G_product} AE _{G_product} AE _{G_tree}	0.70398 0.02956 0.00169 0.59567 0.02501 0.00143 0.03399 0.00143 0.00008	tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/hectare/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/tn of yield/year tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per tree unit CO2 Annual Emissions due to the use of fossil fuels & electricity per tree unit CO2 Annual Emissions due to the use of diesel per unit of cultivated area CO2 Annual Emissions due to the use of diesel per unit of harvested fruits CO2 Annual Emissions due to the use of diesel per tree unit CO2 Annual Emissions due to the use of gasoline per unit of cultivated area CO2 Annual Emissions due to the use of gasoline per unit of harvested fruits CO2 Annual Emissions due to the use of gasoline per unit of harvested fruits CO2 Annual Emissions due to the use of gasoline per unit of harvested fruits CO2 Annual Emissions due to the use of gasoline per unit of harvested fruits CO2 Annual Emissions due to the use of gasoline per unit of harvested fruits CO2 Annual Emissions due to the use of gasoline per unit of harvested fruits CO2 Annual Emissions due to the use of gasoline per unit of harvested fruits	
1.1 1.2 1.3 1.1 1.2 1.3 1.1 1.2 1.3 1.1	AE _{HBe_area} AE _{HBe_product} AE _{E0_area} AE _{0_b} roduct AE _{0_b} roduct AE _{0_b} roduct AE _{6_area} AE _{6_product} AE _{6_tree} AE _{6_tree}	0.70398 0.02956 0.00169 0.59567 0.02501 0.00143 0.03399 0.00143 0.00143 0.00008	tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/tree/year	CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per tree unit CO2 Annual Emissions due to the use of fossil fuels & electricity per tree unit CO2 Annual Emissions due to the use of diesel per unit of cultivated area CO2 Annual Emissions due to the use of diesel per unit of harvested fruits CO2 Annual Emissions due to the use of diesel per unit of harvested fruits CO2 Annual Emissions due to the use of gasoline per unit of cultivated area CO2 Annual Emissions due to the use of gasoline per unit of harvested fruits CO2 Annual Emissions due to the use of gasoline per unit of harvested fruits CO2 Annual Emissions due to the use of gasoline per unit of harvested fruits CO2 Annual Emissions due to the use of gasoline per unit of harvested fruits CO2 Annual Emissions due to the use of gasoline per unit of harvested fruits CO2 Annual Emissions due to the use of gasoline per unit of cultivated area CO2 Annual Emissions due to the use of gasoline per unit	
.1 .2 .3 .3 .2 .3 .3 .3 .3 .3 .3	AE _{HBe_area} AE _{HBe_product} AE _{D_area} AE _{D_product} AE _{D_product} AE _{D_product} AE _{G_area} AE _{G_product} AE _{G_tree} AE _{G_tree} AE _{E_tarea} AE _{EL_product}	0.70398 0.02956 0.00169 0.59567 0.02501 0.00143 0.003399 0.00143 0.00008	tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/hectare/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/hectare/year tn CO2/hectare/year tn CO2/hectare/year	CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per tree unit CO2 Annual Emissions due to the use of diesel per unit of cultivated area CO2 Annual Emissions due to the use of diesel per unit of cultivated area CO2 Annual Emissions due to the use of diesel per unit of harvested fruits CO2 Annual Emissions due to the use of diesel per unit of harvested fruits CO2 Annual Emissions due to the use of gasoline per unit of cultivated area CO2 Annual Emissions due to the use of gasoline per unit of harvested fruits CO2 Annual Emissions due to the use of gasoline per unit of harvested fruits CO2 Annual Emissions due to the use of gasoline per unit of harvested fruits CO2 Annual Emissions due to the use of gasoline per unit of cultivated area CO2 Annual Emissions due to the use of gasoline per unit of cultivated area CO2 Annual Emissions due to the use of electricity per unit of cultivated area CO2 Annual Emissions due to the use of electricity per unit of cultivated area CO2 Annual Emissions due to the use of electricity per unit of harvested fruits	
1.1 1 1.2 1 1.3 1 1.2 1 1.3 1 1.2 1 1.2 1 1.3 1	AE _{HBe_area} AE _{HBe_product} AE _{E0_area} AE _{0_b} roduct AE _{0_b} roduct AE _{0_b} roduct AE _{6_area} AE _{6_product} AE _{6_tree} AE _{6_tree}	0.70398 0.02956 0.00169 0.59567 0.02501 0.00143 0.03399 0.00143 0.00143 0.00008	tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/tree/year	CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per tree unit CO2 Annual Emissions due to the use of fossil fuels & electricity per tree unit CO2 Annual Emissions due to the use of diesel per unit of cultivated area CO2 Annual Emissions due to the use of diesel per unit of harvested fruits CO2 Annual Emissions due to the use of diesel per unit of harvested fruits CO2 Annual Emissions due to the use of gasoline per unit of cultivated area CO2 Annual Emissions due to the use of gasoline per unit of harvested fruits CO2 Annual Emissions due to the use of gasoline per unit of harvested fruits CO2 Annual Emissions due to the use of gasoline per unit of harvested fruits CO2 Annual Emissions due to the use of gasoline per unit of harvested fruits CO2 Annual Emissions due to the use of gasoline per unit of harvested fruits CO2 Annual Emissions due to the use of gasoline per unit of cultivated area CO2 Annual Emissions due to the use of gasoline per unit of cultivated area CO2 Annual Emissions due to the use of electricity per unit of cultivated area	

R21.2	TAGproduct	0.09705	tn CO2/tn of yield/year	CO2 Total Annual Gain per unit of harvested fruits
R21.3	TAG _{tree}	0.00555	tn CO2/tree/year	CO2 Total Annual Gain per tree unit
-				· ·
R22.1	AG _{N-f_LCC_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (Leguminosae cover crops) per unit of cultivated area
R22.2	AG _{N-f_LCC_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (Leguminosae cover crops) per unit of harvested fruits
R22.3	AG _{N-f_LCC_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (Leguminosae cover crops) per tree unit
R23.1	AG _{f_FGT_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to fertilizers reduction (fertigation) per unit of cultivated area
R23.2	AG _{f_FGT_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to fertilizers reduction (fertigation) per unit of harvested fruits
R23.3	AG _{f_FGT_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to fertilizers reduction (fertigation) per tree unit
R24.1	AG _{H_cc/m_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to herbicides reduction (cover crops/mulching) per unit of cultivated area
R24.2	AG _{H_cc/m_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to herbicides reduction (cover crops/mulching) per unit of harvested fruits
R24.3	AG _{H_cc/m_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to herbicides reduction (cover crops/mulching) per tree unit
R25.1	AG _{I_im/mt_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping) per unit of cultivated area
R25.2	AGI_im/mt_product	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping) per unit of harvested fruits
R25.3	AG _{I_im/mt_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping) per tree unit
R26.1	AG _{WF_area}	2.31093	tn CO2/hectare/year	CO2 Annual Gain due to the use of wood fuels instead of diesel per unit of cultivated area
R26.2	AG _{WF_product}	0.09705	tn CO2/tn of yield/year	CO2 Annual Gain due to the use of wood fuels instead of diesel per unit of harvested fruits
R26.3	AG _{WF_tree}	0.00555	tn CO2/tree/year	CO2 Annual Gain due to the use of wood fuels instead of diesel per tree unit
R27.1	AG _{RES_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to the use of RES per unit of cultivated area
R27.2	AG _{RES_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to the use of RES per unit of harvested fruits
R27.3	AG _{RES_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to the use of RES per tree unit

Openation
CLIMATREE

Tree crops' CO2 Removal Capacity Calculation Tool (CO2RCCT)



terra nova

Designed and developed by TERRA NOVA Ltd.

Results

Country where the Tool is applied:	Spain
Species of tree crop:	Apple
Geographical area of the cultivation:	ESPANA (total)

Conventional

CO2 Annual Removal Capacity

R1.1	ARC	61,950.7916 tn CO2/year	CO2 Annual Removal Capacity	(BF is included)
R1.2	ARC	21,310.9162 tn CO2/year	CO2 Annual Removal Capacity	(BF is not included)

The term "CO2 Removal" means the abstraction of CO2 from atmosphere

Agricultural practice:

BF: the fruits' biomass

Analysis

R2.1		AR _{BF}	40,639.8753 tn CO2/year	CO2 Annual Removal due to the production of fruit biomass	
R2.2	als	AR _{BW}	138,479.5387 tn CO2/year	CO2 Annual Removal due to the production of wood biomass	
R2.3	19 CO	ASs	5,468.9824 tn CO2/year	CO2 Annual Storage in soil as carbon of the fallen biomass	
R2.4	Rei	TAR	184,588.3965 tn CO2/year	CO2 Total Annual Removals	(BF is included)
R2.5		TAR	143,948.5211 tn CO2/year	CO2 Total Annual Removals	(BF is not included)

a. It has to be underlined an important difference between ARC and TAR:

ARC is the result of the CO2 mass alance between (a) the total quantity of CO2 which is abstracted from the atmosphere [=TAR] by the tree in order to create biomass and (b) the total quantity of CO2 which is emitted to the atmosphere due to the agricultural practices which are applied for the cultivation of the tree.

R3.1	s	AE _f	33,189.1349 tn CO2/year	CO2 Annual Emissions due to the use of fertilizers
R3.2	2 ion	AE	15,350.2453 tn CO2/year	CO2 Annual Emissions due to the use of pesticides
R3.3	D si	AE _{ff&e}	74,098.2247 tn CO2/year	CO2 Annual Emissions due to the use of fossil fuels & electricity
R3.4	ū	TAE	122,637.6049 tn CO2/year	CO2 Total Annual Emissions
	R4.1	AE _D	69,065.7032 tn CO2/year	CO2 Annual Emissions due to the use of diesel
	R4.2	AE _G	3,739.2772 tn CO2/year	CO2 Annual Emissions due to the use of gasoline
	R4.3	AE _{EL}	1,293.2443 tn CO2/year	CO2 Annual Emissions due to the use of electricity
	R4.4	AE _{ff&e}	74,098.2247 tn CO2/year	CO2 Annual Emissions due to the use of fossil fuels & electricity

R5.1		AG _{N-f_LCC}	0.0000 tn CO2/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (use of Leguminosae cover crops)
R5.2		AG _{f_FGT}	0.0000 tn CO2/year	CO2 Annual Gain due to fertilizers reduction (use of fertigation)
R5.3		AG _{H_cc/m}	0.0000 tn CO2/year	CO2 Annual Gain due to herbicides reduction (use of cover crops/mulching)
R5.4		AG _{I_im/mt}	0.0000 tn CO2/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping)
R5.5	ain 02	AG _{WF}	20,253.3357 tn CO2/year	CO2 Annual Gain due to the use of wood fuels instead of diesel
R5.6	0.0	AG _{RES}	0.0000 tn CO2/year	CO2 Annual Gain due to the use of Renewable Energy Sources
R5.7		AG _{EL_m}	0.0000 tn CO2/year	CO2 Annual Gain due to electricity reduction (use of mulching)
R5.8		AG _{D_FGT}	0.0000 tn CO2/year	CO2 Annual Gain due to diesel reduction (use of fertigation)
R5.9		TAG	20,253.3357 tn CO2/year	CO2 Total Annual Gain

C	CO2 Removal Capacity Indexes				
86.1	ARCarea	2.16131	tn CO2/hectare/year	CO2 Annual Removal Capacity per unit of cultivated area	

ARC _{product} ARC _{tree} ARC _{area}	0.11311 0.00436	tn CO2/tn of yield/year tn CO2/tree/year	CO2 Annual Removal Capacity per unit of harvested fruits CO2 Annual Removal Capacity per tree unit		
ARCarea					
	0 74240				
ARC	0.74348	tn CO2/hectare/year	CO2 Annual Removal Capacity per unit of cultivated area		
ARCproduct	0.03891	tn CO2/tn of yield/year	CO2 Annual Removal Capacity per unit of harvested fruits	(BF is not included)	
ARCtree	0.00150	tn CO2/tree/year	CO2 Annual Removal Capacity per tree unit		
TAE/TAR	0.66438	Total Annual CO2 Emissions/ Total Ann		(BF is included)	
TAE/TAR	0.85195	Total Annual CO2 Emissions/ Total Ann	nual CO2 Removals	(BF is not included)	
				(BF is included)	
TAR _{tree}	0.01300	tn CO2/tree/year	CO2 Total Annual Removals per tree unit		
				(BF is not included)	
TAR _{tree}	0.01014	tn CO2/tree/year	CO2 Total Annual Removals per tree unit		
4.0	1 44702	to CO2 (bostore lines	CO2 Appual Removal due to the production of fruit biomass new unit of sulfilizated even		
ARBF_product					
AK _{BF_tree}	0.00286	th CO2/tree/year	CO2 Annual Removal due to the production of that biomass per tree unit		
AD	4.82420	to CO2/besters/user	CO2 Appust Removal due to the production of wood biomass per unit of sultivated area		
An _{BW_tree}	0.00975	ti coz/tiee/year	CO2 Annual Removal due to the production of wood biomass per tree dime		
٨٢	0 10090	th CO2/bactara/waar	CO2 Annual Storage in soil as carbon of the fallen biomass per unit of cultivated area		
AS AS			•		
hus_tree	0.00035		See human state Se moon as an son or the human sources per tree sint.		
TAE	4,27851	tn CO2/hectare/year	CO2 Total Annual Emissions per unit of cultivated area		
acc					
AE _{f area}	1.15788	tn CO2/hectare/year	CO2 Annual Emissions due to the use of fertilizers per unit of cultivated area		
-	0.06060	tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of fertilizers per unit of harvested fruits		
AE _{f tree}	0.00234	tn CO2/tree/year	CO2 Annual Emissions due to the use of fertilizers per tree unit		
AE _{p_area}	0.53553	tn CO2/hectare/year	CO2 Annual Emissions due to the use of pesticides per unit of cultivated area		
AE _{p_product}	0.02803	tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits		
AE _{p_tree}	0.00108	tn CO2/tree/year	CO2 Annual Emissions due to the use of pesticides per tree unit		
AE _{ff&e_area}	2.58510	tn CO2/hectare/year	CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area		
Eff&e_product	0.13529	tn CO2/tn of yield/year			
AE _{ff&e_tree}	0.00522	tn CO2/tree/year	CO2 Annual Emissions due to the use of fossil fuels & electricity per tree unit		
AE _{D_area}					
AE _{D_product}					
AE _{D_tree}	0.00487	tn CO2/tree/year	CO2 Annual Emissions due to the use of diesel per tree unit		
AE _{G_tree}	0.00026	tn CO2/tree/year	CO2 Annual Emissions due to the use of gasoline per tree unit		
45	0.01510	to 602/h - store /	COD Annual Emissions due to the use of electricity answer of with the discus		
AE _{EL tree}	0.00009	tn CO2/tree/year	CO2 Annual Emissions due to the use of electricity per tree unit		
	TAR _{area} TAR _{product} TAR _{tree} TAR _{area} TAR _{tree} TAR _{area} TAR _{roduct} TAR _{tree} AR _{bf_product} AR _{bf_product} AR _{bf_product} AR _{bf_tree} AR _{bf_tree} AR _{bf_tree} AS ₅ area AS ₅ product AS ₅ tAE _{area} TAE _{area} AE _{f_area} AE _{f_product} AE _{f_product}	TAR _{area} 6.43982 TAR _{product} 0.33702 TAR _{tree} 0.01300 TAR _{tree} 0.01300 TAR _{tree} 0.01300 TAR _{tree} 0.01300 TAR _{area} 5.02200 TAR _{area} 0.26282 TAR _{tree} 0.01014 AR _{tree} 0.001014 AR _{tree} 0.00286 Reg.product 0.07420 AR _{tree} 0.00286 Rew.product 0.25283 AR _{tree} 0.00975 AS _{5_product} 0.25283 AR _{bW,tree} 0.00975 AS _{5_product} 0.00999 AS _{5_tree} 0.00039 TAE _{product} 0.22391 TAE _{product} 0.22391 TAE _{product} 0.00060 AE _{f_product} 0.00234 AE _{f_product} 0.00234 AE _{f_product} 0.13529 AE _{f_product} 0.13529 AE _{filee, product} 0.13252 AE _{filee, product} 0.13045 <td>TAR_{srea} 6.43982 th CO2/hectare/year TAR_{product} 0.33702 th CO2/tn of yield/year TAR_{tree} 0.01300 th CO2/hectare/year TAR_{srea} 5.02200 th CO2/hectare/year TAR_{area} 5.02200 th CO2/hectare/year TAR_{product} 0.26282 th CO2/hectare/year ARer_ama 0.41782 th CO2/hectare/year ARer_ama 0.41782 th CO2/hectare/year ARer_ama 0.01014 th CO2/hectare/year ARer_ama 0.01420 th CO2/hectare/year ARer_ama 0.00286 th CO2/hectare/year ARer_ama 4.83120 th CO2/hectare/year ARer_ama 0.19080 th CO2/hectare/year ASs_area 0.19080 th CO2/hectare/year ASs_area 0.00999 th CO2/hectare/year ASs_area 0.19080 th CO2/hectare/year TAE_area 1.15788 th CO2/hectare/year TAE_parea 1.15788 th CO2/hectare/year AEr_area 0.53553 th CO2/hectare/year</td> <td>Alsone 6.4998 in CO2/hectare/year CO2 Total Annual Removals per unit of cultivated area Alsone 0.3120 in CO2/hectare/year CO2 Total Annual Removals per unit of cultivated area Alsone 0.0120 in CO2/hectare/year CO2 Total Annual Removals per unit of cultivated area TARes 0.022/hectare/year CO2 Total Annual Removals per unit of Cultivated area TARes 0.022/hectare/year CO2 Total Annual Removals per unit of Cultivated area TARes 0.021/hectare/year CO2 Total Annual Removals per unit of Cultivated area Alsone 0.01014 in CO2/hectare/year CO2 Total Annual Removal due to the production of Tult Biomass per unit of Cultivated area Alsone 0.01024 in CO2/hectare/year CO2 Annual Removal due to the production of Tult Biomass per unit of cultivated area Alsone 0.01024 in CO2/hectare/year CO2 Annual Removal due to the production of Tult Biomass per unit of cultivated area Alsone 0.022/hectare/year CO2 Annual Removal due to the production of Tult Biomass per unit of cultivated area Alsone 0.022/hectare/year CO2 Annual Removal due to the production of Nucl Biomas per tree unit Alsone 0.022/hectare/year CO2 Annual Removal due to the production of Nucob Biomass per unit of cultivated area</td>	TAR _{srea} 6.43982 th CO2/hectare/year TAR _{product} 0.33702 th CO2/tn of yield/year TAR _{tree} 0.01300 th CO2/hectare/year TAR _{srea} 5.02200 th CO2/hectare/year TAR _{area} 5.02200 th CO2/hectare/year TAR _{product} 0.26282 th CO2/hectare/year ARer_ama 0.41782 th CO2/hectare/year ARer_ama 0.41782 th CO2/hectare/year ARer_ama 0.01014 th CO2/hectare/year ARer_ama 0.01420 th CO2/hectare/year ARer_ama 0.00286 th CO2/hectare/year ARer_ama 4.83120 th CO2/hectare/year ARer_ama 0.19080 th CO2/hectare/year ASs_area 0.19080 th CO2/hectare/year ASs_area 0.00999 th CO2/hectare/year ASs_area 0.19080 th CO2/hectare/year TAE_area 1.15788 th CO2/hectare/year TAE_parea 1.15788 th CO2/hectare/year AEr_area 0.53553 th CO2/hectare/year	Alsone 6.4998 in CO2/hectare/year CO2 Total Annual Removals per unit of cultivated area Alsone 0.3120 in CO2/hectare/year CO2 Total Annual Removals per unit of cultivated area Alsone 0.0120 in CO2/hectare/year CO2 Total Annual Removals per unit of cultivated area TARes 0.022/hectare/year CO2 Total Annual Removals per unit of Cultivated area TARes 0.022/hectare/year CO2 Total Annual Removals per unit of Cultivated area TARes 0.021/hectare/year CO2 Total Annual Removals per unit of Cultivated area Alsone 0.01014 in CO2/hectare/year CO2 Total Annual Removal due to the production of Tult Biomass per unit of Cultivated area Alsone 0.01024 in CO2/hectare/year CO2 Annual Removal due to the production of Tult Biomass per unit of cultivated area Alsone 0.01024 in CO2/hectare/year CO2 Annual Removal due to the production of Tult Biomass per unit of cultivated area Alsone 0.022/hectare/year CO2 Annual Removal due to the production of Tult Biomass per unit of cultivated area Alsone 0.022/hectare/year CO2 Annual Removal due to the production of Nucl Biomas per tree unit Alsone 0.022/hectare/year CO2 Annual Removal due to the production of Nucob Biomass per unit of cultivated area	

R21.2	TAGproduct	0.03698	tn CO2/tn of yield/year	CO2 Total Annual Gain per unit of harvested fruits
R21.3	TAG _{tree}	0.00143	tn CO2/tree/year	CO2 Total Annual Gain per tree unit
	ucc			
R22.1	AG _{N-f_LCC_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (Leguminosae cover crops) per unit of cultivated area
R22.2	AG _{N-f_LCC_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (Leguminosae cover crops) per unit of harvested fruits
R22.3	AG _{N-f_LCC_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (Leguminosae cover crops) per tree unit
R23.1	AG _{f_FGT_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to fertilizers reduction (fertigation) per unit of cultivated area
R23.2	AG _{f_FGT_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to fertilizers reduction (fertigation) per unit of harvested fruits
R23.3	AG _{f_FGT_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to fertilizers reduction (fertigation) per tree unit
R24.1	AG _{H_cc/m_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to herbicides reduction (cover crops/mulching) per unit of cultivated area
R24.2	AG _{H_cc/m_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to herbicides reduction (cover crops/mulching) per unit of harvested fruits
R24.3	AG _{H_cc/m_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to herbicides reduction (cover crops/mulching) per tree unit
R25.1	AG _{I_im/mt_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping) per unit of cultivated area
R25.2	AG _{I_im/mt_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping) per unit of harvested fruits
R25.3	AG _{I_im/mt_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping) per tree unit
R26.1	AG _{WF_area}	0.70659	tn CO2/hectare/year	CO2 Annual Gain due to the use of wood fuels instead of diesel per unit of cultivated area
R26.2	AG _{WF_product}	0.03698	tn CO2/tn of yield/year	CO2 Annual Gain due to the use of wood fuels instead of diesel per unit of harvested fruits
R26.3	AG _{WF_tree}	0.00143	tn CO2/tree/year	CO2 Annual Gain due to the use of wood fuels instead of diesel per tree unit
R27.1	AG _{RES_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to the use of RES per unit of cultivated area
R27.2	AG _{RES_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to the use of RES per unit of harvested fruits
R27.3	AG _{RES_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to the use of RES per tree unit

Openation
CUMATREE

Tree crops' CO2 Removal Capacity Calculation Tool (CO2RCCT)



terra nova

Designed and developed by TERRA NOVA Ltd.

Results

Country where the Tool is applied:	Spain
Species of tree crop:	Peach
Geographical area of the cultivation:	ESPANA (total)

Conventional

CO2 Annual Removal Capacity

R1.1	ARC	1,304.2763 tn CO2/year	CO2 Annual Removal Capacity	(BF is included)
R1.2	ARC	-53,900.6287 tn CO2/year	CO2 Annual Removal Capacity	(BF is not included)

The term "CO2 Removal" means the abstraction of CO2 from atmosphere

Agricultural practice:

BF: the fruits' biomass

Analysis

R2.1		AR _{BF}	55,204.9049 tn CO2/year	CO2 Annual Removal due to the production of fruit biomass	
R2.2	als	AR _{BW}	78,832.4621 tn CO2/year	CO2 Annual Removal due to the production of wood biomass	
R2.3	19 C	AS _S	5,432.7932 tn CO2/year	CO2 Annual Storage in soil as carbon of the fallen biomass	
R2.4	Rei	TAR	139,470.1603 tn CO2/year	CO2 Total Annual Removals	(BF is included)
R2.5		TAR	84,265.2553 tn CO2/year	CO2 Total Annual Removals	(BF is not included)

a. It has to be underlined an important difference between ARC and TAR:

ARC is the result of the CO2 mass alance between (a) the total quantity of CO2 which is abstracted from the atmosphere [=TAR] by the tree in order to create biomass and (b) the total quantity of CO2 which is emitted to the atmosphere due to the agricultural practices which are applied for the cultivation of the tree.

R3.1	Š	AE _f	35,081.2235 tn CO2/year	CO2 Annual Emissions due to the use of fertilizers		
R3.2	22 Sion	AEp	37,155.6876 tn CO2/year	CO2 Annual Emissions due to the use of pesticides		
R3.3	U Si	AE _{ff&e}	65,928.9729 tn CO2/year	CO2 Annual Emissions due to the use of fossil fuels & electricity		
R3.4		TAE	138,165.8840 tn CO2/year	CO2 Total Annual Emissions		
	R4.1	AED	61,374.3561 tn CO2/year	CO2 Annual Emissions due to the use of diesel		
	R4.2	AE _G	2,424.8264 tn CO2/year	CO2 Annual Emissions due to the use of gasoline		
	R4.3	AE _{EL}	2,129.7904 tn CO2/year	CO2 Annual Emissions due to the use of electricity		
	R4.4	AE _{ff&e}	65,928.9729 tn CO2/year	CO2 Annual Emissions due to the use of fossil fuels & electricity		

R5.1		AG _{N-f_LCC}	0.0000 tn CO2/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (use of Leguminosae cover crops)
R5.2		AG _{f_FGT}	0.0000 tn CO2/year	CO2 Annual Gain due to fertilizers reduction (use of fertigation)
R5.3		AG _{H_cc/m}	0.0000 tn CO2/year	CO2 Annual Gain due to herbicides reduction (use of cover crops/mulching)
R5.4		AG _{I_im/mt}	0.0000 tn CO2/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping)
R5.5	ain 02	AG _{WF}	28,659.8430 tn CO2/year	CO2 Annual Gain due to the use of wood fuels instead of diesel
R5.6	00	AG _{RES}	0.0000 tn CO2/year	CO2 Annual Gain due to the use of Renewable Energy Sources
R5.7		AG _{EL_m}	0.0000 tn CO2/year	CO2 Annual Gain due to electricity reduction (use of mulching)
R5.8		AG _{D_FGT}	0.0000 tn CO2/year	CO2 Annual Gain due to diesel reduction (use of fertigation)
R5.9		TAG	28,659.8430 tn CO2/year	CO2 Total Annual Gain

C	CO2 Removal Capacity Indexes				
AR	Carros	0.02926	tn CO2/hectare/year	CO2 Annual Removal Capacity per unit of cultivated area	

.2 .3	ARCproduct	0.00112	tn CO2/tn of yield/year	CO2 Annual Removal Capacity per unit of harvested fruits	(BF is included)
	ARCtree	0.00006	tn CO2/tree/year	CO2 Annual Removal Capacity per tree unit	
			,		
L	ARCarea	-1.20901	tn CO2/hectare/year	CO2 Annual Removal Capacity per unit of cultivated area	
2	ARCproduct	-0.04626	tn CO2/tn of yield/year	CO2 Annual Removal Capacity per unit of harvested fruits	(BF is not included)
3	ARCtree	-0.00242	tn CO2/tree/year	CO2 Annual Removal Capacity per tree unit	
_					
	TAE/TAR	0.99065	Total Annual CO2 Emissions/ Total Ann		(BF is included)
2	TAE/TAR	1.63965	Total Annual CO2 Emissions/ Total Ann	ual CO2 Removals	(BF is not included)
_					
	TAR _{area}	3.12837	tn CO2/hectare/year	CO2 Total Annual Removals per unit of cultivated area	
2	TAR _{product}	0.11970	tn CO2/tn of yield/year	CO2 Total Annual Removals per unit of harvested fruits	(BF is included)
3	TAR _{tree}	0.00626	tn CO2/tree/year	CO2 Total Annual Removals per tree unit	
	TAD	1.89010			
1	TAR _{area}		tn CO2/hectare/year	CO2 Total Annual Removals per unit of cultivated area	(DE is not included)
2	TARproduct	0.07232	tn CO2/tn of yield/year	CO2 Total Annual Removals per unit of harvested fruits	(BF is not included)
3	TAR _{tree}	0.00378	tn CO2/tree/year	CO2 Total Annual Removals per tree unit	
1	AR	1.23827	tn CO2/hectare/year	CO2 Annual Removal due to the production of fruit biomass per unit of cultivated area	
2	AR _{BF_area}	0.04738	th CO2/hectare/year	CO2 Annual Removal due to the production of fruit biomass per unit of christed area	
3	AR _{BF_product}	0.00248	th CO2/tree/year	CO2 Annual Removal due to the production of fruit biomass per tree unit	
	AR _{BF_tree}	0.00240	theo2/tree/year	ooe runnaar nemovar ade to the production of nait biofiliass per tree drift	
1	AR _{BW area}	1.76824	tn CO2/hectare/year	CO2 Annual Removal due to the production of wood biomass per unit of cultivated area	
.1	AR _{BW_product}	0.06766	tn CO2/tn of yield/year	CO2 Annual Removal due to the production of wood biomass per unit of christed area	
.3	AR _{BW_tree}	0.00354	tn CO2/tree/year	CO2 Annual Removal due to the production of wood biomass per tree unit	
	tree	0.00334			
.1	AS _{S_area}	0.12186	tn CO2/hectare/year	CO2 Annual Storage in soil as carbon of the fallen biomass per unit of cultivated area	
2	AS _{S_product}	0.00466	tn CO2/tn of yield/year	CO2 Annual Storage in soil as carbon of the fallen biomass per unit of harvested fruits	
.3	AS _{S_tree}	0.00024	tn CO2/tree/year	CO2 Annual Storage in soil as carbon of the fallen biomass per tree unit	
	5_400				
.1	TAE _{area}	3.09911	tn CO2/hectare/year	CO2 Total Annual Emissions per unit of cultivated area	
.2	TAEproduct	0.11858	tn CO2/tn of yield/year	CO2 Total Annual Emissions per unit of harvested fruits	
.3	TAEtree	0.00620	tn CO2/tree/year	CO2 Total Annual Emissions per tree unit	
.1	AE _{f_area}	0.78689	tn CO2/hectare/year	CO2 Annual Emissions due to the use of fertilizers per unit of cultivated area	
.2	AE _{f_product}		tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of fertilizers per unit of harvested fruits	
		0.03011	th CO2/th of yield/year	CO2 Annual Emissions due to the use of fertilizers per unit of harvested fruits	
3	AE _{f_tree}	0.03011 0.00157	tn CO2/tree/year	CO2 Annual Emissions due to the use of fertilizers per tree unit	
	AE _{f_tree}				
.1	AE _{f_tree} AE _{p_area}	0.00157	tn CO2/tree/year tn CO2/hectare/year	CO2 Annual Emissions due to the use of fertilizers per tree unit CO2 Annual Emissions due to the use of pesticides per unit of cultivated area	
.1 .2	AE _{p_area} AE _{p_product}	0.00157 0.83342 0.03189	tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of fertilizers per tree unit CO2 Annual Emissions due to the use of pesticides per unit of cultivated area CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits	
.1 .2	AE _{p_area}	0.00157	tn CO2/tree/year tn CO2/hectare/year	CO2 Annual Emissions due to the use of fertilizers per tree unit CO2 Annual Emissions due to the use of pesticides per unit of cultivated area	
.1 .2 .3	AE _{p_area} AE _{p_product} AE _{p_tree}	0.00157 0.83342 0.03189 0.00167	tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year	CO2 Annual Emissions due to the use of fertilizers per tree unit CO2 Annual Emissions due to the use of pesticides per unit of cultivated area CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits CO2 Annual Emissions due to the use of pesticides per tree unit	
1 2 3	AE _{p_area} AE _{p_product} AE _{p_tree} AE _{ff&e_area}	0.00157 0.83342 0.03189 0.00167 1.47881	tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year	CO2 Annual Emissions due to the use of fertilizers per tree unit CO2 Annual Emissions due to the use of pesticides per unit of cultivated area CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits CO2 Annual Emissions due to the use of pesticides per tree unit CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area	
1 2 3 1 2	AE _{p_area} AE _{p_product} AE _{p_tree} AE _{ff8e_area} AE _{ff8e_product}	0.00157 0.83342 0.03189 0.00167 1.47881 0.05658	tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of fertilizers per tree unit CO2 Annual Emissions due to the use of pesticides per unit of cultivated area CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits CO2 Annual Emissions due to the use of pesticides per tree unit CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits	
1 2 3 1 2	AE _{p_area} AE _{p_product} AE _{p_tree} AE _{ff&e_area}	0.00157 0.83342 0.03189 0.00167 1.47881	tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year	CO2 Annual Emissions due to the use of fertilizers per tree unit CO2 Annual Emissions due to the use of pesticides per unit of cultivated area CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits CO2 Annual Emissions due to the use of pesticides per tree unit CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area	
1 2 3 1 2 2 3 2 3 2	AE _{p_area} AE _{p_product} AE _{p_tree} AE _{ff&e_area} AE _{ff&e_product} AE _{ff&e_tree}	0.00157 0.83342 0.03189 0.00167 1.47881 0.05558 0.00296	tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year	CO2 Annual Emissions due to the use of fertilizers per tree unit CO2 Annual Emissions due to the use of pesticides per unit of cultivated area CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits CO2 Annual Emissions due to the use of pesticides per tree unit CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per tree unit	
1 2 3 1 2 3	AE _{p_area} AE _{p_product} AE _{p_tree} AE _{ff&e_area} AE _{ff&e_product} AE _{ff&e_tree} AE _{ff&e_tree}	0.00157 0.83342 0.03189 0.00167 1.47881 0.05658 0.00296 1.37665	tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tree/year tn CO2/tree/year tn CO2/hectare/year	CO2 Annual Emissions due to the use of fertilizers per tree unit CO2 Annual Emissions due to the use of pesticides per unit of cultivated area CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits CO2 Annual Emissions due to the use of pesticides per tree unit CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per tree unit CO2 Annual Emissions due to the use of fossil fuels area	
1 2 2 3 1 1 2 2 1 1 2 1 2 1 2 1 2 1 2 1	AE _{p_area} AE _{p_product} AE _{p_tree} AE _{ff&e_area} AE _{ff&e_tree} AE _{ff&e_tree} AE _{ff&e_tree} AE _{f_area} AE _{p_area} AE _{p_area}	0.00157 0.83342 0.03189 0.00167 1.47881 0.05558 0.00296 1.37665 0.05267	tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/tree/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/hectare/year tn CO2/hectare/year	CO2 Annual Emissions due to the use of fertilizers per tree unit CO2 Annual Emissions due to the use of pesticides per unit of cultivated area CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits CO2 Annual Emissions due to the use of pesticides per tree unit CO2 Annual Emissions due to the use of pesticides per tree unit CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per tree unit CO2 Annual Emissions due to the use of fossil fuels & electricity per tree unit CO2 Annual Emissions due to the use of fossil fuels & electricity per tree unit CO2 Annual Emissions due to the use of fossil fuels & electricity per tree unit CO2 Annual Emissions due to the use of fossil fuels & electricity per tree unit CO2 Annual Emissions due to the use of fossil fuels & electricity per tree unit CO2 Annual Emissions due to the use of fiesel per unit of cultivated area CO2 Annual Emissions due to the use of diesel per unit of harvested fruits	
1 2 3 1 2 3 3 1 1 2	AE _{p_area} AE _{p_product} AE _{p_tree} AE _{ff&e_area} AE _{ff&e_product} AE _{ff&e_tree} AE _{ff&e_tree}	0.00157 0.83342 0.03189 0.00167 1.47881 0.05658 0.00296 1.37665	tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tree/year tn CO2/tree/year tn CO2/hectare/year	CO2 Annual Emissions due to the use of fertilizers per tree unit CO2 Annual Emissions due to the use of pesticides per unit of cultivated area CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits CO2 Annual Emissions due to the use of pesticides per tree unit CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per tree unit CO2 Annual Emissions due to the use of fossil fuels area	· · · · · · · · · · · · · · · · · · ·
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.3 .1 .2 .3 .1 .2 .3 .3 .1 .2 .3 .3 .1 .2 .3 .3 .3	AE _{p_area} AE _{p_tree} AE _{ff&e_area} AE _{ff&e_product} AE _{ff&e_product} AE _{ff&e_tree} AE _{D_area} AE _{D_tree} AE _{D_tree}	0.00157 0.83342 0.03189 0.00167 1.47881 0.05658 0.00296 1.37665 0.05267 0.00275 0.00275	tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/tree/year tn CO2/tree/year tn CO2/tree/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/tree/year tn CO2/tree/year	CO2 Annual Emissions due to the use of fertilizers per tree unit CO2 Annual Emissions due to the use of pesticides per unit of cultivated area CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits CO2 Annual Emissions due to the use of pesticides per tree unit CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per tree unit CO2 Annual Emissions due to the use of diesel per unit of cultivated area CO2 Annual Emissions due to the use of diesel per unit of cultivated area CO2 Annual Emissions due to the use of diesel per unit of harvested fruits CO2 Annual Emissions due to the use of diesel per unit of cultivated area CO2 Annual Emissions due to the use of diesel per unit of harvested fruits CO2 Annual Emissions due to the use of diesel per tree unit CO2 Annual Emissions due to the use of gasoline per unit of cultivated area CO2 Annual Emissions due to the use of gasoline per unit of cultivated area CO2 Annual Emissions due to the use of gasoline per unit of cultivated area	
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.1 .2 .3 .1 .2 .3 .3 .1 .2 .3 .3 .3 .3 .1 .2 .3 .3 .3 .1 .2 .3 .3 .1 .1 .2 .3 .3 	AE _{p_area} AE _{p_product} AE _{p_tree} AE _{ff&e_area} AE _{ff&e_product} AE _{ff&e_tree} AE _{D_area} AE _{D_bree} AE _{D_bree} AE _{G_area} AE _{G_product} AE _{G_tree}	0.00157 0.83342 0.03189 0.00167 1.47881 0.05658 0.00296 1.37665 0.05267 0.05267 0.00275 0.05439 0.00208 0.00011 0.004777	tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tree/year tn CO2/tree/year tn CO2/tree/year tn CO2/tree/year tn CO2/hectare/year tn CO2/hectare/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tree/year	C02 Annual Emissions due to the use of fertilizers per tree unit C02 Annual Emissions due to the use of pesticides per unit of cultivated area C02 Annual Emissions due to the use of pesticides per unit of harvested fruits C02 Annual Emissions due to the use of pesticides per unit of harvested fruits C02 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area C02 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits C02 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits C02 Annual Emissions due to the use of fossil fuels & electricity per tree unit C02 Annual Emissions due to the use of field per unit of cultivated area C02 Annual Emissions due to the use of diesel per unit of cultivated area C02 Annual Emissions due to the use of diesel per unit of harvested fruits C02 Annual Emissions due to the use of gasoline per unit of cultivated area C02 Annual Emissions due to the use of gasoline per unit of harvested fruits C02 Annual Emissions due to the use of gasoline per unit of harvested fruits C02 Annual Emissions due to the use of gasoline per unit of harvested fruits C02 Annual Emissions due to the use of gasoline per unit of harvested fruits C02 Annual Emissions due to the use of gasoline per unit of harvested fruits C02 Annual Emissions due to the use of gasoline per unit of cultivated area <td></td>	
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R21.2	TAGproduct	0.02460	tn CO2/tn of yield/year	CO2 Total Annual Gain per unit of harvested fruits
				CO2 Total Annual Gain per tree unit
R21.3	TAG _{tree}	0.00129	tn CO2/tree/year	CO2 Total Alinda Gain per tree unit
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R22.1	AG _{N-f_LCC_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (Leguminosae cover crops) per unit of cultivated area
R22.2	AG _{N-f_LCC_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (Leguminosae cover crops) per unit of harvested fruits
R22.3	AG _{N-f_LCC_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (Leguminosae cover crops) per tree unit
R23.1	AG _{f_FGT_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to fertilizers reduction (fertigation) per unit of cultivated area
R23.2	AG _{f_FGT_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to fertilizers reduction (fertigation) per unit of harvested fruits
R23.3	AG _{f_FGT_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to fertilizers reduction (fertigation) per tree unit
R24.1	AG _{H_cc/m_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to herbicides reduction (cover crops/mulching) per unit of cultivated area
R24.2	AG _{H_cc/m_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to herbicides reduction (cover crops/mulching) per unit of harvested fruits
R24.3	AG _{H_cc/m_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to herbicides reduction (cover crops/mulching) per tree unit
R25.1	AG _{l_im/mt_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping) per unit of cultivated area
R25.2	AG _{I_im/mt_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping) per unit of harvested fruits
R25.3	AG _{I_im/mt_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping) per tree unit
R26.1	AG _{WF_area}	0.64285	tn CO2/hectare/year	CO2 Annual Gain due to the use of wood fuels instead of diesel per unit of cultivated area
R26.2	AG _{WF_product}	0.02460	tn CO2/tn of yield/year	CO2 Annual Gain due to the use of wood fuels instead of diesel per unit of harvested fruits
R26.3	AG _{WF_tree}	0.00129	tn CO2/tree/year	CO2 Annual Gain due to the use of wood fuels instead of diesel per tree unit
				·
R27.1	AG _{RES area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to the use of RES per unit of cultivated area
R27.2	AG _{RES_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to the use of RES per unit of harvested fruits
R27.3	AG _{RES_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to the use of RES per tree unit
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Openation
CUMATREE

Tree crops' CO2 Removal Capacity Calculation Tool (CO2RCCT)



terra nova

Designed and developed by TERRA NOVA Ltd.

Results

Country where the Tool is applied:	Spain
Species of tree crop:	Almond
Geographical area of the cultivation:	ESPANA (total)

Conventional

CO2 Annual Removal Capacity

R1.1	ARC	471,849.6289 tn CO2/year	CO2 Annual Removal Capacity	(BF is included)
R1.2	ARC	55,887.4182 tn CO2/year	CO2 Annual Removal Capacity	(BF is not included)

The term "CO2 Removal" means the abstraction of CO2 from atmosphere

Agricultural practice:

BF: the fruits' biomass

Analysis

R2.1		AR _{BF}	415,962.2107 tn CO2/year	CO2 Annual Removal due to the production of fruit biomass	1
R2.2	als	AR _{BW}	1,074,842.6145 tn CO2/year	CO2 Annual Removal due to the production of wood biomass	
R2.3	102	AS _s	100,949.4920 tn CO2/year	CO2 Annual Storage in soil as carbon of the fallen biomass	
R2.4	Rei	TAR	1,591,754.3172 tn CO2/year	CO2 Total Annual Removals	(BF is included)
R2.5		TAR	1,175,792.1065 tn CO2/year	CO2 Total Annual Removals	(BF is not included)

a. It has to be underlined an important difference between ARC and TAR:

ARC is the result of the CO2 mass alance between (a) the total quantity of CO2 which is abstracted from the atmosphere [=TAR] by the tree in order to create biomass and (b) the total quantity of CO2 which is emitted to the atmosphere due to the agricultural practices which are applied for the cultivation of the tree.

