Con il patrocinio di:

MACFRUT2018

SEMINARIO SCIENTIFICO GRUSI ANBI CER , venerdì 11 maggio

Progressi dell'irrigazione in ortofrutticoltura

STRATEGIE DI ADATTAMENTO AI CAMBIAMENTI CLIMATICI IN FRUTTICOLTURA

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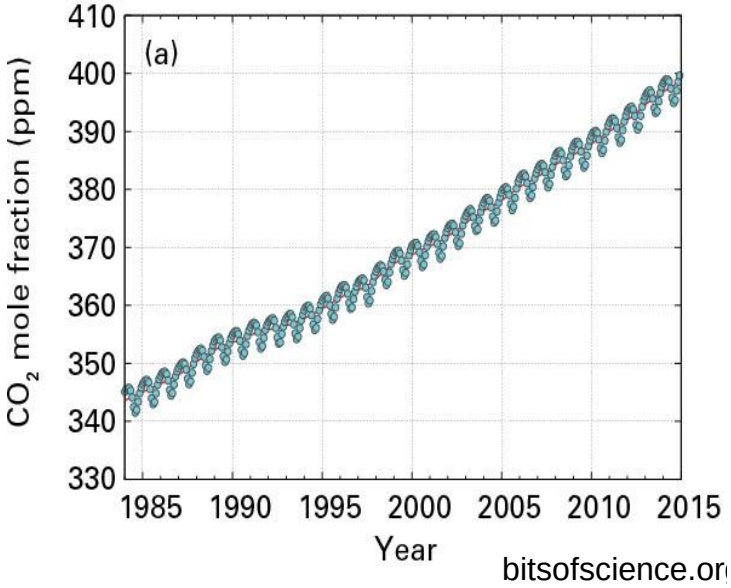
LIFE 14 CCA/GR/00389 - AgroClimaWater

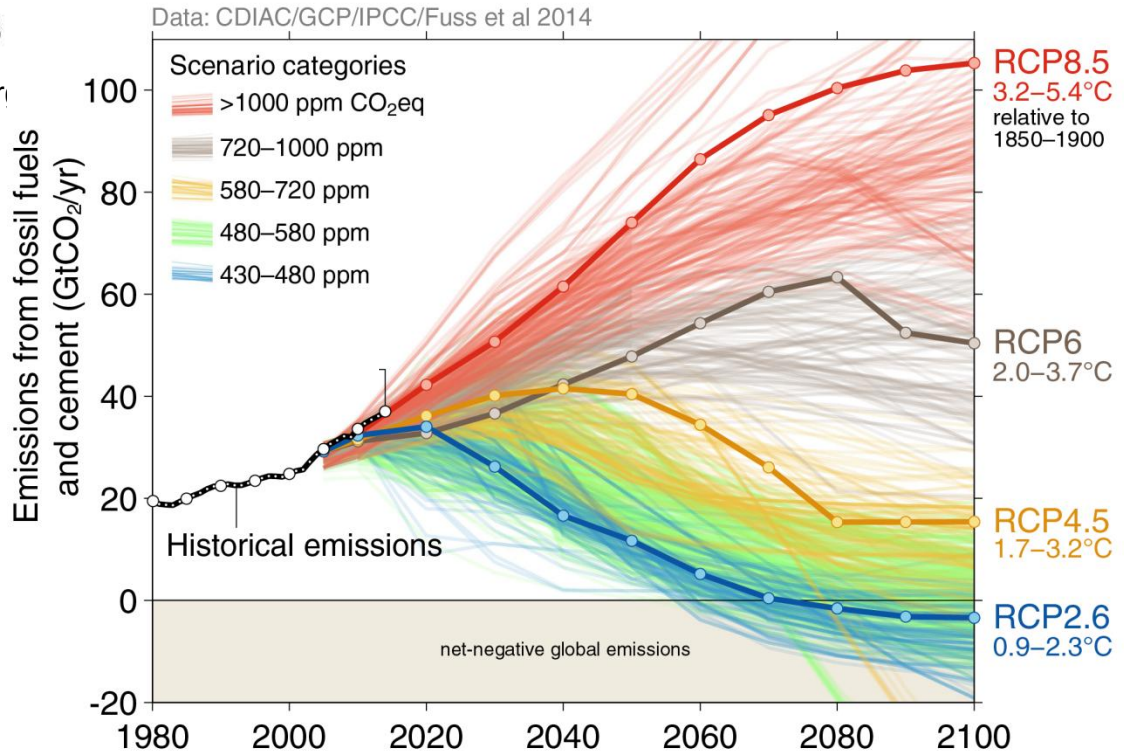
ARCHITETTURA, AMBIENTE PATRIMONI CULTURALI
Dipartimento delle Culture Europee e del Mediterraneo

Air carbon dioxide concentration



ACCORDO INTERNAZIONALE SUL CLIMA

piano d'azione per limitare il riscaldamento globale
"ben al di sotto" dei 2ºC.