R3.1	s	AE _f	251,313.4729 tn CO2/year	CO2 Annual Emissions due to the use of fertilizers	
R3.2	22 Sion	AEp	432,868.4828 tn CO2/year	CO2 Annual Emissions due to the use of pesticides	
R3.3	S iš	AE _{ff&e}	435,722.7326 tn CO2/year	CO2 Annual Emissions due to the use of fossil fuels & electricity	
R3.4	ū	TAE	1,119,904.6884 tn CO2/year	CO2 Total Annual Emissions	
	R4.1	AE _D	393,876.6476 tn CO2/year	CO2 Annual Emissions due to the use of diesel	
	R4.2	AE _G	26,973.2131 tn CO2/year	CO2 Annual Emissions due to the use of gasoline	
	R4.3	AE _{EL}	14,872.8719 tn CO2/year	CO2 Annual Emissions due to the use of electricity	
	R4.4	AE _{ff&e}	435,722.7326 tn CO2/year	CO2 Annual Emissions due to the use of fossil fuels & electricity	

R5.1		AG _{N-f_LCC}	0.0000 tn CO2/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (use of Leguminosae cover crops)
R5.2		AG _{f_FGT}	0.0000 tn CO2/year	CO2 Annual Gain due to fertilizers reduction (use of fertigation)
R5.3		AG _{H_cc/m}	0.0000 tn CO2/year	CO2 Annual Gain due to herbicides reduction (use of cover crops/mulching)
R5.4		AG _{I_im/mt}	0.0000 tn CO2/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping)
R5.5	Gain	AG _{WF}	504,751.3747 tn CO2/year	CO2 Annual Gain due to the use of wood fuels instead of diesel
R5.6	00	AG _{RES}	0.0000 tn CO2/year	CO2 Annual Gain due to the use of Renewable Energy Sources
R5.7		AG _{EL_m}	0.0000 tn CO2/year	CO2 Annual Gain due to electricity reduction (use of mulching)
R5.8		AG _{D_FGT}	0.0000 tn CO2/year	CO2 Annual Gain due to diesel reduction (use of fertigation)
R5.9		TAG	504,751.3747 tn CO2/year	CO2 Total Annual Gain

CO2 Remova	l Capacity Indexes		
			-
a	0.95145	tn CO2/hectare/year	CO2 Annual Removal Capacity per unit of cultivated area

	ARC _{product}	2.46938	tn CO2/tn of yield/year	CO2 Annual Removal Capacity per unit of harvested fruits	(BF is included)
	ARC _{tree}	0.00400	tn CO2/tree/year	CO2 Annual Removal Capacity per tree unit	
_					
	ARC _{area}	0.11269	tn CO2/hectare/year	CO2 Annual Removal Capacity per unit of cultivated area	
	ARCproduct	0.29248	tn CO2/tn of yield/year	CO2 Annual Removal Capacity per unit of harvested fruits	(BF is not included)
	ARC _{tree}	0.00047	tn CO2/tree/year	CO2 Annual Removal Capacity per tree unit	
_					
_	TAE/TAR	0.70357	Total Annual CO2 Emissions/ Total Ann		(BF is included)
	TAE/TAR	0.95247	Total Annual CO2 Emissions/ Total Ann	nual CO2 Removals	(BF is not included)
	TAD	3.20967	tn CO2/hectare/year	CO2 Total Annual Removals per unit of cultivated area	
-	TAR _{area}	8.33028	th CO2/th of yield/year	CO2 Total Annual Removals per unit of harvested fruits	(BF is included)
	TAR	0.01348	tn CO2/trie/year	CO2 Total Annual Removals per tint of narvested nuits	
_	tree	0.01348	th CO2/tree/year	CO2 Total Alindai Kentovais per tree dilit	
	TAR _{area}	2.37091	tn CO2/hectare/year	CO2 Total Annual Removals per unit of cultivated area	
	TAR _{product}	6.15339	tn CO2/tn of yield/year	CO2 Total Annual Removals per unit of harvested fruits	(BF is not included)
	TAR _{tree}	0.00996	tn CO2/tree/year	CO2 Total Annual Removals per tree unit	,
	uee				
	AR _{BF area}	0.83876	tn CO2/hectare/year	CO2 Annual Removal due to the production of fruit biomass per unit of cultivated area	
	AR _{BF_product}	2.17690	tn CO2/tn of yield/year	CO2 Annual Removal due to the production of fruit biomass per unit of harvested fruits	
	AR _{BF_tree}	0.00352	tn CO2/tree/year	CO2 Annual Removal due to the production of fruit biomass per tree unit	
				•	
	AR _{BW area}	2.16735	tn CO2/hectare/year	CO2 Annual Removal due to the production of wood biomass per unit of cultivated area	
	AR _{BW_product}	5.62508	tn CO2/tn of yield/year	CO2 Annual Removal due to the production of wood biomass per unit of harvested fruits	
	AR _{BW_tree}	0.00910	tn CO2/tree/year	CO2 Annual Removal due to the production of wood biomass per tree unit	
	AS _{S_area}	0.20356	tn CO2/hectare/year	CO2 Annual Storage in soil as carbon of the fallen biomass per unit of cultivated area	
	AS _{S_product}	0.52831	tn CO2/tn of yield/year	CO2 Annual Storage in soil as carbon of the fallen biomass per unit of harvested fruits	
	AS _{S_tree}	0.00085	tn CO2/tree/year	CO2 Annual Storage in soil as carbon of the fallen biomass per tree unit	
	TAE _{area}	2.25822	tn CO2/hectare/year	CO2 Total Annual Emissions per unit of cultivated area	
	TAEproduct	5.86091	tn CO2/tn of yield/year	CO2 Total Annual Emissions per unit of harvested fruits	
	TAE _{tree}	0.00948	tn CO2/tree/year	CO2 Total Annual Emissions per tree unit	
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	AE _{f_area}	0.50676	tn CO2/hectare/year	CO2 Annual Emissions due to the use of fertilizers per unit of cultivated area	
	AE _{f_product}	1.31522	tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of fertilizers per unit of harvested fruits	
	AE _{f_tree}	0.00213	tn CO2/tree/year	CO2 Annual Emissions due to the use of fertilizers per tree unit	
		0.07005		Food Annual Environment on the two of environments of a different damage	
_	AE _{p_area}	0.87285	tn CO2/hectare/year	CO2 Annual Emissions due to the use of pesticides per unit of cultivated area	
-	AE _{p_product}	2.26537	tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits	
	AE _{p_tree}	0.00367	tn CO2/tree/year	CO2 Annual Emissions due to the use of pesticides per tree unit	
	AE _{ff&e_area}	0.87861	tn CO2/hectare/year	CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area	· · · · · · · · · · · · · · · · · · ·
	AE _{ff&e_area}	2.28031	th CO2/th of yield/year	CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of chityated area	
	AE _{ff&e_tree}	0.00369	tn CO2/triee/year	CO2 Annual Emissions due to the use of fossil fuels & electricity per dim of historical random and the second seco	
	••••n&e_tree	0.00303	a.coz/rec/year		
	AE _{D_area}	0.79423	tn CO2/hectare/year	CO2 Annual Emissions due to the use of diesel per unit of cultivated area	
		2.06131	tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of diesel per unit of harvested fruits	
				CO2 Annual Emissions due to the use of diesel per tree unit	
	AE _{D_product}	0.00334	th CO2/tree/year		
		0.00334	tn CO2/tree/year		
	AE _{D_product} AE _{D_tree}			CO2 Annual Emissions due to the use of gasoline per unit of cultivated area	
	AE _{D_product} AE _{D_tree} AE _{G_area}	0.00334 0.05439 0.14116	tn CO2/hectare/year	CO2 Annual Emissions due to the use of gasoline per unit of cultivated area CO2 Annual Emissions due to the use of gasoline per unit of harvested fruits	
	AE _{D_product} AE _{D_tree} AE _{G_area} AE _{G_product}	0.05439	tn CO2/hectare/year tn CO2/tn of yield/year		
	AE _{D_product} AE _{D_tree} AE _{G_area}	0.05439 0.14116	tn CO2/hectare/year	CO2 Annual Emissions due to the use of gasoline per unit of harvested fruits	
	AE _{D_product} AE _{D_tree} AE _{G_area} AE _{G_product} AE _{G_tree}	0.05439 0.14116	tn CO2/hectare/year tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of gasoline per unit of harvested fruits	
	AE _{D_product} AE _{D_tree} AE _{G_area} AE _{G_product}	0.05439 0.14116 0.00023	tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year	CO2 Annual Emissions due to the use of gasoline per unit of harvested fruits CO2 Annual Emissions due to the use of gasoline per tree unit	
	AE _{D_product} AE _{D_tree} AE _{G_area} AE _{G_product} AE _{G_tree}	0.05439 0.14116 0.00023 0.02999	tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year	CO2 Annual Emissions due to the use of gasoline per unit of harvested fruits CO2 Annual Emissions due to the use of gasoline per tree unit CO2 Annual Emissions due to the use of electricity per unit of cultivated area	

R21.2	TAGproduct	2.64156	tn CO2/tn of yield/year	CO2 Total Annual Gain per unit of harvested fruits
R21.3	TAG _{tree}	0.00427	tn CO2/tree/year	CO2 Total Annual Gain per tree unit
	ucc			
R22.1	AG _{N-f_LCC_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (Leguminosae cover crops) per unit of cultivated area
R22.2	AG _{N-f_LCC_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (Leguminosae cover crops) per unit of harvested fruits
R22.3	AG _{N-f_LCC_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (Leguminosae cover crops) per tree unit
R23.1	AG _{f_FGT_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to fertilizers reduction (fertigation) per unit of cultivated area
R23.2	AG _{f_FGT_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to fertilizers reduction (fertigation) per unit of harvested fruits
R23.3	AG _{f_FGT_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to fertilizers reduction (fertigation) per tree unit
R24.1	AG _{H_cc/m_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to herbicides reduction (cover crops/mulching) per unit of cultivated area
R24.2	AG _{H_cc/m_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to herbicides reduction (cover crops/mulching) per unit of harvested fruits
R24.3	AG _{H_cc/m_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to herbicides reduction (cover crops/mulching) per tree unit
R25.1	AG _{I_im/mt_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping) per unit of cultivated area
R25.2	AGI_im/mt_product	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping) per unit of harvested fruits
R25.3	AG _{I_im/mt_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping) per tree unit
R26.1	AG _{WF_area}	1.01780	tn CO2/hectare/year	CO2 Annual Gain due to the use of wood fuels instead of diesel per unit of cultivated area
R26.2	AG _{WF_product}	2.64156	tn CO2/tn of yield/year	CO2 Annual Gain due to the use of wood fuels instead of diesel per unit of harvested fruits
R26.3	AG _{WF_tree}	0.00427	tn CO2/tree/year	CO2 Annual Gain due to the use of wood fuels instead of diesel per tree unit
R27.1	AG _{RES_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to the use of RES per unit of cultivated area
R27.2	AG _{RES_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to the use of RES per unit of harvested fruits
R27.3	AG _{RES_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to the use of RES per tree unit

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CUMATREE

Tree crops' CO2 Removal Capacity Calculation Tool (CO2RCCT)



terra nova

Designed and developed by TERRA NOVA Ltd.

Results

Country where the Tool is applied:	Spain
Species of tree crop:	Olive
Geographical area of the cultivation:	ESPANA (total)

Conventional

CO2 Annual Removal Capacity

R1.1	ARC	17,268,559.0164 tn CO2/year	CO2 Annual Removal Capacity	(BF is included)
R1.2	ARC	13,717,511.3640 tn CO2/year	CO2 Annual Removal Capacity	(BF is not included)

The term "CO2 Removal" means the abstraction of CO2 from atmosphere

Agricultural practice:

BF: the fruits' biomass

Analysis

R2.1		AR _{BF}	3,551,047.6525 tn CO2/year	CO2 Annual Removal due to the production of fruit biomass	1
R2.2	als	AR _{BW}	16,840,922.0217 tn CO2/year	CO2 Annual Removal due to the production of wood biomass	
R2.3	19 C	ASs	592,428.0450 tn CO2/year	CO2 Annual Storage in soil as carbon of the fallen biomass	
R2.4	Rei	TAR	20,984,397.7192 tn CO2/year	CO2 Total Annual Removals	(BF is included)
R2.5		TAR	17,433,350.0667 tn CO2/year	CO2 Total Annual Removals	(BF is not included)

a. It has to be underlined an important difference between ARC and TAR:

ARC is the result of the CO2 mass balance between (a) the total quantity of CO2 which is abstracted from the atmosphere [=TAR] by the tree in order to create biomass and (b) the total quantity of CO2 which is emitted to the atmosphere due to the agricultural practices which are applied for the cultivation of the tree.

R3.1	s	AE _f	985,822.8828 tn CO2/year	CO2 Annual Emissions due to the use of fertilizers
R3.2	ŝ S	AEp	1,466,719.2017 tn CO2/year	CO2 Annual Emissions due to the use of pesticides
R3.3	ji C	AE _{ff&e}	1,263,296.6183 tn CO2/year	CO2 Annual Emissions due to the use of fossil fuels & electricity
R3.4	ш	TAE	3,715,838.7028 tn CO2/year	CO2 Total Annual Emissions
	R4.1	AED	1,088,927.5929 tn CO2/year	CO2 Annual Emissions due to the use of diesel
	R4.2	AE _G	165,156.0398 tn CO2/year	CO2 Annual Emissions due to the use of gasoline
	R4.3	AE _{EL}	9,212.9855 tn CO2/year	CO2 Annual Emissions due to the use of electricity
	R4.4	AE _{ff&e}	1,263,296.6183 tn CO2/year	CO2 Annual Emissions due to the use of fossil fuels & electricity

R5.1		AG _{N-f_LCC}	0.0000 tn CO2/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (use of Leguminosae cover crops)
R5.2		AG _{f_FGT}	0.0000 tn CO2/year	CO2 Annual Gain due to fertilizers reduction (use of fertigation)
R5.3		AG _{H_cc/m}	0.0000 tn CO2/year	CO2 Annual Gain due to herbicides reduction (use of cover crops/mulching)
R5.4		AG _{I_im/mt}	0.0000 tn CO2/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping)
R5.5	ain 02	AG _{WF}	7,048,798.7725 tn CO2/year	CO2 Annual Gain due to the use of wood fuels instead of diesel
R5.6	0.0	AG _{RES}	0.0000 tn CO2/year	CO2 Annual Gain due to the use of Renewable Energy Sources
R5.7		AG _{EL_m}	0.0000 tn CO2/year	CO2 Annual Gain due to electricity reduction (use of mulching)
R5.8		AG _{D_FGT}	0.0000 tn CO2/year	CO2 Annual Gain due to diesel reduction (use of fertigation)
R5.9		TAG	7,048,798.7725 tn CO2/year	CO2 Total Annual Gain

2	ARCproduct	2.68885	tn CO2/tn of yield/year	CO2 Annual Removal Capacity per unit of harvested fruits	(BF is included)
3	ARCtree	0.01545	tn CO2/tree/year	CO2 Annual Removal Capacity per tree unit	
			,		
L	ARCarea	5.64687	tn CO2/hectare/year	CO2 Annual Removal Capacity per unit of cultivated area	
2	ARCproduct	2.13593	tn CO2/tn of yield/year	CO2 Annual Removal Capacity per unit of harvested fruits	(BF is not included)
	ARC _{tree}	0.01227	tn CO2/tree/year	CO2 Annual Removal Capacity per tree unit	
	TAE/TAR	0.17708	Total Annual CO2 Emissions/ Total Ann		(BF is included)
2	TAE/TAR	0.21315	Total Annual CO2 Emissions/ Total Ann	ual CO2 Removals	(BF is not included)
_					
-	TAR _{area}	8.63832	tn CO2/hectare/year	CO2 Total Annual Removals per unit of cultivated area	
2	TAR _{product}	3.26744	tn CO2/tn of yield/year	CO2 Total Annual Removals per unit of harvested fruits	(BF is included)
3	TAR _{tree}	0.01877	tn CO2/tree/year	CO2 Total Annual Removals per tree unit	
-					
1	TAR _{area}	7.17652	tn CO2/hectare/year	CO2 Total Annual Removals per unit of cultivated area	
.2	TAR _{product}	2.71451	tn CO2/tn of yield/year	CO2 Total Annual Removals per unit of harvested fruits	(BF is not included)
.3	TAR _{tree}	0.01559	tn CO2/tree/year	CO2 Total Annual Removals per tree unit	
	4.0	1.464.00	to CO2/bostoro/user	CO2 Appual Removal due to the production of fruit biomass per unit of sulfiverted area	
1	AR _{BF_area}	1.46180	tn CO2/hectare/year	CO2 Annual Removal due to the production of fruit biomass per unit of cultivated area CO2 Annual Removal due to the production of fruit biomass per unit of harvested fruits	
2	AR _{BF_product}	0.55293	tn CO2/tn of yield/year		
.3	AR _{BF_tree}	0.00318	tn CO2/tree/year	CO2 Annual Removal due to the production of fruit biomass per tree unit	
.1	AP	6.93264	to CO2/hostors/user	CO2 Annual Removal due to the production of wood biomass per unit of cultivated area	
.1	AR _{BW_area}		tn CO2/hectare/year	CO2 Annual Removal due to the production of wood biomass per unit of cultivated area	
.2	AR _{BW_product}	2.62227 0.01506	tn CO2/tn of yield/year	CO2 Annual Removal due to the production of wood biomass per tree unit	
	AR _{BW_tree}	0.01506	tn CO2/tree/year	CO2 Annual Removal due to the production of wood biomass per tree unit	
.1	AS _{S_area}	0.24388	tn CO2/hectare/year	CO2 Annual Storage in soil as carbon of the fallen biomass per unit of cultivated area	
.2		0.09225	tn CO2/tn of yield/year	CO2 Annual Storage in soil as carbon of the fallen biomass per unit of harvested fruits	
.2	AS _{S_product} AS _{S_tree}	0.00053	tn CO2/tree/year	CO2 Annual Storage in soil as carbon of the fallen biomass per tree unit	
	S_tree	0.00055		eoe hander otologe in son as earborr of the taken stemass per tree date	
.1	TAEarea	1.52964	tn CO2/hectare/year	CO2 Total Annual Emissions per unit of cultivated area	
.2	TAEproduct	0.57859	tn CO2/tn of yield/year	CO2 Total Annual Emissions per unit of harvested fruits	
.3	TAE _{tree}	0.00332	tn CO2/tree/year	CO2 Total Annual Emissions per tree unit	
	ucc .				
.1	AE _{f area}	0.40582	tn CO2/hectare/year	CO2 Annual Emissions due to the use of fertilizers per unit of cultivated area	
.2	AE _{f_product}	0.15350	tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of fertilizers per unit of harvested fruits	
.3	AE _{f tree}	0.00088	tn CO2/tree/year	CO2 Annual Emissions due to the use of fertilizers per tree unit	
1	AE _{p_area}	0.60378	tn CO2/hectare/year		
		0.00578	th CO2/nectare/year	CO2 Annual Emissions due to the use of pesticides per unit of cultivated area	
	AE _{p_product}	0.80378	tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of pesticides per unit of cultivated area CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits	
.2	AE _{p_product} AE _{p_tree}				
2	AE _{p_tree}	0.22838	tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits	
.2	AE _{p_tree} AE _{ff&e_area}	0.22838	tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits CO2 Annual Emissions due to the use of pesticides per tree unit CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area	
.2 .3	AE _{p_tree} AE _{ff&e_area}	0.22838 0.00131	tn CO2/tn of yield/year tn CO2/tree/year	CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits CO2 Annual Emissions due to the use of pesticides per tree unit CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits	
.2 .3 .1 .2	AE _{p_tree}	0.22838 0.00131 0.52004	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year	CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits CO2 Annual Emissions due to the use of pesticides per tree unit CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area	
2 3 1 2 3	AE _{ff&e_area} AE _{ff&e_area} AE _{ff&e_product} AE _{ff&e_tree}	0.22838 0.00131 0.52004 0.19671 0.00113	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year	CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits CO2 Annual Emissions due to the use of pesticides per tree unit CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per tree unit	· · · · · · · · · · · · · · · · · · ·
.2 .3 .1 .2 .3	AE _{p_tree} AE _{ff&e_area} AE _{ff&e_product} AE _{ff&e_tree} AE _{D_area}	0.22838 0.00131 0.52004 0.19671 0.00113 0.44826	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year	CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits CO2 Annual Emissions due to the use of pesticides per tree unit CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per tree unit CO2 Annual Emissions due to the use of fossil fuels & electricity per tree unit CO2 Annual Emissions due to the use of diesel per unit of cultivated area	· · · · · · · · · · · · · · · · · · ·
2 .3 .1 .2 .3 .1 .2 .2	AE _{p_tree} AE _{ff&e_area} AE _{ff&e_tree} AE _{ff&e_tree} AE _{D_area} AE _{D_product}	0.22838 0.00131 0.52004 0.19671 0.00113 0.044826 0.16955	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits CO2 Annual Emissions due to the use of pesticides per tree unit CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per tree unit CO2 Annual Emissions due to the use of fossil fuels & electricity per tree unit CO2 Annual Emissions due to the use of diesel per unit of cultivated area CO2 Annual Emissions due to the use of diesel per unit of cultivated area CO2 Annual Emissions due to the use of diesel per unit of cultivated area CO2 Annual Emissions due to the use of diesel per unit of harvested fruits	
2 .3 .1 .2 .3 .1 .2 .2	AE _{p_tree} AE _{ff&e_area} AE _{ff&e_product} AE _{ff&e_tree} AE _{D_area}	0.22838 0.00131 0.52004 0.19671 0.00113 0.44826	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year	CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits CO2 Annual Emissions due to the use of pesticides per tree unit CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per tree unit CO2 Annual Emissions due to the use of fossil fuels & electricity per tree unit CO2 Annual Emissions due to the use of diesel per unit of cultivated area	
2 3 1 2 3 1 2 3	AE _{p, tree} AE _{ff&e_area} AE _{ff&e_product} AE _{ff&e_tree} AE _{D_area} AE _{D_product} AE _{D_tree}	0.22838 0.00131 0.52004 0.19671 0.00113 0.44826 0.16955 0.00097	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year	CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits CO2 Annual Emissions due to the use of pesticides per tree unit CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per tree unit CO2 Annual Emissions due to the use of fossil fuels & electricity per tree unit CO2 Annual Emissions due to the use of diesel per unit of cultivated area CO2 Annual Emissions due to the use of diesel per unit of harvested fruits CO2 Annual Emissions due to the use of diesel per unit of cultivated area CO2 Annual Emissions due to the use of diesel per unit of harvested fruits CO2 Annual Emissions due to the use of diesel per unit of harvested fruits CO2 Annual Emissions due to the use of diesel per tree unit	
2 3 1 2 3 1 2 3 3	AE _{p, tree} AE _{ff&e_area} AE _{ff&e_product} AE _{ff&e_tree} AE _{D_area} AE _{D_bree} AE _{D_tree}	0.22838 0.00131 0.52004 0.19671 0.00113 0.44826 0.16955 0.00097 0.06799	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/tree/year tn CO2/hectare/year	CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits CO2 Annual Emissions due to the use of possil fuels & electricity per unit of cultivated area CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of farvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per tree unit CO2 Annual Emissions due to the use of diesel per unit of cultivated area CO2 Annual Emissions due to the use of diesel per unit of harvested fruits CO2 Annual Emissions due to the use of diesel per unit of cultivated area CO2 Annual Emissions due to the use of diesel per unit of cultivated fruits CO2 Annual Emissions due to the use of diesel per unit of cultivated area CO2 Annual Emissions due to the use of gasoline per unit of cultivated area CO2 Annual Emissions due to the use of gasoline per unit of cultivated area	
.2 .3 .1 .2 .3 .3 .1 .2 .3 .3 .2 .3	AE _{p, tree} AE _{ff&e_area} AE _{ff&e_product} AE _{ff&e_product} AE _{D_area} AE _{D_product} AE _{D_tree} AE _{G_area} AE _{G_product}	0.22838 0.00131 0.52004 0.19671 0.00113 0.44826 0.16955 0.00097 0.00097 0.06799 0.02572	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/tree/year tn CO2/tree/year tn CO2/hectare/year tn CO2/hectare/year	CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits CO2 Annual Emissions due to the use of possil fuels & electricity per unit of cultivated area CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of farvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per tree unit CO2 Annual Emissions due to the use of diesel per unit of cultivated area CO2 Annual Emissions due to the use of diesel per unit of harvested fruits CO2 Annual Emissions due to the use of diesel per unit of cultivated area CO2 Annual Emissions due to the use of gasoline per unit of cultivated area CO2 Annual Emissions due to the use of gasoline per unit of cultivated area CO2 Annual Emissions due to the use of gasoline per unit of cultivated area CO2 Annual Emissions due to the use of gasoline per unit of cultivated area CO2 Annual Emissions due to the use of gasoline per unit of cultivated area CO2 Annual Emissions due to the use of gasoline per unit of cultivated area CO2 Annual Emissions due to the use of gasoline per unit of cultivated area CO2 Annual Emissions due to the use of gasoline per unit of cultivated area	
2 3 1 2 3 1 2 3 1 2 3 1 2 2	AE _{p, tree} AE _{ff&e_area} AE _{ff&e_product} AE _{ff&e_tree} AE _{D_area} AE _{D_bree} AE _{D_tree}	0.22838 0.00131 0.52004 0.19671 0.00113 0.44826 0.16955 0.00097 0.06799	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/tree/year tn CO2/hectare/year	CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits CO2 Annual Emissions due to the use of possil fuels & electricity per unit of cultivated area CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of farvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per tree unit CO2 Annual Emissions due to the use of diesel per unit of cultivated area CO2 Annual Emissions due to the use of diesel per unit of harvested fruits CO2 Annual Emissions due to the use of diesel per unit of cultivated area CO2 Annual Emissions due to the use of diesel per unit of cultivated fruits CO2 Annual Emissions due to the use of diesel per unit of cultivated area CO2 Annual Emissions due to the use of gasoline per unit of cultivated area CO2 Annual Emissions due to the use of gasoline per unit of cultivated area	
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.2 .3 .1 .2 .3 .3 .1 .2 .3 .3	AEp, tree AEffike_prea AEffike_product AEffike_product AEg_product AEg_product	0.22838 0.00131 0.52004 0.19671 0.00113 0.044826 0.16955 0.00097 0.06799 0.02572 0.00015 0.00015	tn CO2/tn of yield/year tn CO2/hectare/year tn CO2/hectare/year tn CO2/hectare/year tn CO2/hectare/year tn CO2/troe/year tn CO2/troe/year tn CO2/hectare/year tn CO2/troe/year tn CO2/troe/year tn CO2/tree/year tn CO2/tree/year	CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per tree unit CO2 Annual Emissions due to the use of diesel per unit of cultivated area CO2 Annual Emissions due to the use of diesel per unit of harvested fruits CO2 Annual Emissions due to the use of diesel per unit of harvested fruits CO2 Annual Emissions due to the use of gasoline per unit of cultivated area CO2 Annual Emissions due to the use of gasoline per unit of cultivated area CO2 Annual Emissions due to the use of gasoline per unit of harvested fruits CO2 Annual Emissions due to the use of gasoline per unit of harvested fruits CO2 Annual Emissions due to the use of gasoline per unit of harvested fruits CO2 Annual Emissions due to the use of gasoline per unit of harvested fruits CO2 Annual Emissions due to the use of gasoline per unit of harvested fruits CO2 Annual Emissions due to the use of gasoline per unit of cultivated area CO2 Annual Emissions due to the use of electricity per unit of	

R21.2	TAGproduct	1.09755	tn CO2/tn of yield/year	CO2 Total Annual Gain per unit of harvested fruits
R21.3	TAG _{tree}	0.00631	tn CO2/tree/year	CO2 Total Annual Gain per tree unit
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R22.1	AG _{N-f_LCC_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (Leguminosae cover crops) per unit of cultivated area
R22.2	AG _{N-f_LCC_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (Leguminosae cover crops) per unit of harvested fruits
R22.3	AG _{N-f_LCC_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (Leguminosae cover crops) per tree unit
R23.1	AG _{f_FGT_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to fertilizers reduction (fertigation) per unit of cultivated area
R23.2	AG _{f_FGT_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to fertilizers reduction (fertigation) per unit of harvested fruits
R23.3	AG _{f_FGT_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to fertilizers reduction (fertigation) per tree unit
R24.1	AG _{H_cc/m_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to herbicides reduction (cover crops/mulching) per unit of cultivated area
R24.2	AG _{H_cc/m_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to herbicides reduction (cover crops/mulching) per unit of harvested fruits
R24.3	AG _{H_cc/m_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to herbicides reduction (cover crops/mulching) per tree unit
R25.1	AG _{l_im/mt_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping) per unit of cultivated area
R25.2	AG _{I_im/mt_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping) per unit of harvested fruits
R25.3	AG _{I_im/mt_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping) per tree unit
R26.1	AG _{WF_area}	2.90167	tn CO2/hectare/year	CO2 Annual Gain due to the use of wood fuels instead of diesel per unit of cultivated area
R26.2	AG _{WF_product}	1.09755	tn CO2/tn of yield/year	CO2 Annual Gain due to the use of wood fuels instead of diesel per unit of harvested fruits
R26.3	AG _{WF_tree}	0.00631	tn CO2/tree/year	CO2 Annual Gain due to the use of wood fuels instead of diesel per tree unit
R27.1	AG _{RES_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to the use of RES per unit of cultivated area
R27.2	AG _{RES_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to the use of RES per unit of harvested fruits
R27.3	AG _{RES_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to the use of RES per tree unit

Op

Tree crops' CO2 Removal Capacity Calculation Tool (CO2RCCT)



terra nova

Designed and developed by TERRA NOVA Ltd.

Results

Country where the Tool is applied:	Greece
Species of tree crop:	Olive
Geographical area of the cultivation:	GREECE (total)

Use of cover crops

CO2 Annual Removal Capacity

R1.1	ARC	5,386,163.1879 tn CO2/year	CO2 Annual Removal Capacity	(BF is included)
R1.2	ARC	3,402,005.8002 tn CO2/year	CO2 Annual Removal Capacity	(BF is not included)

The term "CO2 Removal" means the abstraction of CO2 from atmosphere

Agricultural practice:

BF: the fruits' biomass

Analysis

R2.1		AR _{BF}	1,984,157.3877 tn CO2/year	CO2 Annual Removal due to the production of fruit biomass	
R2.2	2 /als	AR _{BW}	4,549,120.3612 tn CO2/year	CO2 Annual Removal due to the production of wood biomass	
R2.3	102	ASs	99,284.7535 tn CO2/year	CO2 Annual Storage in soil as carbon of the fallen biomass	
R2.4	Rei	TAR	6,632,562.5023 tn CO2/year	CO2 Total Annual Removals	(BF is included)
R2.5		TAR	4,648,405.1147 tn CO2/year	CO2 Total Annual Removals	(BF is not included)

a. It has to be underlined an important difference between ARC and TAR:

ARC is the result of the CO2 mass balance between (a) the total quantity of CO2 which is abstracted from the atmosphere [=TAR] by the tree in order to create biomass and (b) the total quantity of CO2 which is emitted to the atmosphere due to the agricultural practices which are applied for the cultivation of the tree.

R3.1	<i>6</i>	AE _f	635,915.8293 tn CO2/year	CO2 Annual Emissions due to the use of fertilizers
R3.2	o S S S S S S S S S S S S S S S S S S S	AE	182,446.5566 tn CO2/year	CO2 Annual Emissions due to the use of pesticides
R3.3	miss CC	AE _{ff&e}	428,036.9286 tn CO2/year	CO2 Annual Emissions due to the use of fossil fuels & electricity
R3.4	ū	TAE	1,246,399.3145 tn CO2/year	CO2 Total Annual Emissions
	R4.1	AE _D	365,366.0711 tn CO2/year	CO2 Annual Emissions due to the use of diesel
	R4.2	AE _G	55,414.5324 tn CO2/year	CO2 Annual Emissions due to the use of gasoline
	R4.3	AE _{EL}	7,256.3251 tn CO2/year	CO2 Annual Emissions due to the use of electricity
	R4.4	AE _{ff&e}	428,036.9286 tn CO2/year	CO2 Annual Emissions due to the use of fossil fuels & electricity

R5.1		AG _{N-f_LCC}	0.0000 tn CO2/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (use of Leguminosae cover crops)
R5.2		AG _{f_FGT}	0.0000 tn CO2/year	CO2 Annual Gain due to fertilizers reduction (use of fertigation)
R5.3		AG _{H_cc/m}	309,679.3070 tn CO2/year	CO2 Annual Gain due to herbicides reduction (use of cover crops/mulching)
R5.4		AG _{I_im/mt}	0.0000 tn CO2/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping)
R5.5	Gain	AG _{WF}	1,028,169.7216 tn CO2/year	CO2 Annual Gain due to the use of wood fuels instead of diesel
R5.6	00	AG _{RES}	0.0000 tn CO2/year	CO2 Annual Gain due to the use of Renewable Energy Sources
R5.7		AG _{EL_m}	0.0000 tn CO2/year	CO2 Annual Gain due to electricity reduction (use of mulching)
R5.8		AG _{D_FGT}	0.0000 tn CO2/year	CO2 Annual Gain due to diesel reduction (use of fertigation)
R5.9		TAG	1,337,849.0286 tn CO2/year	CO2 Total Annual Gain

	ARC _{product}	1.50097	tn CO2/tn of yield/year	CO2 Annual Removal Capacity per unit of harvested fruits	(BF is included)
	ARC _{tree}	0.03811	tn CO2/tree/year	CO2 Annual Removal Capacity per tree unit	
_					
	ARC _{area}	4.17387	tn CO2/hectare/year	CO2 Annual Removal Capacity per unit of cultivated area	
	ARCproduct	0.94804	tn CO2/tn of yield/year	CO2 Annual Removal Capacity per unit of harvested fruits	(BF is not included)
	ARC _{tree}	0.02407	tn CO2/tree/year	CO2 Annual Removal Capacity per tree unit	
_					
	TAE/TAR	0.18792	Total Annual CO2 Emissions/ Total An		(BF is included) (BF is not included)
	TAE/TAR	0.26813	Total Annual CO2 Emissions/ Total Ann	Total Annual CO2 Emissions/ Total Annual CO2 Removals	
_					
	TAR _{area}	8.13739	tn CO2/hectare/year	CO2 Total Annual Removals per unit of cultivated area	
_	TAR _{product}	1.84830	tn CO2/tn of yield/year	CO2 Total Annual Removals per unit of harvested fruits	(BF is included)
	TAR _{tree}	0.04693	tn CO2/tree/year	CO2 Total Annual Removals per tree unit	
_	TAD				
_	TAR _{area}	5.70305	tn CO2/hectare/year	CO2 Total Annual Removals per unit of cultivated area	
	TAR _{product}	1.29537	tn CO2/tn of yield/year	CO2 Total Annual Removals per unit of harvested fruits	(BF is not included)
	TAR _{tree}	0.03289	tn CO2/tree/year	CO2 Total Annual Removals per tree unit	
	4.0	2 42422	the CO2/heatars/waar	CO2 Appual Removed due to the production of fruit biomass per unit of sultivated area	
	AR _{BF_area}	2.43433	tn CO2/hectare/year	CO2 Annual Removal due to the production of fruit biomass per unit of cultivated area	
	AR _{BF_product}	0.55293	tn CO2/tn of yield/year	CO2 Annual Removal due to the production of fruit biomass per unit of harvested fruits	
	AR _{BF_tree}	0.01404	tn CO2/tree/year	CO2 Annual Removal due to the production of fruit biomass per tree unit	
	AD	E 50404	to CO2/bostore/seco	CO2 Appual Removal due to the production of wood biomass per unit of sultivated area	
H	AR _{BW_area}	5.58124	tn CO2/hectare/year	CO2 Annual Removal due to the production of wood biomass per unit of cultivated area	
_	AR _{BW_product}	1.26771	tn CO2/tn of yield/year	CO2 Annual Removal due to the production of wood biomass per unit of harvested fruits	
	AR _{BW_tree}	0.03219	tn CO2/tree/year	CO2 Annual Removal due to the production of wood biomass per tree unit	
	AC	0.12181	tra 602/h = stars /	CO2 Annual Storage in soil as carbon of the fallen biomass per unit of cultivated area	
-	AS _{S_area}		tn CO2/hectare/year	CO2 Annual Storage in soil as carbon of the fallen biomass per unit of cutivated area	
-	AS _{S_product}	0.02767	tn CO2/tn of yield/year		
	AS _{S_tree}	0.00070	tn CO2/tree/year	CO2 Annual Storage in soil as carbon of the fallen biomass per tree unit	
	TAE _{area}	1.52919	tn CO2/hectare/year	CO2 Total Annual Emissions per unit of cultivated area	
		0.34733	th CO2/hectare/year	CO2 Total Annual Emissions per unit of buttivated area	
	TAE _{product} TAE _{tree}	0.00882		CO2 Total Annual Emissions per tree unit	
_	TACtree	0.00882	tn CO2/tree/year	CO2 Total Annual Emissions per tree unic	
	AE _{f_area}	0.78020	tn CO2/hectare/year	CO2 Annual Emissions due to the use of fertilizers per unit of cultivated area	
	AE _{f_product}	0.17721	tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of fertilizers per unit of harvested fruits	
	AE _{f_tree}	0.00450	tn CO2/tree/year	CO2 Annual Emissions due to the use of fertilizers per tree unit	
	ALf_tree	0.00430		COL Annual Emissions due to the use of reformers per tree unit	
	AE _{p area}	0.22384	tn CO2/hectare/year	CO2 Annual Emissions due to the use of pesticides per unit of cultivated area	
	AE _{p_product}	0.05084	tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits	
	AE _{p tree}	0.00129	tn CO2/tree/year	CO2 Annual Emissions due to the use of pesticides per tree unit	
	- p_tree	0.00125			
	AE _{ff&e_area}	0.52515	tn CO2/hectare/year	CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area	
	AE _{ff&e_product}	0.11928	tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of barvested fruits	
-	AE _{ff&e tree}	0.00303	tn CO2/tree/year	CO2 Annual Emissions due to the use of fossil fuels & electricity per tree unit	
	-noe_tree	0.00003			
		0.44826	tn CO2/hectare/year	CO2 Annual Emissions due to the use of diesel per unit of cultivated area	
	AE _{D area}			CO2 Annual Emissions due to the use of diesel per unit of harvested fruits	
	AE _{D_area}		th CO2/th of vield/vear		
	AE _{D_product}	0.10182	tn CO2/tn of yield/year tn CO2/tree/year	CO2 Annual Emissions due to the use of diesel per tree unit	
			th CO2/th of yield/year th CO2/tree/year	CO2 Annual Emissions due to the use of diesel per tree unit	
	AE _{D_product} AE _{D_tree}	0.10182 0.00259	tn CO2/tree/year		
	AE _{D_product} AE _{D_tree} AE _{G_area}	0.10182 0.00259 0.06799	tn CO2/tree/year tn CO2/hectare/year	CO2 Annual Emissions due to the use of gasoline per unit of cultivated area	
	AE _{D_product} AE _{D_tree} AE _{G_area} AE _{G_product}	0.10182 0.00259 0.06799 0.01544	tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of gasoline per unit of cultivated area CO2 Annual Emissions due to the use of gasoline per unit of harvested fruits	
	AE _{D_product} AE _{D_tree} AE _{G_area}	0.10182 0.00259 0.06799	tn CO2/tree/year tn CO2/hectare/year	CO2 Annual Emissions due to the use of gasoline per unit of cultivated area	
	AE _{D_product} AE _{D_tree} AE _{G_area} AE _{G_product} AE _{G_tree}	0.10182 0.00259 0.06799 0.01544 0.00039	tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year	CO2 Annual Emissions due to the use of gasoline per unit of cultivated area CO2 Annual Emissions due to the use of gasoline per unit of harvested fruits CO2 Annual Emissions due to the use of gasoline per tree unit	
	AE _{D_product} AE _{D_tree} AE _{G_area} AE _{G_product} AE _{G_tree} AE _{EL_area}	0.10182 0.00259 0.06799 0.01544 0.00039 0.00890	tn CO2/hectare/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year	CO2 Annual Emissions due to the use of gasoline per unit of cultivated area CO2 Annual Emissions due to the use of gasoline per unit of harvested fruits CO2 Annual Emissions due to the use of gasoline per tree unit CO2 Annual Emissions due to the use of electricity per unit of cultivated area	
	AE _{D_product} AE _{D_tree} AE _{G_area} AE _{G_product} AE _{G_tree}	0.10182 0.00259 0.06799 0.01544 0.00039	tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year	CO2 Annual Emissions due to the use of gasoline per unit of cultivated area CO2 Annual Emissions due to the use of gasoline per unit of harvested fruits CO2 Annual Emissions due to the use of gasoline per tree unit	

R21.2	TAGproduct	0.37282	tn CO2/tn of yield/year	CO2 Total Annual Gain per unit of harvested fruits
R21.3	TAG _{tree}	0.00947	tn CO2/tree/year	CO2 Total Annual Gain per tree unit
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R22.1	AG _{N-f_LCC_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (Leguminosae cover crops) per unit of cultivated area
R22.2	AG _{N-f_LCC_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (Leguminosae cover crops) per unit of harvested fruits
R22.3	AG _{N-f_LCC_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (Leguminosae cover crops) per tree unit
R23.1	AG _{f_FGT_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to fertilizers reduction (fertigation) per unit of cultivated area
R23.2	AG _{f_FGT_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to fertilizers reduction (fertigation) per unit of harvested fruits
R23.3	AG _{f_FGT_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to fertilizers reduction (fertigation) per tree unit
R24.1	AG _{H_cc/m_area}	0.37994	tn CO2/hectare/year	CO2 Annual Gain due to herbicides reduction (cover crops/mulching) per unit of cultivated area
R24.2	AG _{H_cc/m_product}	0.08630	tn CO2/tn of yield/year	CO2 Annual Gain due to herbicides reduction (cover crops/mulching) per unit of harvested fruits
R24.3	AG _{H_cc/m_tree}	0.00219	tn CO2/tree/year	CO2 Annual Gain due to herbicides reduction (cover crops/mulching) per tree unit
R25.1	AG _{I_im/mt_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping) per unit of cultivated area
R25.2	AG _{I_im/mt_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping) per unit of harvested fruits
R25.3	AG _{I_im/mt_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping) per tree unit
R26.1	AG _{WF_area}	1.26145	tn CO2/hectare/year	CO2 Annual Gain due to the use of wood fuels instead of diesel per unit of cultivated area
R26.2	AG _{WF_product}	0.28652	tn CO2/tn of yield/year	CO2 Annual Gain due to the use of wood fuels instead of diesel per unit of harvested fruits
R26.3	AG _{WF_tree}	0.00728	tn CO2/tree/year	CO2 Annual Gain due to the use of wood fuels instead of diesel per tree unit
R27.1	AG _{RES_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to the use of RES per unit of cultivated area
R27.2	AG _{RES_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to the use of RES per unit of harvested fruits
R27.3	AG _{RES_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to the use of RES per tree unit



Tree crops' CO2 Removal Capacity Calculation Tool (CO2RCCT)



terra nova

Designed and developed by TERRA NOVA Ltd.

Results

Country where the Tool is applied:	Greece
Species of tree crop:	Olive
Geographical area of the cultivation:	GREECE (total)

Use of cover crops of the Leguminosae family

CO2 Annual Removal Capacity

		er processories		
R1.1	ARC	5,696,767.8056 tn CO2/year	CO2 Annual Removal Capacity	(BF is included)
R1.2	ARC	3,712,610.4180 tn CO2/year	CO2 Annual Removal Capacity	(BF is not included)

The term "CO2 Removal" means the abstraction of CO2 from atmosphere

Agricultural practice:

BF: the fruits' biomass

Analysis

R2.1		AR _{BF}	1,984,157.3877 tn CO2/year	CO2 Annual Removal due to the production of fruit biomass	
R2.2	als	AR _{BW}	4,549,120.3612 tn CO2/year	CO2 Annual Removal due to the production of wood biomass	
R2.3	õ È	ASs	99,284.7535 tn CO2/year	CO2 Annual Storage in soil as carbon of the fallen biomass	
R2.4	- Ba	TAR	6,632,562.5023 tn CO2/year	CO2 Total Annual Removals	(BF is included)
R2.5		TAR	4,648,405.1147 tn CO2/year	CO2 Total Annual Removals	(BF is not included)

a. It has to be underlined an important difference between ARC and TAR:

ARC is the result of the CO2 mass balance between (a) the total quantity of CO2 which is abstracted from the atmosphere [=TAR] by the tree in order to create biomass and (b) the total quantity of CO2 which is emitted to the atmosphere due to the agricultural practices which are applied for the cultivation of the tree.

R3.1	Š	AE _f	325,311.2115 tn CO2/year	CO2 Annual Emissions due to the use of fertilizers
R3.2	22 sion	AEp	182,446.5566 tn CO2/year	CO2 Annual Emissions due to the use of pesticides
R3.3	uis C	AE _{ff&e}	428,036.9286 tn CO2/year	CO2 Annual Emissions due to the use of fossil fuels & electricity
R3.4	ш	TAE	935,794.6967 tn CO2/year	CO2 Total Annual Emissions
	R4.1	AED	365,366.0711 tn CO2/year	CO2 Annual Emissions due to the use of diesel
	R4.2	AE _G	55,414.5324 tn CO2/year	CO2 Annual Emissions due to the use of gasoline
	R4.3	AE _{EL}	7,256.3251 tn CO2/year	CO2 Annual Emissions due to the use of electricity
	R4.4	AE _{ff&e}	428,036.9286 tn CO2/year	CO2 Annual Emissions due to the use of fossil fuels & electricity

R5.1		AG _{N-f_LCC}	310,604.6178 tn CO2/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (use of Leguminosae cover crops)
R5.2		AG _{f_FGT}	0.0000 tn CO2/year	CO2 Annual Gain due to fertilizers reduction (use of fertigation)
R5.3		AG _{H_cc/m}	309,679.3070 tn CO2/year	CO2 Annual Gain due to herbicides reduction (use of cover crops/mulching)
R5.4		AG _{I_im/mt}	0.0000 tn CO2/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping)
R5.5	ain 02	AG _{WF}	1,028,169.7216 tn CO2/year	CO2 Annual Gain due to the use of wood fuels instead of diesel
R5.6	0.0	AG _{RES}	0.0000 tn CO2/year	CO2 Annual Gain due to the use of Renewable Energy Sources
R5.7		AG _{EL_m}	0.0000 tn CO2/year	CO2 Annual Gain due to electricity reduction (use of mulching)
R5.8		AG _{D_FGT}	0.0000 tn CO2/year	CO2 Annual Gain due to diesel reduction (use of fertigation)
R5.9		TAG	1,648,453.6464 tn CO2/year	CO2 Total Annual Gain

CO2 Rem	val Capacity Indexes		
ARC	rea 6.98927	tn CO2/hectare/year	CO2 Annual Removal Capacity per unit of cultivated area

	ARC _{product}	1.58752	tn CO2/tn of yield/year	CO2 Annual Removal Capacity per unit of harvested fruits	(BF is included)
	ARC _{tree}	0.04031	tn CO2/tree/year	CO2 Annual Removal Capacity per tree unit	
	ARCarea	4.55494	tn CO2/hectare/year	CO2 Annual Removal Capacity per unit of cultivated area	
	ARCproduct	1.03460	tn CO2/tn of yield/year	CO2 Annual Removal Capacity per unit of harvested fruits	(BF is not included)
	ARC _{tree}	0.02627	tn CO2/tree/year	CO2 Annual Removal Capacity per tree unit	
_					
	TAE/TAR	0.14109	Total Annual CO2 Emissions/ Total An		(BF is included)
	TAE/TAR	0.20132	Total Annual CO2 Emissions/ Total An	nual CO2 Removals	(BF is not included)
	TAR _{area}	8.13739	tn CO2/hectare/year	CO2 Total Annual Removals per unit of cultivated area	
-	TAR _{product}	1.84830	th CO2/th of yield/year	CO2 Total Annual Removals per unit of barvested fruits	(BF is included)
-	TAR _{tree}	0.04693	tn CO2/tree/year	CO2 Total Annual Removals per tree unit	
	uee				
	TAR _{area}	5.70305	tn CO2/hectare/year	CO2 Total Annual Removals per unit of cultivated area	
	TARproduct	1.29537	tn CO2/tn of yield/year	CO2 Total Annual Removals per unit of harvested fruits	(BF is not included)
	TAR _{tree}	0.03289	tn CO2/tree/year	CO2 Total Annual Removals per tree unit	
	AR _{BF_area}	2.43433	tn CO2/hectare/year	CO2 Annual Removal due to the production of fruit biomass per unit of cultivated area	
_	AR _{BF_product}	0.55293	tn CO2/tn of yield/year	CO2 Annual Removal due to the production of fruit biomass per unit of harvested fruits	
3	AR _{BF_tree}	0.01404	tn CO2/tree/year	CO2 Annual Removal due to the production of fruit biomass per tree unit	
	4.0	E 50404	the CO2/Instant	CO2 Approxil Demoval due to the preduction of used bitment and with of sublicity damage	
L	AR _{BW_area}	5.58124	tn CO2/hectare/year	CO2 Annual Removal due to the production of wood biomass per unit of cultivated area CO2 Annual Removal due to the production of wood biomass per unit of harvested fruits	
2	AR _{BW_product}	1.26771	tn CO2/tn of yield/year	CO2 Annual Removal due to the production of wood biomass per tree unit	
•	AR _{BW_tree}	0.03219	tn CO2/tree/year	CO2 Annual Kentoval due to the production of wood biomass per tree unit	
	AS _{S_area}	0.12181	tn CO2/hectare/year	CO2 Annual Storage in soil as carbon of the fallen biomass per unit of cultivated area	
	AS _{S_product}	0.02767	tn CO2/tn of yield/year	CO2 Annual Storage in soil as carbon of the fallen biomass per unit of harvested fruits	
	AS _{S_tree}	0.00070	tn CO2/tree/year	CO2 Annual Storage in soil as carbon of the fallen biomass per tree unit	
	- <u>5_</u> uee				
	TAE _{area}	1.14811	tn CO2/hectare/year	CO2 Total Annual Emissions per unit of cultivated area	
2	TAEproduct	0.26078	tn CO2/tn of yield/year	CO2 Total Annual Emissions per unit of harvested fruits	
3	TAE _{tree}	0.00662	tn CO2/tree/year	CO2 Total Annual Emissions per tree unit	
L	AE _{f_area}	0.39912	tn CO2/hectare/year	CO2 Annual Emissions due to the use of fertilizers per unit of cultivated area	
2	AE _{f_product}	0.09065	tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of fertilizers per unit of harvested fruits	
3	AE _{f_tree}	0.00230	tn CO2/tree/year	CO2 Annual Emissions due to the use of fertilizers per tree unit	
_		0.00004		CO2 Annual Excitation due to the use of excitation annuals of culture dues	
L	AE _{p_area}	0.22384	tn CO2/hectare/year	CO2 Annual Emissions due to the use of pesticides per unit of cultivated area CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits	
3	AE _{p_product}	0.00129	tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of pesticides per tree unit	
·	AE _{p_tree}	0.00129	tn CO2/tree/year	Coz Annual Emissions que to the use of pesticues per tree unit	
1	AE _{ff&e_area}	0.52515	tn CO2/hectare/year	CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area	· · · · · · · · · · · · · · · · · · ·
	AE _{ff&e_product}	0.11928	tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of entityed due of fuels and the second	
	AE _{ff&e tree}	0.00303	tn CO2/tree/year	CO2 Annual Emissions due to the use of fossil fuels & electricity per tree unit	
_					
	AE _{D_area}	0.44826	tn CO2/hectare/year	CO2 Annual Emissions due to the use of diesel per unit of cultivated area	
2	AE _{D_product}	0.10182	tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of diesel per unit of harvested fruits	
	AE _{D_tree}	0.00259	tn CO2/tree/year	CO2 Annual Emissions due to the use of diesel per tree unit	
_					
_	AE _{G_area}	0.06799	tn CO2/hectare/year	CO2 Annual Emissions due to the use of gasoline per unit of cultivated area	
2	AE _{G_product}	0.01544	tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of gasoline per unit of harvested fruits	
	AE _{G_tree}	0.00039	tn CO2/tree/year	CO2 Annual Emissions due to the use of gasoline per tree unit	
3		0.00000		CO2 Annual Expirations due to the use of electricity neg unit of sultivated area	
3		0.00890	tn CO2/hectare/year	CO2 Annual Emissions due to the use of electricity per unit of cultivated area	
3	AE _{EL_area}		to CO2/to of violat/		
3	AE _{EL_product}	0.00202	tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of electricity per unit of harvested fruits	
			tn CO2/tn of yield/year tn CO2/tree/year	CO2 Annual Emissions due to the use of electricity per unit of narvested truits CO2 Annual Emissions due to the use of electricity per tree unit	

R21.2	TAGproduct	0.45938	tn CO2/tn of yield/year	CO2 Total Annual Gain per unit of harvested fruits
R21.3	TAG _{tree}	0.01166	tn CO2/tree/year	CO2 Total Annual Gain per tree unit
R22.1	AG _{N-f_LCC_area}	0.38108	tn CO2/hectare/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (Leguminosae cover crops) per unit of cultivated area
R22.2	AG _{N-f_LCC_product}	0.08656	tn CO2/tn of yield/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (Leguminosae cover crops) per unit of harvested fruits
R22.3	AG _{N-f_LCC_tree}	0.00220	tn CO2/tree/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (Leguminosae cover crops) per tree unit
R23.1	AG _{f_FGT_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to fertilizers reduction (fertigation) per unit of cultivated area
R23.2	AG _{f_FGT_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to fertilizers reduction (fertigation) per unit of harvested fruits
R23.3	AG _{f_FGT_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to fertilizers reduction (fertigation) per tree unit
R24.1	AG _{H_cc/m_area}	0.37994	tn CO2/hectare/year	CO2 Annual Gain due to herbicides reduction (cover crops/mulching) per unit of cultivated area
R24.2	AG _{H_cc/m_product}	0.08630	tn CO2/tn of yield/year	CO2 Annual Gain due to herbicides reduction (cover crops/mulching) per unit of harvested fruits
R24.3	AG _{H_cc/m_tree}	0.00219	tn CO2/tree/year	CO2 Annual Gain due to herbicides reduction (cover crops/mulching) per tree unit
R25.1	AG _{I_im/mt_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping) per unit of cultivated area
R25.2	AG _{I_im/mt_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping) per unit of harvested fruits
R25.3	AG _{I_im/mt_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping) per tree unit
R26.1	AG _{WF_area}	1.26145	tn CO2/hectare/year	CO2 Annual Gain due to the use of wood fuels instead of diesel per unit of cultivated area
R26.2	AG _{WF_product}	0.28652	tn CO2/tn of yield/year	CO2 Annual Gain due to the use of wood fuels instead of diesel per unit of harvested fruits
R26.3	AG _{WF_tree}	0.00728	tn CO2/tree/year	CO2 Annual Gain due to the use of wood fuels instead of diesel per tree unit
R27.1	AG _{RES_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to the use of RES per unit of cultivated area
R27.2	AG _{RES_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to the use of RES per unit of harvested fruits
R27.3	AG _{RES_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to the use of RES per tree unit



Tree crops' CO2 Removal Capacity Calculation Tool (CO2RCCT)



terra nova

Designed and developed by TERRA NOVA Ltd.

Results

Country where the Tool is applied:	Greece
Species of tree crop:	Olive
Geographical area of the cultivation:	GREECE (total)

Application of fertilizers through fertigation

CO2 Annual Removal Capacity

R1.1	ARC 5,178,948.7197 tn CO2/year	CO2 Annual Removal Capacity	(BF is included)
R1.2	ARC 3,194,791.3321 tn CO2/year	CO2 Annual Removal Capacity	(BF is not included)

The term "CO2 Removal" means the abstraction of CO2 from atmosphere

Agricultural practice:

BF: the fruits' biomass

Analysis

R2.1		AR _{BF}	1,984,157.3877 tn CO2/year	CO2 Annual Removal due to the production of fruit biomass	1
R2.2	als	AR _{BW}	4,549,120.3612 tn CO2/year	CO2 Annual Removal due to the production of wood biomass	
R2.3	102	ASs	55,210.9681 tn CO2/year	CO2 Annual Storage in soil as carbon of the fallen biomass	
R2.4	Rei	TAR	6,588,488.7169 tn CO2/year	CO2 Total Annual Removals	(BF is included)
R2.5		TAR	4,604,331.3293 tn CO2/year	CO2 Total Annual Removals	(BF is not included)

a. It has to be underlined an important difference between ARC and TAR:

ARC is the result of the CO2 mass balance between (a) the total quantity of CO2 which is abstracted from the atmosphere [=TAR] by the tree in order to create biomass and (b) the total quantity of CO2 which is emitted to the atmosphere due to the agricultural practices which are applied for the cultivation of the tree.

R3.1	s	AE _f	540,528.4549 tn CO2/year	CO2 Annual Emissions due to the use of fertilizers
R3.2	2 ion	AEp	492,125.8637 tn CO2/year	CO2 Annual Emissions due to the use of pesticides
R3.3	D si	AE _{ff&e}	376,885.6786 tn CO2/year	CO2 Annual Emissions due to the use of fossil fuels & electricity
R3.4	ū	TAE	1,409,539.9972 tn CO2/year	CO2 Total Annual Emissions
	R4.1	AE _D	314,214.8212 tn CO2/year	CO2 Annual Emissions due to the use of diesel
	R4.2	AE _G	55,414.5324 tn CO2/year	CO2 Annual Emissions due to the use of gasoline
	R4.3	AE _{EL}	7,256.3251 tn CO2/year	CO2 Annual Emissions due to the use of electricity
	R4.4	AE _{ff&e}	376,885.6786 tn CO2/year	CO2 Annual Emissions due to the use of fossil fuels & electricity

R5.1		AG _{N-f_LCC}	0.0000 tn CO2/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (use of Leguminosae cover crops)
R5.2		AG _{f_FGT}	95,387.3744 tn CO2/year	CO2 Annual Gain due to fertilizers reduction (use of fertigation)
R5.3		AG _{H_cc/m}	0.0000 tn CO2/year	CO2 Annual Gain due to herbicides reduction (use of cover crops/mulching)
R5.4		AG _{I_im/mt}	0.0000 tn CO2/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping)
R5.5	ain 02	AG _{WF}	1,028,169.7216 tn CO2/year	CO2 Annual Gain due to the use of wood fuels instead of diesel
R5.6	00	AG _{RES}	0.0000 tn CO2/year	CO2 Annual Gain due to the use of Renewable Energy Sources
R5.7		AG _{EL_m}	0.0000 tn CO2/year	CO2 Annual Gain due to electricity reduction (use of mulching)
R5.8		AG _{D_FGT}	51,151.2500 tn CO2/year	CO2 Annual Gain due to diesel reduction (use of fertigation)
R5.9		TAG	1,174,708.3459 tn CO2/year	CO2 Total Annual Gain

	ARC _{product}	1.44322	tn CO2/tn of yield/year	CO2 Annual Removal Capacity per unit of harvested fruits	(BF is included)
	ARC _{tree}	0.03665	tn CO2/tree/year	CO2 Annual Removal Capacity per tree unit	
1					
	ARCarea	3.91964	tn CO2/hectare/year	CO2 Annual Removal Capacity per unit of cultivated area	
	ARCproduct	0.89029	tn CO2/tn of yield/year	CO2 Annual Removal Capacity per unit of harvested fruits	(BF is not included)
	ARC _{tree}	0.02261	tn CO2/tree/year	CO2 Annual Removal Capacity per tree unit	
					· · · · · · · · · · · · · · · · · · ·
	TAE/TAR	0.21394	Total Annual CO2 Emissions/ Total An		(BF is included)
	TAE/TAR	0.30613	Total Annual CO2 Emissions/ Total An	nual CO2 Removals	BF is not included)
	TAR _{area}	8.08331	tn CO2/hectare/year	CO2 Total Annual Removals per unit of cultivated area	
	TAR _{product}	1.83602	tn CO2/tn of yield/year	CO2 Total Annual Removals per unit of harvested fruits	(BF is included)
-	TAR _{tree}	0.04662	tn CO2/tree/year	CO2 Total Annual Removals per tree unit	
	üce				
	TAR _{area}	5.64898	tn CO2/hectare/year	CO2 Total Annual Removals per unit of cultivated area	
2	TAR _{product}	1.28309	tn CO2/tn of yield/year	CO2 Total Annual Removals per unit of harvested fruits	(BF is not included)
3	TAR _{tree}	0.03258	tn CO2/tree/year	CO2 Total Annual Removals per tree unit	
_					
	AR _{BF_area}	2.43433	tn CO2/hectare/year	CO2 Annual Removal due to the production of fruit biomass per unit of cultivated area	
-	AR _{BF_product}	0.55293	tn CO2/tn of yield/year	CO2 Annual Removal due to the production of fruit biomass per unit of harvested fruits	
	AR _{BF_tree}	0.01404	tn CO2/tree/year	CO2 Annual Removal due to the production of fruit biomass per tree unit	
_	4.0	5 50424	the CO2/hasters/haste	CO3 Approval Demonstrative the production of used biomass not write of authinted area	
L 2	AR _{BW_area}	5.58124	tn CO2/hectare/year	CO2 Annual Removal due to the production of wood biomass per unit of cultivated area CO2 Annual Removal due to the production of wood biomass per unit of harvested fruits	
3	AR _{BW_product}	1.26771 0.03219	tn CO2/tn of yield/year	CO2 Annual Removal due to the production of wood biomass per diff. Of harvested huits	
•	AR _{BW_tree}	0.03219	tn CO2/tree/year		
	AS _{s_area}	0.06774	tn CO2/hectare/year	CO2 Annual Storage in soil as carbon of the fallen biomass per unit of cultivated area	
2	AS _{S_product}	0.01539	tn CO2/tn of yield/year	CO2 Annual Storage in soil as carbon of the fallen biomass per unit of harvested fruits	
	AS _{S_tree}	0.00039	tn CO2/tree/year	CO2 Annual Storage in soil as carbon of the fallen biomass per tree unit	
	5_400				
L	TAE _{area}	1.72934	tn CO2/hectare/year	CO2 Total Annual Emissions per unit of cultivated area	
2	TAEproduct	0.39280	tn CO2/tn of yield/year	CO2 Total Annual Emissions per unit of harvested fruits	
3	TAE _{tree}	0.00997	tn CO2/tree/year	CO2 Total Annual Emissions per tree unit	
_					
1	AE _{f_area}	0.66317	tn CO2/hectare/year	CO2 Annual Emissions due to the use of fertilizers per unit of cultivated area	
2	AE _{f_product}	0.15063	tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of fertilizers per unit of harvested fruits	
3	AE _{f_tree}	0.00382	tn CO2/tree/year	CO2 Annual Emissions due to the use of fertilizers per tree unit	
1	45	0.00270	the CO2/h antene have a	CO3 Appund Emissions due to the use of posticides and with of sublimited area	
2	AE _{p_area}	0.60378	tn CO2/hectare/year tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of pesticides per unit of cultivated area CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits	
3	AE _{p_product}	0.13714		CO2 Annual Emissions due to the use of pesticides per tree unit	
·	AE _{p_tree}	0.00546	tn CO2/tree/year	cos Annual Emissions que to the use of pesticues per tree unit	
1	AE _{ff&e_area}	0.46240	tn CO2/hectare/year	CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area	
2	AE _{ff&e_product}	0.10503	th CO2/th of yield/year	CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of barvested fruits	
3	AE _{ff&e tree}	0.00267	tn CO2/tree/year	CO2 Annual Emissions due to the use of fossil fuels & electricity per tree unit	
_					
1	AE _{D_area}	0.38551	tn CO2/hectare/year	CO2 Annual Emissions due to the use of diesel per unit of cultivated area	
2	AE _{D_product}	0.08756	tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of diesel per unit of harvested fruits	
3	AE _{D_tree}	0.00222	tn CO2/tree/year	CO2 Annual Emissions due to the use of diesel per tree unit	
_					
L	AE _{G_area}	0.06799	tn CO2/hectare/year	CO2 Annual Emissions due to the use of gasoline per unit of cultivated area	
2	AE _{G_product}	0.01544	tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of gasoline per unit of harvested fruits	
	AE _{G_tree}	0.00039	tn CO2/tree/year	CO2 Annual Emissions due to the use of gasoline per tree unit	
3		0.00000		CO2 Annual Enviroinne due to the use of electricity negurit of subjusted area	
	AE _{EL area}	0.00890	tn CO2/hectare/year	CO2 Annual Emissions due to the use of electricity per unit of cultivated area CO2 Annual Emissions due to the use of electricity per unit of harvested fruits	
		0.00000			
	AE _{EL_product}	0.00202	tn CO2/tn of yield/year		
		0.00202	th CO2/th of yield/year th CO2/tree/year	CO2 Annual Emissions due to the use of electricity per time of his rested in the CO2 Annual Emissions due to the use of electricity per tree unit	

R21.2	TAGproduct	0.32736	tn CO2/tn of yield/year	CO2 Total Annual Gain per unit of harvested fruits
R21.3	TAG _{tree}	0.00831	tn CO2/tree/year	CO2 Total Annual Gain per tree unit
				·
R22.1	AG _{N-f_LCC_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (Leguminosae cover crops) per unit of cultivated area
R22.2	AG _{N-f_LCC_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (Leguminosae cover crops) per unit of harvested fruits
R22.3	AG _{N-f_LCC_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (Leguminosae cover crops) per tree unit
R23.1	AG _{f_FGT_area}	0.11703	tn CO2/hectare/year	CO2 Annual Gain due to fertilizers reduction (fertigation) per unit of cultivated area
R23.2	AG _{f_FGT_product}	0.02658	tn CO2/tn of yield/year	CO2 Annual Gain due to fertilizers reduction (fertigation) per unit of harvested fruits
R23.3	AG _{f_FGT_tree}	0.00067	tn CO2/tree/year	CO2 Annual Gain due to fertilizers reduction (fertigation) per tree unit
R24.1	AG _{H_cc/m_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to herbicides reduction (cover crops/mulching) per unit of cultivated area
R24.2	AG _{H_cc/m_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to herbicides reduction (cover crops/mulching) per unit of harvested fruits
R24.3	AG _{H_cc/m_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to herbicides reduction (cover crops/mulching) per tree unit
R25.1	AG _{L_im/mt_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping) per unit of cultivated area
R25.2	AG _{I_im/mt_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping) per unit of harvested fruits
R25.3	AG _{I_im/mt_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping) per tree unit
R26.1	AG _{WF_area}	1.26145	tn CO2/hectare/year	CO2 Annual Gain due to the use of wood fuels instead of diesel per unit of cultivated area
R26.2	AG _{WF_product}	0.28652	tn CO2/tn of yield/year	CO2 Annual Gain due to the use of wood fuels instead of diesel per unit of harvested fruits
R26.3	AG _{WF_tree}	0.00728	tn CO2/tree/year	CO2 Annual Gain due to the use of wood fuels instead of diesel per tree unit
R27.1	AG _{RES_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to the use of RES per unit of cultivated area
R27.2	AG _{RES_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to the use of RES per unit of harvested fruits
R27.3	AG _{RES_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to the use of RES per tree unit



Tree crops' CO2 Removal Capacity Calculation Tool (CO2RCCT)



terra nova

Designed and developed by TERRA NOVA Ltd.

Results

Country where the Tool is applied:	Greece
Species of tree crop:	Orange
Geographical area of the cultivation:	GREECE (total)

Use of cover crops of the Leguminosae family

CO2 Annual Removal Capacity

		and the second		
R1.1	ARC	308,164.2067 tn CO2/year	CO2 Annual Removal Capacity	(BF is included)
R1.2	ARC	250,030.8679 tn CO2/year	CO2 Annual Removal Capacity	(BF is not included)

The term "CO2 Removal" means the abstraction of CO2 from atmosphere

Agricultural practice:

BF: the fruits' biomass

Analysis

R2.1		AR _{BF}	58,133.3388 tn CO2/year	CO2 Annual Removal due to the production of fruit biomass	
R2.2	als	AR _{BW}	300,878.0321 tn CO2/year	CO2 Annual Removal due to the production of wood biomass	
R2.3	S É	ASs	13,029.3724 tn CO2/year	CO2 Annual Storage in soil as carbon of the fallen biomass	
R2.4	Rei _	TAR	372,040.7433 tn CO2/year	CO2 Total Annual Removals	(BF is included)
R2.5		TAR	313,907.4046 tn CO2/year	CO2 Total Annual Removals	(BF is not included)

a. It has to be underlined an important difference between ARC and TAR:

ARC is the result of the CO2 mass balance between (a) the total quantity of CO2 which is abstracted from the atmosphere [=TAR] by the tree in order to create biomass and (b) the total quantity of CO2 which is emitted to the atmosphere due to the agricultural practices which are applied for the cultivation of the tree.

R3.1	s	AE _f	24,150.0068 tn CO2/year	CO2 Annual Emissions due to the use of fertilizers
R3.2	2 Sior	AEp	12,478.7097 tn CO2/year	CO2 Annual Emissions due to the use of pesticides
R3.3	uis C	AE _{ff&e}	27,247.8201 tn CO2/year	CO2 Annual Emissions due to the use of fossil fuels & electricity
R3.4		TAE	63,876.5366 tn CO2/year	CO2 Total Annual Emissions
		-		
	R4.1	AE _D	20,184.8514 tn CO2/year	CO2 Annual Emissions due to the use of diesel
	R4.2	AE _G	1,151.9053 tn CO2/year	CO2 Annual Emissions due to the use of gasoline
	R4.3	AE _{EL}	5,911.0634 tn CO2/year	CO2 Annual Emissions due to the use of electricity
	R4.4	AE _{ff&e}	27,247.8201 tn CO2/year	CO2 Annual Emissions due to the use of fossil fuels & electricity

R5.1		AG _{N-f_LCC}	12,913.1142 tn CO2/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (use of Leguminosae cover crops)
R5.2		AG _{f_FGT}	0.0000 tn CO2/year	CO2 Annual Gain due to fertilizers reduction (use of fertigation)
R5.3		AG _{H_cc/m}	12,874.6452 tn CO2/year	CO2 Annual Gain due to herbicides reduction (use of cover crops/mulching)
R5.4		AG _{I_im/mt}	0.0000 tn CO2/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping)
R5.5	ain 20	AG _{WF}	80,021.1785 tn CO2/year	CO2 Annual Gain due to the use of wood fuels instead of diesel
R5.6	0.0	AG _{RES}	0.0000 tn CO2/year	CO2 Annual Gain due to the use of Renewable Energy Sources
R5.7		AG _{EL_m}	0.0000 tn CO2/year	CO2 Annual Gain due to electricity reduction (use of mulching)
R5.8		AG _{D_FGT}	0.0000 tn CO2/year	CO2 Annual Gain due to diesel reduction (use of fertigation)
R5.9		TAG	105,808.9379 tn CO2/year	CO2 Total Annual Gain

A	ARC _{product}	0.37410	tn CO2/tn of yield/year	CO2 Annual Removal Capacity per unit of harvested fruits	(BF is included)
	ARC _{tree}	0.02039	tn CO2/tree/year	CO2 Annual Removal Capacity per tree unit	
	ARC _{area}	7.37860	tn CO2/hectare/year	CO2 Annual Removal Capacity per unit of cultivated area	
A	ARC _{product}	0.30353	tn CO2/tn of yield/year	CO2 Annual Removal Capacity per unit of harvested fruits	(BF is not included)
	ARC _{tree}	0.01655	tn CO2/tree/year	CO2 Annual Removal Capacity per tree unit	
	TAE/TAR	0.17169	Total Annual CO2 Emissions/ Total An		(BF is included)
T	TAE/TAR	0.20349	Total Annual CO2 Emissions/ Total Ann	uual CO2 Removals	(BF is not included)
	TAR _{area}	10.97921	tn CO2/hectare/year	CO2 Total Annual Removals per unit of cultivated area	
	AR _{product}	0.45165	tn CO2/tn of yield/year	CO2 Total Annual Removals per unit of harvested fruits	(BF is included)
	TAR _{tree}	0.02462	tn CO2/tree/year	CO2 Total Annual Removals per tree unit	
	TAR _{area}	9.26365	tn CO2/hectare/year	CO2 Total Annual Removals per unit of cultivated area	
	TAR _{product}	0.38108	tn CO2/tn of yield/year	CO2 Total Annual Removals per unit of harvested fruits	(BF is not included)
	TAR _{tree}	0.02077	tn CO2/tree/year	CO2 Total Annual Removals per tree unit	
	AR _{BF_area}	1.71556	tn CO2/hectare/year	CO2 Annual Removal due to the production of fruit biomass per unit of cultivated area	
	R _{BF_product}	0.07057	tn CO2/tn of yield/year	CO2 Annual Removal due to the production of fruit biomass per unit of harvested fruits	
	AR _{BF_tree}	0.00385	tn CO2/tree/year	CO2 Annual Removal due to the production of fruit biomass per tree unit	
	AR _{BW_area}	8.87914	tn CO2/hectare/year	CO2 Annual Removal due to the production of wood biomass per unit of cultivated area	
	R _{BW_product}	0.36526	tn CO2/tn of yield/year	CO2 Annual Removal due to the production of wood biomass per unit of harvested fruits	
4	AR _{BW_tree}	0.01991	tn CO2/tree/year	CO2 Annual Removal due to the production of wood biomass per tree unit	
	AS _{S_area}	0.38451	tn CO2/hectare/year	CO2 Annual Storage in soil as carbon of the fallen biomass per unit of cultivated area	
A	AS _{S_product}	0.01582	tn CO2/tn of yield/year	CO2 Annual Storage in soil as carbon of the fallen biomass per unit of harvested fruits	
	AS _{S_tree}	0.00086	tn CO2/tree/year	CO2 Annual Storage in soil as carbon of the fallen biomass per tree unit	
	TAF	1.005.05	to CO2/hastana hasa	CO3 Tatal Annual Emissions are unit of sultivated area	
	TAE _{area}	1.88505	tn CO2/hectare/year	CO2 Total Annual Emissions per unit of cultivated area	
- 1	TAE _{product}	0.07754	tn CO2/tn of yield/year	CO2 Total Annual Emissions per unit of harvested fruits	
	TAE _{tree}	0.00423	tn CO2/tree/year	CO2 Total Annual Emissions per tree unit	
	AF	0 71 2 00	ta 602/basters/base	CO2 Annual Emissions due to the use of fertilizers per unit of cultivated area	
	AE _{f_area}	0.71269 0.02932	tn CO2/hectare/year	CO2 Annual Emissions due to the use of fertilizers per unit of harvested fruits	
	AE _{f_product}		tn CO2/tn of yield/year		
	AE _{f_tree}	0.00160	tn CO2/tree/year	CO2 Annual Emissions due to the use of fertilizers per tree unit	
	45	0.36826		CO2 Annual Emissions due to the use of pesticides per unit of cultivated area	
	AE _{p_area}		tn CO2/hectare/year		
	AE _{p_product}	0.01515	tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits	
	AE _{p_tree}	0.00083	tn CO2/tree/year	CO2 Annual Emissions due to the use of pesticides per tree unit	
	NE.	0.80410	th CO2/hostare/waar	CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area	
	AE _{ff&e_area}		tn CO2/hectare/year	CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits	
	Eff&e_product	0.03308	tn CO2/tn of yield/year		
Å	AE _{ff&e_tree}	0.00180	tn CO2/tree/year	CO2 Annual Emissions due to the use of fossil fuels & electricity per tree unit	
	AE	0.59567	to CO2/bostaro/voor	CO2 Annual Emissions due to the use of diesel per unit of cultivated area	
	AE _{D_area}	0.02450	tn CO2/hectare/year	CO2 Annual Emissions due to the use of diesel per unit of cultivated area	
A	AE _{D_product}		tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of diesel per unit of narvested truits	
	AE _{D_tree}	0.00134	tn CO2/tree/year	CO2 Annual Emissions que to the use of diesel per tree Unit	
	ΔF-	0.03399	tn CO2/hectare/year	CO2 Annual Emissions due to the use of gasoline per unit of cultivated area	
	AE _{G_area}			CO2 Annual Emissions due to the use of gasoline per unit of cultivated area	
	AE _{G_product}	0.00140	tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of gasoline per unit of narvested truits	
	AE _{G_tree}	0.00008	tn CO2/tree/year	CO2 Annual chrissions due to the use of gasonine per tree unit	
	AE	0.17444	to CO2/bactara/vaar	CO2 Annual Emissions due to the use of electricity per unit of cultivated area	
	AE _{EL_area}		tn CO2/hectare/year		
	EL product	0.00718	tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of electricity per unit of harvested fruits	
A		0.00000	the CO2/three huges		
A	AE _{EL_tree}	0.00039	tn CO2/tree/year	CO2 Annual Emissions due to the use of electricity per tree unit	

R21.2	TAGproduct	0.12845	tn CO2/tn of yield/year	CO2 Total Annual Gain per unit of harvested fruits
R21.3	TAG _{tree}	0.00700	tn CO2/tree/year	CO2 Total Annual Gain per tree unit
R22.1	AG _{N-f_LCC_area}	0.38108	tn CO2/hectare/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (Leguminosae cover crops) per unit of cultivated area
R22.2	AG _{N-f_LCC_product}	0.01568	tn CO2/tn of yield/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (Leguminosae cover crops) per unit of harvested fruits
R22.3	AG _{N-f_LCC_tree}	0.00085	tn CO2/tree/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (Leguminosae cover crops) per tree unit
R23.1	AG _{f_FGT_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to fertilizers reduction (fertigation) per unit of cultivated area
R23.2	AG _{f_FGT_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to fertilizers reduction (fertigation) per unit of harvested fruits
R23.3	AG _{f_FGT_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to fertilizers reduction (fertigation) per tree unit
R24.1	AG _{H_cc/m_area}	0.37994	tn CO2/hectare/year	CO2 Annual Gain due to herbicides reduction (cover crops/mulching) per unit of cultivated area
R24.2	AG _{H_cc/m_product}	0.01563	tn CO2/tn of yield/year	CO2 Annual Gain due to herbicides reduction (cover crops/mulching) per unit of harvested fruits
R24.3	AG _{H_cc/m_tree}	0.00085	tn CO2/tree/year	CO2 Annual Gain due to herbicides reduction (cover crops/mulching) per tree unit
R25.1	AG _{l_im/mt_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping) per unit of cultivated area
R25.2	AGI_im/mt_product	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping) per unit of harvested fruits
R25.3	AG _{I_im/mt_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping) per tree unit
R26.1	AG _{WF_area}	2.36149	tn CO2/hectare/year	CO2 Annual Gain due to the use of wood fuels instead of diesel per unit of cultivated area
R26.2	AG _{WF_product}	0.09714	tn CO2/tn of yield/year	CO2 Annual Gain due to the use of wood fuels instead of diesel per unit of harvested fruits
R26.3	AG _{WF_tree}	0.00530	tn CO2/tree/year	CO2 Annual Gain due to the use of wood fuels instead of diesel per tree unit
R27.1	AG _{RES_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to the use of RES per unit of cultivated area
R27.2	AG _{RES_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to the use of RES per unit of harvested fruits
R27.3	AG _{RES_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to the use of RES per tree unit



Tree crops' CO2 Removal Capacity Calculation Tool (CO2RCCT)



terra nova

Designed and developed by TERRA NOVA Ltd.

Results

Country where the Tool is applied:	Greece
Species of tree crop:	Apple
Geographical area of the cultivation:	GREECE (total)

Use of cover crops of the Leguminosae family

CO2 Annual Removal Capacity

		al capacity		
R1.1	ARC	38,202.1563 tn CO2/year	CO2 Annual Removal Capacity	(BF is included)
R1.2	ARC	18,518.4499 tn CO2/year	CO2 Annual Removal Capacity	(BF is not included)

The term "CO2 Removal" means the abstraction of CO2 from atmosphere

Agricultural practice:

BF: the fruits' biomass

Analysis

R2.1		AR _{BF}	19,683.7065 tn CO2/year	CO2 Annual Removal due to the production of fruit biomass	
R2.2	als	AR _{BW}	58,442.8502 tn CO2/year	CO2 Annual Removal due to the production of wood biomass	
R2.3	102	ASs	3,734.7260 tn CO2/year	CO2 Annual Storage in soil as carbon of the fallen biomass	
R2.4	Rei	TAR	81,861.2827 tn CO2/year	CO2 Total Annual Removals	(BF is included)
R2.5		TAR	62,177.5762 tn CO2/year	CO2 Total Annual Removals	(BF is not included)

a. It has to be underlined an important difference between ARC and TAR:

ARC is the result of the CO2 mass balance between (a) the total quantity of CO2 which is abstracted from the atmosphere [=TAR] by the tree in order to create biomass and (b) the total quantity of CO2 which is emitted to the atmosphere due to the agricultural practices which are applied for the cultivation of the tree.

R3.1	S	AE _f	10,957.0366 tn CO2/year	CO2 Annual Emissions due to the use of fertilizers
R3.2	2 Sior	AEp	3,152.0986 tn CO2/year	CO2 Annual Emissions due to the use of pesticides
R3.3	U Si	AE _{ff&e}	29,549.9912 tn CO2/year	CO2 Annual Emissions due to the use of fossil fuels & electricity
R3.4		TAE	43,659.1263 tn CO2/year	CO2 Total Annual Emissions
	R4.1	AE _D	26,910.2182 tn CO2/year	CO2 Annual Emissions due to the use of diesel
	R4.2	AE _G	1,456.9426 tn CO2/year	CO2 Annual Emissions due to the use of gasoline
	R4.3	AE _{EL}	1,182.8304 tn CO2/year	CO2 Annual Emissions due to the use of electricity
	R4.4	AE _{ff&e}	29,549.9912 tn CO2/year	CO2 Annual Emissions due to the use of fossil fuels & electricity

R5.1		AG _{N-f_LCC}	4,255.9544 tn CO2/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (use of Leguminosae cover crops)
R5.2		AG _{f_FGT}	0.0000 tn CO2/year	CO2 Annual Gain due to fertilizers reduction (use of fertigation)
R5.3		AG _{H_cc/m}	2,828.8505 tn CO2/year	CO2 Annual Gain due to herbicides reduction (use of cover crops/mulching)
R5.4		AG _{I_im/mt}	0.0000 tn CO2/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping)
R5.5	ain 20	AG _{WF}	12,245.5992 tn CO2/year	CO2 Annual Gain due to the use of wood fuels instead of diesel
R5.6	0.0	AG _{RES}	0.0000 tn CO2/year	CO2 Annual Gain due to the use of Renewable Energy Sources
R5.7		AG _{EL_m}	0.0000 tn CO2/year	CO2 Annual Gain due to electricity reduction (use of mulching)
R5.8		AG _{D_FGT}	0.0000 tn CO2/year	CO2 Annual Gain due to diesel reduction (use of fertigation)
R5.9		TAG	19,330.4041 tn CO2/year	CO2 Total Annual Gain

C	CO2 Removal Capacity Indexes				
.1	ARCarea	3.42060	tn CO2/hectare/year	CO2 Annual Removal Capacity per unit of cultivated area	

2	ARCproduct	0.14401	tn CO2/tn of yield/year	CO2 Annual Removal Capacity per unit of harvested fruits	(BF is included)
5	ARCtree	0.00463	tn CO2/tree/year	CO2 Annual Removal Capacity per tree unit	
	ARC _{area}	1.65813	tn CO2/hectare/year	CO2 Annual Removal Capacity per unit of cultivated area	
2	ARC _{product}	0.06981	tn CO2/tn of yield/year	CO2 Annual Removal Capacity per unit of harvested fruits	(BF is not included)
	ARC _{tree}	0.00224	tn CO2/tree/year	CO2 Annual Removal Capacity per tree unit	
		0.52222			(DE to to shield all
-	TAE/TAR TAE/TAR	0.53333 0.70217	Total Annual CO2 Emissions/ Total Ann Total Annual CO2 Emissions/ Total Ann		(BF is included) (BF is not included)
		0.70217	Total Annual CO2 Emissions/ Total Ann		
	TAR _{area}	7.32982	tn CO2/hectare/year	CO2 Total Annual Removals per unit of cultivated area	
	TAR _{product}	0.30858	tn CO2/tn of yield/year	CO2 Total Annual Removals per unit of harvested fruits	(BF is included)
	TAR _{tree}	0.00992	tn CO2/tree/year	CO2 Total Annual Removals per tree unit	
_					
	TAR _{area}	5.56735	tn CO2/hectare/year	CO2 Total Annual Removals per unit of cultivated area	
2	TAR _{product}	0.23439	tn CO2/tn of yield/year	CO2 Total Annual Removals per unit of harvested fruits	(BF is not included)
	TAR _{tree}	0.00753	tn CO2/tree/year	CO2 Total Annual Removals per tree unit	
	AR _{BF area}	1.76247	tn CO2/hectare/year	CO2 Annual Removal due to the production of fruit biomass per unit of cultivated area	
	AR _{BF_product}	0.07420	tn CO2/tn of yield/year	CO2 Annual Removal due to the production of fruit biomass per unit of harvested fruits	
	AR _{BF_tree}	0.00238	tn CO2/tried/year	CO2 Annual Removal due to the production of fruit biomass per direct indication and vessed indication of the second secon	
	uee				
	AR _{BW area}	5.23294	tn CO2/hectare/year	CO2 Annual Removal due to the production of wood biomass per unit of cultivated area	
2	AR _{BW_product}	0.22031	tn CO2/tn of yield/year	CO2 Annual Removal due to the production of wood biomass per unit of harvested fruits	
3	AR _{BW_tree}	0.00708	tn CO2/tree/year	CO2 Annual Removal due to the production of wood biomass per tree unit	
_					
L	AS _{S_area}	0.33441	tn CO2/hectare/year	CO2 Annual Storage in soil as carbon of the fallen biomass per unit of cultivated area	
2	AS _{S_product}	0.01408	tn CO2/tn of yield/year	CO2 Annual Storage in soil as carbon of the fallen biomass per unit of harvested fruits	
3	AS _{S_tree}	0.00045	tn CO2/tree/year	CO2 Annual Storage in soil as carbon of the fallen biomass per tree unit	
	TAEarea	3.90921	tn CO2/hectare/year	CO2 Total Annual Emissions per unit of cultivated area	
2	TAE _{product}	0.16458	tn CO2/tn of yield/year	CO2 Total Annual Emissions per unit of harvested fruits	
3	TAE _{tree}	0.00529	tn CO2/tree/year	CO2 Total Annual Emissions per tree unit	
_					
1	AE _{f_area}	0.98109	tn CO2/hectare/year	CO2 Annual Emissions due to the use of fertilizers per unit of cultivated area	
2	AE _{f_product}	0.04130	tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of fertilizers per unit of harvested fruits	
	AE _{f tree}		tn CO2/tree/year	CO2 Annual Emissions due to the use of fertilizers per tree unit	
3	tree	0.00133			
			to CO2/boctare/voar	CO2 Annual Emissions due to the use of pasticides per unit of sultivated area	
3	AE _{p_area}	0.28224	tn CO2/hectare/year	CO2 Annual Emissions due to the use of pesticides per unit of cultivated area	
	AE _{p_area} AE _{p_product}	0.28224 0.01188	tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits	
	AE _{p_area}	0.28224			
L 2 3	AE _{p_area} AE _{p_product}	0.28224 0.01188	tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits	
	AE _{p_area} AE _{p_product} AE _{p_tree} AE _{ff&e_area}	0.28224 0.01188 0.00038	tn CO2/tn of yield/year tn CO2/tree/year	CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits CO2 Annual Emissions due to the use of pesticides per tree unit	· · · · · · · · · · · · · · · · · · ·
	AE _{p_area} AE _{p_product} AE _{p_tree}	0.28224 0.01188 0.00038 2.64589	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year	CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits CO2 Annual Emissions due to the use of pesticides per tree unit CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area	
	AE _{p_area} AE _{p_product} AE _{p_tree} AE _{ff&e_area} AE _{ff&e_area} AE _{ff&e_tree}	0.28224 0.01188 0.00038 2.64589 0.11139 0.00358	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year	CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits CO2 Annual Emissions due to the use of pesticides per tree unit CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per tree unit	
L	AE _{p_area} AE _{p_product} AE _{p_tree} AE _{flike_area} AE _{flike_tree} AE _{flike_tree}	0.28224 0.01188 0.00038 2.64589 0.11139 0.00358 2.40953	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year	CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits CO2 Annual Emissions due to the use of pesticides per tree unit CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per tree unit CO2 Annual Emissions due to the use of fossil fuels & electricity per tree unit CO2 Annual Emissions due to the use of field per unit of cultivated area	· · · · · · · · · · · · · · · · · · ·
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	AE _{p_area} AE _{p_product} AE _{p_tree} AE _{ff&e_area} AE _{ff&e_tree} AE _{ff&e_tree} AE _{D_area} AE _{D_tree} AE _{D_tree}	0.28224 0.01188 0.00038 2.64589 0.11139 0.00358 2.40953 0.10144 0.00326 0.13045	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tree/year tn CO2/tree/year tn CO2/tree/year	C02 Annual Emissions due to the use of pesticides per unit of harvested fruits C02 Annual Emissions due to the use of pesticides per tree unit C02 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area C02 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits C02 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits C02 Annual Emissions due to the use of fossil fuels & electricity per tree unit C02 Annual Emissions due to the use of diesel per unit of cultivated area C02 Annual Emissions due to the use of diesel per unit of harvested fruits C02 Annual Emissions due to the use of diesel per unit of harvested fruits C02 Annual Emissions due to the use of diesel per unit of cultivated area C02 Annual Emissions due to the use of diesel per tree unit C02 Annual Emissions due to the use of gasoline per unit of cultivated area C02 Annual Emissions due to the use of gasoline per unit of cultivated area	
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R21.2	TAGproduct	0.07287	tn CO2/tn of yield/year	CO2 Total Annual Gain per unit of harvested fruits
R21.3	TAG _{tree}	0.00234	tn CO2/tree/year	CO2 Total Annual Gain per tree unit
R22.1	AG _{N-f_LCC_area}	0.38108	tn CO2/hectare/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (Leguminosae cover crops) per unit of cultivated area
R22.2	AG _{N-f_LCC_product}	0.01604	tn CO2/tn of yield/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (Leguminosae cover crops) per unit of harvested fruits
R22.3	AG _{N-f_LCC_tree}	0.00052	tn CO2/tree/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (Leguminosae cover crops) per tree unit
R23.1	AG _{f_FGT_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to fertilizers reduction (fertigation) per unit of cultivated area
R23.2	AG _{f_FGT_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to fertilizers reduction (fertigation) per unit of harvested fruits
R23.3	AG _{f_FGT_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to fertilizers reduction (fertigation) per tree unit
R24.1	AG _{H_cc/m_area}	0.25329	tn CO2/hectare/year	CO2 Annual Gain due to herbicides reduction (cover crops/mulching) per unit of cultivated area
R24.2	AG _{H_cc/m_product}	0.01066	tn CO2/tn of yield/year	CO2 Annual Gain due to herbicides reduction (cover crops/mulching) per unit of harvested fruits
R24.3	AG _{H_cc/m_tree}	0.00034	tn CO2/tree/year	CO2 Annual Gain due to herbicides reduction (cover crops/mulching) per tree unit
R25.1	AG _{I_im/mt_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping) per unit of cultivated area
R25.2	AG _{I_im/mt_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping) per unit of harvested fruits
R25.3	AG _{I_im/mt_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping) per tree unit
R26.1	AG _{WF_area}	1.09646	tn CO2/hectare/year	CO2 Annual Gain due to the use of wood fuels instead of diesel per unit of cultivated area
R26.2	AG _{WF_product}	0.04616	tn CO2/tn of yield/year	CO2 Annual Gain due to the use of wood fuels instead of diesel per unit of harvested fruits
R26.3	AG _{WF_tree}	0.00148	tn CO2/tree/year	CO2 Annual Gain due to the use of wood fuels instead of diesel per tree unit
R27.1	AG _{RES_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to the use of RES per unit of cultivated area
R27.2	AG _{RES_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to the use of RES per unit of harvested fruits
R27.3	AG _{RES_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to the use of RES per tree unit



Tree crops' CO2 Removal Capacity Calculation Tool (CO2RCCT)



terra nova

Designed and developed by TERRA NOVA Ltd.