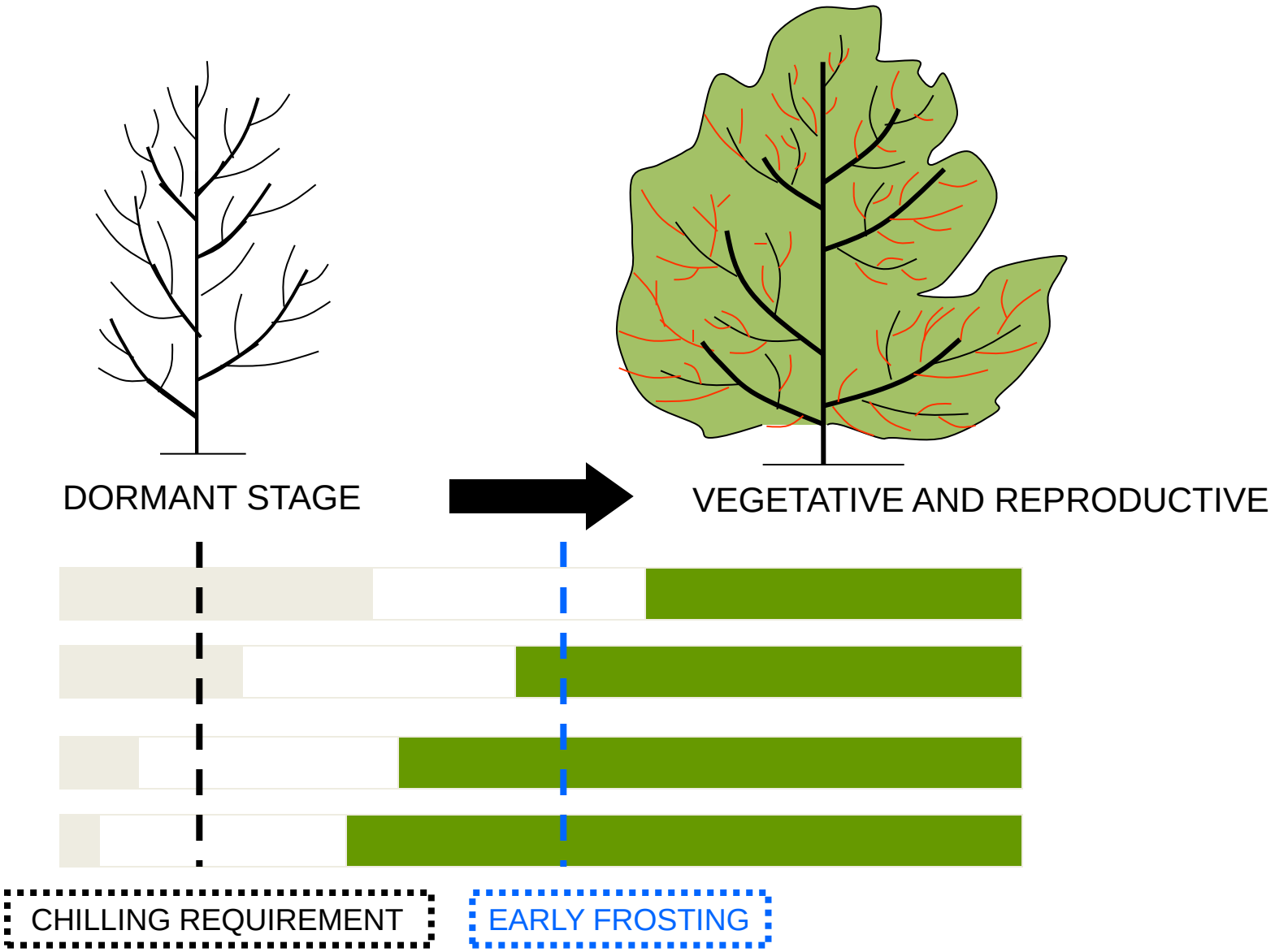


Soil is a natural capital that generates ecosystem services

REGULATING **e.g. C fluxes, soil aggregates stability, water cycle….**

PROVISIONING **e.g. food, energy**

HABITAT, CULTURAL, RECREATION


DORMANT STAGE
VEGETATIVE AND REPRODUCTIVE
CHILLING REQUIREMENT
EARLY FROSTING

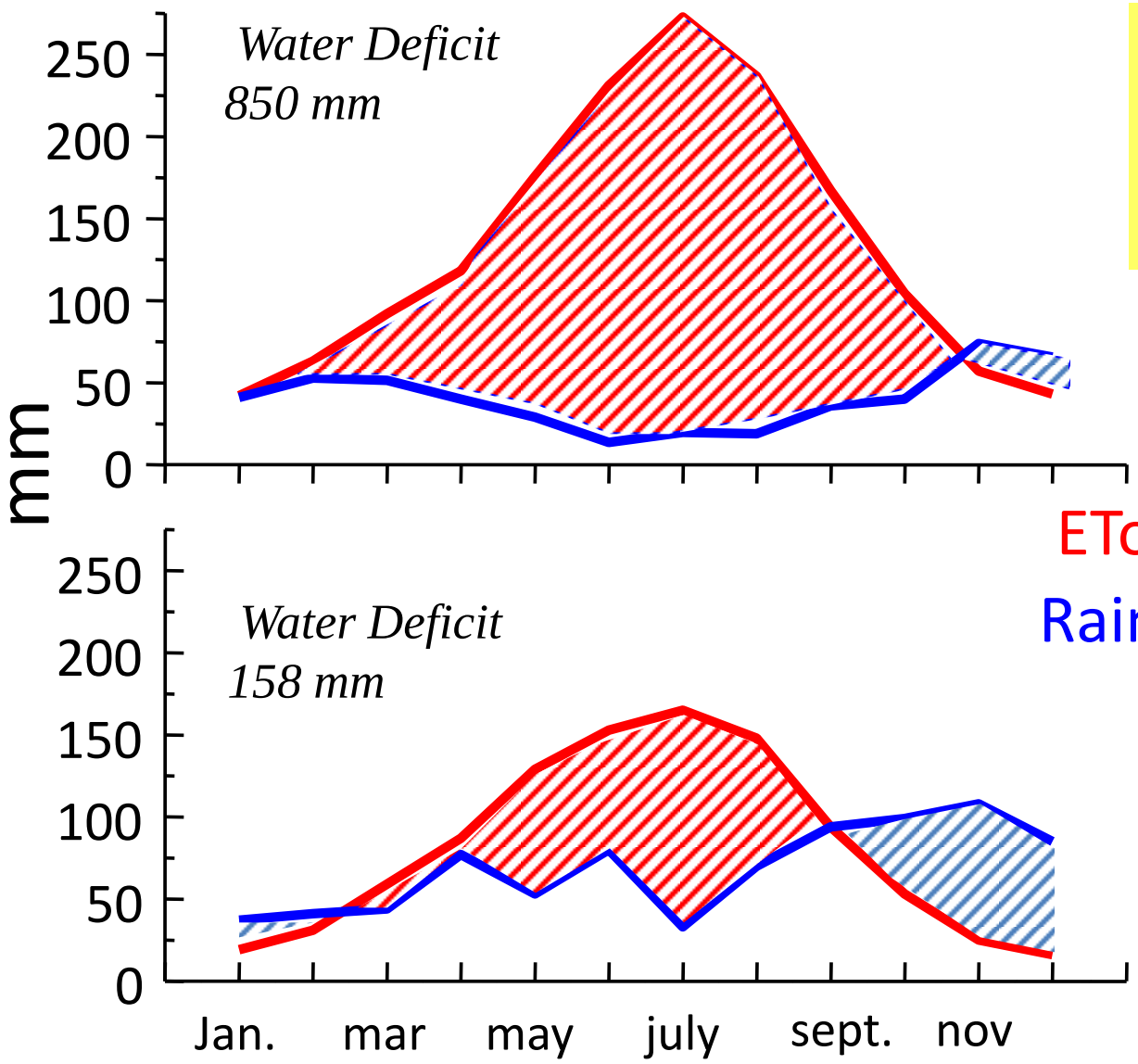
DROUGHT

Will increase:

- Evapotranspiration

- Water consumption

- Rainfall at planet level.



ETo

Rainfall

South Italy
METAPONTO

North Italy
CESENA

“Water Foot-Print”

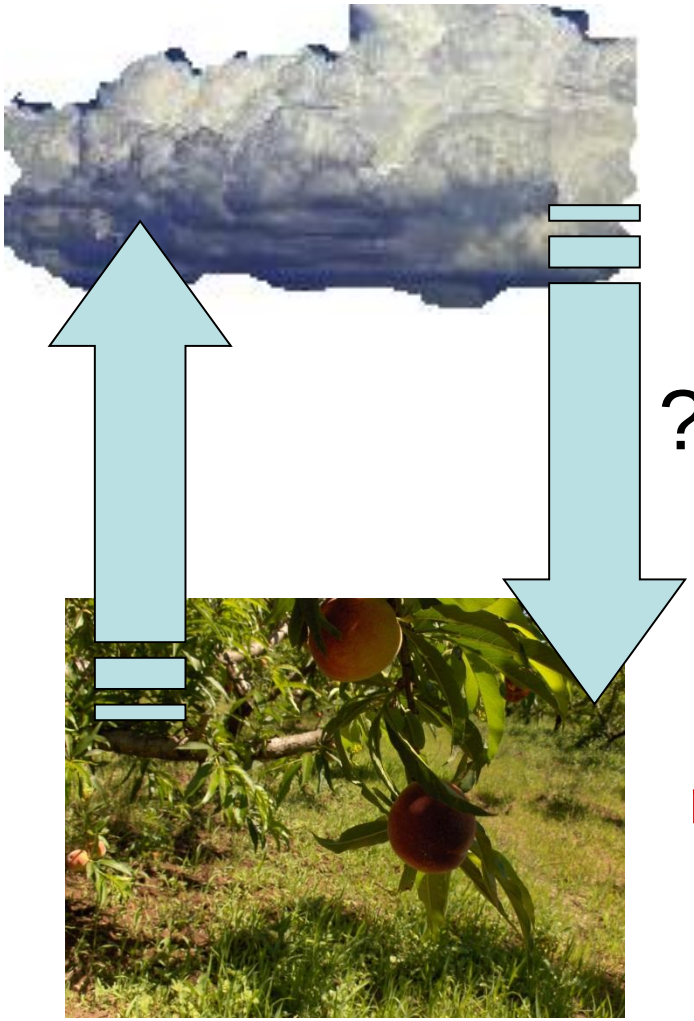
150-300 L/kg
(early – late ripening)