Results

Country where the Tool is applied:	Greece
Species of tree crop:	Peach
Geographical area of the cultivation:	GREECE (total)

Use of cover crops of the Leguminosae family

CO2 Annual Removal Capacity

R1.1	ARC	345,783.3536 tn CO2/year	CO2 Annual Removal Capacity	(BF is included)
R1.2	ARC	315,092.9503 tn CO2/year	CO2 Annual Removal Capacity	(BF is not included)

The term "CO2 Removal" means the abstraction of CO2 from atmosphere

Agricultural practice:

BF: the fruits' biomass

Analysis

R2.1		AR _{BF}	30,690.4033 tn CO2/year	CO2 Annual Removal due to the production of fruit biomass	
R2.2	als	AR _{BW}	403,407.7541 tn CO2/year	CO2 Annual Removal due to the production of wood biomass	
R2.3	102	ASs	4,910.8758 tn CO2/year	CO2 Annual Storage in soil as carbon of the fallen biomass	
R2.4	Rei	TAR	439,009.0333 tn CO2/year	CO2 Total Annual Removals	(BF is included)
R2.5		TAR	408,318.6299 tn CO2/year	CO2 Total Annual Removals	(BF is not included)

a. It has to be underlined an important difference between ARC and TAR:

ARC is the result of the CO2 mass balance between (a) the total quantity of CO2 which is abstracted from the atmosphere [=TAR] by the tree in order to create biomass and (b) the total quantity of CO2 which is emitted to the atmosphere due to the agricultural practices which are applied for the cultivation of the tree.

R3.1	s	AE _f	17,776.5422 tn CO2/year	CO2 Annual Emissions due to the use of fertilizers
R3.2	22 Sion	AEp	14,828.7505 tn CO2/year	CO2 Annual Emissions due to the use of pesticides
R3.3	ji C	AE _{ff&e}	60,620.3870 tn CO2/year	CO2 Annual Emissions due to the use of fossil fuels & electricity
R3.4	ш	TAE	93,225.6797 tn CO2/year	CO2 Total Annual Emissions
	R4.1	AED	54,078.6348 tn CO2/year	CO2 Annual Emissions due to the use of diesel
	R4.2	AE _G	2,136.5813 tn CO2/year	CO2 Annual Emissions due to the use of gasoline
	R4.3	AE _{EL}	4,405.1709 tn CO2/year	CO2 Annual Emissions due to the use of electricity
	R4.4	AE _{ff&e}	60,620.3870 tn CO2/year	CO2 Annual Emissions due to the use of fossil fuels & electricity

R5.1		AG _{N-f_LCC}	14,969.7197 tn CO2/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (use of Leguminosae cover crops)
R5.2		AG _{f_FGT}	0.0000 tn CO2/year	CO2 Annual Gain due to fertilizers reduction (use of fertigation)
R5.3		AG _{H_cc/m}	17,910.1488 tn CO2/year	CO2 Annual Gain due to herbicides reduction (use of cover crops/mulching)
R5.4		AG _{I_im/mt}	0.0000 tn CO2/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping)
R5.5	Gain Gain	AG _{WF}	23,146.9701 tn CO2/year	CO2 Annual Gain due to the use of wood fuels instead of diesel
R5.6	00	AG _{RES}	0.0000 tn CO2/year	CO2 Annual Gain due to the use of Renewable Energy Sources
R5.7		AG _{EL_m}	0.0000 tn CO2/year	CO2 Annual Gain due to electricity reduction (use of mulching)
R5.8		AG _{D_FGT}	0.0000 tn CO2/year	CO2 Annual Gain due to diesel reduction (use of fertigation)
R5.9		TAG	56,026.8386 tn CO2/year	CO2 Total Annual Gain

2	ARCproduct	0.53380	tn CO2/tn of yield/year	CO2 Annual Removal Capacity per unit of harvested fruits	(BF is included)
3	ARCtree	0.02004	tn CO2/trie/year	CO2 Annual Removal Capacity per tree unit	
	tree	0.02004		Coz Annuar Removar Capacity per tree unit	
1	ARCarea	8.02115	tn CO2/hectare/year	CO2 Annual Removal Capacity per unit of cultivated area	
2	ARCproduct	0.48642	tn CO2/tn of yield/year	CO2 Annual Removal Capacity per unit of harvested fruits	(BF is not included)
3	ARCtree	0.01826	tn CO2/tree/year	CO2 Annual Removal Capacity per tree unit	
	uee				
	TAE/TAR	0.21235	Total Annual CO2 Emissions/ Total Ann	ual CO2 Removals	(BF is included)
2	TAE/TAR	0.22832	Total Annual CO2 Emissions/ Total Ann	uual CO2 Removals	(BF is not included)
L	TAR _{area}	11.17561	tn CO2/hectare/year	CO2 Total Annual Removals per unit of cultivated area	
2	TAR _{product}	0.67772	tn CO2/tn of yield/year	CO2 Total Annual Removals per unit of harvested fruits	(BF is included)
3	TAR _{tree}	0.02544	tn CO2/tree/year	CO2 Total Annual Removals per tree unit	
.1	TAR _{area}	10.39434	tn CO2/hectare/year	CO2 Total Annual Removals per unit of cultivated area	
.2	TAR _{product}	0.63034	tn CO2/tn of yield/year	CO2 Total Annual Removals per unit of harvested fruits	(BF is not included)
3	TAR _{tree}	0.02366	tn CO2/tree/year	CO2 Total Annual Removals per tree unit	
.1	AR _{BF_area}	0.78127	tn CO2/hectare/year	CO2 Annual Removal due to the production of fruit biomass per unit of cultivated area	
.2	AR _{BF_product}	0.04738	tn CO2/tn of yield/year	CO2 Annual Removal due to the production of fruit biomass per unit of harvested fruits	
.3	AR _{BF_tree}	0.00178	tn CO2/tree/year	CO2 Annual Removal due to the production of fruit biomass per tree unit	
.1	AR _{BW_area}	10.26933	tn CO2/hectare/year	CO2 Annual Removal due to the production of wood biomass per unit of cultivated area	
.2	AR _{BW_product}	0.62276	tn CO2/tn of yield/year	CO2 Annual Removal due to the production of wood biomass per unit of harvested fruits	
.3	AR _{BW_tree}	0.02338	tn CO2/tree/year	CO2 Annual Removal due to the production of wood biomass per tree unit	
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.1	AS _{S_area}	0.12501	tn CO2/hectare/year	CO2 Annual Storage in soil as carbon of the fallen biomass per unit of cultivated area	
.2	AS _{S_product}	0.00758	tn CO2/tn of yield/year	CO2 Annual Storage in soil as carbon of the fallen biomass per unit of harvested fruits	
.3	AS _{S_tree}	0.00028	tn CO2/tree/year	CO2 Annual Storage in soil as carbon of the fallen biomass per tree unit	
	TAF	2 27240	the CO2/basters/user	CO3 Tatal Annual Emissions not unit of subjusted area	
.1	TAE _{area}	2.37319	tn CO2/hectare/year	CO2 Total Annual Emissions per unit of cultivated area	
.2	TAEproduct	0.14392	tn CO2/tn of yield/year	CO2 Total Annual Emissions per unit of harvested fruits	
	TAE _{tree}	0.00540	tn CO2/tree/year	CO2 Total Annual Emissions per tree unit	
.1					
	AF,	0.45253	tn CO2/hectare/year	CO2 Annual Emissions due to the use of fertilizers per unit of cultivated area	
2	AE _{f_area}	0.45253	tn CO2/hectare/year	CO2 Annual Emissions due to the use of fertilizers per unit of cultivated area CO2 Annual Emissions due to the use of fertilizers per unit of harvested fruits	
.2	AE _{f_product}	0.02744	tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of fertilizers per unit of harvested fruits	
_					
.3	AE _{f_product} AE _{f_tree}	0.02744 0.00103	tn CO2/tn of yield/year tn CO2/tree/year	CO2 Annual Emissions due to the use of fertilizers per unit of harvested fruits CO2 Annual Emissions due to the use of fertilizers per tree unit	
.3	AE _{f_product} AE _{f_tree} AE _{p_area}	0.02744 0.00103 0.37749	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year	CO2 Annual Emissions due to the use of fertilizers per unit of harvested fruits CO2 Annual Emissions due to the use of fertilizers per tree unit CO2 Annual Emissions due to the use of pesticides per unit of cultivated area	
.3 .1 .2	AE _{f_product} AE _{f_tree} AE _{p_area} AE _{p_product}	0.02744 0.00103 0.37749 0.02289	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of fertilizers per unit of harvested fruits CO2 Annual Emissions due to the use of fertilizers per tree unit CO2 Annual Emissions due to the use of pesticides per unit of cultivated area CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits	
.3 .1 .2	AE _{f_product} AE _{f_tree} AE _{p_area}	0.02744 0.00103 0.37749	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year	CO2 Annual Emissions due to the use of fertilizers per unit of harvested fruits CO2 Annual Emissions due to the use of fertilizers per tree unit CO2 Annual Emissions due to the use of pesticides per unit of cultivated area	
.3 .1 .2 .3	AE _{f_product} AE _{f_tree} AE _{p_area} AE _{p_product} AE _{p_tree}	0.02744 0.00103 0.37749 0.02289	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year	CO2 Annual Emissions due to the use of fertilizers per unit of harvested fruits CO2 Annual Emissions due to the use of fertilizers per tree unit CO2 Annual Emissions due to the use of pesticides per unit of cultivated area CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits	
.3 .1 .2 .3	AE _{f_product} AE _{f_tree} AE _{p_area} AE _{p_tree} AE _{ff&e_area}	0.02744 0.00103 0.37749 0.02289 0.00086	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of fertilizers per unit of harvested fruits CO2 Annual Emissions due to the use of fertilizers per tree unit CO2 Annual Emissions due to the use of pesticides per unit of cultivated area CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits CO2 Annual Emissions due to the use of pesticides per tree unit	
.3 .2 .3 .1 .2	AE _{f product} AE _{f tree} AE _{p_area} AE _{p_product} AE _{p_tree} AE _{ff&e_area} AE _{ff&e_area}	0.02744 0.00103 0.37749 0.02289 0.00086 1.54318	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/tree/year	CO2 Annual Emissions due to the use of fertilizers per unit of harvested fruits CO2 Annual Emissions due to the use of fertilizers per tree unit CO2 Annual Emissions due to the use of pesticides per unit of cultivated area CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits CO2 Annual Emissions due to the use of pesticides per tree unit CO2 Annual Emissions due to the use of pesticides per tree unit CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area	
.3 .2 .3 .1 .2	AE _{f_product} AE _{f_tree} AE _{p_area} AE _{p_tree} AE _{ff&e_area}	0.02744 0.00103 0.37749 0.02289 0.00086 1.54318 0.09358	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of fertilizers per unit of harvested fruits CO2 Annual Emissions due to the use of fertilizers per tree unit CO2 Annual Emissions due to the use of pesticides per unit of cultivated area CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits CO2 Annual Emissions due to the use of pesticides per tree unit CO2 Annual Emissions due to the use of pesticides per unit of cultivated area CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits	
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R21.2	TAGproduct	0.08649	tn CO2/tn of yield/year	CO2 Total Annual Gain per unit of harvested fruits
R21.3	TAG _{tree}	0.00325	tn CO2/tree/year	CO2 Total Annual Gain per tree unit
R22.1	AG _{N-f_LCC_area}	0.38108	tn CO2/hectare/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (Leguminosae cover crops) per unit of cultivated area
R22.2	AG _{N-f_LCC_product}	0.02311	tn CO2/tn of yield/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (Leguminosae cover crops) per unit of harvested fruits
R22.3	AG _{N-f_LCC_tree}	0.00087	tn CO2/tree/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (Leguminosae cover crops) per tree unit
R23.1	AG _{f_FGT_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to fertilizers reduction (fertigation) per unit of cultivated area
R23.2	AG _{f_FGT_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to fertilizers reduction (fertigation) per unit of harvested fruits
R23.3	AG _{f_FGT_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to fertilizers reduction (fertigation) per tree unit
R24.1	AG _{H_cc/m_area}	0.45593	tn CO2/hectare/year	CO2 Annual Gain due to herbicides reduction (cover crops/mulching) per unit of cultivated area
R24.2	AG _{H_cc/m_product}	0.02765	tn CO2/tn of yield/year	CO2 Annual Gain due to herbicides reduction (cover crops/mulching) per unit of harvested fruits
R24.3	AG _{H_cc/m_tree}	0.00104	tn CO2/tree/year	CO2 Annual Gain due to herbicides reduction (cover crops/mulching) per tree unit
R25.1	AG _{I_im/mt_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping) per unit of cultivated area
R25.2	AG _{I_im/mt_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping) per unit of harvested fruits
R25.3	AG _{I_im/mt_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping) per tree unit
R26.1	AG _{WF_area}	0.58924	tn CO2/hectare/year	CO2 Annual Gain due to the use of wood fuels instead of diesel per unit of cultivated area
R26.2	AG _{WF_product}	0.03573	tn CO2/tn of yield/year	CO2 Annual Gain due to the use of wood fuels instead of diesel per unit of harvested fruits
R26.3	AG _{WF_tree}	0.00134	tn CO2/tree/year	CO2 Annual Gain due to the use of wood fuels instead of diesel per tree unit
R27.1	AG _{RES_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to the use of RES per unit of cultivated area
R27.2	AG _{RES_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to the use of RES per unit of harvested fruits
R27.3	AG _{RES_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to the use of RES per tree unit



Tree crops' CO2 Removal Capacity Calculation Tool (CO2RCCT)



terra nova

Designed and developed by TERRA NOVA Ltd.

Results

Country where the Tool is applied:	Greece
Species of tree crop:	Almond
Geographical area of the cultivation:	GREECE (total)

Use of cover crops of the Leguminosae family

CO2 Annual Removal Capacity

R1.1	ARC	152,550.5079 tn CO2/year	CO2 Annual Removal Capacity	(BF is included)
R1.2	ARC	82,419.0524 tn CO2/year	CO2 Annual Removal Capacity	(BF is not included)

The term "CO2 Removal" means the abstraction of CO2 from atmosphere

Agricultural practice:

BF: the fruits' biomass

Analysis

R2.1		AR _{BF}	70,131.4555 tn CO2/year	CO2 Annual Removal due to the production of fruit biomass	
R2.2	als	AR _{BW}	101,010.9724 tn CO2/year	CO2 Annual Removal due to the production of wood biomass	
R2.3	5 É	ASs	4,165.4097 tn CO2/year	CO2 Annual Storage in soil as carbon of the fallen biomass	
R2.4	- Be	TAR	175,307.8376 tn CO2/year	CO2 Total Annual Removals	(BF is included)
R2.5		TAR	105,176.3821 tn CO2/year	CO2 Total Annual Removals	(BF is not included)

a. It has to be underlined an important difference between ARC and TAR:

ARC is the result of the CO2 mass balance between (a) the total quantity of CO2 which is abstracted from the atmosphere [=TAR] by the tree in order to create biomass and (b) the total quantity of CO2 which is emitted to the atmosphere due to the agricultural practices which are applied for the cultivation of the tree.

R3.1	S	AE _f	3,979.0382 tn CO2/year	CO2 Annual Emissions due to the use of fertilizers
R3.2	Sio 2	AEp	6,555.5997 tn CO2/year	CO2 Annual Emissions due to the use of pesticides
R3.3	ji C	AE _{ff&e}	12,222.6918 tn CO2/year	CO2 Annual Emissions due to the use of fossil fuels & electricity
R3.4	ш	TAE	22,757.3297 tn CO2/year	CO2 Total Annual Emissions
	R4.1	AE _D	10,563.0311 tn CO2/year	CO2 Annual Emissions due to the use of diesel
	R4.2	AE _G	723.3709 tn CO2/year	CO2 Annual Emissions due to the use of gasoline
	R4.3	AE _{EL}	936.2898 tn CO2/year	CO2 Annual Emissions due to the use of electricity
	R4.4	AE _{ff&e}	12,222.6918 tn CO2/year	CO2 Annual Emissions due to the use of fossil fuels & electricity

R5.1		AG _{N-f_LCC}	5,068.2177 tn CO2/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (use of Leguminosae cover crops)
R5.2		AG _{f_FGT}	0.0000 tn CO2/year	CO2 Annual Gain due to fertilizers reduction (use of fertigation)
R5.3		AG _{H_cc/m}	5,053.1191 tn CO2/year	CO2 Annual Gain due to herbicides reduction (use of cover crops/mulching)
R5.4		AG _{I_im/mt}	0.0000 tn CO2/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping)
R5.5	ain 02	AG _{WF}	16,335.0994 tn CO2/year	CO2 Annual Gain due to the use of wood fuels instead of diesel
R5.6	~ 0	AG _{RES}	0.0000 tn CO2/year	CO2 Annual Gain due to the use of Renewable Energy Sources
R5.7		AG _{EL_m}	0.0000 tn CO2/year	CO2 Annual Gain due to electricity reduction (use of mulching)
R5.8		AG _{D_FGT}	0.0000 tn CO2/year	CO2 Annual Gain due to diesel reduction (use of fertigation)
R5.9		TAG	26,456.4362 tn CO2/year	CO2 Total Annual Gain

2	ARCproduct	4.73520	tn CO2/tn of yield/year	CO2 Annual Removal Capacity per unit of harvested fruits	(BF is included)
3	ARCtree	0.04113	tn CO2/tree/year	CO2 Annual Removal Capacity per tree unit	
	üce				
	ARCarea	6.19703	tn CO2/hectare/year	CO2 Annual Removal Capacity per unit of cultivated area	
2	ARCproduct	2.55831	tn CO2/tn of yield/year	CO2 Annual Removal Capacity per unit of harvested fruits	(BF is not included)
	ARCtree	0.02222	tn CO2/tree/year	CO2 Annual Removal Capacity per tree unit	
				· · · · ·	•
L	TAE/TAR	0.12981	Total Annual CO2 Emissions/ Total Ann	ual CO2 Removals	(BF is included)
2	TAE/TAR	0.21637	Total Annual CO2 Emissions/ Total Ann	ual CO2 Removals	(BF is not included)
_					
1	TAR _{area}	13.18128	tn CO2/hectare/year	CO2 Total Annual Removals per unit of cultivated area	
2	TAR _{product}	5.44159	tn CO2/tn of yield/year	CO2 Total Annual Removals per unit of harvested fruits	(BF is included)
3	TAR _{tree}	0.04727	tn CO2/tree/year	CO2 Total Annual Removals per tree unit	
-					
.1	TAR _{area}	7.90814	tn CO2/hectare/year	CO2 Total Annual Removals per unit of cultivated area	
.2	TAR _{product}	3.26470	tn CO2/tn of yield/year	CO2 Total Annual Removals per unit of harvested fruits	(BF is not included)
3	TAR _{tree}	0.02836	tn CO2/tree/year	CO2 Total Annual Removals per tree unit	
		6.07047		CO2 Amount Descent due to the second where of facility between a second of a different due of	
.1	AR _{BF_area}	5.27314	tn CO2/hectare/year	CO2 Annual Removal due to the production of fruit biomass per unit of cultivated area	
2	AR _{BF_product}	2.17690	tn CO2/tn of yield/year	CO2 Annual Removal due to the production of fruit biomass per unit of harvested fruits	
3	AR _{BF_tree}	0.01891	tn CO2/tree/year	CO2 Annual Removal due to the production of fruit biomass per tree unit	
	4.0	7.50.405		CO3 Access Descended up to the and extension of word biogeneous access to facility and access	
.1	AR _{BW_area}	7.59495	tn CO2/hectare/year	CO2 Annual Removal due to the production of wood biomass per unit of cultivated area CO2 Annual Removal due to the production of wood biomass per unit of harvested fruits	
.2	AR _{BW_product}	3.13540	tn CO2/tn of yield/year		
.3	AR _{BW_tree}	0.02723	tn CO2/tree/year	CO2 Annual Removal due to the production of wood biomass per tree unit	
	A.C.	0.04040		CO2 Annual Storage in soil as carbon of the fallen biomass per unit of cultivated area	
.1	AS _{S_area}	0.31319	tn CO2/hectare/year	CO2 Annual Storage in soil as carbon of the fallen biomass per unit of cultivated area	
3	AS _{S_product}	0.12930	tn CO2/tn of yield/year	CO2 Annual Storage in soil as carbon of the fallen biomass per unit of narvested indits	
. 3	AS _{S_tree}	0.00112	tn CO2/tree/year	CO2 Annual storage in soir as carbon of the failer biomass per tree unit	
.1	TAE _{area}	1.71111	tn CO2/hectare/year	CO2 Total Annual Emissions per unit of cultivated area	
.2		0.70639	th CO2/th of yield/year	CO2 Total Annual Emissions per unit of calculated area	
.3	TAE _{product}	0.00614	tn CO2/tree/year	CO2 Total Annual Emissions per tree unit	
	tree	0.00014			
.1	AE _{f area}	0.29918	tn CO2/hectare/year	CO2 Annual Emissions due to the use of fertilizers per unit of cultivated area	
	i_aica				
.2	AE,				
.2	AE _{f_product}	0.12351	tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of fertilizers per unit of harvested fruits	
_	AE _{f_product} AE _{f_tree}				
.3	AE _{f_tree}	0.12351	tn CO2/tn of yield/year tn CO2/tree/year	CO2 Annual Emissions due to the use of fertilizers per unit of harvested fruits	
.2	AE _{f_tree} AE _{p_area}	0.12351 0.00107	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year	CO2 Annual Emissions due to the use of fertilizers per unit of harvested fruits CO2 Annual Emissions due to the use of fertilizers per tree unit	
.3 .1 .2	AE _{f_tree} AE _{p_area} AE _{p_product}	0.12351 0.00107 0.49291	tn CO2/tn of yield/year tn CO2/tree/year	CO2 Annual Emissions due to the use of fertilizers per unit of harvested fruits CO2 Annual Emissions due to the use of fertilizers per tree unit CO2 Annual Emissions due to the use of pesticides per unit of cultivated area	
.3 .1 .2	AE _{f_tree} AE _{p_area}	0.12351 0.00107 0.49291 0.20349	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of fertilizers per unit of harvested fruits CO2 Annual Emissions due to the use of fertilizers per tree unit CO2 Annual Emissions due to the use of pesticides per unit of cultivated area CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits	
.1 .2 .3	AE _{f_tree} AE _{p_area} AE _{p_product} AE _{p_tree}	0.12351 0.00107 0.49291 0.20349	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of fertilizers per unit of harvested fruits CO2 Annual Emissions due to the use of fertilizers per tree unit CO2 Annual Emissions due to the use of pesticides per unit of cultivated area CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits	
.3 .2 .3	AE _{p_area} AE _{p_product} AE _{p_tree} AE _{ff&e_area}	0.12351 0.00107 0.49291 0.20349 0.00177	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year	CO2 Annual Emissions due to the use of fertilizers per unit of harvested fruits CO2 Annual Emissions due to the use of fertilizers per tree unit CO2 Annual Emissions due to the use of pesticides per unit of cultivated area CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits CO2 Annual Emissions due to the use of pesticides per tree unit	
.3 .2 .3 .1 .2	AE _{f_tree} AE _{p_area} AE _{p_product} AE _{p_tree}	0.12351 0.00107 0.49291 0.20349 0.00177 0.91902	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/tree/year	CO2 Annual Emissions due to the use of fertilizers per unit of harvested fruits CO2 Annual Emissions due to the use of fertilizers per tree unit CO2 Annual Emissions due to the use of pesticides per unit of cultivated area CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits CO2 Annual Emissions due to the use of pesticides per tree unit CO2 Annual Emissions due to the use of pesticides per tree unit CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area	
.3 .2 .3 .1 .2	AE _{f_tree} AE _{p_area} AE _{p_product} AE _{p_tree} AE _{ff&e_area} AE _{ff&e_product}	0.12351 0.00107 0.49291 0.20349 0.00177 0.91902 0.37940	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of fertilizers per unit of harvested fruits CO2 Annual Emissions due to the use of fertilizers per tree unit CO2 Annual Emissions due to the use of pesticides per unit of cultivated area CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits CO2 Annual Emissions due to the use of pesticides per tree unit CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits	
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3 1 2 3 3 1 2 3 3	AE _{f, tree} AE _{p, product} AE _{p, product} AE _{p, tree} AE _{ff&e, product} AE _{ff&e, product} AE _{ff&e, product} AE _{ff&e, prea}	0.12351 0.00107 0.49291 0.20349 0.00177 0.91902 0.37940 0.00330	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/hectare/year tn CO2/tro of yield/year tn CO2/tree/year	CO2 Annual Emissions due to the use of fertilizers per unit of harvested fruits CO2 Annual Emissions due to the use of fertilizers per tree unit CO2 Annual Emissions due to the use of pesticides per unit of cultivated area CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits CO2 Annual Emissions due to the use of pesticides per tree unit CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per tree unit	
3 1 2 3 1 2 3 1 2 2	AE _{f, tree} AE _{p, product} AE _{p, product} AE _{p, tree} AE _{ff&e, product} AE _{ff&e, product} AE _{ff&e, product}	0.12351 0.00107 0.49291 0.20349 0.00177 0.91902 0.37940 0.00330 0.79423	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/tn of yield/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year	CO2 Annual Emissions due to the use of fertilizers per unit of harvested fruits CO2 Annual Emissions due to the use of fertilizers per tree unit CO2 Annual Emissions due to the use of pesticides per unit of cultivated area CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits CO2 Annual Emissions due to the use of pesticides per tree unit CO2 Annual Emissions due to the use of pesticides per tree unit CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per tree unit CO2 Annual Emissions due to the use of fossil fuels & electricity per tree unit	
3 1 2 3 1 2 3 3 1 2 2	AE _{f, tree} AE _{p, product} AE _{p, product} AE _{p, tree} AE _{ff&e, product} AE _{ff&e, product} AE _{ff&e, product} AE _{ff&e, prea}	0.12351 0.00107 0.49291 0.20349 0.00177 0.91902 0.37940 0.00330 0.00330 0.79423 0.32788	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/tn of yield/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/tree/year tn CO2/tn of yield/year	C02 Annual Emissions due to the use of fertilizers per unit of harvested fruits C02 Annual Emissions due to the use of fertilizers per tree unit C02 Annual Emissions due to the use of pesticides per unit of cultivated area C02 Annual Emissions due to the use of pesticides per unit of harvested fruits C02 Annual Emissions due to the use of pesticides per unit of harvested fruits C02 Annual Emissions due to the use of pesticides per tree unit C02 Annual Emissions due to the use of pesticides per tree unit C02 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area C02 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits C02 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits C02 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits C02 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits C02 Annual Emissions due to the use of fossil fuels & electricity per tree unit C02 Annual Emissions due to the use of diesel per unit of cultivated area C02 Annual Emissions due to the use of diesel per unit of cultivated area C02 Annual Emissions due to the use of diesel per unit of harvested fruits	
3 1 2 3 1 2 3 3 1 2 3	AE _{f, tree} AE _{p, product} AE _{p, product} AE _{p, tree} AE _{ff&e, product} AE _{ff&e, product} AE _{ff&e, product}	0.12351 0.00107 0.49291 0.20349 0.00177 0.91902 0.37940 0.00330 0.00330 0.79423 0.32788	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/tn of yield/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/tree/year tn CO2/tn of yield/year	C02 Annual Emissions due to the use of fertilizers per unit of harvested fruits C02 Annual Emissions due to the use of fertilizers per tree unit C02 Annual Emissions due to the use of pesticides per unit of cultivated area C02 Annual Emissions due to the use of pesticides per unit of harvested fruits C02 Annual Emissions due to the use of pesticides per unit of harvested fruits C02 Annual Emissions due to the use of pesticides per tree unit C02 Annual Emissions due to the use of pesticides per tree unit C02 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area C02 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits C02 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits C02 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits C02 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits C02 Annual Emissions due to the use of fossil fuels & electricity per tree unit C02 Annual Emissions due to the use of diesel per unit of cultivated area C02 Annual Emissions due to the use of diesel per unit of cultivated area C02 Annual Emissions due to the use of diesel per unit of harvested fruits	
3 1 2 3 1 2 3 1 2 3 3 1 2 3	AE _{f, tree} AE _{p, area} AE _{p, product} AE _{p, tree} AE _{ff&e, area} AE _{ff&e, e} roduct AE _{ff&e, tree} AE _{ff&e, product} AE _{ff, p, product} AE _{ff, p} roduct AE _{ff, tree}	0.12351 0.00107 0.49291 0.20349 0.00177 0.91902 0.37940 0.00330 0.79423 0.32788 0.00285	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/tnetare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/tnetare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/tree/year	C02 Annual Emissions due to the use of fertilizers per unit of harvested fruits C02 Annual Emissions due to the use of fertilizers per tree unit C02 Annual Emissions due to the use of pesticides per unit of cultivated area C02 Annual Emissions due to the use of pesticides per unit of harvested fruits C02 Annual Emissions due to the use of pesticides per unit of harvested fruits C02 Annual Emissions due to the use of pesticides per tree unit C02 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area C02 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits C02 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits C02 Annual Emissions due to the use of fossil fuels & electricity per tree unit C02 Annual Emissions due to the use of diesel per unit of cultivated area C02 Annual Emissions due to the use of diesel per unit of cultivated area C02 Annual Emissions due to the use of diesel per unit of harvested fruits C02 Annual Emissions due to the use of diesel per unit of harvested fruits C02 Annual Emissions due to the use of diesel per unit of harvested fruits C02 Annual Emissions due to the use of diesel per unit of harvested fruits	
3 1 2 3 1 2 3 1 2 3 3 1 2 3	AE _{f_tree} AE _{p_product} AE _{p_product} AE _{p_tree} AE _{ff&e_area} AE _{ff&e_tree} AE _{ff_b_tree} AE _{ff_b_tree} AE _{f_see_tree}	0.12351 0.00107 0.49291 0.20349 0.00177 0.91902 0.37940 0.00330 0.79423 0.32788 0.0285 0.00285	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/tn of yield/year tn CO2/tn of yield/year tn CO2/hectare/year tn CO2/tree/year tn CO2/tree/year tn CO2/tree/year tn CO2/tree/year	C02 Annual Emissions due to the use of fertilizers per unit of harvested fruits C02 Annual Emissions due to the use of fertilizers per tree unit C02 Annual Emissions due to the use of pesticides per unit of cultivated area C02 Annual Emissions due to the use of pesticides per unit of harvested fruits C02 Annual Emissions due to the use of pesticides per unit of harvested fruits C02 Annual Emissions due to the use of pesticides per tree unit C02 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area C02 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits C02 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits C02 Annual Emissions due to the use of fossil fuels & electricity per tree unit C02 Annual Emissions due to the use of diesel per unit of cultivated area C02 Annual Emissions due to the use of diesel per unit of harvested fruits C02 Annual Emissions due to the use of diesel per unit of harvested fruits C02 Annual Emissions due to the use of diesel per unit of cultivated area C02 Annual Emissions due to the use of diesel per unit of cultivated area C02 Annual Emissions due to the use of gasoline per unit of cultivated area C02 Annual Emissions due to the use of gasoline per unit of cultivated area	
.3	AE _{L tree} AE _{p, product} AE _{p, product} AE _{p, tree} AE _{ff&e, tree} AE _{ff&e, product} AE _{ff&e, tree} AE _{D, product} AE _{D, tree} AE _{D, tree} AE _{D, tree} AE _{G, product} AE _{G, product}	0.12351 0.00107 0.49291 0.20349 0.00177 0.91902 0.37940 0.00330 0.79423 0.32788 0.00285 0.00285	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/tree/year tn CO2/tree/year tn CO2/tree/year tn CO2/tn of yield/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/tn of yield/year	C02 Annual Emissions due to the use of fertilizers per unit of harvested fruits C02 Annual Emissions due to the use of pesticides per unit of cultivated area C02 Annual Emissions due to the use of pesticides per unit of cultivated area C02 Annual Emissions due to the use of pesticides per unit of harvested fruits C02 Annual Emissions due to the use of pesticides per unit of harvested fruits C02 Annual Emissions due to the use of pesticides per unit of cultivated area C02 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area C02 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits C02 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits C02 Annual Emissions due to the use of diesel per unit of cultivated area C02 Annual Emissions due to the use of diesel per unit of harvested fruits C02 Annual Emissions due to the use of diesel per unit of harvested fruits C02 Annual Emissions due to the use of diesel per tree unit C02 Annual Emissions due to the use of diesel per tree unit C02 Annual Emissions due to the use of gasoline per unit of cultivated area C02 Annual Emissions due to the use of gasoline per unit of cultivated area C02 Annual Emissions due to the use of gasoline per unit of cultivated area C02 Annual Emissions due to the use of gasoline per unit of cultivated fruits <td></td>	
.3 .1 .2 .3 .1 .2 .3 .3 .1 .2 .3 .3	AE _{L tree} AE _{p, product} AE _{p, product} AE _{p, tree} AE _{ff&e, tree} AE _{ff&e, product} AE _{ff&e, tree} AE _{D, product} AE _{D, tree} AE _{D, tree} AE _{D, tree} AE _{G, product} AE _{G, product}	0.12351 0.00107 0.49291 0.20349 0.00177 0.91902 0.37940 0.00330 0.79423 0.32788 0.00285 0.00285	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/tree/year tn CO2/tree/year tn CO2/tree/year tn CO2/tn of yield/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/tn of yield/year	C02 Annual Emissions due to the use of fertilizers per unit of harvested fruits C02 Annual Emissions due to the use of pesticides per unit of cultivated area C02 Annual Emissions due to the use of pesticides per unit of cultivated area C02 Annual Emissions due to the use of pesticides per unit of harvested fruits C02 Annual Emissions due to the use of pesticides per unit of harvested fruits C02 Annual Emissions due to the use of pesticides per unit of cultivated area C02 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area C02 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits C02 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits C02 Annual Emissions due to the use of diesel per unit of cultivated area C02 Annual Emissions due to the use of diesel per unit of harvested fruits C02 Annual Emissions due to the use of diesel per unit of harvested fruits C02 Annual Emissions due to the use of diesel per tree unit C02 Annual Emissions due to the use of diesel per tree unit C02 Annual Emissions due to the use of gasoline per unit of cultivated area C02 Annual Emissions due to the use of gasoline per unit of cultivated area C02 Annual Emissions due to the use of gasoline per unit of cultivated area C02 Annual Emissions due to the use of gasoline per unit of cultivated fruits <td></td>	
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3 1 2 3 1 2 3 1 2 3 1 2 3 1 2 3 1 2 3 1 1 2 3 1 1 2 3 1 1 2 3 1 1 2 3 1 1 2 1 3 1 1 1 1 1 1 1 1 1 1 1 1 1	AE _{f, tree} AE _{p, product} AE _{p, tree} AE _{p, tree} AE _{ff&e, area} AE _{ff&e, tree} AE _{ff&e, tree} AE _{ff&e, product} AE _{ff&e, tree} AE _{ff&e, tree} AE _{ff&e, tree} AE _{ff, area} AE _{ff, area} AE _{ff, area} AE _{ff, area} AE _{G, tree} AE _{G, tree} AE _{EL, area}	0.12351 0.00107 0.49291 0.20349 0.00177 0.91902 0.37940 0.0330 0.0330 0.79423 0.0235 0.02285 0.00245 0.00020 0.00020	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/tree/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/tree/year tn CO2/tree/year tn CO2/tree/year tn CO2/tn of yield/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/tree/year tn CO2/tree/year	C02 Annual Emissions due to the use of fertilizers per unit of harvested fruits C02 Annual Emissions due to the use of pesticides per unit of cultivated area C02 Annual Emissions due to the use of pesticides per unit of harvested fruits C02 Annual Emissions due to the use of pesticides per unit of harvested fruits C02 Annual Emissions due to the use of pesticides per unit of harvested fruits C02 Annual Emissions due to the use of pesticides per tree unit C02 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area C02 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits C02 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits C02 Annual Emissions due to the use of fossil fuels & electricity per tree unit C02 Annual Emissions due to the use of diesel per unit of cultivated area C02 Annual Emissions due to the use of diesel per unit of harvested fruits C02 Annual Emissions due to the use of diesel per unit of cultivated area C02 Annual Emissions due to the use of gasoline per unit of cultivated area C02 Annual Emissions due to the use of gasoline per unit of harvested fruits C02 Annual Emissions due to the use of gasoline per unit of harvested fruits C02 Annual Emissions due to the use of gasoline per unit of harvested fruits C02 Annual Emissions due to the use of gasoline per unit of cultivated area	

R21.2	TAGproduct	0.82121	tn CO2/tn of yield/year	CO2 Total Annual Gain per unit of harvested fruits
R21.3	TAG _{tree}	0.00713	tn CO2/tree/year	CO2 Total Annual Gain per tree unit
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R22.1	AG _{N-f_LCC_area}	0.38108	tn CO2/hectare/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (Leguminosae cover crops) per unit of cultivated area
R22.2	AG _{N-f_LCC_product}	0.15732	tn CO2/tn of yield/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (Leguminosae cover crops) per unit of harvested fruits
R22.3	AG _{N-f_LCC_tree}	0.00137	tn CO2/tree/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (Leguminosae cover crops) per tree unit
R23.1	AG _{f_FGT_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to fertilizers reduction (fertigation) per unit of cultivated area
R23.2	AG _{f_FGT_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to fertilizers reduction (fertigation) per unit of harvested fruits
R23.3	AG _{f_FGT_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to fertilizers reduction (fertigation) per tree unit
R24.1	AG _{H_cc/m_area}	0.37994	tn CO2/hectare/year	CO2 Annual Gain due to herbicides reduction (cover crops/mulching) per unit of cultivated area
R24.2	AG _{H_cc/m_product}	0.15685	tn CO2/tn of yield/year	CO2 Annual Gain due to herbicides reduction (cover crops/mulching) per unit of harvested fruits
R24.3	AG _{H_cc/m_tree}	0.00136	tn CO2/tree/year	CO2 Annual Gain due to herbicides reduction (cover crops/mulching) per tree unit
R25.1	AG _{I_im/mt_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping) per unit of cultivated area
R25.2	AG _{I_im/mt_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping) per unit of harvested fruits
R25.3	AG _{I_im/mt_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping) per tree unit
R26.1	AG _{WF_area}	1.22823	tn CO2/hectare/year	CO2 Annual Gain due to the use of wood fuels instead of diesel per unit of cultivated area
R26.2	AG _{WF_product}	0.50705	tn CO2/tn of yield/year	CO2 Annual Gain due to the use of wood fuels instead of diesel per unit of harvested fruits
R26.3	AG _{WF_tree}	0.00440	tn CO2/tree/year	CO2 Annual Gain due to the use of wood fuels instead of diesel per tree unit
R27.1	AG _{RES_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to the use of RES per unit of cultivated area
R27.2	AG _{RES_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to the use of RES per unit of harvested fruits
R27.3	AG _{RES_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to the use of RES per tree unit

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CUMATREE

Tree crops' CO2 Removal Capacity Calculation Tool (CO2RCCT)



terra nova

Designed and developed by TERRA NOVA Ltd.

Results

Country where the Tool is applied:	Greece
Species of tree crop:	Olive
Geographical area of the cultivation:	GREECE (total)

Use of prunings as wood fuel

CO2 Annual Removal Capacity

R1.1	ARC	5,231,357.6446 tn CO2/year	CO2 Annual Removal Capacity	(BF is included)
R1.2	ARC	3,341,683.9421 tn CO2/year	CO2 Annual Removal Capacity	(BF is not included)

The term "CO2 Removal" means the abstraction of CO2 from atmosphere

Agricultural practice:

BF: the fruits' biomass

Analysis

R2.1		AR _{BF}	1,889,673.7025 tn CO2/year	CO2 Annual Removal due to the production of fruit biomass	7
R2.2	als	AR _{BW}	4,842,883.1388 tn CO2/year	CO2 Annual Removal due to the production of wood biomass	
R2.3	19 C	AS _S	54,879.4248 tn CO2/year	CO2 Annual Storage in soil as carbon of the fallen biomass	
R2.4	Rei	TAR	6,787,436.2662 tn CO2/year	CO2 Total Annual Removals	(BF is included)
R2.5		TAR	4,897,762.5636 tn CO2/year	CO2 Total Annual Removals	(BF is not included)

a. It has to be underlined an important difference between ARC and TAR:

ARC is the result of the CO2 mass balance between (a) the total quantity of CO2 which is abstracted from the atmosphere [=TAR] by the tree in order to create biomass and (b) the total quantity of CO2 which is emitted to the atmosphere due to the agricultural practices which are applied for the cultivation of the tree.

R3.1	10	AE _f	635,915.8293 tn CO2/year	CO2 Annual Emissions due to the use of fertilizers
R3.2	on S no	AE	492,125.8637 tn CO2/year	CO2 Annual Emissions due to the use of pesticides
R3.3	nis C	AE _{ff&e}	428,036.9286 tn CO2/year	CO2 Annual Emissions due to the use of fossil fuels & electricity
R3.4	<u>ت</u>	TAE	1,556,078.6215 tn CO2/year	CO2 Total Annual Emissions
-				
	R4.1	AE _D	365,366.0711 tn CO2/year	CO2 Annual Emissions due to the use of diesel
	R4.2	AE _G	55,414.5324 tn CO2/year	CO2 Annual Emissions due to the use of gasoline
	R4.3	AE _{EL}	7,256.3251 tn CO2/year	CO2 Annual Emissions due to the use of electricity
	R4.4	AE _{ff&e}	428,036.9286 tn CO2/year	CO2 Annual Emissions due to the use of fossil fuels & electricity

R5.1		AG _{N-f_LCC}	0.0000 tn CO2/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (use of Leguminosae cover crops)
R5.2		AG _{f_FGT}	0.0000 tn CO2/year	CO2 Annual Gain due to fertilizers reduction (use of fertigation)
R5.3		AG _{H_cc/m}	0.0000 tn CO2/year	CO2 Annual Gain due to herbicides reduction (use of cover crops/mulching)
R5.4		AG _{I_im/mt}	0.0000 tn CO2/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping)
R5.5	ain 02	AG _{WF}	1,321,932.4992 tn CO2/year	CO2 Annual Gain due to the use of wood fuels instead of diesel
R5.6	00	AG _{RES}	0.0000 tn CO2/year	CO2 Annual Gain due to the use of Renewable Energy Sources
R5.7		AG _{EL_m}	0.0000 tn CO2/year	CO2 Annual Gain due to electricity reduction (use of mulching)
R5.8		AG _{D_FGT}	0.0000 tn CO2/year	CO2 Annual Gain due to diesel reduction (use of fertigation)
R5.9		TAG	1,321,932.4992 tn CO2/year	CO2 Total Annual Gain

CO2 Removal Capacity Indexes		1
6.41827	tn CO2/hectare/year	COD Annual Removal Connectual of sulfiverted area

	ARCproduct	1.53072	tn CO2/tn of yield/year	CO2 Annual Removal Capacity per unit of harvested fruits	(BF is included)
3	ARCtree	0.03702	tn CO2/tree/year	CO2 Annual Removal Capacity per tree unit	
ι 🗌	ARCarea	4.09986	tn CO2/hectare/year	CO2 Annual Removal Capacity per unit of cultivated area	
2	ARCproduct	0.97779	tn CO2/tn of yield/year	CO2 Annual Removal Capacity per unit of harvested fruits	(BF is not included)
3	ARCtree	0.02365	tn CO2/tree/year	CO2 Annual Removal Capacity per tree unit	
	TAE/TAR	0.22926	Total Annual CO2 Emissions/ Total Ann		(BF is included)
	TAE/TAR	0.31771	Total Annual CO2 Emissions/ Total Ann	ual CO2 Removals	(BF is not included)
_					
	TAR _{area}	8.32740	tn CO2/hectare/year	CO2 Total Annual Removals per unit of cultivated area	
-	TAR _{product}	1.98603	tn CO2/tn of yield/year	CO2 Total Annual Removals per unit of harvested fruits	(BF is included)
3	TAR _{tree}	0.04803	tn CO2/tree/year	CO2 Total Annual Removals per tree unit	
-					
1	TAR _{area}	6.00899	tn CO2/hectare/year	CO2 Total Annual Removals per unit of cultivated area	
2	TAR _{product}	1.43311	tn CO2/tn of yield/year	CO2 Total Annual Removals per unit of harvested fruits	(BF is not included)
3	TAR _{tree}	0.03466	tn CO2/tree/year	CO2 Total Annual Removals per tree unit	
	10	2 24044	to CO2/hostons/	COD Annual Removal due to the production of fruit birmore requests of sublicity down	
1	AR _{BF_area}	2.31841	tn CO2/hectare/year	CO2 Annual Removal due to the production of fruit biomass per unit of cultivated area CO2 Annual Removal due to the production of fruit biomass per unit of harvested fruits	
2	AR _{BF_product}	0.55293	tn CO2/tn of yield/year		
3	AR _{BF_tree}	0.01337	tn CO2/tree/year	CO2 Annual Removal due to the production of fruit biomass per tree unit	
	AD	5.94166	to CO2/hostors/user	CO2 Annual Removal due to the production of wood biomass per unit of cultivated area	
.1	AR _{BW_area}		tn CO2/hectare/year	CO2 Annual Removal due to the production of wood biomass per unit of childrated area	
.2	AR _{BW_product}	1.41705 0.03427	tn CO2/tn of yield/year	CO2 Annual Removal due to the production of wood biomass per tree unit	
	AR _{BW_tree}	0.03427	tn CO2/tree/year	Coz Alintari temoval due to the production of wood biomass per tree unit	
.1	AS _{S_area}	0.06733	tn CO2/hectare/year	CO2 Annual Storage in soil as carbon of the fallen biomass per unit of cultivated area	
2		0.01606	tn CO2/tn of yield/year	CO2 Annual Storage in soil as carbon of the fallen biomass per unit of entited area	
.3	AS _{S_product} AS _{S_tree}	0.00039	tn CO2/tree/year	CO2 Annual Storage in soil as carbon of the fallen biomass per tree unit	
	AJS_tree	0.00033		Cost Annual storage in soil as carbon of the famel biomass per cree and	
.1	TAE _{area}	1.90913	tn CO2/hectare/year	CO2 Total Annual Emissions per unit of cultivated area	
2	TAEproduct	0.45532	tn CO2/tn of yield/year	CO2 Total Annual Emissions per unit of harvested fruits	
.3	TAE _{tree}	0.01101	tn CO2/tree/year	CO2 Total Annual Emissions per tree unit	
	uce				· · · · · · · · · · · · · · · · · · ·
1	AE _{f area}	0.78020	tn CO2/hectare/year	CO2 Annual Emissions due to the use of fertilizers per unit of cultivated area	
2	AE _{f_product}	0.18607	tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of fertilizers per unit of harvested fruits	
.3				CO2 Annual Emissions due to the use of fertilizers per tree unit	
3	AE _{f_tree}	0.00450	tn CO2/tree/year	CO2 Annual Emissions due to the use of fertilizers per tree unit	
.3	AE _{f_tree}			CO2 Annual Emissions due to the use of fertilizers per tree unit CO2 Annual Emissions due to the use of pesticides per unit of cultivated area	
	AE _{f_tree} AE _{p_area}	0.00450	tn CO2/tree/year		
.1 .2	AE _{f_tree}	0.00450	tn CO2/tree/year tn CO2/hectare/year	CO2 Annual Emissions due to the use of pesticides per unit of cultivated area	
.1 .2	AE _{f_tree} AE _{p_area} AE _{p_product}	0.00450 0.60378 0.14400	tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of pesticides per unit of cultivated area CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits	
.1 .2 .3	AE _{f_tree} AE _{p_area} AE _{p_product}	0.00450 0.60378 0.14400	tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of pesticides per unit of cultivated area CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits	
.1 .2 .3	AE _{f_tree} AE _{p_area} AE _{p_tree} AE _{fi&e_area}	0.00450 0.60378 0.14400 0.00348	tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year	CO2 Annual Emissions due to the use of pesticides per unit of cultivated area CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits CO2 Annual Emissions due to the use of pesticides per tree unit	
.1 .2 .3 .1 .2	AE _{f tree} AE _{p_area} AE _{p_product} AE _{p_tree}	0.00450 0.60378 0.14400 0.00348 0.52515	tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year	CO2 Annual Emissions due to the use of pesticides per unit of cultivated area CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits CO2 Annual Emissions due to the use of pesticides per tree unit CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area	
.1 .2 .3 .1 .2	AE _{f_tree} AE _{p_area} AE _{p_product} AE _{p_tree} AE _{ff&e_area} AE _{ff&e_product}	0.00450 0.60378 0.14400 0.00348 0.52515 0.12525	tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of pesticides per unit of cultivated area CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits CO2 Annual Emissions due to the use of pesticides per tree unit CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits	
.1	AE _{f_tree} AE _{p_area} AE _{p_product} AE _{p_tree} AE _{ff&e_area} AE _{ff&e_broduct} AE _{ff&e_tree} AE _{ff&e_broduct}	0.00450 0.60378 0.14400 0.00348 0.52515 0.12525	tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of pesticides per unit of cultivated area CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits CO2 Annual Emissions due to the use of pesticides per tree unit CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits	
1 2 3 1 2 3 3 1 1 2 2	AE _{f_tree} AE _{p_area} AE _{p_product} AE _{p_tree} AE _{ff&e_area} AE _{ff&e_broduct} AE _{ff&e_tree} AE _{ff&e_broduct}	0.00450 0.60378 0.14400 0.00348 0.52515 0.12525 0.00303	tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year	CO2 Annual Emissions due to the use of pesticides per unit of cultivated area CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits CO2 Annual Emissions due to the use of pesticides per tree unit CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per tree unit CO2 Annual Emissions due to the use of fissel per unit of cultivated area CO2 Annual Emissions due to the use of diesel per unit of cultivated area CO2 Annual Emissions due to the use of diesel per unit of cultivated area CO2 Annual Emissions due to the use of diesel per unit of harvested fruits	
1 2 3 1 2 3 3 1 2 2	AE _{f_tree} AE _{p_area} AE _{p_product} AE _{f_tree} AE _{ff&e_product} AE _{ff&e_product}	0.00450 0.60378 0.14400 0.00348 0.52515 0.12525 0.00303 0.44826	tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tree/year tn CO2/tree/year tn CO2/hectare/year	CO2 Annual Emissions due to the use of pesticides per unit of cultivated area CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits CO2 Annual Emissions due to the use of pesticides per tree unit CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per tree unit CO2 Annual Emissions due to the use of fossil fuels area	
1 2 3 3 3 3 3 3 3 3 3	AE _{f_tree} AE _{p_area} AE _{p_product} AE _{p_tree} AE _{ff&e_area} AE _{ff&e_product} AE _{ff&e_tree} AE _{ff&e_tree}	0.00450 0.60378 0.14400 0.00348 0.52515 0.12525 0.00303 0.44826 0.10691 0.00259	tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/tree/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/hectare/year tn CO2/hectare/year	CO2 Annual Emissions due to the use of pesticides per unit of cultivated area CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits CO2 Annual Emissions due to the use of pesticides per tree unit CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per tree unit CO2 Annual Emissions due to the use of diesel per unit of cultivated area CO2 Annual Emissions due to the use of diesel per unit of cultivated area CO2 Annual Emissions due to the use of diesel per unit of harvested fruits CO2 Annual Emissions due to the use of diesel per unit of harvested fruits CO2 Annual Emissions due to the use of diesel per unit of harvested fruits	
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R21.2	TAGproduct	0.38680	tn CO2/tn of yield/year	CO2 Total Annual Gain per unit of harvested fruits
R21.3	TAG _{tree}	0.00935	tn CO2/tree/year	CO2 Total Annual Gain per tree unit
R22.1	AG _{N-f_LCC_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (Leguminosae cover crops) per unit of cultivated area
R22.2	AG _{N-f_LCC_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (Leguminosae cover crops) per unit of harvested fruits
R22.3	AG _{N-f_LCC_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (Leguminosae cover crops) per tree unit
R23.1	AG _{f_FGT_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to fertilizers reduction (fertigation) per unit of cultivated area
R23.2	AG _{f_FGT_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to fertilizers reduction (fertigation) per unit of harvested fruits
R23.3	AG _{f_FGT_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to fertilizers reduction (fertigation) per tree unit
R24.1	AG _{H_cc/m_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to herbicides reduction (cover crops/mulching) per unit of cultivated area
R24.2	AG _{H_cc/m_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to herbicides reduction (cover crops/mulching) per unit of harvested fruits
R24.3	AG _{H_cc/m_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to herbicides reduction (cover crops/mulching) per tree unit
R25.1	AG _{I_im/mt_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping) per unit of cultivated area
R25.2	AG _{I_im/mt_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping) per unit of harvested fruits
R25.3	AG _{I_im/mt_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping) per tree unit
R26.1	AG _{WF_area}	1.62186	tn CO2/hectare/year	CO2 Annual Gain due to the use of wood fuels instead of diesel per unit of cultivated area
R26.2	AG _{WF_product}	0.38680	tn CO2/tn of yield/year	CO2 Annual Gain due to the use of wood fuels instead of diesel per unit of harvested fruits
R26.3	AG _{WF_tree}	0.00935	tn CO2/tree/year	CO2 Annual Gain due to the use of wood fuels instead of diesel per tree unit
R27.1	AG _{RES_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to the use of RES per unit of cultivated area
R27.2	AG _{RES_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to the use of RES per unit of harvested fruits
R27.3	AG _{RES_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to the use of RES per tree unit

Openation
CLIMATREE

Tree crops' CO2 Removal Capacity Calculation Tool (CO2RCCT)



terra nova

Designed and developed by TERRA NOVA Ltd.

Results

Country where the Tool is applied:	Greece
Species of tree crop:	Orange
Geographical area of the cultivation:	GREECE (total)

Use of prunings as wood fuel

CO2 Annual Removal Capacity

R1.1	ARC	313,116.8603 tn CO2/year	CO2 Annual Removal Capacity	(BF is included)
R1.2	ARC	257,751.7757 tn CO2/year	CO2 Annual Removal Capacity	(BF is not included)

The term "CO2 Removal" means the abstraction of CO2 from atmosphere

Agricultural practice:

BF: the fruits' biomass

Analysis

R2.1		AR _{BF}	55,365.0845 tn CO2/year	CO2 Annual Removal due to the production of fruit biomass	
R2.2	als	AR _{BW}	340,888.6214 tn CO2/year	CO2 Annual Removal due to the production of wood biomass	
R2.3	102	ASs	6,527.4504 tn CO2/year	CO2 Annual Storage in soil as carbon of the fallen biomass	
R2.4	Rei	TAR	402,781.1563 tn CO2/year	CO2 Total Annual Removals	(BF is included)
R2.5		TAR	347,416.0718 tn CO2/year	CO2 Total Annual Removals	(BF is not included)

a. It has to be underlined an important difference between ARC and TAR:

ARC is the result of the CO2 mass alance between (a) the total quantity of CO2 which is abstracted from the atmosphere [=TAR] by the tree in order to create biomass and (b) the total quantity of CO2 which is emitted to the atmosphere due to the agricultural practices which are applied for the cultivation of the tree.

R3.1	Ś	AE _f	37,063.1211 tn CO2/year	CO2 Annual Emissions due to the use of fertilizers
R3.2	2 si	AEp	25,353.3549 tn CO2/year	CO2 Annual Emissions due to the use of pesticides
R3.3	uis C	AE _{ff&e}	27,247.8201 tn CO2/year	CO2 Annual Emissions due to the use of fossil fuels & electricity
R3.4		TAE	89,664.2960 tn CO2/year	CO2 Total Annual Emissions
	R4.1	AE _D	20,184.8514 tn CO2/year	CO2 Annual Emissions due to the use of diesel
	R4.2	AE _G	1,151.9053 tn CO2/year	CO2 Annual Emissions due to the use of gasoline
	R4.3	AE _{EL}	5,911.0634 tn CO2/year	CO2 Annual Emissions due to the use of electricity
	R4.4	AE _{ff&e}	27,247.8201 tn CO2/year	CO2 Annual Emissions due to the use of fossil fuels & electricity

R5.1		AG _{N-f_LCC}	0.0000 tn CO2/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (use of Leguminosae cover crops)
R5.2		AG _{f_FGT}	0.0000 tn CO2/year	CO2 Annual Gain due to fertilizers reduction (use of fertigation)
R5.3		AG _{H_cc/m}	0.0000 tn CO2/year	CO2 Annual Gain due to herbicides reduction (use of cover crops/mulching)
R5.4		AG _{I_im/mt}	0.0000 tn CO2/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping)
R5.5	ain 02	AG _{WF}	120,031.7677 tn CO2/year	CO2 Annual Gain due to the use of wood fuels instead of diesel
R5.6	0.0	AG _{RES}	0.0000 tn CO2/year	CO2 Annual Gain due to the use of Renewable Energy Sources
R5.7		AG _{EL_m}	0.0000 tn CO2/year	CO2 Annual Gain due to electricity reduction (use of mulching)
R5.8		AG _{D_FGT}	0.0000 tn CO2/year	CO2 Annual Gain due to diesel reduction (use of fertigation)
R5.9		TAG	120,031.7677 tn CO2/year	CO2 Total Annual Gain

C	CO2 Removal Capacity Indexes		
ARC	9.24032	tn CO2/hectare/year	CO2 Annual Removal Capacity per unit of cultivated area

.2	ARC _{product}	0.39912	tn CO2/tn of yield/year	CO2 Annual Removal Capacity per unit of harvested fruits	(BF is included)
3	ARCtree	0.02072	tn CO2/tree/year	CO2 Annual Removal Capacity per tree unit	
	ucc				
	ARCarea	7.60645	tn CO2/hectare/year	CO2 Annual Removal Capacity per unit of cultivated area	
2	ARCproduct	0.32855	tn CO2/tn of yield/year	CO2 Annual Removal Capacity per unit of harvested fruits	(BF is not included)
	ARCtree	0.01706	tn CO2/tree/year	CO2 Annual Removal Capacity per tree unit	
					<u>.</u>
1	TAE/TAR	0.22261	Total Annual CO2 Emissions/ Total Ann	ual CO2 Removals	(BF is included)
2	TAE/TAR	0.25809	Total Annual CO2 Emissions/ Total Ann	ual CO2 Removals	(BF is not included)
1	TAR _{area}	11.88638	tn CO2/hectare/year	CO2 Total Annual Removals per unit of cultivated area	
2	TAR _{product}	0.51341	tn CO2/tn of yield/year	CO2 Total Annual Removals per unit of harvested fruits	(BF is included)
3	TAR _{tree}	0.02666	tn CO2/tree/year	CO2 Total Annual Removals per tree unit	
_					
.1	TAR _{area}	10.25251	tn CO2/hectare/year	CO2 Total Annual Removals per unit of cultivated area	
.2	TAR _{product}	0.44284	tn CO2/tn of yield/year	CO2 Total Annual Removals per unit of harvested fruits	(BF is not included)
3	TAR _{tree}	0.02299	tn CO2/tree/year	CO2 Total Annual Removals per tree unit	
		4 62207		COO Assessed Researced along to the annual other of figure bits are a south of sublicated area	
.1	AR _{BF_area}	1.63387	tn CO2/hectare/year	CO2 Annual Removal due to the production of fruit biomass per unit of cultivated area	
2	AR _{BF_product}	0.07057	tn CO2/tn of yield/year	CO2 Annual Removal due to the production of fruit biomass per unit of harvested fruits	
.3	AR _{BF_tree}	0.00366	tn CO2/tree/year	CO2 Annual Removal due to the production of fruit biomass per tree unit	
. —	10	40.05000			
.1	AR _{BW_area}	10.05988	tn CO2/hectare/year	CO2 Annual Removal due to the production of wood biomass per unit of cultivated area CO2 Annual Removal due to the production of wood biomass per unit of harvested fruits	
2.2	AR _{BW_product}	0.43452	tn CO2/tn of yield/year		
.3	AR _{BW_tree}	0.02256	tn CO2/tree/year	CO2 Annual Removal due to the production of wood biomass per tree unit	
	40	0.40050		CO2 Annual Storage in soil as carbon of the fallen biomass per unit of cultivated area	
.1	AS _{S_area}	0.19263	tn CO2/hectare/year	CO2 Annual Storage in soil as carbon of the fallen biomass per unit of cultivated area	
	AS _{S_product}	0.00832	tn CO2/tn of yield/year	• • • • • • • • • • • • • • • • • • •	
.3	AS _{S_tree}	0.00043	tn CO2/tree/year	CO2 Annual Storage in soil as carbon of the fallen biomass per tree unit	
-	TAE _{area}	2.64606	to CO2 (hostore (upor	CO2 Total Annual Emissions per unit of cultivated area	
.1			tn CO2/hectare/year		
.2		0.11429 0.00593	tn CO2/tn of yield/year	CO2 Total Annual Emissions per unit of harvested fruits CO2 Total Annual Emissions per tree unit CO2 Total Annual Emissions per tree unit	
	TAE _{tree}	0.00595	tn CO2/tree/year		
.1	AE _{f area}	1.09376	tn CO2/hectare/year	CO2 Annual Emissions due to the use of fertilizers per unit of cultivated area	
.2	-	0.04724	tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of fertilizers per unit of harvested fruits	
.3	AE _{f_product}	0.00245	tn CO2/triee/year	CO2 Annual Emissions due to the use of fertilizers per tree unit	
···	ALf_tree	0.00245	th coz/tree/year		
.1	AE _{p_area}	0.74820	tn CO2/hectare/year	CO2 Annual Emissions due to the use of pesticides per unit of cultivated area	
.2	AE _{p_product}	0.03232	tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits	
.3	AE _{p tree}	0.00168	th CO2/tree/year	CO2 Annual Emissions due to the use of pesticides per tree unit	
	p_tree	0.00100			
.1	AE _{ff&e_area}	0.80410	tn CO2/hectare/year	CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area	
.2	AE _{ff&e_product}	0.03473	tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of entityted due of fossil fuels & electricity per unit of harvested fruits	
		0.00180	tn CO2/triee/year	CO2 Annual Emissions due to the use of fossil fuels & electricity per tree unit	
.3					
.3	AE _{ff&e_tree}	0.00100			
			tn CO2/hectare/vear	CO2 Annual Emissions due to the use of diesel per unit of cultivated area	
1	AE _{D_area}	0.59567	tn CO2/hectare/year tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of diesel per unit of cultivated area CO2 Annual Emissions due to the use of diesel per unit of harvested fruits	
.1	AE _{D_area} AE _{D_product}	0.59567 0.02573	tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of diesel per unit of harvested fruits	
.1	AE _{D_area}	0.59567			
.1 .2 .3	AE _{D_area} AE _{D_product} AE _{D_tree}	0.59567 0.02573 0.00134	tn CO2/tn of yield/year tn CO2/tree/year	CO2 Annual Emissions due to the use of diesel per unit of harvested fruits CO2 Annual Emissions due to the use of diesel per tree unit	
.13	AE _{D_area} AE _{D_product} AE _{D_tree} AE _{G_area}	0.59567 0.02573 0.00134 0.03399	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year	CO2 Annual Emissions due to the use of diesel per unit of harvested fruits CO2 Annual Emissions due to the use of diesel per tree unit CO2 Annual Emissions due to the use of gasoline per unit of cultivated area	
.1 .2 .3 .1 .1	AE _{D_area} AE _{D_product} AE _{D_tree} AE _{G_area} AE _{G_product}	0.59567 0.02573 0.00134 0.03399 0.00147	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of diesel per unit of harvested fruits CO2 Annual Emissions due to the use of diesel per tree unit	
.1 .2 .3 .1 .1	AE _{D_area} AE _{D_product} AE _{D_tree} AE _{G_area}	0.59567 0.02573 0.00134 0.03399	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year	CO2 Annual Emissions due to the use of diesel per unit of harvested fruits CO2 Annual Emissions due to the use of diesel per tree unit CO2 Annual Emissions due to the use of gasoline per unit of cultivated area CO2 Annual Emissions due to the use of gasoline per unit of harvested fruits	
	AE _{D_area} AE _{D_product} AE _{D_tree} AE _{G_area} AE _{G_product} AE _{G_tree}	0.59567 0.02573 0.00134 0.03399 0.00147	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of diesel per unit of harvested fruits CO2 Annual Emissions due to the use of diesel per tree unit CO2 Annual Emissions due to the use of gasoline per unit of cultivated area CO2 Annual Emissions due to the use of gasoline per unit of harvested fruits	
8.1 8.2 8.3 9.1 9.2 9.3	AE _{D_area} AE _{D_product} AE _{D_tree} AE _{G_area} AE _{G_product} AE _{G_tree} AE _{G_tree}	0.59567 0.02573 0.00134 0.03399 0.00147 0.0008	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year	CO2 Annual Emissions due to the use of diesel per unit of harvested fruits CO2 Annual Emissions due to the use of diesel per tree unit CO2 Annual Emissions due to the use of gasoline per unit of cultivated area CO2 Annual Emissions due to the use of gasoline per unit of harvested fruits CO2 Annual Emissions due to the use of gasoline per tree unit	
.1 .2 .3 .1 .2 .3 .3	AE _{D_area} AE _{D_product} AE _{D_tree} AE _{G_area} AE _{G_product} AE _{G_tree}	0.59567 0.02573 0.00134 0.03399 0.00147 0.00008 0.17444	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year	CO2 Annual Emissions due to the use of diesel per unit of harvested fruits CO2 Annual Emissions due to the use of diesel per tree unit CO2 Annual Emissions due to the use of gasoline per unit of cultivated area CO2 Annual Emissions due to the use of gasoline per unit of harvested fruits CO2 Annual Emissions due to the use of gasoline per tree unit CO2 Annual Emissions due to the use of gasoline per tree unit CO2 Annual Emissions due to the use of gasoline per tree unit	

R21.2	TAGproduct	0.15300	tn CO2/tn of yield/year	CO2 Total Annual Gain per unit of harvested fruits
R21.3	TAG _{tree}	0.00794	tn CO2/tree/year	CO2 Total Annual Gain per tree unit
	- uee			
R22.1	AG _{N-f_LCC_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (Leguminosae cover crops) per unit of cultivated area
R22.2	AG _{N-f_LCC_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (Leguminosae cover crops) per unit of harvested fruits
R22.3	AG _{N-f_LCC_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (Leguminosae cover crops) per tree unit
R23.1	AG _{f_FGT_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to fertilizers reduction (fertigation) per unit of cultivated area
R23.2	AG _{f_FGT_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to fertilizers reduction (fertigation) per unit of harvested fruits
R23.3	AG _{f_FGT_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to fertilizers reduction (fertigation) per tree unit
R24.1	AG _{H_cc/m_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to herbicides reduction (cover crops/mulching) per unit of cultivated area
R24.2	AG _{H_cc/m_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to herbicides reduction (cover crops/mulching) per unit of harvested fruits
R24.3	AG _{H_cc/m_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to herbicides reduction (cover crops/mulching) per tree unit
R25.1	AG _{I_im/mt_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping) per unit of cultivated area
R25.2	AG _{I_im/mt_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping) per unit of harvested fruits
R25.3	AG _{I_im/mt_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping) per tree unit
R26.1	AG _{WF_area}	3.54223	tn CO2/hectare/year	CO2 Annual Gain due to the use of wood fuels instead of diesel per unit of cultivated area
R26.2	AG _{WF_product}	0.15300	tn CO2/tn of yield/year	CO2 Annual Gain due to the use of wood fuels instead of diesel per unit of harvested fruits
R26.3	AG _{WF_tree}	0.00794	tn CO2/tree/year	CO2 Annual Gain due to the use of wood fuels instead of diesel per tree unit
R27.1	AG _{RES_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to the use of RES per unit of cultivated area
R27.2	AG _{RES_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to the use of RES per unit of harvested fruits
R27.3	AG _{RES_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to the use of RES per tree unit

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CLIMATREE

Tree crops' CO2 Removal Capacity Calculation Tool (CO2RCCT)



terra nova

Designed and developed by TERRA NOVA Ltd.

Results

Country where the Tool is applied:	Greece
Species of tree crop:	Apple
Geographical area of the cultivation:	GREECE (total)

Use of prunings as wood fuel

CO2 Annual Removal Capacity

R1.1	ARC	70,713.8138 tn CO2/year	CO2 Annual Removal Capacity	(BF is included)
R1.2	ARC	51,967.4267 tn CO2/year	CO2 Annual Removal Capacity	(BF is not included)

The term "CO2 Removal" means the abstraction of CO2 from atmosphere

Agricultural practice:

BF: the fruits' biomass

Analysis

R2.1		AR _{BF}	18,746.3871 tn CO2/year	CO2 Annual Removal due to the production of fruit biomass	
R2.2	als	AR _{BW}	101,302.4475 tn CO2/year	CO2 Annual Removal due to the production of wood biomass	
R2.3	õ È	ASs	1,408.9104 tn CO2/year	CO2 Annual Storage in soil as carbon of the fallen biomass	
R2.4	- Ba	TAR	121,457.7450 tn CO2/year	CO2 Total Annual Removals	(BF is included)
R2.5		TAR	102,711.3579 tn CO2/year	CO2 Total Annual Removals	(BF is not included)

a. It has to be underlined an important difference between ARC and TAR:

ARC is the result of the CO2 mass alance between (a) the total quantity of CO2 which is abstracted from the atmosphere [=TAR] by the tree in order to create biomass and (b) the total quantity of CO2 which is emitted to the atmosphere due to the agricultural practices which are applied for the cultivation of the tree.

R3.1	s	AE _f	15,212.9910 tn CO2/year	CO2 Annual Emissions due to the use of fertilizers
R3.2	2 Sior	AEp	5,980.9490 tn CO2/year	CO2 Annual Emissions due to the use of pesticides
R3.3	uis C	AE _{ff&e}	29,549.9912 tn CO2/year	CO2 Annual Emissions due to the use of fossil fuels & electricity
R3.4		TAE	50,743.9312 tn CO2/year	CO2 Total Annual Emissions
		-		
	R4.1	AE _D	26,910.2182 tn CO2/year	CO2 Annual Emissions due to the use of diesel
	R4.2	AE _G	1,456.9426 tn CO2/year	CO2 Annual Emissions due to the use of gasoline
	R4.3	AE _{EL}	1,182.8304 tn CO2/year	CO2 Annual Emissions due to the use of electricity
	R4.4	AE _{ff&e}	29,549.9912 tn CO2/year	CO2 Annual Emissions due to the use of fossil fuels & electricity

R5.1		AG _{N-f_LCC}	0.0000 tn CO2/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (use of Leguminosae cover crops)
R5.2		AG _{f_FGT}	0.0000 tn CO2/year	CO2 Annual Gain due to fertilizers reduction (use of fertigation)
R5.3		AG _{H_cc/m}	0.0000 tn CO2/year	CO2 Annual Gain due to herbicides reduction (use of cover crops/mulching)
R5.4		AG _{I_im/mt}	0.0000 tn CO2/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping)
R5.5	Gain	AG _{WF}	55,105.1965 tn CO2/year	CO2 Annual Gain due to the use of wood fuels instead of diesel
R5.6	00	AG _{RES}	0.0000 tn CO2/year	CO2 Annual Gain due to the use of Renewable Energy Sources
R5.7		AG _{EL_m}	0.0000 tn CO2/year	CO2 Annual Gain due to electricity reduction (use of mulching)
R5.8		AG _{D_FGT}	0.0000 tn CO2/year	CO2 Annual Gain due to diesel reduction (use of fertigation)
R5.9		TAG	55,105.1965 tn CO2/year	CO2 Total Annual Gain

.2	ARC _{product}	0.27989	tn CO2/tn of yield/year	CO2 Annual Removal Capacity per unit of harvested fruits	(BF is included)
3	ARCtree	0.00857	tn CO2/tree/year	CO2 Annual Removal Capacity per tree unit	
	acc.				
	ARCarea	4.65314	tn CO2/hectare/year	CO2 Annual Removal Capacity per unit of cultivated area	
	ARCproduct	0.20569	tn CO2/tn of yield/year	CO2 Annual Removal Capacity per unit of harvested fruits	(BF is not included)
	ARCtree	0.00630	tn CO2/tree/year	CO2 Annual Removal Capacity per tree unit	
					<u>.</u>
	TAE/TAR	0.41779	Total Annual CO2 Emissions/ Total Ann	ual CO2 Removals	(BF is included)
2	TAE/TAR	0.49404	Total Annual CO2 Emissions/ Total Ann	ual CO2 Removals	(BF is not included)
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	TAR _{area}	10.87526	tn CO2/hectare/year	CO2 Total Annual Removals per unit of cultivated area	
2	TAR _{product}	0.48074	tn CO2/tn of yield/year	CO2 Total Annual Removals per unit of harvested fruits	(BF is included)
3	TAR _{tree}	0.01472	tn CO2/tree/year	CO2 Total Annual Removals per tree unit	
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1	TAR _{area}	9.19672	tn CO2/hectare/year	CO2 Total Annual Removals per unit of cultivated area	
.2	TAR _{product}	0.40654	tn CO2/tn of yield/year	CO2 Total Annual Removals per unit of harvested fruits	(BF is not included)
3	TAR _{tree}	0.01244	tn CO2/tree/year	CO2 Total Annual Removals per tree unit	
	4.0	1.07854	to CO2/bostoro/usor	CO2 Annual Removal due to the production of fruit biomass per unit of cultivated area	
1	AR _{BF_area}	1.67854 0.07420	tn CO2/hectare/year	CO2 Annual Removal due to the production of fruit biomass per unit of cultivated area	
3	AR _{BF_product}	0.00227	tn CO2/tn of yield/year	CO2 Annual Removal due to the production of truit biomass per unit of narvested truits	
•	AR _{BF_tree}	0.00227	tn CO2/tree/year	CO2 Annual Removal due to the production of that biofflass per tree unit	
1	AR _{BW area}	9.07057	tn CO2/hectare/year	CO2 Annual Removal due to the production of wood biomass per unit of cultivated area	
.1	AR _{BW_area}	0.40096	th CO2/th of yield/year	CO2 Annual Removal due to the production of wood biomass per unit of harvested fruits	
2.3	AR _{BW_tree}	0.01227	tn CO2/tree/year	CO2 Annual Removal due to the production of wood biomass per tree unit	
	BW_tree	0.01227		cor Annual nemoval date to the production of wood biology per tree dime	
.1	AS _{S_area}	0.12615	tn CO2/hectare/year	CO2 Annual Storage in soil as carbon of the fallen biomass per unit of cultivated area	
2	AS _{S_product}	0.00558	tn CO2/tn of yield/year	CO2 Annual Storage in soil as carbon of the fallen biomass per unit of harvested fruits	
3	AS _{S_tree}	0.00017	tn CO2/tree/year	CO2 Annual Storage in soil as carbon of the fallen biomass per tree unit	
	tree	0.00017	th 002/ th 00/ year		
.1	TAE _{area}	4.54358	tn CO2/hectare/year	CO2 Total Annual Emissions per unit of cultivated area	
.2	TAEproduct	0.20085	tn CO2/tn of yield/year	CO2 Total Annual Emissions per unit of harvested fruits	
.3	TAEtree	0.00615	tn CO2/tree/year	CO2 Total Annual Emissions per tree unit	
.1	AE _{f_area}	1.36216	tn CO2/hectare/year	CO2 Annual Emissions due to the use of fertilizers per unit of cultivated area	
.2	AE _{f_product}	0.06021	tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of fertilizers per unit of harvested fruits	
.3	AE _{f_tree}	0.00184	tn CO2/tree/year	CO2 Annual Emissions due to the use of fertilizers per tree unit	
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.1	AE _{p_area}	0.53553	tn CO2/hectare/year	CO2 Annual Emissions due to the use of pesticides per unit of cultivated area	
.2	AE _{p_product}	0.02367	tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits	
.3	AE _{p tree}	0.00072	tn CO2/tree/year	CO2 Annual Emissions due to the use of pesticides per tree unit	
i and i a					
	AE _{ff&e_area}	2.64589	tn CO2/hectare/year	CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area	
2	AE _{ff&e_area} AE _{ff&e_product}	2.64589 0.11696	tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits	
2	AE _{ff&e_area}	2.64589			
2	AE _{ff&e_area} AE _{ff&e_product} AE _{ff&e_tree}	2.64589 0.11696 0.00358	tn CO2/tn of yield/year tn CO2/tree/year	CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per tree unit	
2 3	AE _{ff&e_area} AE _{ff&e_product} AE _{ff&e_tree} AE _{D_area}	2.64589 0.11696 0.00358 2.40953	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year	CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per tree unit CO2 Annual Emissions due to the use of diesel per unit of cultivated area	
2 3 1 2	AE _{ff&e_area} AE _{ff&e_product} AE _{ff&e_tree} AE _{D_area} AE _{D_product}	2.64589 0.11696 0.00358 2.40953 0.10651	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per tree unit CO2 Annual Emissions due to the use of diesel per unit of cultivated area CO2 Annual Emissions due to the use of diesel per unit of harvested fruits	
2 3 1 2	AE _{ff&e_area} AE _{ff&e_product} AE _{ff&e_tree} AE _{D_area}	2.64589 0.11696 0.00358 2.40953	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year	CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per tree unit CO2 Annual Emissions due to the use of diesel per unit of cultivated area	
2 3 1 2 3	AE _{ff&e_area} AE _{ff&e_product} AE _{ff&e_tree} AE _{D_area} AE _{D_product} AE _{D_tree}	2.64589 0.11696 0.00358 2.40953 0.10651 0.00326	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year	CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per tree unit CO2 Annual Emissions due to the use of diesel per unit of cultivated area CO2 Annual Emissions due to the use of diesel per unit of harvested fruits CO2 Annual Emissions due to the use of diesel per tree unit	
2 3 1 2 3 1	AE _{ff&e_area} AE _{ff&e_product} AE _{ff&e_product} AE _{f0_area} AE _{f0_product} AE _{f0_tree} AE _{f0_tree}	2.64589 0.11696 0.00358 2.40953 0.10651 0.00326 0.13045	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year	CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per tree unit CO2 Annual Emissions due to the use of diesel per unit of cultivated area CO2 Annual Emissions due to the use of diesel per unit of harvested fruits CO2 Annual Emissions due to the use of diesel per unit of harvested fruits CO2 Annual Emissions due to the use of diesel per tree unit CO2 Annual Emissions due to the use of diesel per tree unit CO2 Annual Emissions due to the use of gasoline per unit of cultivated area	
.2 .3 .1 .2 .3 .1 .2 .2	AE _{ff&e_area} AE _{ff&e_product} AE _{ff&e_product} AE _{f0_area} AE _{0_product} AE _{0_tree} AE _{0_tree} AE _{6_area} AE _{6_product}	2.64589 0.11696 0.00358 2.40953 0.10651 0.00326 0.13045 0.00577	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per tree unit CO2 Annual Emissions due to the use of diesel per unit of cultivated area CO2 Annual Emissions due to the use of diesel per unit of harvested fruits CO2 Annual Emissions due to the use of diesel per unit of harvested fruits CO2 Annual Emissions due to the use of diesel per tree unit CO2 Annual Emissions due to the use of gasoline per unit of cultivated area CO2 Annual Emissions due to the use of gasoline per unit of cultivated area CO2 Annual Emissions due to the use of gasoline per unit of harvested fruits	
.2 .3 .1 .2 .3 .1 .2 .2	AE _{ff&e_area} AE _{ff&e_product} AE _{ff&e_product} AE _{f0_area} AE _{f0_product} AE _{f0_tree} AE _{f0_tree}	2.64589 0.11696 0.00358 2.40953 0.10651 0.00326 0.13045	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year	CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per tree unit CO2 Annual Emissions due to the use of diesel per unit of cultivated area CO2 Annual Emissions due to the use of diesel per unit of harvested fruits CO2 Annual Emissions due to the use of diesel per unit of harvested fruits CO2 Annual Emissions due to the use of diesel per tree unit CO2 Annual Emissions due to the use of diesel per tree unit CO2 Annual Emissions due to the use of gasoline per unit of cultivated area	
.2 .3 .1 .2 .3 .3 .1 .2 .3 .3	AE _{ff&e_area} AE _{ff&e_product} AE _{ff&e_tree} AE _{D_area} AE _{D_product} AE _{D_tree} AE _{G_area} AE _{G_product} AE _{G_tree}	2.64589 0.11696 0.00358 2.40953 0.10651 0.00326 0.13045 0.00577 0.00018	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year	CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per tree unit CO2 Annual Emissions due to the use of diesel per unit of cultivated area CO2 Annual Emissions due to the use of diesel per unit of harvested fruits CO2 Annual Emissions due to the use of diesel per unit of harvested fruits CO2 Annual Emissions due to the use of diesel per tree unit CO2 Annual Emissions due to the use of gasoline per unit of cultivated area CO2 Annual Emissions due to the use of gasoline per unit of cultivated area CO2 Annual Emissions due to the use of gasoline per unit of harvested fruits CO2 Annual Emissions due to the use of gasoline per unit of harvested fruits CO2 Annual Emissions due to the use of gasoline per unit of harvested fruits CO2 Annual Emissions due to the use of gasoline per unit of harvested fruits CO2 Annual Emissions due to the use of gasoline per unit of harvested fruits CO3 Annual Emissions due to the use of gasoline per tree unit	
.2 .3 .2 .3 .3 .3 .2 .3 .3 .3	AE _{fil&e_area} AE _{fil&e_product} AE _{fil&e_product} AE _{fo_area} AE _{fo_product} AE _{fo_product} AE _{fo_product} AE _{fo_product} AE _{fo_tree} AE _{fo_tree}	2.64589 0.11696 0.00358 2.40953 0.10651 0.00326 0.13045 0.00577 0.00018 0.10591	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/tn of yield/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/tree/year	CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per tree unit CO2 Annual Emissions due to the use of diesel per unit of cultivated area CO2 Annual Emissions due to the use of diesel per unit of harvested fruits CO2 Annual Emissions due to the use of diesel per tree unit CO2 Annual Emissions due to the use of gasoline per unit of cultivated area CO2 Annual Emissions due to the use of gasoline per unit of harvested fruits CO2 Annual Emissions due to the use of gasoline per unit of harvested fruits CO2 Annual Emissions due to the use of gasoline per unit of harvested fruits CO2 Annual Emissions due to the use of gasoline per unit of cultivated area CO2 Annual Emissions due to the use of gasoline per unit of cultivated area CO2 Annual Emissions due to the use of gasoline per unit of cultivated area	
1.1 1.2 1.3 1.1 1.2 1.3 1.1 1.2 1.3 1.1 1.2 1.2 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3	AE _{ff&e_area} AE _{ff&e_product} AE _{ff&e_tree} AE _{D_area} AE _{D_product} AE _{D_tree} AE _{G_area} AE _{G_product} AE _{G_tree}	2.64589 0.11696 0.00358 2.40953 0.10651 0.00326 0.13045 0.00577 0.00018	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year	CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per tree unit CO2 Annual Emissions due to the use of diesel per unit of cultivated area CO2 Annual Emissions due to the use of diesel per unit of harvested fruits CO2 Annual Emissions due to the use of diesel per unit of harvested fruits CO2 Annual Emissions due to the use of diesel per tree unit CO2 Annual Emissions due to the use of gasoline per unit of cultivated area CO2 Annual Emissions due to the use of gasoline per unit of cultivated area CO2 Annual Emissions due to the use of gasoline per unit of harvested fruits CO2 Annual Emissions due to the use of gasoline per unit of harvested fruits CO2 Annual Emissions due to the use of gasoline per unit of harvested fruits CO2 Annual Emissions due to the use of gasoline per unit of harvested fruits CO2 Annual Emissions due to the use of gasoline per unit of harvested fruits CO3 Annual Emissions due to the use of gasoline per tree unit	

R21.2	TAGproduct	0.21811	tn CO2/tn of yield/year	CO2 Total Annual Gain per unit of harvested fruits
R21.3	TAG _{tree}	0.00668	tn CO2/tree/year	CO2 Total Annual Gain per tree unit
R22.1	AG _{N-f_LCC_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (Leguminosae cover crops) per unit of cultivated area
R22.2	AG _{N-f_LCC_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (Leguminosae cover crops) per unit of harvested fruits
R22.3	AG _{N-f_LCC_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (Leguminosae cover crops) per tree unit
R23.1	AG _{f_FGT_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to fertilizers reduction (fertigation) per unit of cultivated area
R23.2	AG _{f_FGT_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to fertilizers reduction (fertigation) per unit of harvested fruits
R23.3	AG _{f_FGT_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to fertilizers reduction (fertigation) per tree unit
R24.1	AG _{H_cc/m_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to herbicides reduction (cover crops/mulching) per unit of cultivated area
R24.2	AG _{H_cc/m_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to herbicides reduction (cover crops/mulching) per unit of harvested fruits
R24.3	AG _{H_cc/m_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to herbicides reduction (cover crops/mulching) per tree unit
R25.1	AG _{I_im/mt_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping) per unit of cultivated area
R25.2	AG _{I_im/mt_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping) per unit of harvested fruits
R25.3	AG _{I_im/mt_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping) per tree unit
R26.1	AG _{WF_area}	4.93409	tn CO2/hectare/year	CO2 Annual Gain due to the use of wood fuels instead of diesel per unit of cultivated area
R26.2	AG _{WF_product}	0.21811	tn CO2/tn of yield/year	CO2 Annual Gain due to the use of wood fuels instead of diesel per unit of harvested fruits
R26.3	AG _{WF_tree}	0.00668	tn CO2/tree/year	CO2 Annual Gain due to the use of wood fuels instead of diesel per tree unit
R27.1	AG _{RES_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to the use of RES per unit of cultivated area
R27.2	AG _{RES_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to the use of RES per unit of harvested fruits
R27.3	AG _{RES_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to the use of RES per tree unit

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CLIMATREE

Tree crops' CO2 Removal Capacity Calculation Tool (CO2RCCT)



terra nova

Designed and developed by TERRA NOVA Ltd.

Results

Country where the Tool is applied:	Greece
Species of tree crop:	Peach
Geographical area of the cultivation:	GREECE (total)

Use of prunings as wood fuel

CO2 Annual Removal Capacity

R1.1	ARC	389,760.5551 tn CO2/year	CO2 Annual Removal Capacity	(BF is included)
R1.2	ARC	360,531.5996 tn CO2/year	CO2 Annual Removal Capacity	(BF is not included)

The term "CO2 Removal" means the abstraction of CO2 from atmosphere

Agricultural practice:

BF: the fruits' biomass

Analysis

R2.1		AR _{BF}	29,228.9555 tn CO2/year	CO2 Annual Removal due to the production of fruit biomass	
R2.2	als	AR _{BW}	484,422.1493 tn CO2/year	CO2 Annual Removal due to the production of wood biomass	
R2.3	102	ASs	2,214.9984 tn CO2/year	CO2 Annual Storage in soil as carbon of the fallen biomass	
R2.4	Rei	TAR	515,866.1033 tn CO2/year	CO2 Total Annual Removals	(BF is included)
R2.5		TAR	486,637.1477 tn CO2/year	CO2 Total Annual Removals	(BF is not included)

a. It has to be underlined an important difference between ARC and TAR:

ARC is the result of the CO2 mass alance between (a) the total quantity of CO2 which is abstracted from the atmosphere [=TAR] by the tree in order to create biomass and (b) the total quantity of CO2 which is emitted to the atmosphere due to the agricultural practices which are applied for the cultivation of the tree.