	m3/ha
LEAVES	19.0
FRUITS	16.8
WINTER PRUNNING	1.7
SUMMER PRUNNING	1.9
total (m^3)	**39.4**

<1% of distributed water

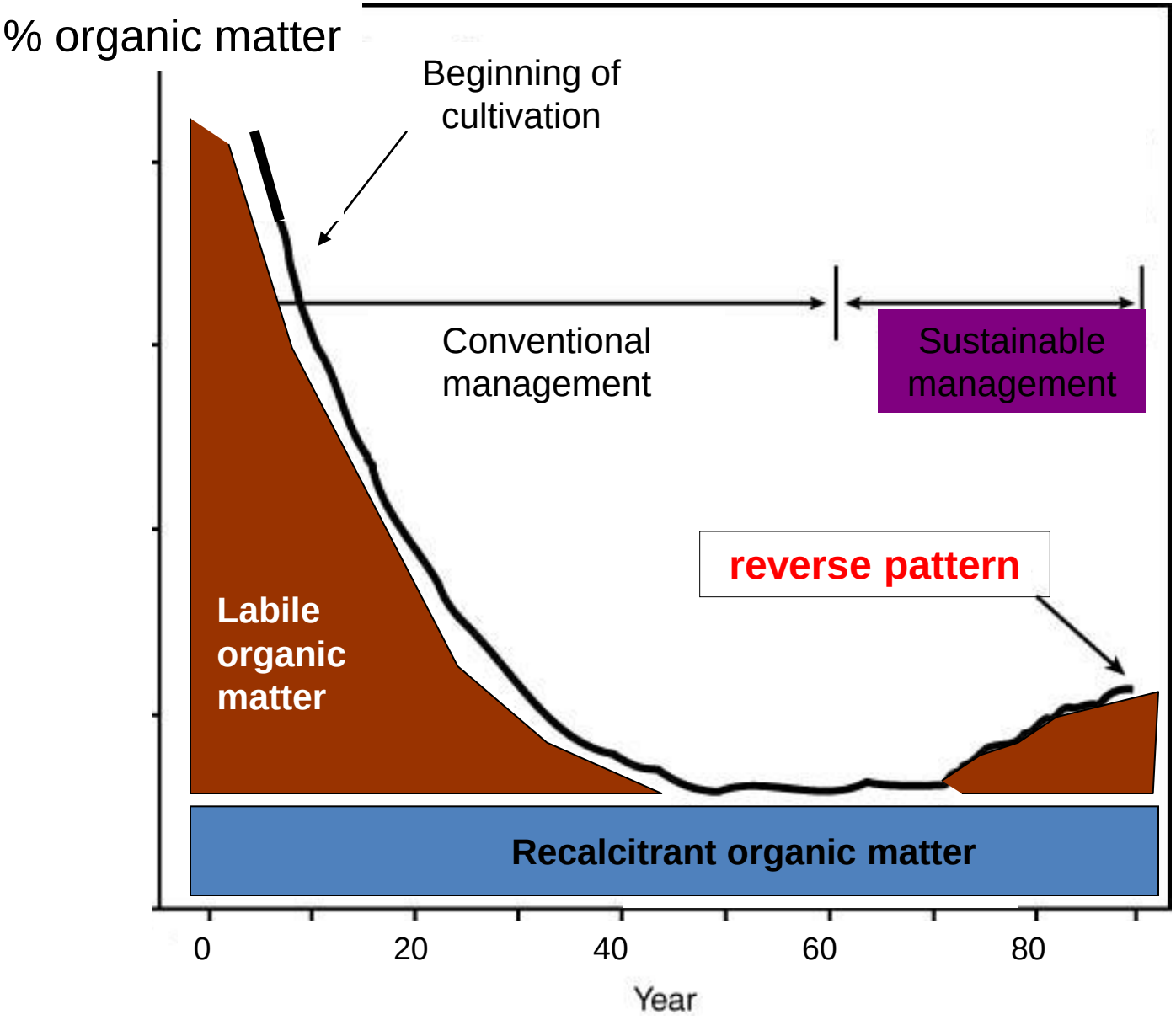
YIELD 20 t ha-1,
Irrigation volume 4000 m^3 ha^{-1}

water evaporated and transpired from the orchard (almost 99% of the total) returns to the atmosphere…



…..will it return to the same region???

BILDING THE SOIL



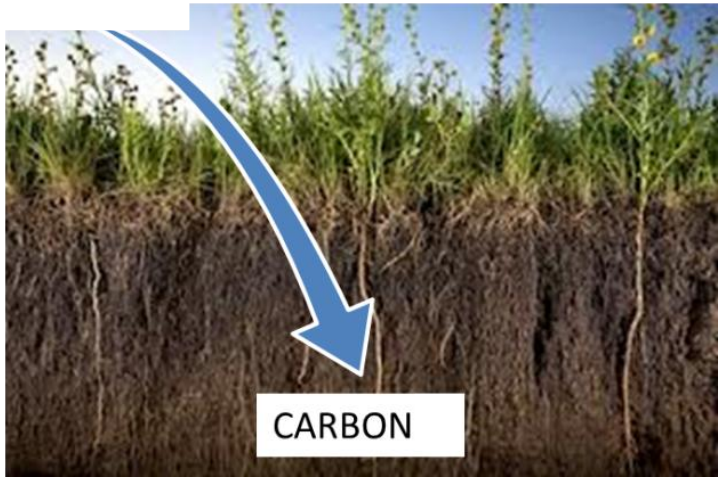
Adapted from WBGU Special Report:
The Accounting of Biological Sinks and Sources Under the Kyoto Protocol

Soils impoverishment

Basilicata Region

Soil Organic Matter 0,8 - 1,3%

CO_2



The 1% increase of carbon in the soil corresponds to 260 t / ha of CO_2 stably stored

(50 cm depth, 1.4 t/m3 bulk density)

Increasing soil carbon sequestration:

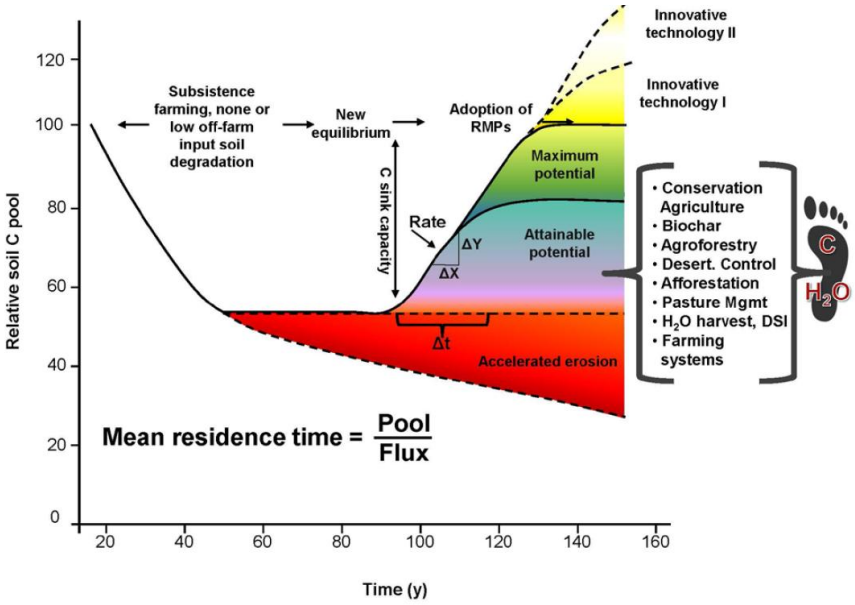
0.4% a year (40 cm depth)…

VIEWPOINT

doi:10.2489/jswc.71.1.20A

Beyond COP21: Potential and challenges of the "4 per Thousand" initiative

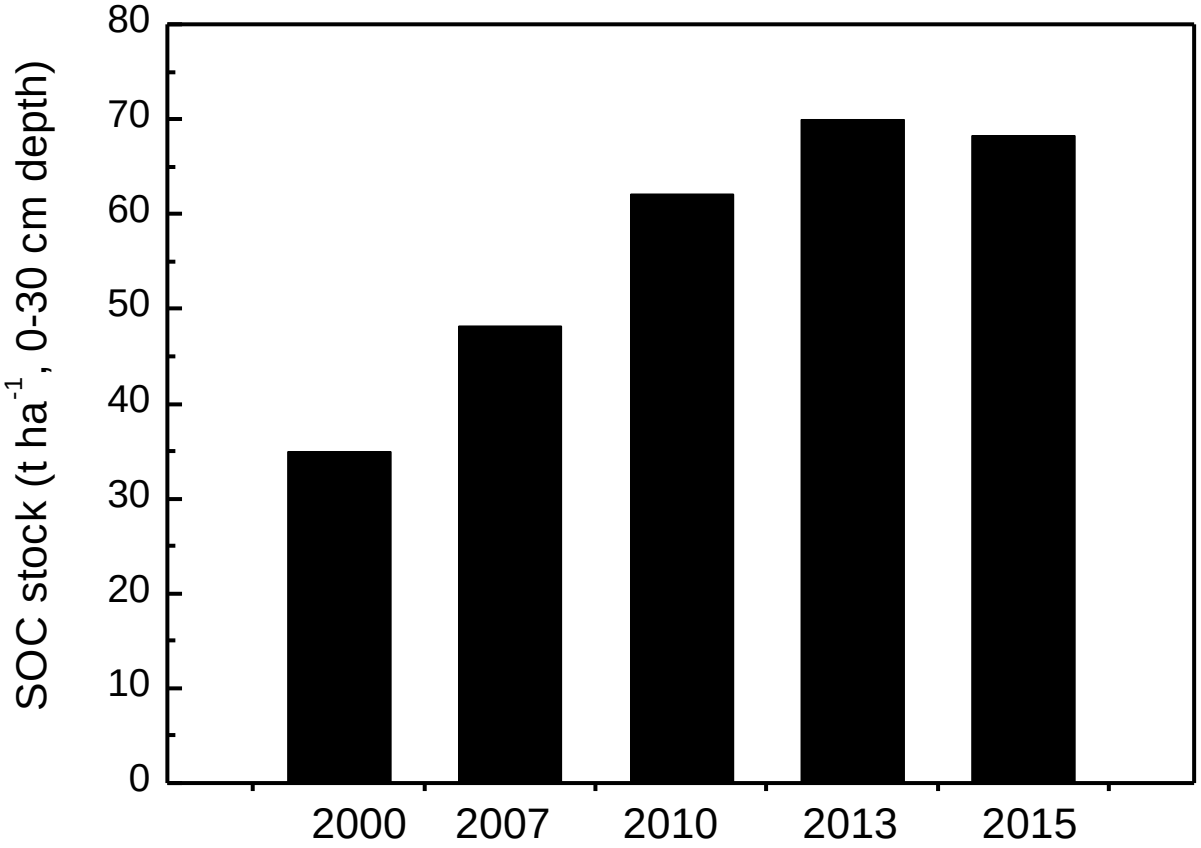
Rattan Lal



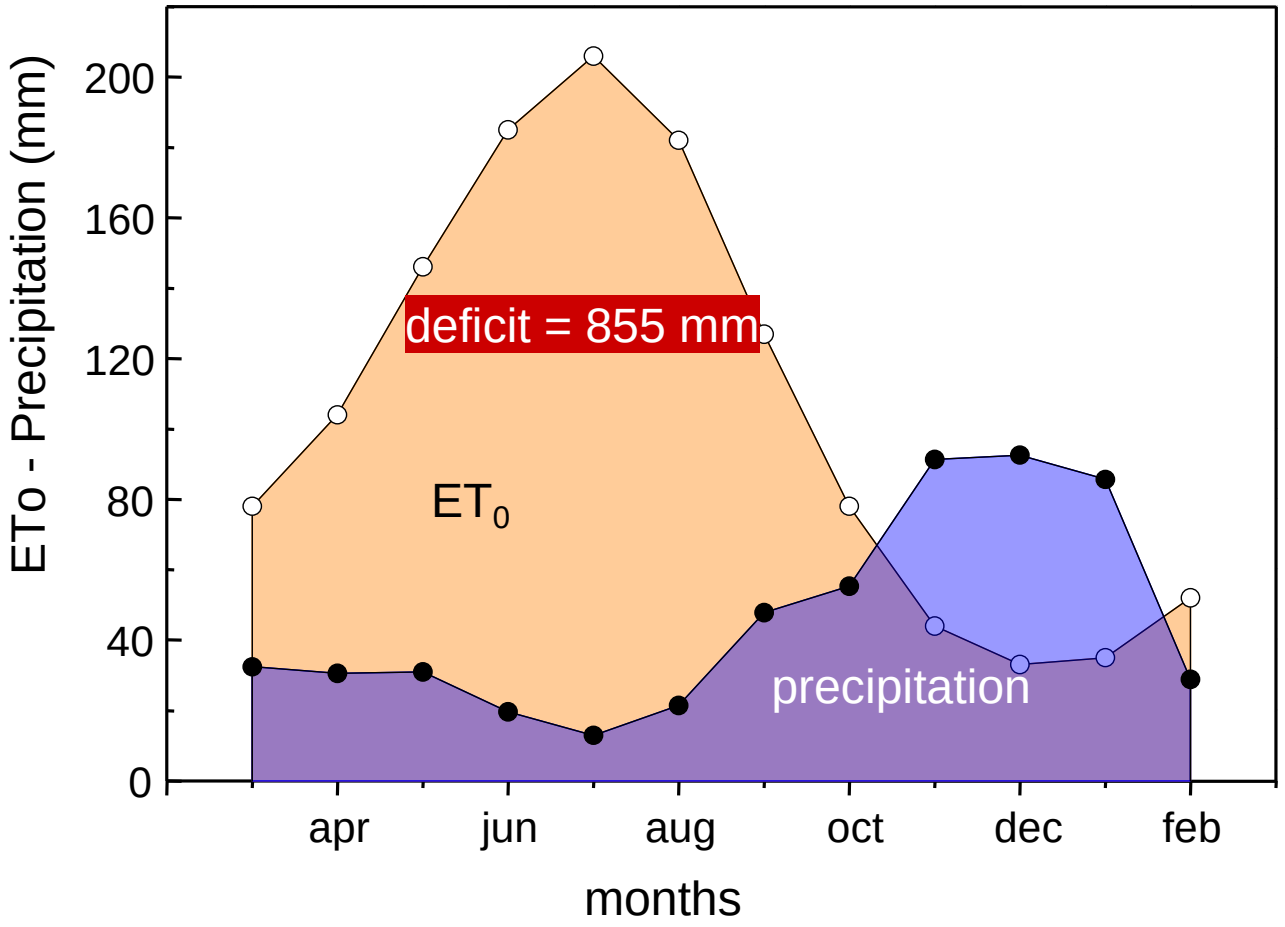
	increasing SOC rate t C ha-1 yr-1	experiment duration	soil depth	
		years	(m)	refs
"4 thousand initiative"	18-20	-	0.4	
case 1	2.0	17	0.3	Palese et al., 2014
case 2	2.2	13	0.3	Palese et al., 2014
case 3	1.4	13	0.3	Mohamad et al., 2016

SOC stock changes in a sustainable olive grove

2.2 t/ha/yr C



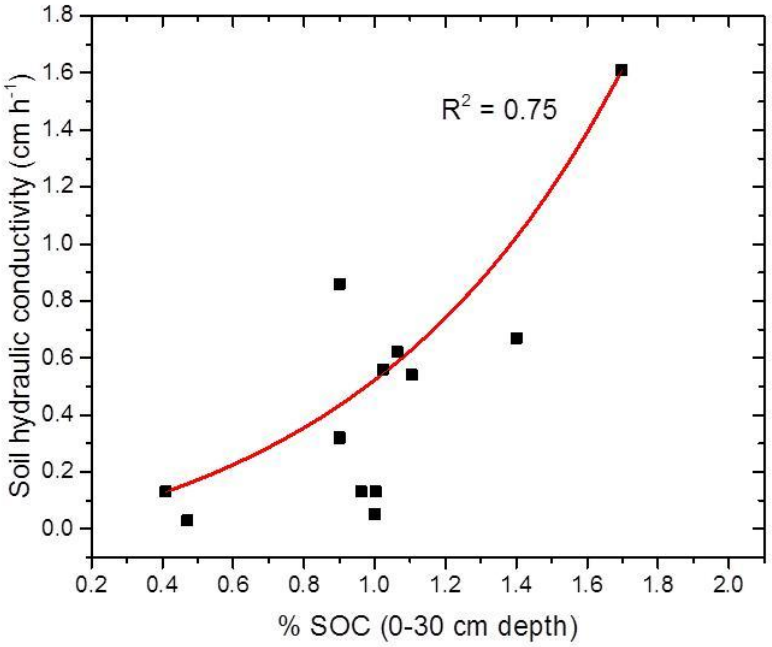
Annual deficit in semi-arid environment



SOUTHERN ITALY

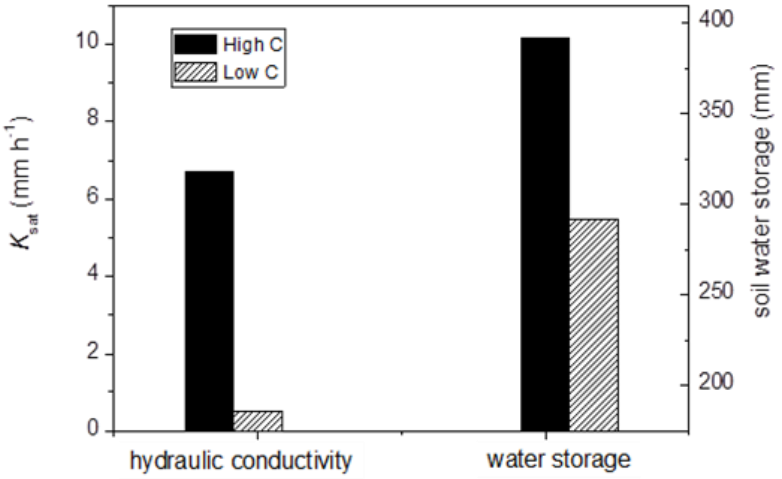
Increasing SOC improves soil hydraulic conductivity

data from peach, kiwifruit, apricot and olive orchards are grouped
(Xiloyannis, unpublished)



….and water storage capacity

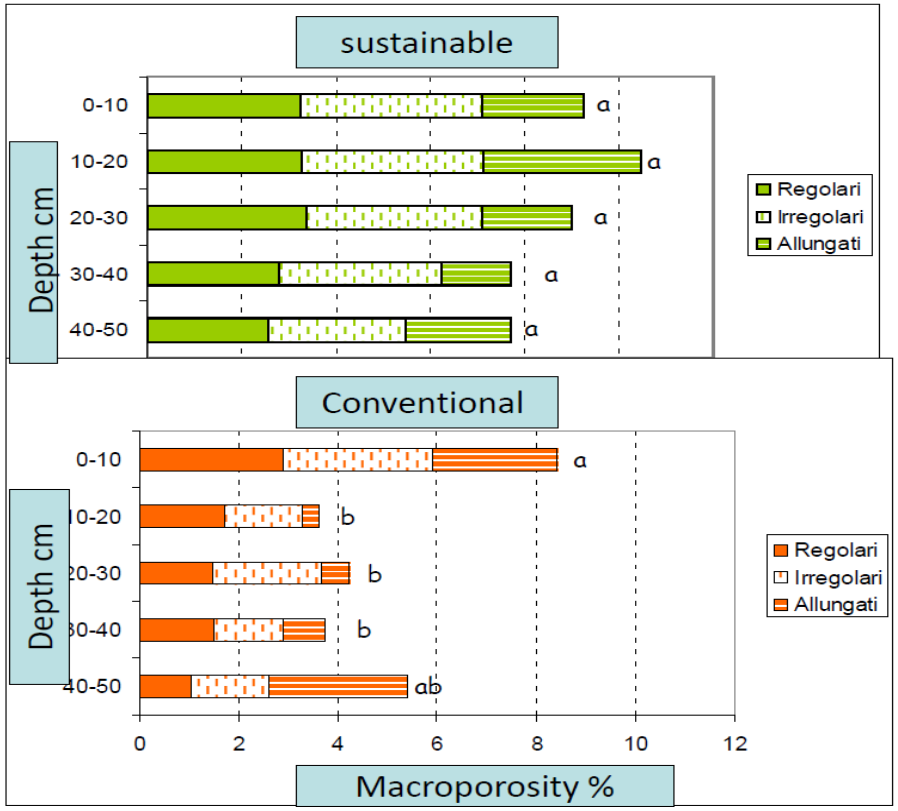
Redrawn from Palese et al., 2014



Increase of soil water reserve

High infiltration capacity H_20

Reduction of water stress



Effect of soil management on water infiltration	
Management	Infiltration (mm/day)
Sustainable	160
Conventional	13

At 12 cm of depth (point of compacted layer) Palese et al., 2014

Saturated hydraulic conductivity measurements

(Model 2800 Guelph Permeameter, Santa Barbara, USA)

Evaluation of the vertical water flux (using a plastic tube as confined well)

	K_{sat} (Guelph) (mm d^{-1})	
Sustainable (confined)	**160**	
Conventional (confined)	**13**	

Increase of soil water reserve

SOIL WATER CONTENT (TILL TO 2 m of depth)
in two different orchard management system

SUSTAINABLE

4250 m^3/ha

CONVENTIONAL

2934 m^3/ha

Celano et al., 2011; Palese et al., 2014

conventional

sustainable

Soil losses

60-105 t ha^{-1} y^{-1}

(a soil layer of about 1 cm)

Soil losses

< 1 t ha^{-1} y^{-1}

Foto 3 – Particolare del ristagno idrico che si verifica prevalentemente da metà filare a fine filare in impianto di actinidia irrigato per scorrimento.