R3.1	s	AE _f	32,746.2619 tn CO2/year	CO2 Annual Emissions due to the use of fertilizers
R3.2	22 Sion	AEp	32,738.8993 tn CO2/year	CO2 Annual Emissions due to the use of pesticides
R3.3	uis C	AE _{ff&e}	60,620.3870 tn CO2/year	CO2 Annual Emissions due to the use of fossil fuels & electricity
R3.4		TAE	126,105.5482 tn CO2/year	CO2 Total Annual Emissions
	R4.1	AED	54,078.6348 tn CO2/year	CO2 Annual Emissions due to the use of diesel
	R4.2	AE _G	2,136.5813 tn CO2/year	CO2 Annual Emissions due to the use of gasoline
	R4.3	AE _{EL}	4,405.1709 tn CO2/year	CO2 Annual Emissions due to the use of electricity
	R4.4	AE _{ff&e}	60,620.3870 tn CO2/year	CO2 Annual Emissions due to the use of fossil fuels & electricity

R5.1		AG _{N-f_LCC}	0.0000 tn CO2/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (use of Leguminosae cover crops)
R5.2		AG _{f_FGT}	0.0000 tn CO2/year	CO2 Annual Gain due to fertilizers reduction (use of fertigation)
R5.3		AG _{H_cc/m}	0.0000 tn CO2/year	CO2 Annual Gain due to herbicides reduction (use of cover crops/mulching)
R5.4		AG _{I_im/mt}	0.0000 tn CO2/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping)
R5.5	ain 02	AG _{WF}	104,161.3653 tn CO2/year	CO2 Annual Gain due to the use of wood fuels instead of diesel
R5.6	0.0	AG _{RES}	0.0000 tn CO2/year	CO2 Annual Gain due to the use of Renewable Energy Sources
R5.7		AG _{EL_m}	0.0000 tn CO2/year	CO2 Annual Gain due to electricity reduction (use of mulching)
R5.8		AG _{D_FGT}	0.0000 tn CO2/year	CO2 Annual Gain due to diesel reduction (use of fertigation)
R5.9		TAG	104,161.3653 tn CO2/year	CO2 Total Annual Gain

CO2 Removal Capacity Indexes
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2	ARC _{product}	0.63177	tn CO2/tn of yield/year	CO2 Annual Removal Capacity per unit of harvested fruits	(BF is included)
3	ARCtree	0.02258	tn CO2/tree/year	CO2 Annual Removal Capacity per tree unit	
	-uee				
. 「	ARCarea	9.17785	tn CO2/hectare/year	CO2 Annual Removal Capacity per unit of cultivated area	
2	ARCproduct	0.58440	tn CO2/tn of yield/year	CO2 Annual Removal Capacity per unit of harvested fruits	(BF is not included)
3	ARCtree	0.02089	tn CO2/tree/year	CO2 Annual Removal Capacity per tree unit	
1	TAE/TAR	0.24445	Total Annual CO2 Emissions/ Total Ann	ual CO2 Removals	(BF is included)
2	TAE/TAR	0.25914	Total Annual CO2 Emissions/ Total Ann	ual CO2 Removals	(BF is not included)
_					
1	TAR _{area}	13.13212	tn CO2/hectare/year	CO2 Total Annual Removals per unit of cultivated area	
2	TAR _{product}	0.83618	tn CO2/tn of yield/year	CO2 Total Annual Removals per unit of harvested fruits	(BF is included)
3	TAR _{tree}	0.02989	tn CO2/tree/year	CO2 Total Annual Removals per tree unit	
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.1	TAR _{area}	12.38805	tn CO2/hectare/year	CO2 Total Annual Removals per unit of cultivated area	
.2	TAR _{product}	0.78880	tn CO2/tn of yield/year	CO2 Total Annual Removals per unit of harvested fruits	(BF is not included)
3	TAR _{tree}	0.02820	tn CO2/tree/year	CO2 Total Annual Removals per tree unit	
1	AR _{BF_area}	0.74407	tn CO2/hectare/year	CO2 Annual Removal due to the production of fruit biomass per unit of cultivated area	
.2	AR _{BF_product}	0.04738	tn CO2/tn of yield/year	CO2 Annual Removal due to the production of fruit biomass per unit of harvested fruits	
.3	AR _{BF_tree}	0.00169	tn CO2/tree/year	CO2 Annual Removal due to the production of fruit biomass per tree unit	
.1	AR _{BW_area}	12.33167	tn CO2/hectare/year	CO2 Annual Removal due to the production of wood biomass per unit of cultivated area CO2 Annual Removal due to the production of wood biomass per unit of harvested fruits	
.2	AR _{BW_product}	0.78521	tn CO2/tn of yield/year		
.3	AR _{BW_tree}	0.02807	tn CO2/tree/year	CO2 Annual Removal due to the production of wood biomass per tree unit	
		0.05000		CO2 Annual Storage in soil as carbon of the fallen biomass per unit of cultivated area	
.1	AS _{S_area}	0.05639	tn CO2/hectare/year	CO2 Annual Storage in soil as carbon of the fallen biomass per unit of cultivated area	
.2	AS _{S_product}	0.00359	tn CO2/tn of yield/year	CO2 Annual Storage in soil as carbon of the fallen biomass per unit of harvested indits	
	AS _{S_tree}	0.00015	tn CO2/tree/year	CO2 Alimual storage in soil as calibon of the failer biomass per tree unit	
.1	TAE _{area}	3.21020	tn CO2/hectare/year	CO2 Total Annual Emissions per unit of cultivated area	
.2		0.20441	tn CO2/tn of yield/year	CO2 Total Annual Emissions per unit of barvested fruits	
.3	TAE _{product}	0.00731	tn CO2/trie/year	CO2 Total Annual Emissions per unit	
	tree	0.00751			
.1	AE _{f area}	0.83360	tn CO2/hectare/year	CO2 Annual Emissions due to the use of fertilizers per unit of cultivated area	
.2	AE _{f_product}	0.05308	tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of fertilizers per unit of harvested fruits	
.3					
	AEr trop	0.00190	tn CO2/tree/vear	CO2 Annual Emissions due to the use of fertilizers per tree unit	
	AE _{f_tree}	0.00190	tn CO2/tree/year	CO2 Annual Emissions due to the use of fertilizers per tree unit	
		0.00190		CO2 Annual Emissions due to the use of pesticides per unit of cultivated area	
.1	AE _{p_area}		tn CO2/hectare/year		
.1 .2	AE _{p_area} AE _{p_product}	0.83342 0.05307	tn CO2/hectare/year tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of pesticides per unit of cultivated area	
.1	AE _{p_area}	0.83342	tn CO2/hectare/year	CO2 Annual Emissions due to the use of pesticides per unit of cultivated area CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits	
.1 .2 .3	AE _{p_area} AE _{p_product} AE _{p_tree}	0.83342 0.05307	tn CO2/hectare/year tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of pesticides per unit of cultivated area CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits	
.1 .2 .3	AE _{p_area} AE _{p_product} AE _{p_tree}	0.83342 0.05307 0.00190	tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year	CO2 Annual Emissions due to the use of pesticides per unit of cultivated area CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits CO2 Annual Emissions due to the use of pesticides per tree unit	
.1 .2 .3 .1 .2	AE _{p_area} AE _{p_product} AE _{p_tree}	0.83342 0.05307 0.00190 1.54318	tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year	CO2 Annual Emissions due to the use of pesticides per unit of cultivated area CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits CO2 Annual Emissions due to the use of pesticides per tree unit CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area	
.1 .2 .3 .1 .2	AE _{p_area} AE _{p_product} AE _{p_tree} AE _{ff&e_area} AE _{ff&e_product}	0.83342 0.05307 0.00190 1.54318 0.09826	tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of pesticides per unit of cultivated area CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits CO2 Annual Emissions due to the use of pesticides per tree unit CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits	
.1 .2 .3 .1 .2 .3	AE _{p_area} AE _{p_product} AE _{p_tree} AE _{ff&e_area} AE _{ff&e_broduct} AE _{ff&e_tree} AE _{ff&e_tree}	0.83342 0.05307 0.00190 1.54318 0.09826	tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of pesticides per unit of cultivated area CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits CO2 Annual Emissions due to the use of pesticides per tree unit CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits	
.1 .2 .3 .1 .2 .3	AE _{p_area} AE _{p_product} AE _{p_tree} AE _{ff&e_area} AE _{ff&e_broduct} AE _{ff&e_tree} AE _{ff&e_tree}	0.83342 0.05307 0.00190 1.54318 0.09826 0.00351	tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year	CO2 Annual Emissions due to the use of pesticides per unit of cultivated area CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits CO2 Annual Emissions due to the use of pesticides per tree unit CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per tree unit	
.1 .2 .3 .1 .2 .3 .3	AE _{p_area} AE _{p_product} AE _{p_tree} AE _{ff&e_area} AE _{ff&e_area} AE _{ff&e_tree}	0.83342 0.05307 0.00190 1.54318 0.09826 0.00351 1.37665	tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year	CO2 Annual Emissions due to the use of pesticides per unit of cultivated area CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits CO2 Annual Emissions due to the use of pesticides per tree unit CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per tree unit CO2 Annual Emissions due to the use of fossil fuels & electricity per tree unit	
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i.1 i.2 i.3 i.3 i.1 i.2 i.3 i.1 i.2 i.3 i.1 i.2	AE _{p_area} AE _{p_product} AE _{p_tree} AE _{ff&e_area} AE _{ff&e_tree} AE _{fb_area} AE _{fb_area} AE _{fb_area} AE _{b_area} AE _{b_tree} AE _{c_area} AE _{c_area} AE _{c_area}	0.83342 0.05307 0.00190 1.54318 0.09826 0.00351 1.37665 0.08766 0.00313 	tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/hectare/year tn CO2/hectare/year tn CO2/hectare/year	CO2 Annual Emissions due to the use of pesticides per unit of cultivated area CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits CO2 Annual Emissions due to the use of pesticides per tree unit CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per tree unit CO2 Annual Emissions due to the use of fossil fuels & electricity per tree unit CO2 Annual Emissions due to the use of diesel per unit of cultivated area CO2 Annual Emissions due to the use of diesel per unit of harvested fruits CO2 Annual Emissions due to the use of diesel per unit of harvested fruits CO2 Annual Emissions due to the use of gasoline per unit of cultivated area CO2 Annual Emissions due to the use of gasoline per unit of cultivated area CO2 Annual Emissions due to the use of gasoline per unit of cultivated area CO2 Annual Emissions due to the use of gasoline per unit of cultivated area CO2 Annual Emissions due to the use of gasoline per unit of cultivated area CO2 Annual Emissions due to the use of gasoline per unit of harvested fruits	
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.1 .2 .3 .1 .2 .3 .3 .1 .2 .3 .3 .3 .3 .3 .3	AE _{p_area} AE _{p_product} AE _{p_tree} AE _{ff&e_area} AE _{ff&e_tree} AE _{ff&e_tree} AE _{f0_area} AE _{0_b} product AE ₀	0.83342 0.05307 0.00190 1.54318 0.09826 0.00351 1.37665 0.08766 0.00313 0.05439 0.00346 0.00012 0.11214	tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/hectare/year tn CO2/hectare/year tn CO2/hectare/year tn CO2/hectare/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tn of yield/year tn CO2/tn of yield/year tn CO2/hectare/year tn CO2/hectare/year	CO2 Annual Emissions due to the use of pesticides per unit of cultivated area CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits CO2 Annual Emissions due to the use of pesticides per tree unit CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per tree unit CO2 Annual Emissions due to the use of diesel per unit of cultivated area CO2 Annual Emissions due to the use of diesel per unit of cultivated area CO2 Annual Emissions due to the use of diesel per unit of harvested fruits CO2 Annual Emissions due to the use of gasoline per unit of cultivated area CO2 Annual Emissions due to the use of gasoline per unit of cultivated area CO2 Annual Emissions due to the use of gasoline per unit of harvested fruits CO2 Annual Emissions due to the use of gasoline per unit of harvested fruits CO2 Annual Emissions due to the use of gasoline per unit of harvested fruits CO2 Annual Emissions due to the use of gasoline per unit of cultivated area CO2 Annual Emissions due to the use of gasoline per unit of cultivated area CO2 Annual Emissions due to the use of gasoline per unit of cultivated area	

R21.2	TAGproduct	0.16884	tn CO2/tn of yield/year	CO2 Total Annual Gain per unit of harvested fruits
R21.3	TAG _{tree}	0.00604	tn CO2/tree/year	CO2 Total Annual Gain per tree unit
R22.1	AG _{N-f_LCC_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (Leguminosae cover crops) per unit of cultivated area
R22.2	AG _{N-f_LCC_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (Leguminosae cover crops) per unit of harvested fruits
R22.3	AG _{N-f_LCC_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (Leguminosae cover crops) per tree unit
R23.1	AG _{f_FGT_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to fertilizers reduction (fertigation) per unit of cultivated area
R23.2	AG _{f_FGT_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to fertilizers reduction (fertigation) per unit of harvested fruits
R23.3	AG _{f_FGT_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to fertilizers reduction (fertigation) per tree unit
R24.1	AG _{H_cc/m_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to herbicides reduction (cover crops/mulching) per unit of cultivated area
R24.2	AG _{H_cc/m_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to herbicides reduction (cover crops/mulching) per unit of harvested fruits
R24.3	AG _{H_cc/m_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to herbicides reduction (cover crops/mulching) per tree unit
R25.1	AG _{I_im/mt_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping) per unit of cultivated area
R25.2	AG _{I_im/mt_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping) per unit of harvested fruits
R25.3	AG _{I_im/mt_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping) per tree unit
R26.1	AG _{WF_area}	2.65158	tn CO2/hectare/year	CO2 Annual Gain due to the use of wood fuels instead of diesel per unit of cultivated area
R26.2	AG _{WF_product}	0.16884	tn CO2/tn of yield/year	CO2 Annual Gain due to the use of wood fuels instead of diesel per unit of harvested fruits
R26.3	AG _{WF_tree}	0.00604	tn CO2/tree/year	CO2 Annual Gain due to the use of wood fuels instead of diesel per tree unit
R27.1	AG _{RES_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to the use of RES per unit of cultivated area
R27.2	AG _{RES_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to the use of RES per unit of harvested fruits
R27.3	AG _{RES_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to the use of RES per tree unit

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CLIMATREE

Tree crops' CO2 Removal Capacity Calculation Tool (CO2RCCT)



terra nova

Designed and developed by TERRA NOVA Ltd.

Results

Country where the Tool is applied:	Greece
Species of tree crop:	Almond
Geographical area of the cultivation:	GREECE (total)

Use of prunings as wood fuel

CO2 Annual Removal Capacity

R1.1	ARC	145,348.1950 tn CO2/year	CO2 Annual Removal Capacity	(BF is included)
R1.2	ARC	78,556.3326 tn CO2/year	CO2 Annual Removal Capacity	(BF is not included)

The term "CO2 Removal" means the abstraction of CO2 from atmosphere

Agricultural practice:

BF: the fruits' biomass

Analysis

R2.1		AR _{BF}	66,791.8624 tn CO2/year	CO2 Annual Removal due to the production of fruit biomass	
R2.2	als	AR _{BW}	109,178.5221 tn CO2/year	CO2 Annual Removal due to the production of wood biomass	
R2.3	õ È	AS _s	2,256.4770 tn CO2/year	CO2 Annual Storage in soil as carbon of the fallen biomass	
R2.4	- Ba	TAR	178,226.8616 tn CO2/year	CO2 Total Annual Removals	(BF is included)
R2.5		TAR	111,434.9991 tn CO2/year	CO2 Total Annual Removals	(BF is not included)

a. It has to be underlined an important difference between ARC and TAR:

ARC is the result of the CO2 mass balance between (a) the total quantity of CO2 which is abstracted from the atmosphere [=TAR] by the tree in order to create biomass and (b) the total quantity of CO2 which is emitted to the atmosphere due to the agricultural practices which are applied for the cultivation of the tree.

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R3.1	S	AE _f	9,047.2559 tn CO2/year	CO2 Annual Emissions due to the use of fertilizers		
R3.2	Sior 2	AEp	11,608.7189 tn CO2/year	CO2 Annual Emissions due to the use of pesticides		
R3.3	uis C	AE _{ff&e}	12,222.6918 tn CO2/year	CO2 Annual Emissions due to the use of fossil fuels & electricity		
R3.4	Э	TAE	32,878.6665 tn CO2/year	CO2 Total Annual Emissions		
	R4.1	AE _D	10,563.0311 tn CO2/year	CO2 Annual Emissions due to the use of diesel		
	R4.2	AE _G	723.3709 tn CO2/year	CO2 Annual Emissions due to the use of gasoline		
	R4.3	AE _{EL}	936.2898 tn CO2/year	CO2 Annual Emissions due to the use of electricity		
	R4.4	AE _{ff&e}	12,222.6918 tn CO2/year	CO2 Annual Emissions due to the use of fossil fuels & electricity		

R5.1		AG _{N-f_LCC}	0.0000 tn CO2/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (use of Leguminosae cover crops)
R5.2		AG _{f_FGT}	0.0000 tn CO2/year	CO2 Annual Gain due to fertilizers reduction (use of fertigation)
R5.3		AG _{H_cc/m}	0.0000 tn CO2/year	CO2 Annual Gain due to herbicides reduction (use of cover crops/mulching)
R5.4		AG _{I_im/mt}	0.0000 tn CO2/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping)
R5.5	Gain Gain	AG _{WF}	24,502.6491 tn CO2/year	CO2 Annual Gain due to the use of wood fuels instead of diesel
R5.6	00	AG _{RES}	0.0000 tn CO2/year	CO2 Annual Gain due to the use of Renewable Energy Sources
R5.7		AG _{EL_m}	0.0000 tn CO2/year	CO2 Annual Gain due to electricity reduction (use of mulching)
R5.8		AG _{D_FGT}	0.0000 tn CO2/year	CO2 Annual Gain due to diesel reduction (use of fertigation)
R5.9		TAG	24,502.6491 tn CO2/year	CO2 Total Annual Gain

2	ARC _{product}	4.73722	tn CO2/tn of yield/year	CO2 Annual Removal Capacity per unit of harvested fruits	(BF is included)	
3	ARCtree	0.03919	tn CO2/tree/year	CO2 Annual Removal Capacity per tree unit		
			,			
L	ARCarea	5.90660	tn CO2/hectare/year	CO2 Annual Removal Capacity per unit of cultivated area		
2	ARCproduct	2.56033	tn CO2/tn of yield/year	CO2 Annual Removal Capacity per unit of harvested fruits	(BF is not included)	
	ARCtree	0.02118	tn CO2/tree/year	CO2 Annual Removal Capacity per tree unit		
	TAE/TAR	0.18448	Total Annual CO2 Emissions/ Total Ann		(BF is included)	
2	TAE/TAR	0.29505	Instrument Instrut			
		10 10070				
-	TAR _{area}	13.40076	tn CO2/hectare/year	CO2 Total Annual Removals per unit of cultivated area	(DE to include d)	
+	TAR _{product}	5.80881	tn CO2/tn of yield/year	CO2 Total Annual Removals per unit of harvested fruits	(BF is included)	
	TAR _{tree}	0.04805	tn CO2/tree/year	CO2 Total Annual Removals per tree unit		
	TAR _{area}	8.37872	tn CO2/hectare/year	CO2 Total Annual Removals per unit of cultivated area		
2	TARproduct	3.63192	tn CO2/tn of yield/year	CO2 Total Annual Removals per unit of barvested fruits	(BF is not included)	
3	TAR _{tree}	0.03005	tn CO2/trie/year	CO2 Total Annual Removals per unit		
	tree	0.03003		Cos rotar Annual nemovals per declanic		
	AR _{BF area}	5.02204	tn CO2/hectare/year	CO2 Annual Removal due to the production of fruit biomass per unit of cultivated area		
2	AR _{BF_product}	2.17690	tn CO2/tn of yield/year	CO2 Annual Removal due to the production of fruit biomass per unit of harvested fruits		
3	AR _{BF_tree}	0.01801	tn CO2/tree/year	CO2 Annual Removal due to the production of fruit biomass per tree unit		
	bi_ucc					
1	AR _{BW area}	8.20906	tn CO2/hectare/year	CO2 Annual Removal due to the production of wood biomass per unit of cultivated area		
2	AR _{BW_product}	3.55837	tn CO2/tn of yield/year	CO2 Annual Removal due to the production of wood biomass per unit of harvested fruits		
3	AR _{BW_tree}	0.02944	tn CO2/tree/year	CO2 Annual Removal due to the production of wood biomass per tree unit		
1	AS _{S_area}	0.16966	tn CO2/hectare/year	CO2 Annual Storage in soil as carbon of the fallen biomass per unit of cultivated area		
2	AS _{S_product}	0.07354	tn CO2/tn of yield/year	CO2 Annual Storage in soil as carbon of the fallen biomass per unit of harvested fruits		
3	AS _{S_tree}	0.00061	tn CO2/tree/year	CO2 Annual Storage in soil as carbon of the fallen biomass per tree unit		
.1	TAE _{area}	2.47212	tn CO2/hectare/year	CO2 Total Annual Emissions per unit of cultivated area		
.2	TAEproduct	1.07159	tn CO2/tn of yield/year	CO2 Total Annual Emissions per unit of harvested fruits		
3	TAE _{tree}	0.00886	tn CO2/tree/year	CO2 Total Annual Emissions per tree unit		
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1	AE _{f_area}	0.68026	tn CO2/hectare/year	CO2 Annual Emissions due to the use of fertilizers per unit of cultivated area		
.2	AE _{f_product}	0.29487	tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of fertilizers per unit of harvested fruits		
3	AE _{f_tree}	0.00244	tn CO2/tree/year	CO2 Annual Emissions due to the use of fertilizers per tree unit		
	45	0.07005	tra 602/h			
	AE _{p_area}			CO2 Annual Emissions due to the use of pesticides per unit of cultivated area		
		0.87285	tn CO2/hectare/year			
.2	AE _{p_product}	0.37835	tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits		
.2						
2 3	AE _{p_product} AE _{p_tree}	0.37835 0.00313	tn CO2/tn of yield/year tn CO2/tree/year	CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits CO2 Annual Emissions due to the use of pesticides per tree unit		
2 3	AE _{p_product} AE _{p_tree} AE _{ff&e_area}	0.37835 0.00313 0.91902	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year	CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits CO2 Annual Emissions due to the use of pesticides per tree unit CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area		
2 3 1 2	AE _{p_product} AE _{p_tree} AE _{ff&e_area} AE _{ff&e_product}	0.37835 0.00313 0.91902 0.39836	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits CO2 Annual Emissions due to the use of pesticides per tree unit CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits		
2 3 1 2	AE _{p_product} AE _{p_tree} AE _{ff&e_area}	0.37835 0.00313 0.91902	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year	CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits CO2 Annual Emissions due to the use of pesticides per tree unit CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area		
2 3 1 2 3	AE _{p_product} AE _{p_tree} AE _{ff&e_area} AE _{ff&e_product} AE _{ff&e_tree}	0.37835 0.00313 0.91902 0.39836	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year	CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits CO2 Annual Emissions due to the use of pesticides per tree unit CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits		
2 3 1 2 3 1	AE _{p_product} AE _{p_tree} AE _{ff&e_area} AE _{ff&e_product} AE _{ff&e_tree} AE _{ff&e_tree}	0.37835 0.00313 0.91902 0.39836 0.00330	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits CO2 Annual Emissions due to the use of pesticides per tree unit CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits		
2 3 1 2 3 3 1 2	AE _{p_product} AE _{p_tree} AE _{ff&e_area} AE _{ff&e_product} AE _{ff&e_tree} AE _{ff&e_tree} AE _{D_area} AE _{D_product}	0.37835 0.00313 0.91902 0.39836 0.00330 0.79423	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year	C02 Annual Emissions due to the use of pesticides per unit of harvested fruits C02 Annual Emissions due to the use of pesticides per tree unit C02 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area C02 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits C02 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits C02 Annual Emissions due to the use of fossil fuels & electricity per tree unit C02 Annual Emissions due to the use of diesel per unit of cultivated area		
2 3 1 2 3 3 1 2	AE _{p_product} AE _{p_tree} AE _{ff&e_area} AE _{ff&e_product} AE _{ff&e_tree} AE _{ff&e_tree}	0.37835 0.00313 0.91902 0.39836 0.00330 0.79423 0.34427	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year	C02 Annual Emissions due to the use of pesticides per unit of harvested fruits C02 Annual Emissions due to the use of pesticides per tree unit C02 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area C02 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits C02 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits C02 Annual Emissions due to the use of fossil fuels & electricity per tree unit C02 Annual Emissions due to the use of diesel per unit of cultivated area C02 Annual Emissions due to the use of diesel per unit of harvested fruits		
2 3 1 2 3 1 2 3	AE _{p_product} AE _{p_tree} AE _{ff&e_area} AE _{ff&e_product} AE _{ff&e_tree} AE _{ff&e_tree} AE _{D_area} AE _{D_product}	0.37835 0.00313 0.91902 0.39836 0.00330 0.79423 0.34427	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year	C02 Annual Emissions due to the use of pesticides per unit of harvested fruits C02 Annual Emissions due to the use of pesticides per tree unit C02 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area C02 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits C02 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits C02 Annual Emissions due to the use of fossil fuels & electricity per tree unit C02 Annual Emissions due to the use of diesel per unit of cultivated area C02 Annual Emissions due to the use of diesel per unit of harvested fruits		
2 3 1 2 3 1 2 3 3	AE _{p_product} AE _{p_tree} AE _{ff&e_area} AE _{ff&e_product} AE _{ff&e_product} AE _{f_ae_area} AE _{D_area} AE _{D_product} AE _{D_tree}	0.37835 0.00313 0.91902 0.39836 0.00330 0.79423 0.34427 0.00285	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year	CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits CO2 Annual Emissions due to the use of pesticides per tree unit CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per tree unit CO2 Annual Emissions due to the use of diesel per unit of cultivated area CO2 Annual Emissions due to the use of diesel per unit of harvested fruits CO2 Annual Emissions due to the use of diesel per unit of harvested fruits CO2 Annual Emissions due to the use of diesel per unit of harvested fruits CO2 Annual Emissions due to the use of diesel per unit of harvested fruits CO2 Annual Emissions due to the use of diesel per tree unit		
2 3 1 2 3 3 1 2 3 3 2	AE _{p_product} AE _{p_tree} AE _{flike_area} AE _{flike_product} AE _{flike_tree} AE _{fo_area} AE _{fo_product} AE _{fo_product} AE _{fo_tree}	0.37835 0.00313 0.91902 0.39836 0.00330 0.79423 0.34427 0.00285 0.00285	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/tree/year tn CO2/hectare/year	C02 Annual Emissions due to the use of pesticides per unit of harvested fruits C02 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area C02 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits C02 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits C02 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits C02 Annual Emissions due to the use of fossil fuels & electricity per tree unit C02 Annual Emissions due to the use of diesel per unit of cultivated area C02 Annual Emissions due to the use of diesel per unit of harvested fruits C02 Annual Emissions due to the use of diesel per unit of harvested fruits C02 Annual Emissions due to the use of diesel per tree unit C02 Annual Emissions due to the use of gasoline per unit of cultivated area C02 Annual Emissions due to the use of gasoline per unit of cultivated area		
2 3 1 2 3 1 2 3 3 1 2 2	AE _{p_product} AE _{p_tree} AE _{fl&e_area} AE _{fl&e_product} AE _{fl&e_product} AE _{fl_area} AE _{fl_area} AE _{fl_area} AE _{fl_area} AE _{fl_area} AE _{fl_area}	0.37835 0.00313 0.91902 0.39836 0.00330 0.79423 0.34427 0.00285 0.00285 0.05439 0.02358	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/tn of yield/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/tree/year tn CO2/tn of yield/year	C02 Annual Emissions due to the use of pesticides per unit of harvested fruits C02 Annual Emissions due to the use of pesticides per tree unit C02 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area C02 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits C02 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits C02 Annual Emissions due to the use of fossil fuels & electricity per tree unit C02 Annual Emissions due to the use of diesel per unit of cultivated area C02 Annual Emissions due to the use of diesel per unit of harvested fruits C02 Annual Emissions due to the use of diesel per unit of harvested fruits C02 Annual Emissions due to the use of diesel per unit of harvested fruits C02 Annual Emissions due to the use of diesel per tree unit C02 Annual Emissions due to the use of gasoline per unit of cultivated area C02 Annual Emissions due to the use of gasoline per unit of cultivated area C02 Annual Emissions due to the use of gasoline per unit of cultivated area C02 Annual Emissions due to the use of gasoline per unit of cultivated area C02 Annual Emissions due to the use of gasoline per unit of cultivated area C02 Annual Emissions due to the use of gasoline per unit of cultivated area C02 Annual Emissions due to the use of gasoline per unit of cultivated area C02 A		
.1 .2 .3 .1 .2 .3 .3 .3 .1 .2 .3 .3 .1 .2 .3 .3	AE _{p_product} AE _{p_tree} AE _{ff&e_area} AE _{ff&e_product} AE _{ff&e_product} AE _{0_area} AE _{0_product} AE _{0_product} AE _{6_product} AE _{6_product}	0.37835 0.00313 0.91902 0.39836 0.00330 0.79423 0.34427 0.00285 0.00285 0.05439 0.02358	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/tn of yield/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/tree/year tn CO2/tn of yield/year	C02 Annual Emissions due to the use of pesticides per unit of harvested fruits C02 Annual Emissions due to the use of pesticides per tree unit C02 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area C02 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits C02 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits C02 Annual Emissions due to the use of fossil fuels & electricity per tree unit C02 Annual Emissions due to the use of diesel per unit of cultivated area C02 Annual Emissions due to the use of diesel per unit of harvested fruits C02 Annual Emissions due to the use of diesel per unit of harvested fruits C02 Annual Emissions due to the use of diesel per unit of harvested fruits C02 Annual Emissions due to the use of diesel per tree unit C02 Annual Emissions due to the use of gasoline per unit of cultivated area C02 Annual Emissions due to the use of gasoline per unit of cultivated area C02 Annual Emissions due to the use of gasoline per unit of cultivated area C02 Annual Emissions due to the use of gasoline per unit of cultivated area C02 Annual Emissions due to the use of gasoline per unit of cultivated area C02 Annual Emissions due to the use of gasoline per unit of cultivated area C02 Annual Emissions due to the use of gasoline per unit of cultivated area C02 A		
2 3 1 2 3 1 2 3 1 2 3 3 1 2 3 1	AE _{p_product} AE _{p_tree} AE _{fl&e_area} AE _{fl&e_product} AE _{fl&e_product} AE _{fl_area} AE _{fl_area} AE _{fl_area} AE _{fl_area} AE _{fl_area} AE _{fl_area}	0.37835 0.00313 0.91902 0.39836 0.00330 0.79423 0.34427 0.00285 0.05439 0.02358 0.00020	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tree/year tn CO2/tn of yield/year tn CO2/tree/year	C02 Annual Emissions due to the use of pesticides per unit of harvested fruits C02 Annual Emissions due to the use of pesticides per tree unit C02 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area C02 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits C02 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits C02 Annual Emissions due to the use of fossil fuels & electricity per tree unit C02 Annual Emissions due to the use of diesel per unit of cultivated area C02 Annual Emissions due to the use of diesel per unit of harvested fruits C02 Annual Emissions due to the use of diesel per unit of harvested fruits C02 Annual Emissions due to the use of gasoline per unit of cultivated area C02 Annual Emissions due to the use of gasoline per unit of cultivated area C02 Annual Emissions due to the use of gasoline per unit of cultivated area C02 Annual Emissions due to the use of gasoline per unit of cultivated area C02 Annual Emissions due to the use of gasoline per unit of harvested fruits C02 Annual Emissions due to the use of gasoline per unit of harvested fruits C02 Annual Emissions due to the use of gasoline per tree unit		
2 3 1 2 3 1 2 3 3 1 2 3	AEp_product AEp_tree AEff&e_area AEff&e_product AEff&e_product AEff&e_product AEff&e_product AE_D_product AE_0_product AE_0_product AE_0_product AE_0_product AE_0_tree AE_6_product AE_6_tree AE_1_tree	0.37835 0.00313 0.91902 0.39836 0.00330 0.079423 0.34427 0.00285 0.00285 0.02358 0.00200	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/tree/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/tn of yield/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/tree/year	C02 Annual Emissions due to the use of pesticides per unit of harvested fruits C02 Annual Emissions due to the use of pesticides per tree unit C02 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area C02 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits C02 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits C02 Annual Emissions due to the use of fossil fuels & electricity per tree unit C02 Annual Emissions due to the use of diesel per unit of cultivated area C02 Annual Emissions due to the use of diesel per unit of harvested fruits C02 Annual Emissions due to the use of diesel per unit of harvested fruits C02 Annual Emissions due to the use of gasoline per unit of cultivated area C02 Annual Emissions due to the use of gasoline per unit of cultivated area C02 Annual Emissions due to the use of gasoline per unit of harvested fruits C02 Annual Emissions due to the use of gasoline per unit of harvested fruits C02 Annual Emissions due to the use of gasoline per unit of harvested fruits C02 Annual Emissions due to the use of gasoline per unit of harvested fruits C02 Annual Emissions due to the use of gasoline per unit of cultivated area C02 Annual Emissions due to the use of gasoline per unit of cultivated area C02 Annual Emissions due to the use of electricity per unit of cultivated area		

R21.2	TAGproduct	0.79860	tn CO2/tn of yield/year	CO2 Total Annual Gain per unit of harvested fruits
R21.3	TAG _{tree}	0.00661	tn CO2/tree/year	CO2 Total Annual Gain per tree unit
-				
R22.1	AG _{N-f_LCC_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (Leguminosae cover crops) per unit of cultivated area
R22.2	AG _{N-f_LCC_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (Leguminosae cover crops) per unit of harvested fruits
R22.3	AG _{N-f_LCC_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (Leguminosae cover crops) per tree unit
R23.1	AG _{f_FGT_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to fertilizers reduction (fertigation) per unit of cultivated area
R23.2	AG _{f_FGT_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to fertilizers reduction (fertigation) per unit of harvested fruits
R23.3	AG _{f_FGT_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to fertilizers reduction (fertigation) per tree unit
R24.1	AG _{H_cc/m_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to herbicides reduction (cover crops/mulching) per unit of cultivated area
R24.2	AG _{H_cc/m_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to herbicides reduction (cover crops/mulching) per unit of harvested fruits
R24.3	AG _{H_cc/m_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to herbicides reduction (cover crops/mulching) per tree unit
R25.1	AG _{l_im/mt_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping) per unit of cultivated area
R25.2	AG _{I_im/mt_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping) per unit of harvested fruits
R25.3	AG _{I_im/mt_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping) per tree unit
R26.1	AG _{WF_area}	1.84234	tn CO2/hectare/year	CO2 Annual Gain due to the use of wood fuels instead of diesel per unit of cultivated area
R26.2	AG _{WF_product}	0.79860	tn CO2/tn of yield/year	CO2 Annual Gain due to the use of wood fuels instead of diesel per unit of harvested fruits
R26.3	AG _{WF_tree}	0.00661	tn CO2/tree/year	CO2 Annual Gain due to the use of wood fuels instead of diesel per tree unit
R27.1	AG _{RES_area}	0.00000	tn CO2/hectare/year	CO2 Annual Gain due to the use of RES per unit of cultivated area
R27.2	AG _{RES_product}	0.00000	tn CO2/tn of yield/year	CO2 Annual Gain due to the use of RES per unit of harvested fruits
R27.3	AG _{RES_tree}	0.00000	tn CO2/tree/year	CO2 Annual Gain due to the use of RES per tree unit

E
CUMATREE

Tree crops' CO2 Removal Capacity Calculation Tool (CO2RCCT)



 Run 28
 Agricultural practice:
 Electricity supply 100% by dedicated RES

Designed and developed by TERRA NOVA Ltd. X TERRANOVA

Results

Country where the Tool is applied:	Greece
Species of tree crop:	Orange
Geographical area of the cultivation:	GREECE (total)

CO2 Annual Removal Capacity

R1.1	ARC	279.713,4935 tn CO2/year	CO2 Annual Removal Capacity	(BF is included)
R1.2	ARC	224.348,4090 tn CO2/year	CO2 Annual Removal Capacity	(BF is not included)

The term "CO2 Removal" means the abstraction of CO2 from atmosphere

BF: the fruits' biomass

Analysis

R2.1		AR _{BF}	55.365,0845 tn CO2/year	CO2 Annual Removal due to the production of fruit biomass	
R2.2	als 2	AR _{BW}	300.878,0321 tn CO2/year	CO2 Annual Removal due to the production of wood biomass	
R2.3	₿ Ĉ	AS _s	7.223,6095 tn CO2/year	CO2 Annual Storage in soil as carbon of the fallen biomass	
R2.4	Rei	TAR	363.466,7262 tn CO2/year	CO2 Total Annual Removals	(BF is included)
R2.5		TAR	308.101,6417 tn CO2/year	CO2 Total Annual Removals	(BF is not included)

a. It has to be underlined an important difference between ARC and TAR:

ARC is the result of the CO2 mass balance between (a) the total quantity of CO2 which is abstracted from the atmosphere [=TAR] by the tree in order to create biomass and (b) the total quantity of CO2 which is emitted to the atmosphere due to the agricultural practices which are applied for the cultivation of the tree.

R3.1	s	AE _f	37.063,1211 tn CO2/year	CO2 Annual Emissions due to the use of fertilizers
R3.2	22 sior	AEp	25.353,3549 tn CO2/year	CO2 Annual Emissions due to the use of pesticides
R3.3	mis C	AE _{ff&e}	21.336,7567 tn CO2/year	CO2 Annual Emissions due to the use of fossil fuels & electricity
R3.4	ш	TAE	83.753,2327 tn CO2/year	CO2 Total Annual Emissions
	R4.1	AED	20.184,8514 tn CO2/year	CO2 Annual Emissions due to the use of diesel
	R4.2	AE _G	1.151,9053 tn CO2/year	CO2 Annual Emissions due to the use of gasoline
	R4.3	AE _{EL}	0,0000 tn CO2/year	CO2 Annual Emissions due to the use of electricity
	R4.4	AE _{ff&e}	21.336,7567 tn CO2/year	CO2 Annual Emissions due to the use of fossil fuels & electricity

R5.1		AG _{N-f_LCC}	0,0000 tn CO2/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (use of Leguminosae cover crops)
R5.2		AG _{f_FGT}	0,0000 tn CO2/year	CO2 Annual Gain due to fertilizers reduction (use of fertigation)
R5.3		AG _{H_cc/m}	0,0000 tn CO2/year	CO2 Annual Gain due to herbicides reduction (use of cover crops/mulching)
R5.4		AG _{I_im/mt}	0,0000 tn CO2/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping)
R5.5	Gain C	AG _{WF}	80.021,1785 tn CO2/year	CO2 Annual Gain due to the use of wood fuels instead of diesel
R5.6	00	AG _{RES}	5.911,0634 tn CO2/year	CO2 Annual Gain due to the use of Renewable Energy Sources
R5.7		AG _{EL_m}	0,0000 tn CO2/year	CO2 Annual Gain due to electricity reduction (use of mulching)
R5.8		AG _{D_FGT}	0,0000 tn CO2/year	CO2 Annual Gain due to diesel reduction (use of fertigation)
R5.9		TAG	85.932,2418 tn CO2/year	CO2 Total Annual Gain

CO2 Removal Capacity Indexes	
area 8,25456 tn CO2/hectare/year	CO2 Annual Removal Capacity per unit of cultivated area

2	ARC _{product}	0,35654	tn CO2/tn of yield/year	CO2 Annual Removal Capacity per unit of harvested fruits	(BF is included)
	ARC _{tree}	0,01851	tn CO2/tree/year	CO2 Annual Removal Capacity per tree unit	
	ARCarea	6,62069	tn CO2/hectare/year	CO2 Annual Removal Capacity per unit of cultivated area	
2	ARCproduct	0,28597	tn CO2/tn of yield/year	CO2 Annual Removal Capacity per unit of harvested fruits	(BF is not included)
	ARC _{tree}	0,01485	tn CO2/tree/year	CO2 Annual Removal Capacity per tree unit	
_	TAE/TAR	0,23043	Total Annual CO2 Emissions/ Total An		(BF is included)
	TAE/TAR	0,27184	Total Annual CO2 Emissions/ Total An	nual CO2 Removals	(BF is not included)
	TAR _{area}	10,72618	tn CO2/hectare/year	CO2 Total Annual Removals per unit of cultivated area	
	TAR _{product}	0,46330	th CO2/th of yield/year	CO2 Total Annual Removals per unit of harvested fruits	(BF is included)
	TAR	0,02405	tn CO2/tree/year	CO2 Total Annual Removals per tree unit	
	tree	0,02100			
1	TAR _{area}	9,09232	tn CO2/hectare/year	CO2 Total Annual Removals per unit of cultivated area	
2	TARproduct	0,39273	tn CO2/tn of yield/year	CO2 Total Annual Removals per unit of harvested fruits	(BF is not included)
3	TAR _{tree}	0,02039	tn CO2/tree/year	CO2 Total Annual Removals per tree unit	
L	AR _{BF_area}	1,63387	tn CO2/hectare/year	CO2 Annual Removal due to the production of fruit biomass per unit of cultivated area	
2	AR _{BF_product}	0,07057	tn CO2/tn of yield/year	CO2 Annual Removal due to the production of fruit biomass per unit of harvested fruits	
3	AR _{BF_tree}	0,00366	tn CO2/tree/year	CO2 Annual Removal due to the production of fruit biomass per tree unit	
	4.0	0.0704.4	the CO2/Instance/	CO2 ApproxI Demoval due to the preduction of wood bitment and with of whitehal appr	
1	AR _{BW_area}	8,87914	tn CO2/hectare/year	CO2 Annual Removal due to the production of wood biomass per unit of cultivated area CO2 Annual Removal due to the production of wood biomass per unit of harvested fruits	
2	AR _{BW_product}	0,38352	tn CO2/tn of yield/year	CO2 Annual Removal due to the production of wood biomass per true unit	
3	AR _{BW_tree}	0,01991	tn CO2/tree/year	CO2 Annual Kentoval due to the production of wood biomass per tree unit	
1	AS _{S_area}	0,21317	tn CO2/hectare/year	CO2 Annual Storage in soil as carbon of the fallen biomass per unit of cultivated area	
2	AS _{S_product}	0,00921	tn CO2/tn of yield/year	CO2 Annual Storage in soil as carbon of the fallen biomass per unit of harvested fruits	
3	AS _{S_tree}	0,00048	tn CO2/tree/year	CO2 Annual Storage in soil as carbon of the fallen biomass per tree unit	
	- <u>J</u> uee	.,			
1	TAE _{area}	2,47162	tn CO2/hectare/year	CO2 Total Annual Emissions per unit of cultivated area	
2	TAEproduct	0,10676	tn CO2/tn of yield/year	CO2 Total Annual Emissions per unit of harvested fruits	
3	TAE _{tree}	0,00554	tn CO2/tree/year	CO2 Total Annual Emissions per tree unit	
1	AE _{f_area}	1,09376	tn CO2/hectare/year	CO2 Annual Emissions due to the use of fertilizers per unit of cultivated area	
2	AE _{f_product}	0,04724	tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of fertilizers per unit of harvested fruits	
3	AE _{f_tree}	0,00245	tn CO2/tree/year	CO2 Annual Emissions due to the use of fertilizers per tree unit	
1	45	0.74020	tra 602/h = stars /	CO3 Annual Emissions due to the use of posticidae new with of sulficiented area	
2	AE _{p_area}	0,74820 0,03232	tn CO2/hectare/year tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of pesticides per unit of cultivated area CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits	
3	AE _{p_product}	0,03232	th CO2/th of yield/year	CO2 Annual Emissions due to the use of pesticides per tree unit	
•	AE _{p_tree}	0,00108	th CO2/tree/year	CO2 Annuar Emissions due to the use of pesticides per tree unit	
1	AE _{ff&e_area}	0,62966	tn CO2/hectare/year	CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area	· · · · · · · · · · · · · · · · · · ·
2	AE _{ff&e_product}	0,02720	th CO2/th of yield/year	CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of entitied due of fuels and the second	
3	AE _{ff&e tree}	0,00141	tn CO2/tree/year	CO2 Annual Emissions due to the use of fossil fuels & electricity per tree unit	
	nuc_nec				
1	AE _{D_area}	0,59567	tn CO2/hectare/year	CO2 Annual Emissions due to the use of diesel per unit of cultivated area	
2	AE _{D_product}	0,02573	tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of diesel per unit of harvested fruits	
3	AE _{D_tree}	0,00134	tn CO2/tree/year	CO2 Annual Emissions due to the use of diesel per tree unit	
	AE _{G_area}	0,03399	tn CO2/hectare/year	CO2 Annual Emissions due to the use of gasoline per unit of cultivated area	
	AE _{G_product}	0,00147	tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of gasoline per unit of harvested fruits	
	AE _{G_tree}	0,00008	tn CO2/tree/year	CO2 Annual Emissions due to the use of gasoline per tree unit	
				CO2 Annual Environmentary to the same of all statistics and the first statistics	
2			tn CO2/hectare/year	CO2 Annual Emissions due to the use of electricity per unit of cultivated area	
3	AE _{EL_area}	0,00000		CO2 Approal Emissions due to the use of electricity personals of how extend function	
3	AE _{EL_product}	0,00000	tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of electricity per unit of harvested fruits	
3				CO2 Annual Emissions due to the use of electricity per unit of harvested fruits CO2 Annual Emissions due to the use of electricity per tree unit	