…..soil management

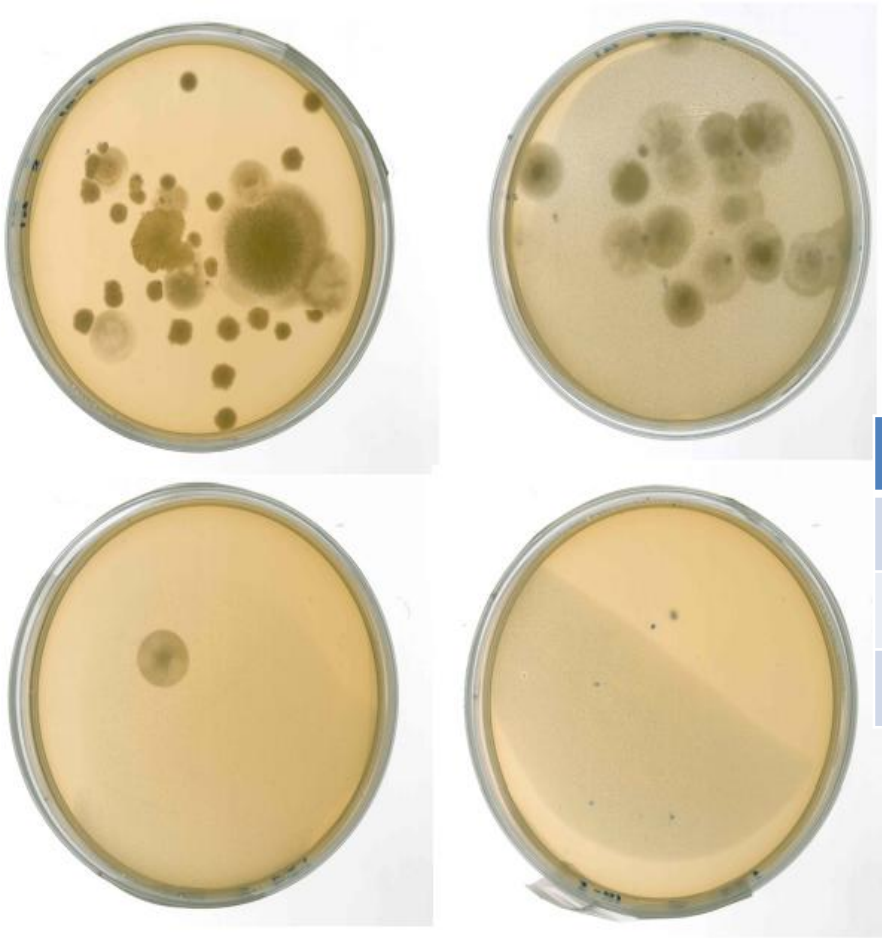
Was it only a rainfall intensity effect ?????

SOIL BIODIVERSITY

root with ifes and spores of glomus intraradices (10 X).

Restore of soil fertility

SUSTAINABLE



CONVENTIONAL

Fungi and bacterial communities in the soils		
Management	Fungi	Bacterial
Sustainable	214.000	35.600.000
Conventional	29.000	10.000.000

1 g of dry soil

Sofo et al., 2014. Pascazio et al., 2015


95 5 15

In un frutteto con sesto di impianto 5x3
Terreno con buona capacità di ritensione idrica

Con irrigazione che interessa una profondità di 0,5 m
A.U =20%vol
A.F.U= 40% RU

Irrigazione	Sup. Bagnata m2	Profondità bagnata (m)	Volume suolo m3	R.U m3	R.F.U m3
Irr tutta superfice	10.000	0.5	5.000	1.000	**400**
spruzzatori	6000	0.5	3.000	600	**240**
goccia	2.000	0.5	1.000	200	**80**

Irrigazione giornaliera nel caso dell'impianto a goccia mese di luglio Agosto

Summer Pruning materials

10.34 m^2/tree LAI=0,517

3,650 g di DM/tree
785 g of leaves

-24 l H_20 $d^{-1}tree^{-1}$

…..Promuovere consumo idrico ‘a domanda’

….a superficie

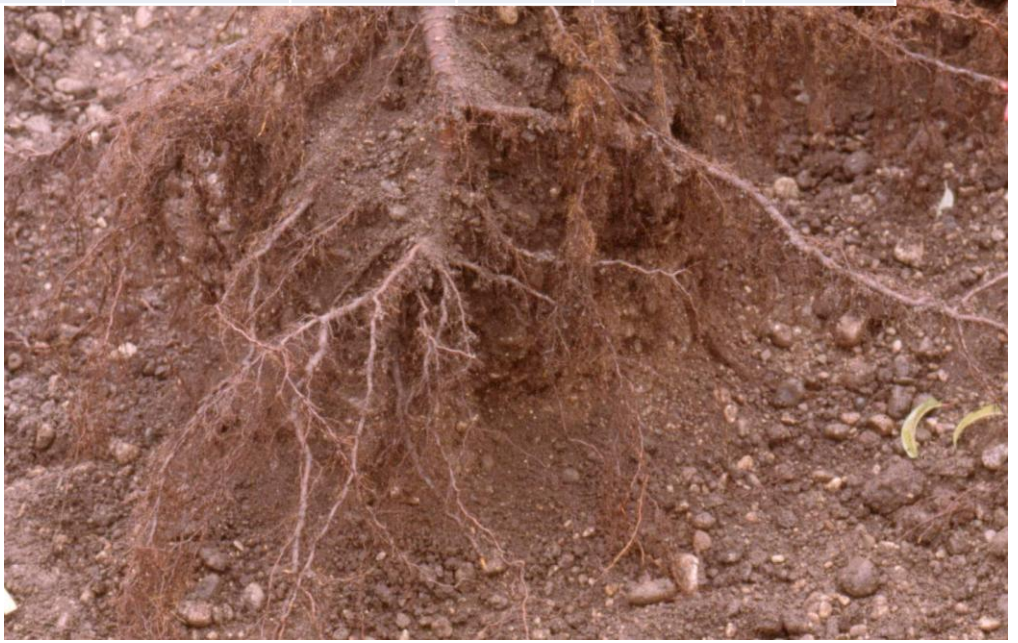
….a volumi

rootstocks

CHARACTERISTICS OF ROOTS

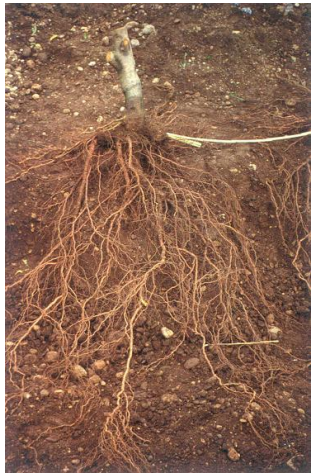
Soil volume explored cv Vega on 2 rootstocks

	Missour (4.5*1.25)				Mr. S. 2/5 (4.5*1.25)				
year	I	II	III	IV	year	I	II	III	IV
$m^3 * p^{-1}$	1.22	3.39	3.60	3.60	$m^3 * p^{-1}$	0.56	1.97	2.8	2.8
$m^3 * ha^{-1}$	2168	6024	6575	6575	$m^3 * ha^{-1}$	995	3501	5029	5029



Water storaged in the soil volume explored by roots in peach orchard in the first 4 years after planting

(Vega/ Missour , Xiloyannis et. al 1993).



1.22 m^3 p^{-1}

134 L p^{-1}

1st year

3.39 m^3 p^{-1}

373 L p^{-1}

2nd year

3.60 m^3 p^{-1}

407 L p^{-1}

3rd year

3.60 m^3 p^{-1}

407 L p^{-1}

4th year

Water available

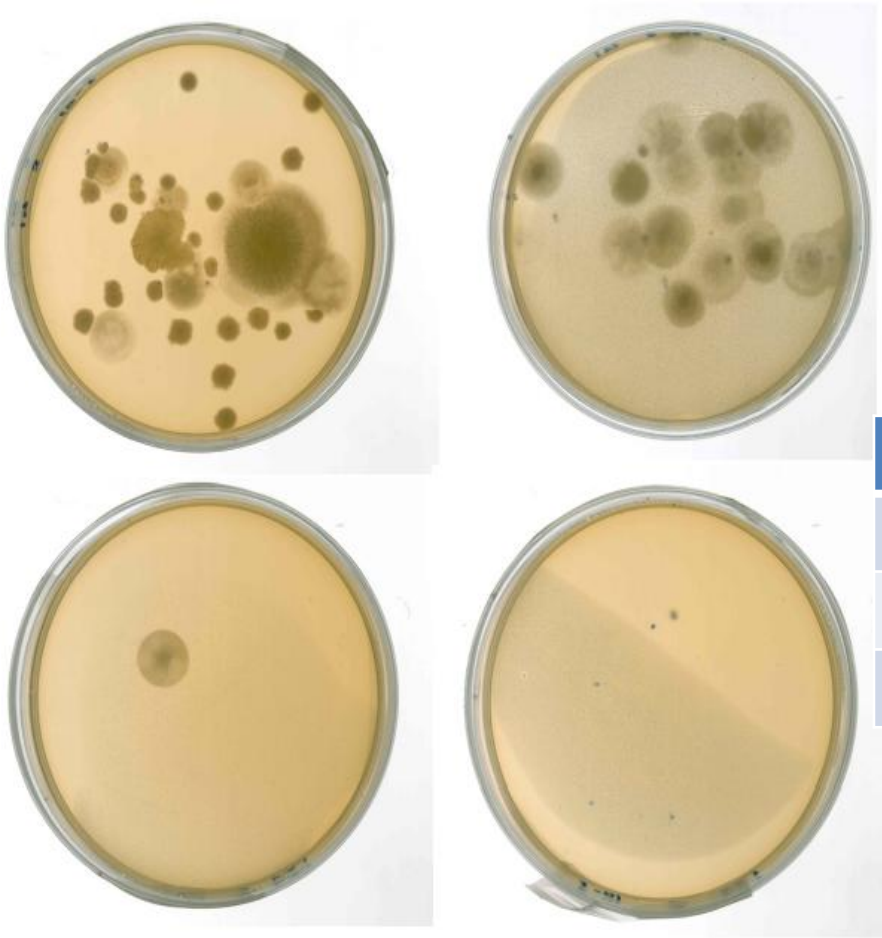
Volume of soil explored by roots

SOIL BIODIVERSITY

root with ifes and spores of glomus intraradices (10 X).

Restore of soil fertility

SUSTAINABLE



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Sofo et al., 2014. Pascazio et al., 2015

The biggest fruit is not always the best in quality

new marketing approaches that allow to sell also the not perfect, from aesthetic point of view and size, fruit /nuts

Apricot cv Flopria

Size and Price to the growers

35/40 gr → 0.10 €

55+ gr → 0.70 €

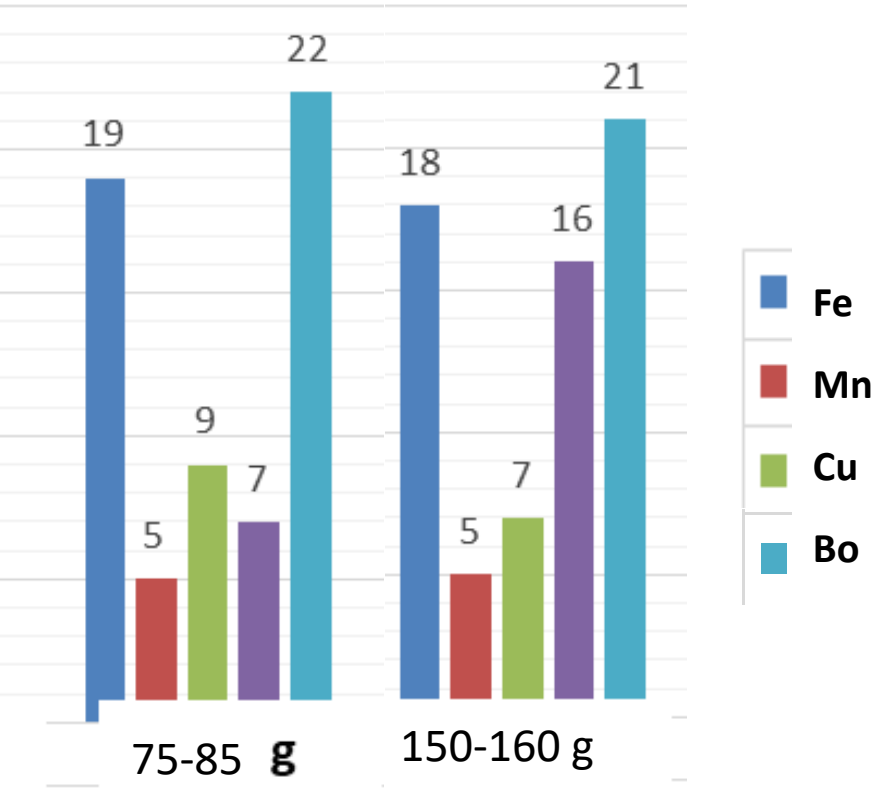
NINFA	40/45	€0.40	NINFA	40/45	€ 1.20
MAGADOR/COLORADO	50 +	€1.70	MAGADOR/COLORADO	50 +	€ 2.30
MAGADOR/COLORADO	45/50	€1.40	MAGADOR/COLORADO	45/50	€ 1.80
MAGADOR/COLORADO	40/45	€1.10	MAGADOR/COLORADO	40/45	€ 1.50
WONDERCOOT/MARGOTTINA	50 +	€2.00	WONDERCOOT/MARGOTTINA	50 +	€ 2.60
WONDERCOOT/MARGOTTINA	45/50	€1.70	WONDERCOOT/MARGOTTINA	45/50	€ 2.10
WONDERCOOT/MARGOTTINA	40/45	€1.40	WONDERCOOT/MARGOTTINA	40/45	€ 1.80
BORA/FLODEA/PRICIA/PRIMAYA	50 +	€1.80	BORA/FLODEA	50 +	€ 2.50
BORA/FLODEA/PRICIA/PRIMAYA	45/50	€1.50	BORA/FLODEA	45/50	€ 2.00
BORA/FLODEA/PRICIA/PRIMAYA	40/45	€1.20	BORA/FLODEA	40/45	€ 1.70
PRODOTTO IN CASSE					