R21.2	TAGproduct	0,10954	tn CO2/tn of yield/year	CO2 Total Annual Gain per unit of harvested fruits
R21.3	TAG _{tree}	0,00569	tn CO2/tree/year	CO2 Total Annual Gain per tree unit
R22.1	AG _{N-f_LCC_area}	0,00000	tn CO2/hectare/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (Leguminosae cover crops) per unit of cultivated area
R22.2	AG _{N-f_LCC_product}	0,00000	tn CO2/tn of yield/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (Leguminosae cover crops) per unit of harvested fruits
R22.3	AG _{N-f_LCC_tree}	0,00000	tn CO2/tree/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (Leguminosae cover crops) per tree unit
R23.1	AG _{f_FGT_area}	0,00000	tn CO2/hectare/year	CO2 Annual Gain due to fertilizers reduction (fertigation) per unit of cultivated area
R23.2	AG _{f_FGT_product}	0,00000	tn CO2/tn of yield/year	CO2 Annual Gain due to fertilizers reduction (fertigation) per unit of harvested fruits
R23.3	AG _{f_FGT_tree}	0,00000	tn CO2/tree/year	CO2 Annual Gain due to fertilizers reduction (fertigation) per tree unit
R24.1	AG _{H_cc/m_area}	0,00000	tn CO2/hectare/year	CO2 Annual Gain due to herbicides reduction (cover crops/mulching) per unit of cultivated area
R24.2	AG _{H_cc/m_product}	0,00000	tn CO2/tn of yield/year	CO2 Annual Gain due to herbicides reduction (cover crops/mulching) per unit of harvested fruits
R24.3	AG _{H_cc/m_tree}	0,00000	tn CO2/tree/year	CO2 Annual Gain due to herbicides reduction (cover crops/mulching) per tree unit
R25.1	AG _{l_im/mt_area}	0,00000	tn CO2/hectare/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping) per unit of cultivated area
R25.2	AGI_im/mt_product	0,00000	tn CO2/tn of yield/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping) per unit of harvested fruits
R25.3	AG _{I_im/mt_tree}	0,00000	tn CO2/tree/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping) per tree unit
R26.1	AG _{WF_area}	2,36149	tn CO2/hectare/year	CO2 Annual Gain due to the use of wood fuels instead of diesel per unit of cultivated area
R26.2	AG _{WF_product}	0,10200	tn CO2/tn of yield/year	CO2 Annual Gain due to the use of wood fuels instead of diesel per unit of harvested fruits
R26.3	AG _{WF_tree}	0,00530	tn CO2/tree/year	CO2 Annual Gain due to the use of wood fuels instead of diesel per tree unit
R27.1	AG _{RES_area}	0,17444	tn CO2/hectare/year	CO2 Annual Gain due to the use of RES per unit of cultivated area
R27.2	AG _{RES_product}	0,00753	tn CO2/tn of yield/year	CO2 Annual Gain due to the use of RES per unit of harvested fruits
R27.3	AG _{RES_tree}	0,00039	tn CO2/tree/year	CO2 Annual Gain due to the use of RES per tree unit

E

Tree crops' CO2 Removal Capacity Calculation Tool (CO2RCCT)



	Run 29 Ag	gricultural practice: Use of insects mass trapping	Designed and develop	bed by TERRA NOVA Ltd. 😿 TERRANOV
			Results	
	Country where the Too			
	Species of tree crop:	Orange		
	Geographical area of t	the cultivation: GREECE (total		
	CO2 Annual Remova	al Capacity		
R1.1	ARC	283.025,0291 tn CO2/year	CO2 Annual Removal Capacity	(BF is included)
R1.2	ARC	227.659,9446 tn CO2/year	CO2 Annual Removal Capacity	(BF is not included)
	BF: the fruits' biomass	" means the abstraction of CO2 from atmosphere		
	Analysis			
	AR _{BF}	55.365,0845 tn CO2/year	CO2 Annual Removal due to the production of fruit biomass	
als	AR _{BW}	300.878,0321 tn CO2/year	CO2 Annual Removal due to the production of wood biomass	
5 5	ASs	7.223,6095 tn CO2/year	CO2 Annual Storage in soil as carbon of the fallen biomass	
ŏε			CO2 Affilial Storage In soil as carbon of the failen biofilass	
CO2 Removals	TAR	363.466,7262 tn CO2/year	CO2 Total Annual Removals	(BF is included)
C	a. It has to be underlined ARC is the result of the C	363.466,7262 tn CO2/year 308.101,6417 tn CO2/year d an important difference between ARC and TAR: :02 mass balance between (a) the total quantity of CO2 which is ab		(BF is not included)
C	TAR a. It has to be underlined ARC is the result of the Cr which are applied for the	363.466,7262 tn CO2/year 308.101,6417 tn CO2/year d an important difference between ARC and TAR: :O2 mass balance between (a) the total quantity of CO2 which is at e cultivation of the tree.	CO2 Total Annual Removals CO2 Total Annual Removals	(BF is not included)
	TAR a. It has to be underlined ARC is the result of the Cr which are applied for the	363.466,7262 tn CO2/year 308.101,6417 tn CO2/year d an important difference between ARC and TAR: :O2 mass balance between (a) the total quantity of CO2 which is at e cultivation of the tree.	CO2 Total Annual Removals CO2 Total Annual Removals ostracted from the atmosphere [=TAR] by the tree in order to create biomass and (b) the total quantity of CO2 which is emitted to the atmosphere due to	(BF is not included)
	TAR a. It has to be underlined ARC is the result of the C which are applied for the b. The following are defin	363.466,7262 tn CO2/year 308.101,6417 tn CO2/year d an important difference between ARC and TAR: :O2 mass balance between (a) the total quantity of CO2 which is ab e cultivation of the tree. ned as fallen biomass: fallen leaves, fallen fruits (naturally fallen or	CO2 Total Annual Removals CO2 Total Annual Removals ostracted from the atmosphere [=TAR] by the tree in order to create biomass and (b) the total quantity of CO2 which is emitted to the atmosphere due to as a result of a thinning process), other fallen biomass (e.g. almond hulls) as well as prunings which are left in the field.	(BF is not included)
	TAR a. It has to be underlined ARC is the result of the C which are applied for the b. The following are defin AE _f	363.466,7262 tn CO2/year 308.101,6417 tn CO2/year d an important difference between ARC and TAR: :02 mass balance between (a) the total quantity of CO2 which is at e cultivation of the tree. ned as fallen biomass: fallen leaves, fallen fruits (naturally fallen or 37.063,1211 tn CO2/year	CO2 Total Annual Removals CO2 Total Annual Removals Destracted from the atmosphere [=TAR] by the tree in order to create biomass and (b) the total quantity of CO2 which is emitted to the atmosphere due to r as a result of a thinning process), other fallen biomass (e.g. almond hulls) as well as prunings which are left in the field. CO2 Annual Emissions due to the use of fertilizers	(BF is not included)
CO2 CO Emissions Rem	TAR a. It has to be underlined ARC is the result of the C which are applied for the b. The following are defined AE _r AE _p	363.466,7262 tn CO2/year 308.101,6417 tn CO2/year d an important difference between ARC and TAR: :CO2 mass balance between (a) the total quantity of CO2 which is at e cultivation of the tree. ned as fallen biomass: fallen leaves, fallen fruits (naturally fallen or 37.063,1211 tn CO2/year 16.130,7560 tn CO2/year	CO2 Total Annual Removals CO2 Total Annual Removals ostracted from the atmosphere [=TAR] by the tree in order to create biomass and (b) the total quantity of CO2 which is emitted to the atmosphere due to as a result of a thinning process), other fallen biomass (e.g. almond hulls) as well as prunings which are left in the field. CO2 Annual Emissions due to the use of fertilizers CO2 Annual Emissions due to the use of pesticides	(BF is not included)
	TAR a. It has to be underlined ARC is the result of the CI which are applied for the b. The following are defir AE _r AE _p AE _{rae} TAE	363.466,7262 tn CO2/year 308.101,6417 tn CO2/year d an important difference between ARC and TAR: :02 mass balance between (a) the total quantity of CO2 which is ab cultivation of the tree. ned as fallen biomass: fallen leaves, fallen fruits (naturally fallen or 37.063,1211 tn CO2/year 16.130,7560 tn CO2/year 27.247,8201 tn CO2/year 80.441,6971 tn CO2/year	CO2 Total Annual Removals CO2 Total Annual Removals costracted from the atmosphere [=TAR] by the tree in order to create biomass and (b) the total quantity of CO2 which is emitted to the atmosphere due to as a result of a thinning process), other fallen biomass (e.g. almond hulls) as well as prunings which are left in the field. CO2 Annual Emissions due to the use of fertilizers CO2 Annual Emissions due to the use of pesticides CO2 Annual Emissions due to the use of fossil fuels & electricity	(BF is not included)
CO2 Emissions	TAR a. It has to be underlined ARC is the result of the C which are applied for the b. The following are defined AE _r AE _r AE _r AE _{re}	363.466,7262 tn CO2/year 308.101,6417 tn CO2/year d an important difference between ARC and TAR: :02 mass balance between (a) the total quantity of CO2 which is at e cultivation of the tree. ned as fallen biomass: fallen leaves, fallen fruits (naturally fallen or 37.063,1211 tn CO2/year 16.130,7560 tn CO2/year 27.247,8201 tn CO2/year	CO2 Total Annual Removals CO2 Total Annual Removals Distracted from the atmosphere [=TAR] by the tree in order to create biomass and (b) the total quantity of CO2 which is emitted to the atmosphere due to as a result of a thinning process), other fallen biomass (e.g. almond hulls) as well as prunings which are left in the field. CO2 Annual Emissions due to the use of fertilizers CO2 Annual Emissions due to the use of pesticides CO2 Annual Emissions due to the use of fossil fuels & electricity CO2 Total Annual Emissions	(BF is not included)
CO2 Emissions R4.1	TAR a. It has to be underlined ARC is the result of the Cl which are applied for the b. The following are defined AE _r AE _p AE _{rbac} TAE AE _b	363.466,7262 tn CO2/year 308.101,6417 tn CO2/year a nimportant difference between ARC and TAR: :02 mass balance between (a) the total quantity of CO2 which is ab cultivation of the tree. ned as fallen biomass: fallen leaves, fallen fruits (naturally fallen or 37.063,1211 tn CO2/year 16.130,7560 tn CO2/year 27.247,8201 tn CO2/year 80.441,6971 tn CO2/year 20.184,8514 tn CO2/year	CO2 Total Annual Removals CO2 Total Annual Removals costracted from the atmosphere [=TAR] by the tree in order to create biomass and (b) the total quantity of CO2 which is emitted to the atmosphere due to ras a result of a thinning process), other fallen biomass (e.g. almond hulls) as well as prunings which are left in the field. CO2 Annual Emissions due to the use of fertilizers CO2 Annual Emissions due to the use of fossil fuels & electricity CO2 Total Annual Emissions CO2 Annual Emissions due to the use of fersil fuels & electricity CO2 Annual Emissions CO2 Annual Emissions due to the use of diesel	(BF is not included)
CO2 R4.1 R4.2	TAR a. It has to be underlined ARC is the result of the CI which are applied for the b. The following are defined AEr AEp AErse TAE AEp AEg AEg AEg AEg	363.466,7262 tn CO2/year 308.101,6417 tn CO2/year a nimportant difference between ARC and TAR: :02 mass balance between (a) the total quantity of CO2 which is ab cultivation of the tree. ned as fallen biomass: fallen leaves, fallen fruits (naturally fallen or 37.063,1211 tn CO2/year 16.130,7560 tn CO2/year 20.7447,8201 tn CO2/year 20.184,8514 tn CO2/year 20.184,8514 tn CO2/year 1.151,9053 tn CO2/year	CO2 Total Annual Removals CO2 Total Annual Removals costracted from the atmosphere [=TAR] by the tree in order to create biomass and (b) the total quantity of CO2 which is emitted to the atmosphere due to ras a result of a thinning process), other fallen biomass (e.g. almond hulls) as well as prunings which are left in the field. CO2 Annual Emissions due to the use of fertilizers CO2 Annual Emissions due to the use of pesticides CO2 Annual Emissions due to the use of forsil fuels & electricity CO2 Total Annual Emissions CO2 Annual Emissions due to the use of diesel CO2 Annual Emissions due to the use of gasoline	(BF is not included)
R4.1 R4.2 R4.3	TAR a. It has to be underlined ARC is the result of the CU which are applied for the b. The following are defined AEr	363.466,7262 tn CO2/year 308.101,6417 tn CO2/year d an important difference between ARC and TAR: :CO2 mass balance between (a) the total quantity of CO2 which is at e cultivation of the tree. ned as fallen biomass: fallen leaves, fallen fruits (naturally fallen or 37.063,1211 tn CO2/year 16.130,7560 tn CO2/year 27.247,8201 tn CO2/year 80.441,6971 tn CO2/year 20.184,8514 tn CO2/year 1.151,9053 tn CO2/year 5.911,0634 tn CO2/year	CO2 Total Annual Removals CO2 Total Annual Removals costracted from the atmosphere [=TAR] by the tree in order to create biomass and (b) the total quantity of CO2 which is emitted to the atmosphere due to ras a result of a thinning process), other fallen biomass (e.g. almond hulls) as well as prunings which are left in the field. CO2 Annual Emissions due to the use of fertilizers CO2 Annual Emissions due to the use of posticides CO2 Annual Emissions due to the use of fossil fuels & electricity CO2 Annual Emissions CO2 Annual Emissions due to the use of diesel CO2 Annual Emissions due to the use of electricity CO2 Annual Emissions due to the use of electricity	(BF is not included)
R4.1 R4.2 R4.3	TAR a. It has to be underlined ARC is the result of the CU which are applied for the b. The following are defined AEr	363.466,7262 tn CO2/year 308.101,6417 tn CO2/year d an important difference between ARC and TAR: :CO2 mass balance between (a) the total quantity of CO2 which is at e cultivation of the tree. ned as fallen biomass: fallen leaves, fallen fruits (naturally fallen or 37.063,1211 tn CO2/year 16.130,7560 tn CO2/year 27.247,8201 tn CO2/year 80.441,6971 tn CO2/year 20.184,8514 tn CO2/year 1.151,9053 tn CO2/year 5.911,0634 tn CO2/year	CO2 Total Annual Removals CO2 Total Annual Removals costracted from the atmosphere [=TAR] by the tree in order to create biomass and (b) the total quantity of CO2 which is emitted to the atmosphere due to ras a result of a thinning process), other fallen biomass (e.g. almond hulls) as well as prunings which are left in the field. CO2 Annual Emissions due to the use of fertilizers CO2 Annual Emissions due to the use of posticides CO2 Annual Emissions due to the use of fossil fuels & electricity CO2 Annual Emissions CO2 Annual Emissions due to the use of diesel CO2 Annual Emissions due to the use of electricity CO2 Annual Emissions due to the use of electricity	(BF is not included)
R4.1 R4.2 R4.3	TAR a. It has to be underlined ARC is the result of the CU which are applied for the b. The following are defined AEr AEp AEr AEg AErae AEg	363.466,7262 th CO2/year 308.101,6417 th CO2/year 3 an important difference between ARC and TAR: :: ::O2 mass balance between (a) the total quantity of CO2 which is ab : ::O2 mass balance between (a) the total quantity of CO2 which is ab : ::O2 mass balance between (a) the total quantity of CO2 which is ab : ::O2 mass balance between (a) the total quantity of CO2 which is ab : ::O2 mass balance between (a) the total quantity of CO2 which is ab : ::O2 mass balance between (a) the total quantity of CO2 which is ab : ::O3 mass balance between (a) the total quantity of CO2 which is ab : ::O4 mass balance between (a) the total quantity of CO2 which is ab : ::O3 mass balance between (a) the total quantity of CO2 which is ab : ::O2 mass balance between (a) the CO2/year : ::O4 mass balance between (a) the CO2/year : ::O5 mass balance between (a) the CO2/year : ::O1 moss balance between (a) the CO2/year : ::O1 moss balance between (a) the CO2/year : ::O2 mass balance between (a) the CO2/year : ::O3 mass balance between (a) the CO2/year :	CO2 Total Annual Removals CO2 Total Annual Removals Distracted from the atmosphere [=TAR] by the tree in order to create biomass and (b) the total quantity of CO2 which is emitted to the atmosphere due to r as a result of a thinning process), other fallen biomass (e.g. almond hulls) as well as prunings which are left in the field. CO2 Annual Emissions due to the use of fertilizers CO2 Annual Emissions due to the use of pesticides CO2 Total Annual Emissions due to the use of fossil fuels & electricity CO2 Total Annual Emissions due to the use of diesel CO2 Annual Emissions due to the use of gasoline CO2 Annual Emissions due to the use of electricity CO2 Annual Emissions due to the use of fossil fuels & electricity	(BF is not included)
R4.1 R4.2 R4.3	TAR a. It has to be underlined ARC is the result of the CU which are applied for the b. The following are defined AEr AEp AEre AEre AEg	363.466,7262 tn CO2/year 308.101,6417 tn CO2/year 3 an important difference between ARC and TAR: :C2 mass balance between (a) the total quantity of CO2 which is ab cultivation of the tree. ned as fallen biomass: fallen leaves, fallen fruits (naturally fallen or 37.063,1211 tn CO2/year 16.130,7560 tn CO2/year 27.247,8201 tn CO2/year 20.184,8514 tn CO2/year 20.184,8514 tn CO2/year 5.911,0634 tn CO2/year 27.247,8201 tn CO2/year 0,0000 tn CO2/year	CO2 Total Annual Removals CO2 Total Annual Removals astracted from the atmosphere [=TAR] by the tree in order to create biomass and (b) the total quantity of CO2 which is emitted to the atmosphere due to as a result of a thinning process), other fallen biomass (e.g. almond hulls) as well as prunings which are left in the field. CO2 Annual Emissions due to the use of fertilizers CO2 Annual Emissions due to the use of pesticides CO2 Annual Emissions due to the use of fossil fuels & electricity CO2 Annual Emissions CO2 Annual Emissions due to the use of diesel CO2 Annual Emissions due to the use of electricity CO2 Annual Emissions due to the use of electricity CO2 Annual Emissions due to the use of electricity CO2 Annual Emissions due to the use of electricity CO2 Annual Emissions due to the use of electricity CO2 Annual Emissions due to the use of leesel CO2 Annual Emissions due to the use of fossil fuels & electricity CO2 Annual Emissions due to the use of fossil fuels & electricity CO2 Annual Emissions due to the use of fossil fuels & electricity CO2 Annual Emissions due to the use of fossil fuels & electricity CO2 Annual Emissions due to the use of fossil fuels & electricity CO2 Annual Emissions due to Nitrogen-fertilizers reduction (use of Leguminosae cover crops)	(BF is not included)
R4.1 R4.2 R4.3 R4.4	TAR a. It has to be underlined ARC is the result of the Cl which are applied for the b. The following are defin AE _r AE _p AE _{r8e} TAE AE _{r8} AE _{r8} AE _{r8} AE _{r8} AE ₆ AE ₆ AE ₆ AE ₆ AE ₆ AE ₇ AE ₇	363.466,7262 tn CO2/year 308.101,6417 tn CO2/year 3 an important difference between ARC and TAR: :02 mass balance between (a) the total quantity of CO2 which is ab e cultivation of the tree. ned as fallen biomass: fallen leaves, fallen fruits (naturally fallen or 37.063,1211 tn CO2/year 16.130,7560 tn CO2/year 27.247,8201 tn CO2/year 20.184,8514 tn CO2/year 20.184,8514 tn CO2/year 5.911,0634 tn CO2/year 27.247,8201 tn CO2/year 0,0000 tn CO2/year 0,0000 tn CO2/year	CO2 Total Annual Removals CO2 Total Annual Removals astracted from the atmosphere [=TAR] by the tree in order to create biomass and (b) the total quantity of CO2 which is emitted to the atmosphere due to as a result of a thinning process), other fallen biomass (e.g. almond hulls) as well as prunings which are left in the field. CO2 Annual Emissions due to the use of fertilizers CO2 Annual Emissions due to the use of operaticides CO2 Annual Emissions due to the use of forsil fuels & electricity CO2 Annual Emissions CO2 Annual Emissions due to the use of diesel CO2 Annual Emissions due to the use of electricity CO2 Annual Emissions due to the use of electricity CO2 Annual Emissions due to the use of diesel CO2 Annual Emissions due to the use of electricity CO2 Annual Emissions due to the use of fersil fuels & electricity CO2 Annual Emissions due to the use of fersil fuels & electricity CO2 Annual Emissions due to the use of gasoline CO2 Annual Emissions due to the use of fersil fuels & electricity CO2 Annual Emissions due to the use of fersil fuels & electricity CO2 Annual Emissions due to the use of forsil fuels & electricity CO2 Annual Gain due to Nitrogen-fertilizers reduction (use of Leguminosae cover crops) CO2 Annual Gain due to Nitrogen-fertilizers reduction (use of fertigation) <td>(BF is not included)</td>	(BF is not included)
R4.1 R4.2 R4.3 R4.4	TAR a. It has to be underlined ARC is the result of the Cl which are applied for the b. The following are defin AE _p AE _f AE _{ff} AE _{ff} AE _{ff} AE _{ff} AE _{ff} AE _{ff} AG _{l, FGT} AG _{H_cC/m} AG _{WF}	363.466,7262 tn CO2/year 308.101,6417 tn CO2/year 308.101,6417 tn CO2/year d an important difference between ARC and TAR: :02 mass balance between (a) the total quantity of CO2 which is ab a cultivation of the tree. ned as fallen biomass: fallen leaves, fallen fruits (naturally fallen or 37.063,1211 tn CO2/year 16.130,7560 tn CO2/year 20.184,8514 tn CO2/year 20.184,8514 tn CO2/year 20.184,8514 tn CO2/year 5.911,0634 tn CO2/year 0,0000 tn CO2/year	CO2 Total Annual Removals CO2 Total Annual Removals Destracted from the atmosphere [=TAR] by the tree in order to create biomass and (b) the total quantity of CO2 which is emitted to the atmosphere due to r-as a result of a thinning process), other fallen biomass (e.g. almond hulls) as well as prunings which are left in the field. CO2 Annual Emissions due to the use of fertilizers CO2 Annual Emissions due to the use of pesticides CO2 Annual Emissions due to the use of fossil fuels & electricity CO2 Total Annual Emissions due to the use of diesel CO2 Annual Emissions due to the use of gasoline CO2 Annual Emissions due to the use of gasoline CO2 Annual Emissions due to the use of fossil fuels & electricity CO2 Annual Emissions due to the use of fossil fuels & electricity CO2 Annual Emissions due to the use of gasoline CO2 Annual Emissions due to the use of gasoline CO2 Annual Emissions due to the use of fossil fuels & electricity CO2 Annual Emissions due to the use of fossil fuels & electricity CO2 Annual Emissions due to the use of fossil fuels & electricity CO2 Annual Gain due to Nitrogen-fertilizers reduction (use of Leguminosae cover crops) CO2 Annual Gain due to Nitrogen-fertilizers reduction (use of cover crops/mulching) CO2 Annual Gain due to herbicides reduction (use of cover crops/mulching) CO2 Annual Gain	(BF is not included)
R4.1 R4.2 R4.3	TAR a. It has to be underlined ARC is the result of the Cl which are applied for the b. The following are defin AE _r AE _p AE _{r8e} TAE AE _{r8} AE _{r8} AE _{r8} AE _{r8} AE ₆ AE ₆ AE ₆ AE ₆ AE ₆ AE ₇ AE ₇	363.466,7262 tn CO2/year 308.101,6417 tn CO2/year 3 an important difference between ARC and TAR: :02 mass balance between (a) the total quantity of CO2 which is at e cultivation of the tree. ned as fallen biomass: fallen leaves, fallen fruits (naturally fallen or 37.063,1211 tn CO2/year 16.130,7560 tn CO2/year 20.184,8514 tn CO2/year 20.184,8514 tn CO2/year 1.51,9053 tn CO2/year 2.911,0634 tn CO2/year 0,0000 tn CO2/year 0,2000 tn CO2/year 0,2000 tn CO2/year 0,2000 tn CO2/year	CO2 Total Annual Removals CO2 Total Annual Removals costracted from the atmosphere [=TAR] by the tree in order to create biomass and (b) the total quantity of CO2 which is emitted to the atmosphere due to as a result of a thinning process), other fallen biomass (e.g. almond hulls) as well as prunings which are left in the field. CO2 Annual Emissions due to the use of fertilizers CO2 Annual Emissions due to the use of pesticides CO2 Annual Emissions due to the use of fossil fuels & electricity CO2 Annual Emissions due to the use of gasoline CO2 Annual Emissions due to the use of gasoline CO2 Annual Emissions due to the use of electricity CO2 Annual Emissions due to the use of fossil fuels & electricity CO2 Annual Emissions due to the use of gasoline CO2 Annual Emissions due to the use of gasoline CO2 Annual Emissions due to the use of fossil fuels & electricity CO2 Annual Emissions due to the use of fossil fuels & electricity CO2 Annual Emissions due to the use of fossil fuels & electricity CO2 Annual Emissions due to the use of fossil fuels & electricity CO2 Annual Gain due to Nitrogen-fertilizers reduction (use of Leguminosae cover crops) CO2 Annual Gain due to Nitrogen-fertilizers reduction (use of fertigation) CO2 Annual Gain due to herbicides reduction (use of cover crops/mulching) CO2 Annual Gain due to insec	(BF is not included)
R4.1 R4.2 R4.3 R4.4	TAR a. It has to be underlined ARC is the result of the Cl which are applied for the b. The following are defin AE _p AE _f AE _{ff} AE _{ff} AE _{ff} AE _{ff} AE _{ff} AE _{ff} AG _{l, FGT} AG _{H_cC/m} AG _{WF}	363.466,7262 tn CO2/year 308.101,6417 tn CO2/year 308.101,6417 tn CO2/year d an important difference between ARC and TAR: :02 mass balance between (a) the total quantity of CO2 which is ab e cultivation of the tree. ned as fallen biomass: fallen leaves, fallen fruits (naturally fallen or 37.063,1211 tn CO2/year 16.130,7560 tn CO2/year 20.184,8514 tn CO2/year 20.184,8514 tn CO2/year 20.184,8514 tn CO2/year 3.911,0634 tn CO2/year 0,0000 tn CO2/year	CO2 Total Annual Removals CO2 Total Annual Removals Destracted from the atmosphere [=TAR] by the tree in order to create biomass and (b) the total quantity of CO2 which is emitted to the atmosphere due to r-as a result of a thinning process), other fallen biomass (e.g. almond hulls) as well as prunings which are left in the field. CO2 Annual Emissions due to the use of fertilizers CO2 Annual Emissions due to the use of pesticides CO2 Annual Emissions due to the use of fossil fuels & electricity CO2 Total Annual Emissions due to the use of diesel CO2 Annual Emissions due to the use of gasoline CO2 Annual Emissions due to the use of gasoline CO2 Annual Emissions due to the use of fossil fuels & electricity CO2 Annual Emissions due to the use of fossil fuels & electricity CO2 Annual Emissions due to the use of gasoline CO2 Annual Emissions due to the use of gasoline CO2 Annual Emissions due to the use of fossil fuels & electricity CO2 Annual Emissions due to the use of fossil fuels & electricity CO2 Annual Emissions due to the use of fossil fuels & electricity CO2 Annual Gain due to Nitrogen-fertilizers reduction (use of Leguminosae cover crops) CO2 Annual Gain due to Nitrogen-fertilizers reduction (use of cover crops/mulching) CO2 Annual Gain due to herbicides reduction (use of cover crops/mulching) CO2 Annual Gain	(BF is not included)
R4.1 R4.2 R4.3 R4.4	TAR a. It has to be underlined ARC is the result of the Cl which are applied for the b. The following are defin AE _p AE _r AE _g AE _{flac} TAE AE _{flac} AG _{gass}	363.466,7262 th CO2/year 308.101,6417 th CO2/year 308.101,6417 th CO2/year d an important difference between ARC and TAR: ::::O2 :::O2 mass balance between (a) the total quantity of CO2 which is ab ::::O2 ::O2 mass balance between (a) the total quantity of CO2 which is ab ::::O2 ::O2 mass balance between (a) the total quantity of CO2 which is ab :::::::O2 ::O2 mass balance between (a) the total quantity of CO2 which is ab ::::::::::::::::::::::::::::::::::::	CO2 Total Annual Removals CO2 Total Annual Removals Destracted from the atmosphere [=TAR] by the tree in order to create biomass and (b) the total quantity of CO2 which is emitted to the atmosphere due to ras a result of a thinning process), other fallen biomass (e.g. almond hulls) as well as prunings which are left in the field. CO2 Annual Emissions due to the use of fertilizers CO2 Annual Emissions due to the use of pesticides CO2 Annual Emissions due to the use of fossil fuels & electricity CO2 Total Annual Emissions due to the use of gasoline CO2 Annual Emissions due to the use of gasoline CO2 Annual Emissions due to the use of fossil fuels & electricity CO2 Annual Emissions due to the use of fossil fuels & electricity CO2 Annual Emissions due to the use of gasoline CO2 Annual Emissions due to the use of fossil fuels & electricity CO2 Annual Emissions due to the use of fossil fuels & electricity CO2 Annual Emissions due to the use of fossil fuels & electricity CO2 Annual Emissions due to the use of fossil fuels & electricity CO2 Annual Emissions due to the use of forsil fuels & electricity CO2 Annual Gain due to Nitrogen-fertilizers reduction (use of Leguminosae cover crops) CO2 Annual Gain due to Introgen-fertilizers reduction (use of fortigation) CO2 Annual Gain due to therbicides reduction (use of cover crops/mulching) <t< td=""><td>(BF is not included)</td></t<>	(BF is not included)

	CO2 Removal Capacity Indexes				
R6.1	ARC area	8,35229	tn CO2/hectare/year	CO2 Annual Removal Capacity per unit of cultivated area	

.2	ADC	0.00070	to CO2/ba africiald/user	COD A served Benerated Consistence with of the server to all facility	(DE is included)
.3	ARC	0,36076	tn CO2/tn of yield/year	CO2 Annual Removal Capacity per unit of harvested fruits	(BF is included)
.3	ARC _{tree}	0,01873	tn CO2/tree/year	CO2 Annual Removal Capacity per tree unit	
.1	ARCarea	6,71842	tn CO2/hectare/year	CO2 Annual Removal Capacity per unit of cultivated area	
.1		0,29019			(BF is not included)
.2	ARCproduct		tn CO2/tn of yield/year	CO2 Annual Removal Capacity per unit of harvested fruits	
	ARC _{tree}	0,01507	tn CO2/tree/year	CO2 Annual Removal Capacity per tree unit	
1	TAE/TAR	0,22132	Total Annual CO2 Emissions/ Total Annu	al CO2 Removals	(BF is included)
2	TAE/TAR	0,26109	Total Annual CO2 Emissions/ Total Annu		(BF is not included)
ιΓ	TAR _{area}	10,72618	tn CO2/hectare/year	CO2 Total Annual Removals per unit of cultivated area	
2	TAR _{product}	0,46330	tn CO2/tn of yield/year	CO2 Total Annual Removals per unit of harvested fruits	(BF is included)
.3	TAR _{tree}	0,02405	tn CO2/tree/year	CO2 Total Annual Removals per tree unit	
.1	TAR _{area}	9,09232	tn CO2/hectare/year	CO2 Total Annual Removals per unit of cultivated area	
.2	TARproduct	0,39273	tn CO2/tn of yield/year	CO2 Total Annual Removals per unit of harvested fruits	(BF is not included)
.3	TAR _{tree}	0,02039	tn CO2/tree/year	CO2 Total Annual Removals per tree unit	
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.1	AR _{BF_area}	1,63387	tn CO2/hectare/year	CO2 Annual Removal due to the production of fruit biomass per unit of cultivated area	
.2	AR _{BF_product}	0,07057	tn CO2/tn of yield/year	CO2 Annual Removal due to the production of fruit biomass per unit of harvested fruits	
.3	AR _{BF_tree}	0,00366	tn CO2/tree/year	CO2 Annual Removal due to the production of fruit biomass per tree unit	
		0.000		CO2 Accord Descent data for the construction of the constant o	
.1	AR _{BW_area}	8,87914	tn CO2/hectare/year	CO2 Annual Removal due to the production of wood biomass per unit of cultivated area	
2.2	AR _{BW_product}	0,38352	tn CO2/tn of yield/year	CO2 Annual Removal due to the production of wood biomass per unit of harvested fruits	
.3	AR _{BW_tree}	0,01991	tn CO2/tree/year	CO2 Annual Removal due to the production of wood biomass per tree unit	
		0.04047		CO2 Annual Storage in soil as carbon of the fallen biomass per unit of cultivated area	
.1	AS _{S_area}	0,21317	tn CO2/hectare/year		
.2	AS _{S_product}	0,00921	tn CO2/tn of yield/year	CO2 Annual Storage in soil as carbon of the fallen biomass per unit of harvested fruits	
.3	AS _{S_tree}	0,00048	tn CO2/tree/year	CO2 Annual Storage in soil as carbon of the fallen biomass per tree unit	
.1	TAEarea	2,37390	tn CO2/hectare/year	CO2 Total Annual Emissions per unit of cultivated area	
1.2	TAEproduct	0,10254	tn CO2/tn of yield/year	CO2 Total Annual Emissions per unit of harvested fruits	
1.3	TAE _{tree}	0,00532	tn CO2/tree/year	CO2 Total Annual Emissions per tree unit	
	uee	0,00002			
.1	AE _{f_area}	1,09376	tn CO2/hectare/year	CO2 Annual Emissions due to the use of fertilizers per unit of cultivated area	
5.2	AE _{f_product}	0,04724	tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of fertilizers per unit of harvested fruits	
.3	AE _{f tree}	0,00245	tn CO2/tree/year	CO2 Annual Emissions due to the use of fertilizers per tree unit	
				· ·	
.1	AE _{p_area}	0,47603	tn CO2/hectare/year	CO2 Annual Emissions due to the use of pesticides per unit of cultivated area	
.2	AE _{p_product}	0,02056	tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits	
.3	AE _{p_tree}	0.004.07			
		0,00107	tn CO2/tree/year	CO2 Annual Emissions due to the use of pesticides per tree unit	
		0,00107	th CO2/tree/year	CO2 Annual Emissions due to the use of pesticides per tree unit	
	AE _{ff&e_area}	0,00107	th CO2/tree/year th CO2/hectare/year	CO2 Annual Emissions due to the use of pesticides per tree unit CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area	
.1	AE _{ff&e_area}				
.1		0,80410	tn CO2/hectare/year	CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area	
.1 .2 .3	AE _{ff&e_area} AE _{ff&e_product} AE _{ff&e_tree}	0,80410 0,03473 0,00180	tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year	CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per tree unit	
.1 .2 .3	AE _{ff&e_area} AE _{ff&e_product} AE _{ff&e_tree} AE _{p_area}	0,80410 0,03473 0,00180 0,59567	tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year	CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per tree unit CO2 Annual Emissions due to the use of diesel per unit of cultivated area	
.1 .2 .3 .1 .2	AE _{ff&e_area} AE _{ff&e_product} AE _{ff&e_tree}	0,80410 0,03473 0,00180 0,59567 0,02573	tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year	CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per tree unit CO2 Annual Emissions due to the use of diesel per unit of cultivated area CO2 Annual Emissions due to the use of diesel per unit of harvested fruits	
.1 .2 .3 .1 .2	AE _{ff&e_area} AE _{ff&e_product} AE _{ff&e_tree} AE _{p_area}	0,80410 0,03473 0,00180 0,59567	tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year	CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per tree unit CO2 Annual Emissions due to the use of diesel per unit of cultivated area	
.1 .2 .3 .1 .2 .3	AE _{ff&e_area} AE _{ff&e_product} AE _{ff&e_tree} AE _{D_area} AE _{D_product} AE _{D_tree}	0,80410 0,03473 0,00180 0,59567 0,02573 0,00134	tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year	CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per tree unit CO2 Annual Emissions due to the use of diesel per unit of cultivated area CO2 Annual Emissions due to the use of diesel per unit of harvested fruits CO2 Annual Emissions due to the use of diesel per unit of harvested fruits CO2 Annual Emissions due to the use of diesel per unit of harvested fruits	
.1 .2 .3 .1 .2 .3 .3	AE _{ff&e_area} AE _{ff&e_product} AE _{ff&e_product} AE _{D_area} AE _{D_product} AE _{D_tree} AE _{C_area}	0,80410 0,03473 0,00180 0,59567 0,02573 0,00134 0,03399	tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year	CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per tree unit CO2 Annual Emissions due to the use of diesel per unit of cultivated area CO2 Annual Emissions due to the use of diesel per unit of harvested fruits CO2 Annual Emissions due to the use of diesel per unit of harvested fruits CO2 Annual Emissions due to the use of diesel per tree unit CO2 Annual Emissions due to the use of diesel per tree unit CO2 Annual Emissions due to the use of gasoline per unit of cultivated area	
.1 .2 .3 .1 .2 .3 .3 .3 .1 .2	AE _{ff&e_area} AE _{ff&e_product} AE _{ff&e_tree} AE _{D_area} AE _{D_product} AE _{D_tree} AE _{G_area} AE _{G_product}	0,80410 0,03473 0,00180 0,59567 0,02573 0,00134 0,03399 0,00147	tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/hectare/year tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per tree unit CO2 Annual Emissions due to the use of diesel per unit of cultivated area CO2 Annual Emissions due to the use of diesel per unit of harvested fruits CO2 Annual Emissions due to the use of diesel per unit of harvested fruits CO2 Annual Emissions due to the use of diesel per tree unit CO2 Annual Emissions due to the use of diesel per tree unit CO2 Annual Emissions due to the use of gasoline per unit of cultivated area CO2 Annual Emissions due to the use of gasoline per unit of harvested fruits	
.1 .2 .3	AE _{ff&e_area} AE _{ff&e_product} AE _{ff&e_product} AE _{D_area} AE _{D_product} AE _{D_tree} AE _{C_area}	0,80410 0,03473 0,00180 0,59567 0,02573 0,00134 0,03399	tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year	CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per tree unit CO2 Annual Emissions due to the use of diesel per unit of cultivated area CO2 Annual Emissions due to the use of diesel per unit of harvested fruits CO2 Annual Emissions due to the use of diesel per unit of harvested fruits CO2 Annual Emissions due to the use of diesel per tree unit CO2 Annual Emissions due to the use of diesel per tree unit CO2 Annual Emissions due to the use of gasoline per unit of cultivated area	
.1 .2 .3 .1 .2 .3 .3 .1 .2 .3 .3	AE _{ff&e_product} AE _{ff&e_product} AE _{ff&e_tree} AE _{D_product} AE _{D_product} AE _{D_tree} AE _{G_product} AE _{G_product} AE _{G_tree}	0,80410 0,03473 0,00180 0,59567 0,02573 0,00134 0,03399 0,00147 0,00008	tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/tn of yield/year tn CO2/tree/year	CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per tree unit CO2 Annual Emissions due to the use of diesel per unit of cultivated area CO2 Annual Emissions due to the use of diesel per unit of harvested fruits CO2 Annual Emissions due to the use of diesel per unit of harvested fruits CO2 Annual Emissions due to the use of gasoline per unit of cultivated area CO2 Annual Emissions due to the use of gasoline per unit of cultivated area CO2 Annual Emissions due to the use of gasoline per unit of harvested fruits CO2 Annual Emissions due to the use of gasoline per unit of harvested fruits CO2 Annual Emissions due to the use of gasoline per unit of harvested fruits	
7.1 7.2 7.3 3.1 3.2 3.3 9.1 9.1 9.2 9.3 9.3	AE _{ff&e_product} AE _{ff&e_product} AE _{ff&e_product} AE _{D_product} AE _{D_product} AE _{G_product} AE _{G_product} AE _{G_tree} AE _{G_tree}	0,80410 0,03473 0,00180 0,59567 0,02573 0,00134 	tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tree/year tn CO2/tree/year tn CO2/tree/year tn CO2/tree/year tn CO2/tree/year tn CO2/tree/year	CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per tree unit CO2 Annual Emissions due to the use of diesel per unit of cultivated area CO2 Annual Emissions due to the use of diesel per unit of harvested fruits CO2 Annual Emissions due to the use of diesel per unit of harvested fruits CO2 Annual Emissions due to the use of diesel per unit of harvested fruits CO2 Annual Emissions due to the use of gasoline per unit of cultivated area CO2 Annual Emissions due to the use of gasoline per unit of harvested fruits CO2 Annual Emissions due to the use of gasoline per unit of harvested fruits CO2 Annual Emissions due to the use of gasoline per unit of harvested fruits CO2 Annual Emissions due to the use of gasoline per unit of harvested fruits CO2 Annual Emissions due to the use of gasoline per unit of harvested fruits CO2 Annual Emissions due to the use of gasoline per unit of harvested fruits CO2 Annual Emissions due to the use of gasoline per unit of cultivated area	
.1 .2 .3 .1 .2 .3 .3 .3 .3 .3 .3 .3 .2 .2 .2 .2 .2	AErtse_pros AErtse_product AErtse_product AErtse_product AE _{D_product} AE _{D_product} AE _{D_product} AE _{G_product} AE _{G_product} AE _{G_product} AE _{G_product} AE _{G_tree} AE _{L_product}	0,80410 0,03473 0,00180 0,59567 0,02573 0,00134 0,003399 0,00147 0,00008 0,17444 0,00753	tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/tree/year tn CO2/hectare/year tn CO2/hectare/year tn CO2/hectare/year	CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per tree unit CO2 Annual Emissions due to the use of fossil fuels & electricity per tree unit CO2 Annual Emissions due to the use of diesel per unit of cultivated area CO2 Annual Emissions due to the use of diesel per unit of harvested fruits CO2 Annual Emissions due to the use of diesel per tree unit CO2 Annual Emissions due to the use of gasoline per unit of cultivated area CO2 Annual Emissions due to the use of gasoline per unit of harvested fruits CO2 Annual Emissions due to the use of gasoline per unit of harvested fruits CO2 Annual Emissions due to the use of gasoline per unit of harvested fruits CO2 Annual Emissions due to the use of gasoline per unit of harvested fruits CO2 Annual Emissions due to the use of gasoline per unit of cultivated area CO2 Annual Emissions due to the use of electricity per unit of cultivated area CO2 Annual Emissions due to the use of electricity per unit of harvested fruits	
1 2 3 3 1 2 3 3 1 2 3 3	AE _{ff&e_product} AE _{ff&e_product} AE _{ff&e_product} AE _{D_product} AE _{D_product} AE _{G_product} AE _{G_product} AE _{G_tree} AE _{G_tree}	0,80410 0,03473 0,00180 0,59567 0,02573 0,00134 	tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tree/year tn CO2/tree/year tn CO2/tree/year tn CO2/tree/year tn CO2/tree/year tn CO2/tree/year	CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per tree unit CO2 Annual Emissions due to the use of diesel per unit of cultivated area CO2 Annual Emissions due to the use of diesel per unit of harvested fruits CO2 Annual Emissions due to the use of diesel per unit of harvested fruits CO2 Annual Emissions due to the use of diesel per unit of harvested fruits CO2 Annual Emissions due to the use of gasoline per unit of cultivated area CO2 Annual Emissions due to the use of gasoline per unit of harvested fruits CO2 Annual Emissions due to the use of gasoline per unit of harvested fruits CO2 Annual Emissions due to the use of gasoline per unit of harvested fruits CO2 Annual Emissions due to the use of gasoline per unit of harvested fruits CO2 Annual Emissions due to the use of gasoline per unit of harvested fruits CO2 Annual Emissions due to the use of gasoline per unit of harvested fruits CO2 Annual Emissions due to the use of gasoline per unit of cultivated area	

R21.2	TAGproduct	0,11376	tn CO2/tn of yield/year	CO2 Total Annual Gain per unit of harvested fruits
R21.3	TAG _{tree}	0,00591	tn CO2/tree/year	CO2 Total Annual Gain per tree unit
R22.1	AG _{N-f_LCC_area}	0,00000	tn CO2/hectare/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (Leguminosae cover crops) per unit of cultivated area
R22.2	AG _{N-f_LCC_product}	0,00000	tn CO2/tn of yield/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (Leguminosae cover crops) per unit of harvested fruits
R22.3	AG _{N-f_LCC_tree}	0,00000	tn CO2/tree/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (Leguminosae cover crops) per tree unit
R23.1	AG _{f_FGT_area}	0,00000	tn CO2/hectare/year	CO2 Annual Gain due to fertilizers reduction (fertigation) per unit of cultivated area
R23.2	AG _{f_FGT_product}	0,00000	tn CO2/tn of yield/year	CO2 Annual Gain due to fertilizers reduction (fertigation) per unit of harvested fruits
R23.3	AG _{f_FGT_tree}	0,00000	tn CO2/tree/year	CO2 Annual Gain due to fertilizers reduction (fertigation) per tree unit
R24.1	AG _{H_cc/m_area}	0,00000	tn CO2/hectare/year	CO2 Annual Gain due to herbicides reduction (cover crops/mulching) per unit of cultivated area
R24.2	AG _{H_cc/m_product}	0,00000	tn CO2/tn of yield/year	CO2 Annual Gain due to herbicides reduction (cover crops/mulching) per unit of harvested fruits
R24.3	AG _{H_cc/m_tree}	0,00000	tn CO2/tree/year	CO2 Annual Gain due to herbicides reduction (cover crops/mulching) per tree unit
R25.1	AG _{I_im/mt_area}	0,27217	tn CO2/hectare/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping) per unit of cultivated area
R25.2	AG _{I_im/mt_product}	0,01176	tn CO2/tn of yield/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping) per unit of harvested fruits
R25.3	AG _{I_im/mt_tree}	0,00061	tn CO2/tree/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping) per tree unit
R26.1	AG _{WF_area}	2,36149	tn CO2/hectare/year	CO2 Annual Gain due to the use of wood fuels instead of diesel per unit of cultivated area
R26.2	AG _{WF_product}	0,10200	tn CO2/tn of yield/year	CO2 Annual Gain due to the use of wood fuels instead of diesel per unit of harvested fruits
R26.3	AG _{WF_tree}	0,00530	tn CO2/tree/year	CO2 Annual Gain due to the use of wood fuels instead of diesel per tree unit
R27.1	AG _{RES_area}	0,00000	tn CO2/hectare/year	CO2 Annual Gain due to the use of RES per unit of cultivated area
R27.2	AG _{RES_product}	0,00000	tn CO2/tn of yield/year	CO2 Annual Gain due to the use of RES per unit of harvested fruits
R27.3	AG _{RES_tree}	0,00000	tn CO2/tree/year	CO2 Annual Gain due to the use of RES per tree unit