ÄPPLE SVENSKA
36 95
/kg

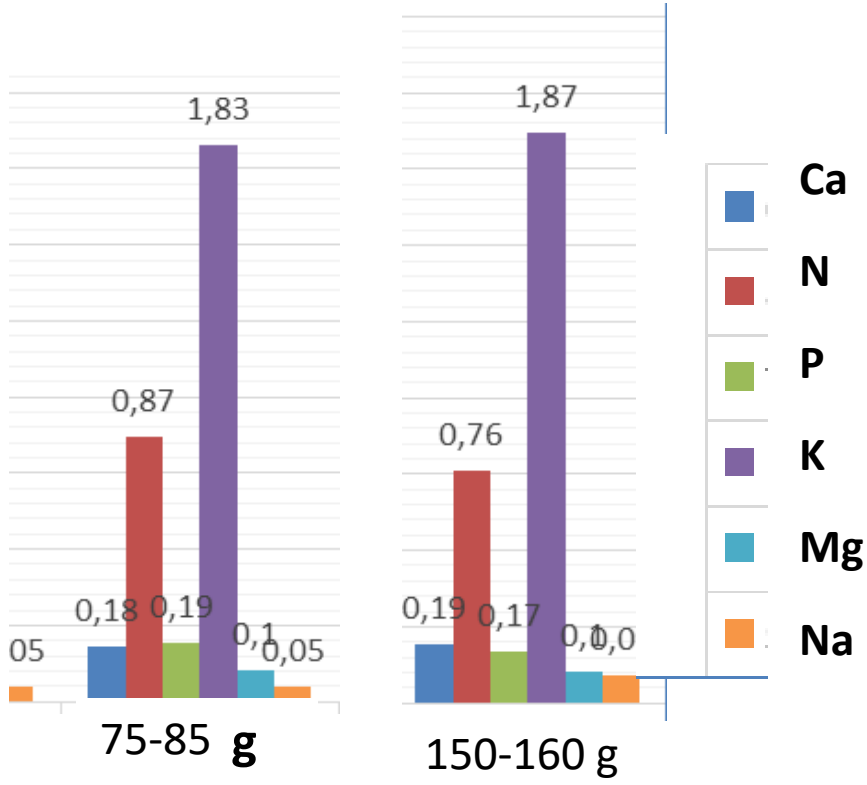

RED DELICIOUS
29 95
/kg

Mineral content of kiwifruit

Microelements ppm



Macroelements %



No differences between sizes!

United Kingdom: 9 out of 10 retailers promote the sale of imperfect fruits and vegetables

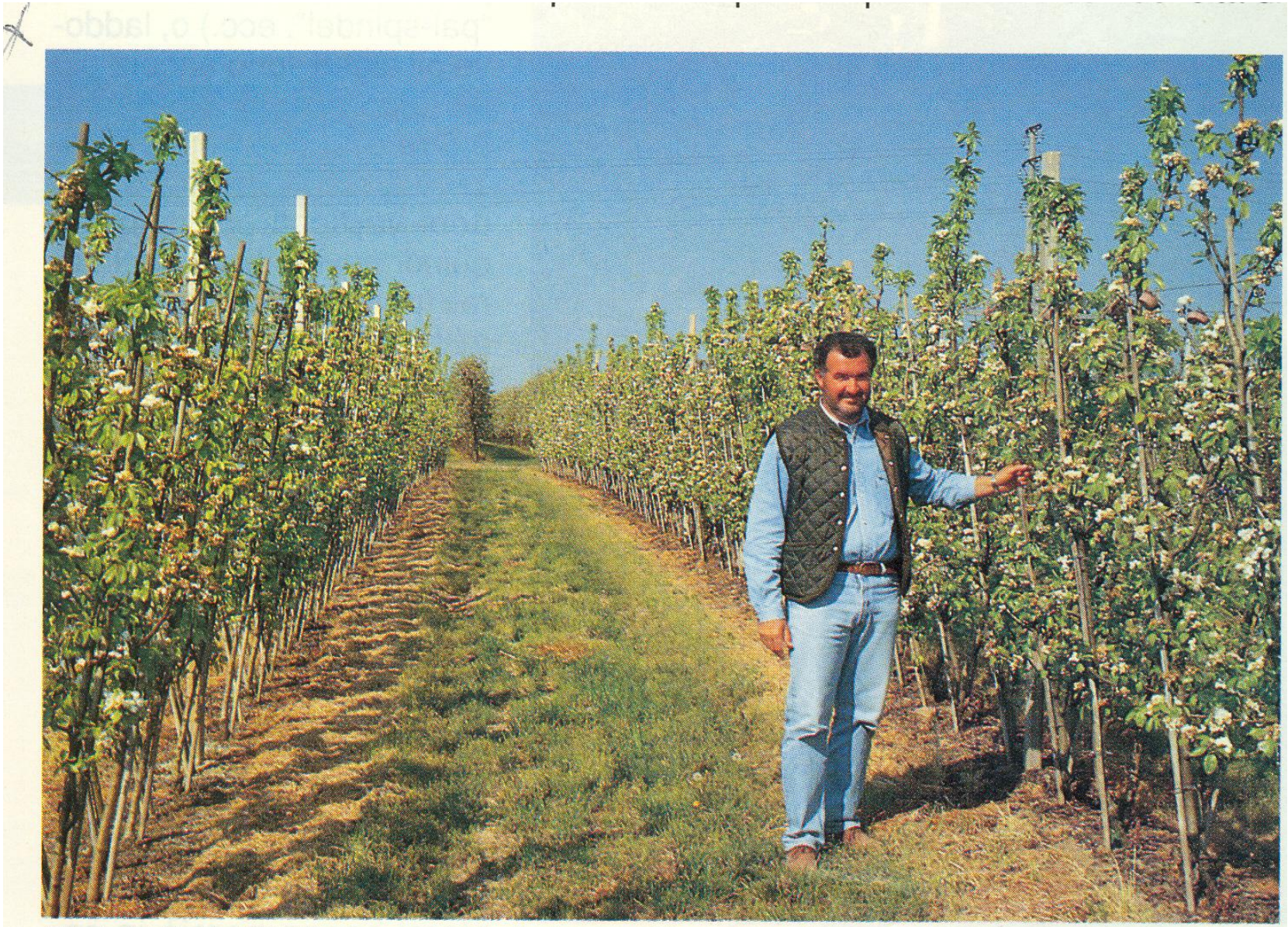
Nel Regno Unito la vendita di **frutta e verdura imperfetta**, cioè quella che normalmente non raggiunge gli scaffali perché ha problemi estetici che però non ne inficiano la qualità, sembra essere promossa a pieni voti... ma con una riserva: quella del pezzo.

Una recente indagine della società di ricerca Blue Yonder - come **riporta Aol** - rivela infatti che 9 responsabili vendite su 10 dei maggiori retailers britannici giudicano positivamente la vendita di frutta e verdura *brutta ma buona* a patto però che, stando ai feedback dei propri clienti, sia venduta sugli scaffali a un prezzo più basso, assimilabile a quello da discount.

Frutta e verdura solitamente scartata per la vendita al dettaglio.

Nel Regno Unito il consumatore si dimostra particolarmente attento alla sostenibilità ambientale, visto e considerato che un recente rapporto del **Global Food Security** del governo britannico rivela che il 40% della frutta e della verdura commestibile non raggiunge nemmeno gli scaffali, proprio per via di difetti esteriori.

Foto Vivai Mazzoni



Filari di "Abate Fétel"/cotogno MC in fioritura, al 5° anno. L'allevamento a V sembra congeniale per gli alberi fitti sulla fila (distanza 0,4 m). Si noti la bassa statura degli alberi.

Reti antipioggia

Research Group

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ISHS- IX International Symposium on Irrigation of Horticultural Crop
17-20 June 2019 in MATERA, ITALY

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Agreenment
towards a green society
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