Op

CO2 Removal Capacity Indexes

8,71309

tn CO2/hectare/year

ARCarea

R6.1



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	Run 30 Ag	gricultural practice: Use of cover crops		Designed and developed	I by TERRA NOVA Ltd. 😿 TERRANOV	
	Results					
	Country where the Too	l is applied:	Greece			
	Species of tree crop:	Complete State	Orange			
	Geographical area of th	ne cultivation: GR	ECE (total)			
	CO2 Annual Removal	I Canacity				
R1.1	ARC	295.251,0925 tn CO2/year	CO2	Annual Removal Capacity	(BF is included)	
R1.2	ARC	237.117,7537 tn CO2/year		Annual Removal Capacity	(BF is not included)	
		means the abstraction of CO2 from atmosphere	002	Annour terrover capacity	(b) is not included)	
	BF: the fruits' biomass	means the abstraction of CO2 non-atmosphere				
	br. the muits biomass					
	Analysis					
	Analysis					
	AR	58.133,3388 tn CO2/year	C02	Annual Removal due to the production of fruit biomass		
<u>s</u>		300.878,0321 tn CO2/year		Annual Removal due to the production of wood biomass		
	AS					
, <u> </u>	AS _S 13.029,3724 th CO2/year					
lem c	TAR	13.029,3724 tn CO2/year		Annual Storage in soil as carbon of the fallen biomass	(BE is included)	
	TAR a. It has to be underlined ARC is the result of the CC	372.040,7433 tn CO2/year 313.907,4046 tn CO2/year an important difference between ARC and TAR: D2 mass balance between (a) the total quantity of CC	C02 C02		(BF is included) (BF is not included) ne agricultural practices	
	TAR a. It has to be underlined ARC is the result of the CC which are applied for the	372.040,7433 tn CO2/year 313.907,4046 tn CO2/year an important difference between ARC and TAR: D2 mass balance between (a) the total quantity of CC cultivation of the tree.	2 which is abstracted from the atmosph	Annual Storage in soil as carbon of the fallen biomass Total Annual Removals Total Annual Removals	(BF is not included)	
	TAR a. It has to be underlined ARC is the result of the CC which are applied for the	372.040,7433 tn CO2/year 313.907,4046 tn CO2/year an important difference between ARC and TAR: D2 mass balance between (a) the total quantity of C0 cultivation of the tree. led as fallen biomass: fallen leaves, fallen fruits (natu	CO2 CO2 2 which is abstracted from the atmosph rally fallen or as a result of a thinning pro	Annual Storage in soil as carbon of the fallen biomass Total Annual Removals Total Annual Removals ere [=TAR] by the tree in order to create biomass and (b) the total quantity of CO2 which is emitted to the atmosphere due to th	(BF is not included)	
sı	TAR a. It has to be underlined ARC is the result of the CC which are applied for the b. The following are defin AE _f	372.040,7433 tn CO2/year 313.907,4046 tn CO2/year an important difference between ARC and TAR: 20 mass balance between (a) the total quantity of CC cultivation of the tree. ed as fallen biomass: fallen leaves, fallen fruits (natu 37.063,1211 tn CO2/year	CO2 CO2 2 which is abstracted from the atmosph rally fallen or as a result of a thinning pro CO2	Annual Storage in soil as carbon of the fallen biomass Total Annual Removals Total Annual Removals ere [=TAR] by the tree in order to create biomass and (b) the total quantity of CO2 which is emitted to the atmosphere due to th press), other fallen biomass (e.g. almond hulls) as well as prunings which are left in the field.	(BF is not included)	
sı	TAR a. It has to be underlined ARC is the result of the CC which are applied for the b. The following are defin AE _f	372.040,7433 tn CO2/year 313.907,4046 tn CO2/year an important difference between ARC and TAR: D2 mass balance between (a) the total quantity of C0 cultivation of the tree. led as fallen biomass: fallen leaves, fallen fruits (natu	2 which is abstracted from the atmosph rally fallen or as a result of a thinning pro CO2 CO2	Annual Storage in soil as carbon of the fallen biomass Total Annual Removals Total Annual Removals ere [=TAR] by the tree in order to create biomass and (b) the total quantity of CO2 which is emitted to the atmosphere due to th process), other fallen biomass (e.g. almond hulls) as well as prunings which are left in the field. Annual Emissions due to the use of fertilizers	(BF is not included)	
sı	TAR a. It has to be underlined ARC is the result of the CC which are applied for the b. The following are defin AE _f	372.040,7433 tn CO2/year 313.907,4046 tn CO2/year an important difference between ARC and TAR: 22 mass balance between (a) the total quantity of CC cultivation of the tree. ed as fallen biomass: fallen leaves, fallen fruits (natu 37.063,1211 tn CO2/year 12.478,7097 tn CO2/year	2 which is abstracted from the atmosph rally fallen or as a result of a thinning pro CO2 CO2 CO2 CO2	Annual Storage in soil as carbon of the fallen biomass Total Annual Removals Total Annual Removals ere [=TAR] by the tree in order to create biomass and (b) the total quantity of CO2 which is emitted to the atmosphere due to th occess), other fallen biomass (e.g. almond hulls) as well as prunings which are left in the field. Annual Emissions due to the use of fertilizers Annual Emissions due to the use of pesticides	(BF is not included)	
Emissions	TAR a. It has to be underlined ARC is the result of the CC which are applied for the b. The following are defin AE _f AE _p AE _{ffRe} TAE	372.040,7433 tn CO2/year 313.907,4046 tn CO2/year an important difference between ARC and TAR: D2 mass balance between (a) the total quantity of CC cultivation of the tree. ed as fallen biomass: fallen leaves, fallen fruits (natu 37.063,1211 tn CO2/year 12.478,7097 tn CO2/year 27.247,8201 tn CO2/year 76.789,6508	2 which is abstracted from the atmosph ally fallen or as a result of a thinning pro CO2 CO2 CO2 CO2 CO2	Annual Storage in soil as carbon of the fallen biomass Total Annual Removals Total Annual Removals ere [=TAR] by the tree in order to create biomass and (b) the total quantity of CO2 which is emitted to the atmosphere due to th scess), other fallen biomass (e.g. almond hulls) as well as prunings which are left in the field. Annual Emissions due to the use of fertilizers Annual Emissions due to the use of pesticides Annual Emissions due to the use of fossil fuels & electricity Total Annual Emissions	(BF is not included)	
	TAR a. It has to be underlined ARC is the result of the CC which are applied for the b. The following are defin AE _f AE _p AE _{ffac}	372.040,7433 tn CO2/year 313.907,4046 tn CO2/year an important difference between ARC and TAR: 22 mass balance between (a) the total quantity of CC cultivation of the tree. ied as fallen biomass: fallen leaves, fallen fruits (natu 37.063,1211 tn CO2/year 12.478,7097 tn CO2/year 27.247,8201 tn CO2/year	2 which is abstracted from the atmosph rally fallen or as a result of a thinning pro CO2 CO2 CO2 CO2 CO2 CO2 CO2	Annual Storage in soil as carbon of the fallen biomass Total Annual Removals Total Annual Removals ere [=TAR] by the tree in order to create biomass and (b) the total quantity of CO2 which is emitted to the atmosphere due to th press), other fallen biomass (e.g. almond hulls) as well as prunings which are left in the field. Annual Emissions due to the use of fertilizers Annual Emissions due to the use of pesticides Annual Emissions due to the use of fossil fuels & electricity	(BF is not included)	
suoissima R4.1	TAR a. It has to be underlined ARC is the result of the CC which are applied for the b. The following are define AE _f AE _p AE _{face} TAE AE _b AE _g	372.040,7433 tn CO2/year 313.907,4046 tn CO2/year an important difference between ARC and TAR: D2 mass balance between (a) the total quantity of CC cultivation of the tree. ued as fallen biomass: fallen leaves, fallen fruits (natu 37.063,1211 tn CO2/year 12.478,7097 tn CO2/year 27.247,8201 tn CO2/year 76.789,6508 20.184,8514 tn CO2/year 1.151,9053 tn CO2/year	2 which is abstracted from the atmosph rally fallen or as a result of a thinning pro CO2 CO2 CO2 CO2 CO2 CO2 CO2 CO2 CO2 CO2	Annual Storage in soil as carbon of the fallen biomass Total Annual Removals Total Annual Removals ere [=TAR] by the tree in order to create biomass and (b) the total quantity of CO2 which is emitted to the atmosphere due to th brees), other fallen biomass (e.g. almond hulls) as well as prunings which are left in the field. Annual Emissions due to the use of fertilizers Annual Emissions due to the use of pesticides Annual Emissions due to the use of fossil fuels & electricity Total Annual Emissions Annual Emissions due to the use of diesel	(BF is not included)	
84.1 R4.2 R4.3	TAR a. It has to be underlined ARC is the result of the CC which are applied for the b. The following are defin AE _f AE _p AE _{ff&e} TAE AE _b	372.040,7433 tn CO2/year 313.907,4046 tn CO2/year an important difference between ARC and TAR: D2 mass balance between (a) the total quantity of CC cultivation of the tree. ed as failen biomass: failen leaves, failen fruits (natu 37.063,1211 tn CO2/year 12.478,7097 tn CO2/year 27.247,8201 tn CO2/year 76.789,6508 tn CO2/year 20.184,8514 tn CO2/year	2 which is abstracted from the atmosph rally fallen or as a result of a thinning pro CO2 CO2 CO2 CO2 CO2 CO2 CO2 CO2 CO2 CO2	Annual Storage in soil as carbon of the fallen biomass Total Annual Removals Total Annual Removals ere [=TAR] by the tree in order to create biomass and (b) the total quantity of CO2 which is emitted to the atmosphere due to th brees), other fallen biomass (e.g. almond hulls) as well as prunings which are left in the field. Annual Emissions due to the use of fertilizers Annual Emissions due to the use of pesticides Annual Emissions due to the use of fossil fuels & electricity Total Annual Emissions Annual Emissions due to the use of diesel Annual Emissions due to the use of gasoline	(BF is not included)	
suoissima R4.1 R4.2	TAR a. It has to be underlined ARC is the result of the CC which are applied for the b. The following are defined AE _f AE _p AF _{fike} TAE AE _b AE _g AE _g AE _g AE _g AE _g	372.040,7433 tn CO2/year 313.907,4046 tn CO2/year an important difference between ARC and TAR: D2 mass balance between (a) the total quantity of CC cultivation of the tree. eed as fallen biomass: fallen leaves, fallen fruits (natu 37.063,1211 tn CO2/year 12.478,7097 tn CO2/year 76.789,6508 tn CO2/year 20.184,8514 tn CO2/year 1.51,9053 tn CO2/year 5.911,0634 tn CO2/year	2 which is abstracted from the atmosph rally fallen or as a result of a thinning pro CO2 CO2 CO2 CO2 CO2 CO2 CO2 CO2 CO2 CO2	Annual Storage in soil as carbon of the fallen biomass Total Annual Removals Total Annual Removals Total Annual Removals ere [=TAR] by the tree in order to create biomass and (b) the total quantity of CO2 which is emitted to the atmosphere due to th occess), other fallen biomass (e.g. almond hulls) as well as prunings which are left in the field. Annual Emissions due to the use of fertilizers Annual Emissions due to the use of fossil fuels & electricity Total Annual Emissions Annual Emissions due to the use of diesel Annual Emissions due to the use of gasoline Annual Emissions due to the use of electricity	(BF is not included)	
84.1 R4.2 R4.3	TAR a. It has to be underlined ARC is the result of the CC which are applied for the b. The following are defin AE _f AE _{ff&e} AE _{ff&e} AE _{ff&e} AE _{ff&e}	372.040,7433 tn CO2/year 313.907,4046 tn CO2/year an important difference between ARC and TAR: D2 mass balance between (a) the total quantity of CC cultivation of the tree. eed as fallen biomass: fallen leaves, fallen fruits (natu 37.063,1211 tn CO2/year 12.478,7097 tn CO2/year 76.789,6508 tn CO2/year 20.184,8514 tn CO2/year 1.51,9053 tn CO2/year 5.911,0634 tn CO2/year	2 which is abstracted from the atmosph rally fallen or as a result of a thinning pro- CO2 CO2 CO2 CO2 CO2 CO2 CO2 CO2 CO2 CO2	Annual Storage in soil as carbon of the fallen biomass Total Annual Removals Total Annual Removals Total Annual Removals ere [=TAR] by the tree in order to create biomass and (b) the total quantity of CO2 which is emitted to the atmosphere due to th occess), other fallen biomass (e.g. almond hulls) as well as prunings which are left in the field. Annual Emissions due to the use of fertilizers Annual Emissions due to the use of fossil fuels & electricity Total Annual Emissions Annual Emissions due to the use of diesel Annual Emissions due to the use of gasoline Annual Emissions due to the use of electricity	(BF is not included)	
84.1 R4.2 R4.3	TAR a. It has to be underlined ARC is the result of the CC which are applied for the b. The following are defined AE _f AE _p AF _{fike} TAE AE _b AE _g AE _g AE _g AE _g AE _g	372.040,7433 tn CO2/year 313.907,4046 tn CO2/year an important difference between ARC and TAR: 22 mass balance between (a) the total quantity of CC cultivation of the tree. ed as fallen biomass: fallen leaves, fallen fruits (natu 37.063,1211 tn CO2/year 12.478,7097 tn CO2/year 27.247,8201 tn CO2/year 20.184,8514 tn CO2/year 20.184,8514 tn CO2/year 5.911,0634 tn CO2/year 27.247,8201 tn CO2/year	CO2 2 which is abstracted from the atmosph rally fallen or as a result of a thinning pro- CO2 CO2 CO2 CO2 CO2 CO2 CO2 CO2	Annual Storage in soil as carbon of the fallen biomass Total Annual Removals Total Annual Removals ere [=TAR] by the tree in order to create biomass and (b) the total quantity of CO2 which is emitted to the atmosphere due to th excess), other fallen biomass (e.g. almond hulls) as well as prunings which are left in the field. Annual Emissions due to the use of fertilizers Annual Emissions due to the use of festil fuels & electricity Total Annual Emissions due to the use of diesel Annual Emissions due to the use of gasoline Annual Emissions due to the use of gesoline Annual Emissions due to the use of fossil fuels & electricity Annual Emissions due to the use of fossil fuels & electricity Annual Emissions due to the use of fossil fuels & electricity	(BF is not included)	
84.1 R4.2 R4.3	TAR a. It has to be underlined ARC is the result of the CC which are applied for the b. The following are defin AE _f AE _p AE _f	372.040,7433 tn CO2/year 313.907,4046 tn CO2/year an important difference between ARC and TAR: D2 mass balance between (a) the total quantity of CC cultivation of the tree. ed as fallen biomass: fallen leaves, fallen fruits (natu 37.063,1211 tn CO2/year 12.478,7097 tn CO2/year 27.247,8201 tn CO2/year 20.184,8514 tn CO2/year 1.151,9053 tn CO2/year 5.911,0634 tn CO2/year 27.247,8201 tn CO2/year 0,0000 tn CO2/year	CO2 CO2 2 which is abstracted from the atmosph rally fallen or as a result of a thinning pro CO2 CO2 CO2 CO2 CO2 CO2 CO2 CO2 CO2 CO2	Annual Storage in soil as carbon of the fallen biomass Total Annual Removals Total Annual Removals ere [=TAR] by the tree in order to create biomass and (b) the total quantity of CO2 which is emitted to the atmosphere due to th ccess), other fallen biomass (e.g. almond hulls) as well as prunings which are left in the field. Annual Emissions due to the use of fertilizers Annual Emissions due to the use of fertilizes & electricity Total Annual Emissions due to the use of diesel Annual Emissions due to the use of diesel Annual Emissions due to the use of electricity Annual Emissions due to the use of sasoline Annual Emissions due to the use of fossil fuels & electricity Annual Emissions due to the use of sasoline Annual Emissions due to the use of fossil fuels & electricity Annual Emissions due to the use of fossil fuels & electricity Annual Emissions due to the use of sasoline Annual Emissions due to the use of fossil fuels & electricity Annual Gain due to Nitrogen-fertilizers reduction (use of Leguminosae cover crops)	(BF is not included)	
suoissimi R4.1 R4.2 R4.3 R4.4	TAR a. It has to be underlined ARC is the result of the CC which are applied for the b. The following are defin AE _f AE _g AE _{ffRe} TAE AE _g AE _{ffRe} AE _{ffRe} AG _{H-LCC} AG _{H-CC} /m	372.040,7433 tn CO2/year 313.907,4046 tn CO2/year an important difference between ARC and TAR: D2 mass balance between (a) the total quantity of CC cultivation of the tree. ed as fallen biomass: fallen leaves, fallen fruits (natu 37.063,1211 tn CO2/year 12.478,7097 tn CO2/year 27.247,8201 tn CO2/year 20.184,8514 tn CO2/year 20.184,8514 tn CO2/year 5.911,0634 tn CO2/year 27.247,8201 tn CO2/year 0,0000 tn CO2/year	CO2 CO2 2 which is abstracted from the atmosph rally fallen or as a result of a thinning pro CO2 CO2 CO2 CO2 CO2 CO2 CO2 CO2 CO2 CO2	Annual Storage in soil as carbon of the fallen biomass Total Annual Removals Total Annual Removals Total Annual Removals ere [=TAR] by the tree in order to create biomass and (b) the total quantity of CO2 which is emitted to the atmosphere due to th occess), other fallen biomass (e.g. almond hulls) as well as prunings which are left in the field. Annual Emissions due to the use of fertilizers Annual Emissions due to the use of fessil fuels & electricity Total Annual Emissions due to the use of diesel Annual Emissions due to the use of diesel Annual Emissions due to the use of fertilizet Annual Emissions due to the use of fossil fuels & electricity Annual Emissions due to the use of fossil fuels & electricity Annual Emissions due to the use of fossil fuels & electricity Annual Emissions due to the use of fossil fuels & electricity Annual Emissions due to the use of fossil fuels & electricity Annual Emissions due to the use of fossil fuels & electricity Annual Emissions due to the use of fossil fuels & electricity Annual Emissions due to the use of fossil fuels & electricity Annual Emissions due to the use of fossil fuels & electricity Annual Emissions due to the use of fossil fuels & electricity Annual Emissions due to the use of fossil fuels & electricity Annual Gain due to Nitrogen-fertilizers reduction (use of Leguminosae cover crops) Annual Gain due to fertilizers reduction (use of fertigation)	(BF is not included)	
suoissimi R4.1 R4.2 R4.3 R4.4	TAR a. It has to be underlined ARC is the result of the CC which are applied for the b. The following are defin AE _f AE _g AE _{ffRe} TAE AE _g AE _{ffRe} AE _{ffRe} AG _{H-LCC} AG _{H-CC} /m	372.040,7433 tn CO2/year 313.907,4046 tn CO2/year an important difference between ARC and TAR: 20 mass balance between (a) the total quantity of CO cultivation of the tree. ed as fallen biomass: fallen leaves, fallen fruits (natu 37.063,1211 tn CO2/year 12.478,7097 tn CO2/year 76.789,6508 tn CO2/year 20.184,8514 tn CO2/year 1.51,9053 tn CO2/year 5.911,0634 tn CO2/year 27.247,8201 tn CO2/year 0.0000 tn CO2/year 21.2478,7001 tn CO2/year	CO2 CO2 2 which is abstracted from the atmosph rally fallen or as a result of a thinning pro- CO2 CO2 CO2 CO2 CO2 CO2 CO2 CO2 CO2 CO2	Annual Storage in soil as carbon of the fallen biomass Total Annual Removals Total Annual Removals Total Annual Removals ere [=TAR] by the tree in order to create biomass and (b) the total quantity of CO2 which is emitted to the atmosphere due to th occess), other fallen biomass (e.g. almond hulls) as well as prunings which are left in the field. Annual Emissions due to the use of fertilizers Annual Emissions due to the use of festil fuels & electricity Total Annual Emissions due to the use of fossil fuels & electricity Annual Emissions due to the use of diesel Annual Emissions due to the use of festil fuels & electricity Annual Emissions due to the use of fossil fuels & electricity Annual Emissions due to the use of fossil fuels & electricity Annual Emissions due to the use of fossil fuels & electricity Annual Emissions due to the use of fossil fuels & electricity Annual Emissions due to the use of fossil fuels & electricity Annual Emissions due to the use of fossil fuels & electricity Annual Emissions due to the use of fossil fuels & electricity Annual Emissions due to the use of fossil fuels & electricity Annual Emissions due to the use of fossil fuels & electricity Annual Emissions due to the use of fossil fuels & electricity Annual Emissions due to the use of fossil fuels & electricity Annual Gain due to Nitrogen-fertilizers reduction (use of Leguminosae cover crops) Annual Gain due to herbicides reduction (use of cover crops/mulching)	(BF is not included)	
84.1 R4.2 R4.3	TAR a. It has to be underlined ARC is the result of the CC which are applied for the b. The following are defin AE _f AE _g AE _{ffRe} TAE AE _g AE _{ffRe} AE _{ffRe} AG _{H-LCC} AG _{H-CC} /m	372.040,7433 tn CO2/year 313.907,4046 tn CO2/year an important difference between ARC and TAR: 22 mass balance between (a) the total quantity of C0 cultivation of the tree. red as fallen biomass: fallen leaves, fallen fruits (natu 37.063,1211 tn CO2/year 12.478,7097 tn CO2/year 27.247,8201 tn CO2/year 20.184,8514 tn CO2/year 1.151,9053 tn CO2/year 27.247,8201 tn CO2/year 27.247,8201 tn CO2/year 0,0000 tn CO2/year 0,0000 tn CO2/year 0,0000 tn CO2/year 0,0000 tn CO2/year	CO2 CO2 2 which is abstracted from the atmosph rally fallen or as a result of a thinning pro- CO2 CO2 CO2 CO2 CO2 CO2 CO2 CO2 CO2 CO2	Annual Storage in soil as carbon of the fallen biomass Total Annual Removals Total Annual Removals ere [=TAR] by the tree in order to create biomass and (b) the total quantity of CO2 which is emitted to the atmosphere due to th excess), other fallen biomass (e.g. almond hulls) as well as prunings which are left in the field. Annual Emissions due to the use of fertilizers Annual Emissions due to the use of pesticides Annual Emissions due to the use of fossil fuels & electricity Total Annual Emissions due to the use of diesel Annual Emissions due to the use of felectricity Annual Emissions due to the use of felectricity Annual Emissions due to the use of fossil fuels & electricity Annual Emissions due to the use of fossil fuels & electricity Annual Emissions due to the use of fossil fuels & electricity Annual Emissions due to the use of fossil fuels & electricity Annual Emissions due to the use of fossil fuels & electricity Annual Emissions due to the use of fossil fuels & electricity Annual Emissions due to the use of fossil fuels & electricity Annual Emissions due to the use of fossil fuels & electricity Annual Emissions due to the use of fossil fuels & electricity Annual Gain due to Nitrogen-fertilizers reduction (use of Leguminosae cover crops) Annual Gain due to herbicides reduction (use of forcigation) Annual Gain due to insecticides reduction (use of sover crops/mulching) Annual Gain due to insecticides reduction (insects monitoring/mass trapping)	(BF is not included)	
suoissimi R4.1 R4.2 R4.3 R4.4	TAR TAR a. It has to be underlined ARC is the result of the CC which are applied for the b. The following are defin AE _f AE _g AE _{ffRe} TAE AE _{ffRe} AG _{MM} AG _{MVF} AG _{MKES}	372.040,7433 tn CO2/year 313.907,4046 tn CO2/year an important difference between ARC and TAR: 20 mass balance between (a) the total quantity of C0 cultivation of the tree. ed as fallen biomass: fallen leaves, fallen fruits (natu 37.063,1211 tn CO2/year 12.478,7097 tn CO2/year 27.247,8201 tn CO2/year 20.184,8514 tn CO2/year 1.151,9053 tn CO2/year 27.247,8201 tn CO2/year 3.911,0634 tn CO2/year 0,0000 tn CO2/year 0,0000 tn CO2/year 12.874,6452 tn CO2/year 0,0000 tn CO2/year	CO2 CO2 2 which is abstracted from the atmosph rally fallen or as a result of a thinning pro- CO2 CO2 CO2 CO2 CO2 CO2 CO2 CO2 CO2 CO2	Annual Storage in soil as carbon of the fallen biomass Total Annual Removals Total Annual Removals ere [=TAR] by the tree in order to create biomass and (b) the total quantity of CO2 which is emitted to the atmosphere due to th excess), other fallen biomass (e.g. almond hulls) as well as prunings which are left in the field. Annual Emissions due to the use of fertilizers Annual Emissions due to the use of fertilizers Annual Emissions due to the use of fossil fuels & electricity Total Annual Emissions due to the use of gasoline Annual Emissions due to the use of gasoline Annual Emissions due to the use of fossil fuels & electricity Annual Emissions due to the use of fossil fuels & electricity Annual Emissions due to the use of fossil fuels & electricity Annual Emissions due to the use of fossil fuels & electricity Annual Emissions due to the use of fossil fuels & electricity Annual Gain due to Nitrogen-fertilizers reduction (use of Leguminosae cover crops) Annual Gain due to herbicides reduction (use of forcing/mass trapping) Annual Gain due to the use of wood fuels instead of diesel	(BF is not included)	
suo:ssion R4.1 R4.2 R4.3 R4.4	TAR TAR a. It has to be underlined ARC is the result of the CC which are applied for the b. The following are defin AE _f AE _p AE _f AG _{i, f} AG _{i, f} AG _{i, f} AG _{i, m} AG _{WF}	372.040,7433 tn CO2/year 313.907,4046 tn CO2/year an important difference between ARC and TAR: 22 mass balance between (a) the total quantity of CC 20 mass balance between (a) the total quantity of CC cultivation of the tree. ed as fallen biomass: fallen leaves, fallen fruits (natu 37.063,1211 tn CO2/year 12.478,7097 tn CO2/year 20.184,8514 tn CO2/year 20.184,8514 tn CO2/year 20.184,8514 tn CO2/year 21,0000 tn CO2/year 0,0000 tn CO2/year	CO2 CO2 2 which is abstracted from the atmosph rally fallen or as a result of a thinning pro- CO2 CO2 CO2 CO2 CO2 CO2 CO2 CO2 CO2 CO2	Annual Storage in soil as carbon of the fallen biomass Total Annual Removals Total Annual Removals ere [=TAR] by the tree in order to create biomass and (b) the total quantity of CO2 which is emitted to the atmosphere due to th excess), other fallen biomass (e.g. almond hulls) as well as prunings which are left in the field. Annual Emissions due to the use of fertilizers Annual Emissions due to the use of fertilizers Annual Emissions due to the use of fossil fuels & electricity Total Annual Emissions due to the use of diesel Annual Emissions due to the use of diesel Annual Emissions due to the use of fossil fuels & electricity Annual Emissions due to the use of fossil fuels & electricity Annual Emissions due to the use of fossil fuels & electricity Annual Emissions due to the use of fossil fuels & electricity Annual Emissions due to the use of fossil fuels & electricity Annual Emissions due to the use of fossil fuels & electricity Annual Emissions due to the use of fossil fuels & electricity Annual Gain due to Nitrogen-fertilizers reduction (use of Leguminosae cover crops) Annual Gain due to nerbicides reduction (use of fertigation) Annual Gain due to nerbicides reduction (use of cover crops/mulching) Annual Gain due to insecticides reduction (use of cover crops/mulching) Annual Gain due to the use of wood fuels instead of diesel Annual Gain due to the use of mewable Energy Sources	(BF is not included)	

CO2 Annual Removal Capacity per unit of cultivated area

.2	100	0.070.00			(DE is is shaded)
	ARCproduct	0,35843	tn CO2/tn of yield/year	CO2 Annual Removal Capacity per unit of harvested fruits	(BF is included)
.3	ARC _{tree}	0,01954	tn CO2/tree/year	CO2 Annual Removal Capacity per tree unit	
.1	ARCarea	6,99753	tn CO2/hectare/year	CO2 Annual Removal Capacity per unit of cultivated area	
.1					(BF is not included)
	ARCproduct	0,28785	tn CO2/tn of yield/year	CO2 Annual Removal Capacity per unit of harvested fruits	(Br is not included)
3	ARC _{tree}	0,01569	tn CO2/tree/year	CO2 Annual Removal Capacity per tree unit	
	TAE/TAR	0,20640	Total Annual CO2 Emissions/ Total Ann	ual CO2 Removals	(BF is included)
2	TAE/TAR	0,24463	Total Annual CO2 Emissions/ Total Ann		(BF is not included)
	TAR _{area}	10,97921	tn CO2/hectare/year	CO2 Total Annual Removals per unit of cultivated area	
2	TARproduct	0,45165	tn CO2/tn of yield/year	CO2 Total Annual Removals per unit of harvested fruits	(BF is included)
3	TAR _{tree}	0,02462	tn CO2/tree/year	CO2 Total Annual Removals per tree unit	
1					
.1	TAR _{area}	9,26365	tn CO2/hectare/year	CO2 Total Annual Removals per unit of cultivated area	
.2	TARproduct	0,38108	tn CO2/tn of yield/year	CO2 Total Annual Removals per unit of harvested fruits	(BF is not included)
3	TAR _{tree}	0,02077	tn CO2/tree/year	CO2 Total Annual Removals per tree unit	
1	AR _{BF_area}	1,71556	tn CO2/hectare/year	CO2 Annual Removal due to the production of fruit biomass per unit of cultivated area	
2	AR _{BF_product}	0,07057	tn CO2/tn of yield/year	CO2 Annual Removal due to the production of fruit biomass per unit of harvested fruits	
.3	AR _{BF_tree}	0,00385	tn CO2/tree/year	CO2 Annual Removal due to the production of fruit biomass per tree unit	
.1	AR _{BW_area}	8,87914	tn CO2/hectare/year	CO2 Annual Removal due to the production of wood biomass per unit of cultivated area	
.2	AR _{BW_product}	0,36526	tn CO2/tn of yield/year	CO2 Annual Removal due to the production of wood biomass per unit of harvested fruits	
.3	AR _{BW_tree}	0,01991	tn CO2/tree/year	CO2 Annual Removal due to the production of wood biomass per tree unit	
_					
.1	AS _{S_area}	0,38451	tn CO2/hectare/year	CO2 Annual Storage in soil as carbon of the fallen biomass per unit of cultivated area	
2	AS _{S_product}	0,01582	tn CO2/tn of yield/year	CO2 Annual Storage in soil as carbon of the fallen biomass per unit of harvested fruits	
3	AS _{S_tree}	0,00086	tn CO2/tree/year	CO2 Annual Storage in soil as carbon of the fallen biomass per tree unit	
1	TAE _{area}	2,26612	tn CO2/hectare/year	CO2 Total Annual Emissions per unit of cultivated area	
.2	TAEproduct	0,09322	th CO2/th of yield/year	CO2 Total Annual Emissions per unit of entitied duct	
.3	TAEtree	0,00508	tn CO2/tree/year	CO2 Total Annual Emissions per tree unit	
	uee	-,			· · · · · · · · · · · · · · · · · · ·
.1	AE _{f area}	1,09376	tn CO2/hectare/year	CO2 Annual Emissions due to the use of fertilizers per unit of cultivated area	
.2	AE _{f_product}	0,04499	tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of fertilizers per unit of harvested fruits	
.3	AE _{f_tree}	0,00245	tn CO2/tree/year	CO2 Annual Emissions due to the use of fertilizers per tree unit	
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1	AE _{p_area}	0,36826	tn CO2/hectare/year	CO2 Annual Emissions due to the use of pesticides per unit of cultivated area	
.2	AE _{p_product}	0,01515	tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of pesticides per unit of harvested fruits	
.3	AE _{p_tree}	0,00083	tn CO2/tree/year	CO2 Annual Emissions due to the use of pesticides per tree unit	
	AE _{ff&e_area}		the CO2/heatara/usar		
1	inde_area	0,80410	tn CO2/hectare/year	CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of cultivated area	
1	AE _{ff&e_product}	0,03308	tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits	
1	AE _{ff&e_product}	,			
1 2 3	AE _{ff&e_product} AE _{ff&e_tree}	0,03308 0,00180	tn CO2/tn of yield/year tn CO2/tree/year	CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per tree unit	
1 2 3	AE _{ff&e_product} AE _{ff&e_tree} AE _{D_area}	0,03308 0,00180 0,59567	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year	CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per tree unit CO2 Annual Emissions due to the use of diesel per unit of cultivated area	
1 2 3 1 2	AE _{ff&e_product} AE _{ff&e_tree} AE _{D_area} AE _{D_product}	0,03308 0,00180 0,59567 0,02450	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year	CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per tree unit CO2 Annual Emissions due to the use of diesel per unit of cultivated area CO2 Annual Emissions due to the use of diesel per unit of harvested fruits	
1 2 3 1 2	AE _{ff&e_product} AE _{ff&e_tree} AE _{D_area}	0,03308 0,00180 0,59567	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year	CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per tree unit CO2 Annual Emissions due to the use of diesel per unit of cultivated area	
1 2 3 1 2 3	AE _{ff&e_product} AE _{ff&e_tree} AE _{D_area} AE _{D_product} AE _{D_tree}	0,03308 0,00180 0,59567 0,02450 0,00134	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year	CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per tree unit CO2 Annual Emissions due to the use of diesel per unit of cultivated area CO2 Annual Emissions due to the use of diesel per unit of harvested fruits CO2 Annual Emissions due to the use of diesel per tree unit	
1 2 3 1 2 3 	AE _{ff8e_product} AE _{ff8e_tree} AE _{D_area} AE _{D_product} AE _{D_tree} AE _{G_area}	0,03308 0,00180 0,59567 0,02450 0,00134 0,03399	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year	C02 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits C02 Annual Emissions due to the use of fossil fuels & electricity per tree unit C02 Annual Emissions due to the use of diesel per unit of cultivated area C02 Annual Emissions due to the use of diesel per unit of harvested fruits C02 Annual Emissions due to the use of diesel per unit of harvested fruits C02 Annual Emissions due to the use of diesel per tree unit C02 Annual Emissions due to the use of diesel per tree unit C02 Annual Emissions due to the use of gasoline per unit of cultivated area	
.1 .2 .3 .3 .2 .3 .3 .1 .2 .2	AE _{ff&e_product} AE _{ff&e_tree} AE _{D_product} AE _{D_product} AE _{D_tree} AE _{G_product}	0,03308 0,00180 0,59567 0,02450 0,00134 0,03399 0,00140	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year	C02 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits C02 Annual Emissions due to the use of fossil fuels & electricity per tree unit C02 Annual Emissions due to the use of diesel per unit of cultivated area C02 Annual Emissions due to the use of diesel per unit of harvested fruits C02 Annual Emissions due to the use of diesel per unit of harvested fruits C02 Annual Emissions due to the use of diesel per unit of harvested fruits C02 Annual Emissions due to the use of gasoline per unit of cultivated area C02 Annual Emissions due to the use of gasoline per unit of cultivated area C02 Annual Emissions due to the use of gasoline per unit of cultivated area C02 Annual Emissions due to the use of gasoline per unit of cultivated area C02 Annual Emissions due to the use of gasoline per unit of cultivated area C02 Annual Emissions due to the use of gasoline per unit of harvested fruits	
1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2	AE _{ff8e_product} AE _{ff8e_tree} AE _{D_area} AE _{D_product} AE _{D_tree} AE _{G_area}	0,03308 0,00180 0,59567 0,02450 0,00134 0,03399	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year	C02 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits C02 Annual Emissions due to the use of fossil fuels & electricity per tree unit C02 Annual Emissions due to the use of diesel per unit of cultivated area C02 Annual Emissions due to the use of diesel per unit of harvested fruits C02 Annual Emissions due to the use of diesel per unit of harvested fruits C02 Annual Emissions due to the use of diesel per tree unit C02 Annual Emissions due to the use of diesel per tree unit C02 Annual Emissions due to the use of gasoline per unit of cultivated area	
1 2 3 1 2 3 3 1 2 3 2 3	AE _{ff&e_product} AE _{ff&e_tree} AE _{D_product} AE _{D_product} AE _{D_tree} AE _{G_product}	0,03308 0,00180 0,59567 0,02450 0,00134 0,03399 0,00140	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year	C02 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits C02 Annual Emissions due to the use of fossil fuels & electricity per tree unit C02 Annual Emissions due to the use of diesel per unit of cultivated area C02 Annual Emissions due to the use of diesel per unit of harvested fruits C02 Annual Emissions due to the use of diesel per unit of harvested fruits C02 Annual Emissions due to the use of diesel per unit of harvested fruits C02 Annual Emissions due to the use of gasoline per unit of cultivated area C02 Annual Emissions due to the use of gasoline per unit of cultivated area C02 Annual Emissions due to the use of gasoline per unit of cultivated area C02 Annual Emissions due to the use of gasoline per unit of cultivated area C02 Annual Emissions due to the use of gasoline per unit of cultivated area C02 Annual Emissions due to the use of gasoline per unit of harvested fruits	
.1 .2 .3 .1 .2 .3 .3	AE _{ff&e_product} AE _{ff&e_tree} AE _{D_area} AE _{D_product} AE _{D_tree} AE _{G_area} AE _{G_product} AE _{G_product}	0,03308 0,00180 0,59567 0,02450 0,00134 0,03399 0,00140 0,00008	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year	CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per tree unit CO2 Annual Emissions due to the use of diesel per unit of cultivated area CO2 Annual Emissions due to the use of diesel per unit of harvested fruits CO2 Annual Emissions due to the use of diesel per unit of harvested fruits CO2 Annual Emissions due to the use of diesel per tree unit CO2 Annual Emissions due to the use of gasoline per unit of cultivated area CO2 Annual Emissions due to the use of gasoline per unit of cultivated area CO2 Annual Emissions due to the use of gasoline per unit of cultivated area CO2 Annual Emissions due to the use of gasoline per unit of cultivated area CO2 Annual Emissions due to the use of gasoline per unit of harvested fruits CO2 Annual Emissions due to the use of gasoline per unit of harvested fruits CO2 Annual Emissions due to the use of gasoline per unit of harvested fruits CO3 Annual Emissions due to the use of gasoline per tree unit	
1 2 3 3 1 2 3 3 1 2 3 3	AE _{ff&e_product} AE _{ff&e_tree} AE _{D_product} AE _{D_tree} AE _{G_tree} AE _{G_tree} AE _{G_tree} AE _{G_tree}	0,03308 0,00180 0,59567 0,02450 0,00134 0,03399 0,00140 0,00008 0,17444	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/tree/year	CO2 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits CO2 Annual Emissions due to the use of fossil fuels & electricity per tree unit CO2 Annual Emissions due to the use of diesel per unit of cultivated area CO2 Annual Emissions due to the use of diesel per unit of harvested fruits CO2 Annual Emissions due to the use of diesel per tree unit CO2 Annual Emissions due to the use of diesel per unit of cultivated area CO2 Annual Emissions due to the use of gasoline per unit of cultivated area CO2 Annual Emissions due to the use of gasoline per unit of harvested fruits CO2 Annual Emissions due to the use of gasoline per unit of harvested fruits CO2 Annual Emissions due to the use of gasoline per tree unit CO2 Annual Emissions due to the use of gasoline per unit of cultivated area CO2 Annual Emissions due to the use of gasoline per tree unit	
1 2 3 1 2 3 3 1 2 3 3 1 2 2	AE _{ff&e_product} AE _{ff&e_tree} AE _{D_area} AE _{D_broduct} AE _{D_tree} AE _{G_area} AE _{G_area} AE _{G_tree} AE _{EL_area} AE _{EL_product}	0,03308 0,00180 0,59567 0,02450 0,00134 0,03399 0,00140 0,00008 0,17444 0,00718	tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/hectare/year tn CO2/tn of yield/year tn CO2/tree/year tn CO2/tn of yield/year	C02 Annual Emissions due to the use of fossil fuels & electricity per unit of harvested fruits C02 Annual Emissions due to the use of fossil fuels & electricity per tree unit C02 Annual Emissions due to the use of diesel per unit of cultivated area C02 Annual Emissions due to the use of diesel per unit of harvested fruits C02 Annual Emissions due to the use of diesel per unit of harvested fruits C02 Annual Emissions due to the use of diesel per unit of harvested fruits C02 Annual Emissions due to the use of gasoline per unit of cultivated area C02 Annual Emissions due to the use of gasoline per unit of harvested fruits C02 Annual Emissions due to the use of gasoline per unit of harvested fruits C02 Annual Emissions due to the use of gasoline per tree unit C02 Annual Emissions due to the use of gasoline per tree unit C02 Annual Emissions due to the use of electricity per unit of cultivated area C02 Annual Emissions due to the use of electricity per unit of cultivated area C02 Annual Emissions due to the use of electricity per unit of harvested fruits	

R21.2	TAGproduct	0,11277	tn CO2/tn of yield/year	CO2 Total Annual Gain per unit of harvested fruits
R21.3	TAG _{tree}	0,00615	tn CO2/tree/year	CO2 Total Annual Gain per tree unit
R22.1	AG _{N-f_LCC_area}	0,00000	tn CO2/hectare/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (Leguminosae cover crops) per unit of cultivated area
R22.2	AG _{N-f_LCC_product}	0,00000	tn CO2/tn of yield/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (Leguminosae cover crops) per unit of harvested fruits
R22.3	AG _{N-f_LCC_tree}	0,00000	tn CO2/tree/year	CO2 Annual Gain due to Nitrogen-fertilizers reduction (Leguminosae cover crops) per tree unit
R23.1	AG _{f_FGT_area}	0,00000	tn CO2/hectare/year	CO2 Annual Gain due to fertilizers reduction (fertigation) per unit of cultivated area
R23.2	AG _{f_FGT_product}	0,00000	tn CO2/tn of yield/year	CO2 Annual Gain due to fertilizers reduction (fertigation) per unit of harvested fruits
R23.3	AG _{f_FGT_tree}	0,00000	tn CO2/tree/year	CO2 Annual Gain due to fertilizers reduction (fertigation) per tree unit
R24.1	AG _{H_cc/m_area}	0,37994	tn CO2/hectare/year	CO2 Annual Gain due to herbicides reduction (cover crops/mulching) per unit of cultivated area
R24.2	AG _{H_cc/m_product}	0,01563	tn CO2/tn of yield/year	CO2 Annual Gain due to herbicides reduction (cover crops/mulching) per unit of harvested fruits
R24.3	AG _{H_cc/m_tree}	0,00085	tn CO2/tree/year	CO2 Annual Gain due to herbicides reduction (cover crops/mulching) per tree unit
R25.1	AG _{I_im/mt_area}	0,00000	tn CO2/hectare/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping) per unit of cultivated area
R25.2	AGI_im/mt_product	0,00000	tn CO2/tn of yield/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping) per unit of harvested fruits
R25.3	AG _{I_im/mt_tree}	0,00000	tn CO2/tree/year	CO2 Annual Gain due to insecticides reduction (insects monitoring/mass trapping) per tree unit
R26.1	AG _{WF_area}	2,36149	tn CO2/hectare/year	CO2 Annual Gain due to the use of wood fuels instead of diesel per unit of cultivated area
R26.2	AG _{WF_product}	0,09714	tn CO2/tn of yield/year	CO2 Annual Gain due to the use of wood fuels instead of diesel per unit of harvested fruits
R26.3	AG _{WF_tree}	0,00530	tn CO2/tree/year	CO2 Annual Gain due to the use of wood fuels instead of diesel per tree unit
R27.1	AG _{RES_area}	0,00000	tn CO2/hectare/year	CO2 Annual Gain due to the use of RES per unit of cultivated area
R27.2	AG _{RES_product}	0,00000	tn CO2/tn of yield/year	CO2 Annual Gain due to the use of RES per unit of harvested fruits
R27.3	AG _{RES_tree}	0,00000	tn CO2/tree/year	CO2 Annual Gain due to the use of RES per tree unit