Giornata di studio GRU.S.I.

ATTUAZIONE DEL Decr. MIPAAF 31 LUGLIO 2015
per la STIMA DEI VOLUMI IRRIGUI

E 14 CCA/GR/00389 - AgroClimaWater

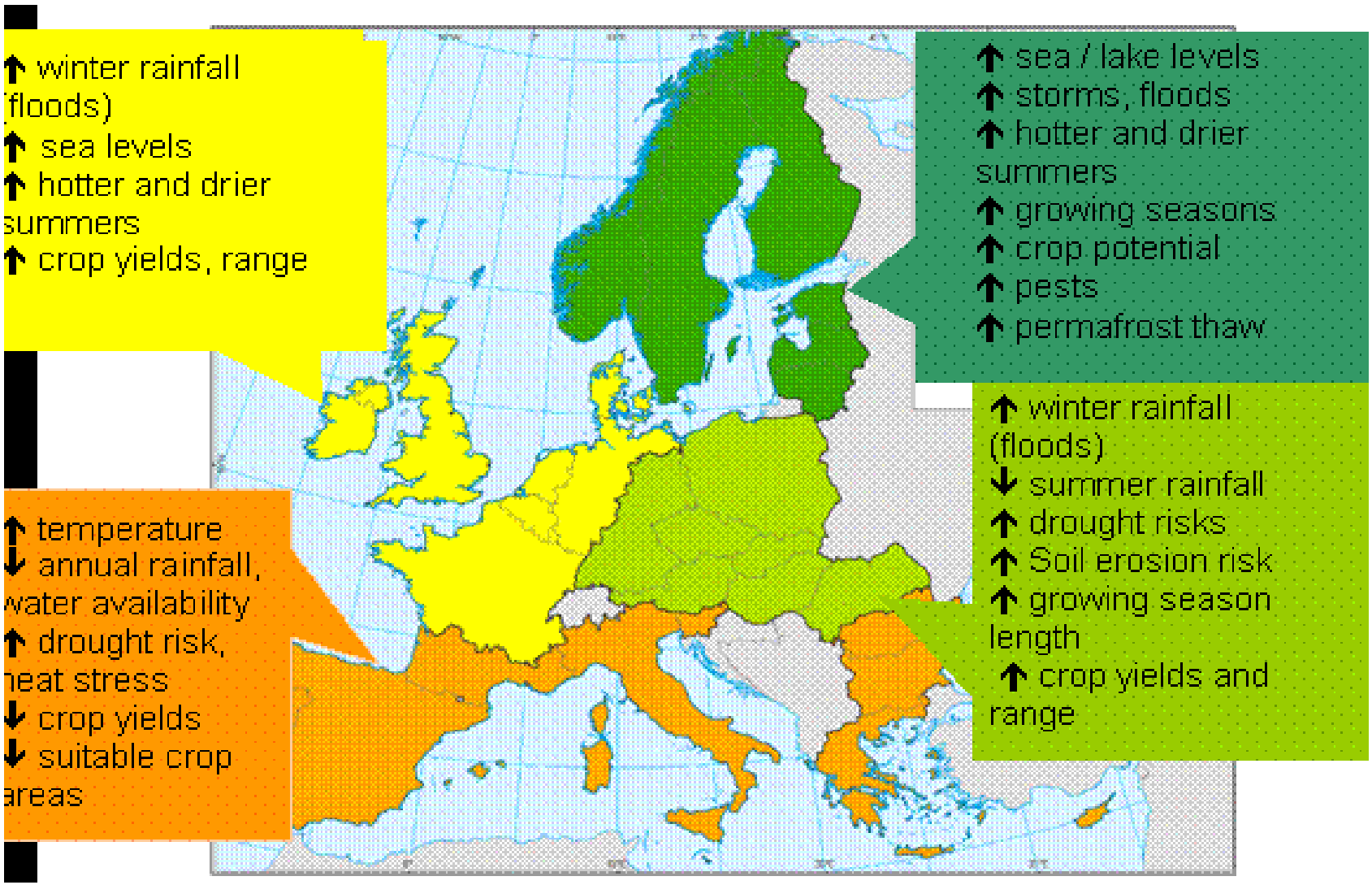
Gestione sostenibile dell'irrigazione nella frutticoltura degli ambienti mediterranei

Bartolomeo Dichio

Università degli Studi della Basilicata /DiCEM




Cambiamenti Climatici in Europa

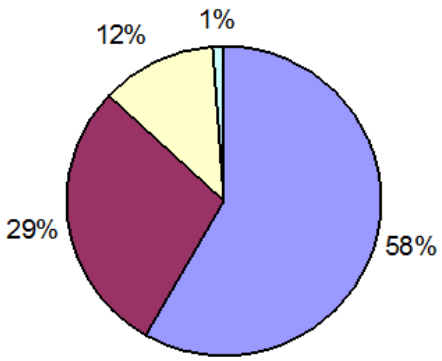


http://ec.europa.eu

Basilicata – ITALY

agriculture

Land use of the whole territory



PETROLEUM

Oilfield

Gas 3.400.000 m3 14%/Italy

81.868 barrels/day 70%/Italy

Royalties to Basilicata Region
1,16 miliardi di euro dal 1998 al 2013

Rapporto Eni 2013

BASILICATA: hydrographical system

5 main rivers

BASILICATA Region: WATER

Acerenza

Maximum capacity of dams:

950 Mm3

Genzano

Basentello

Camastra

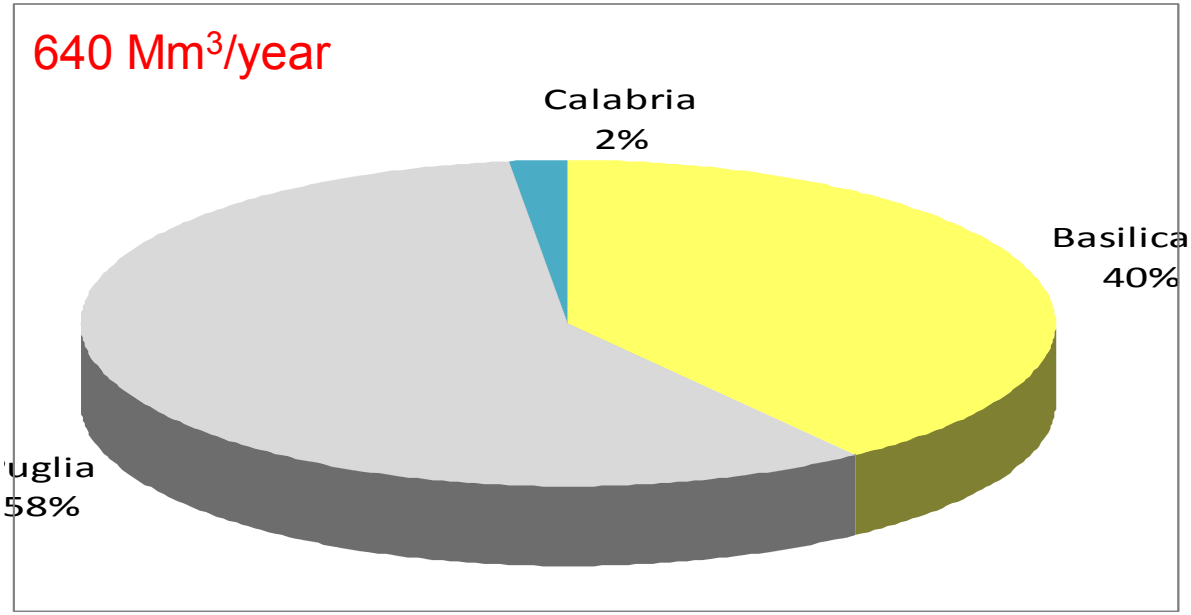
Pertusillo

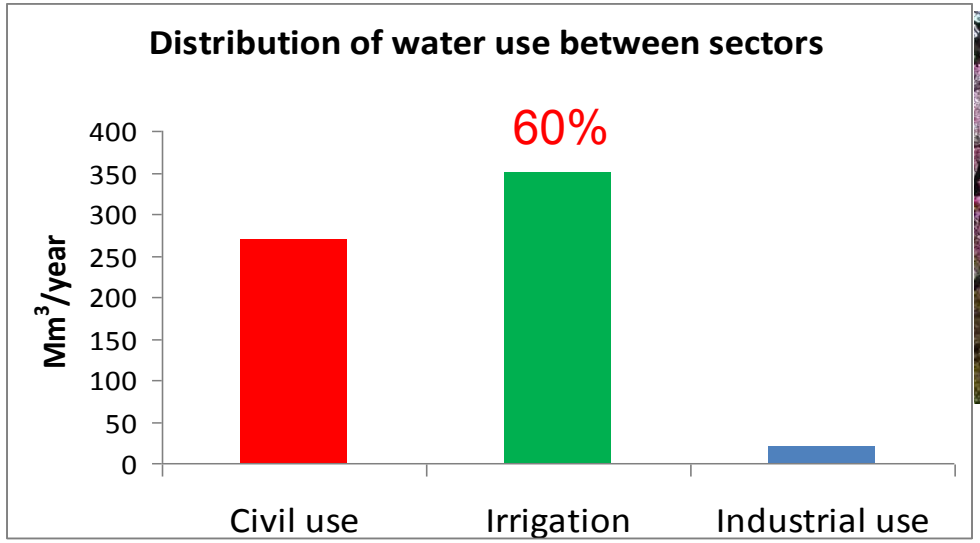
Montecotugno

San Giuliano

BASILICATA Region

Sharing of water resources with adjacent regions





Irrigated fruit crops in Basilicata:
72 % of total irrigated ha

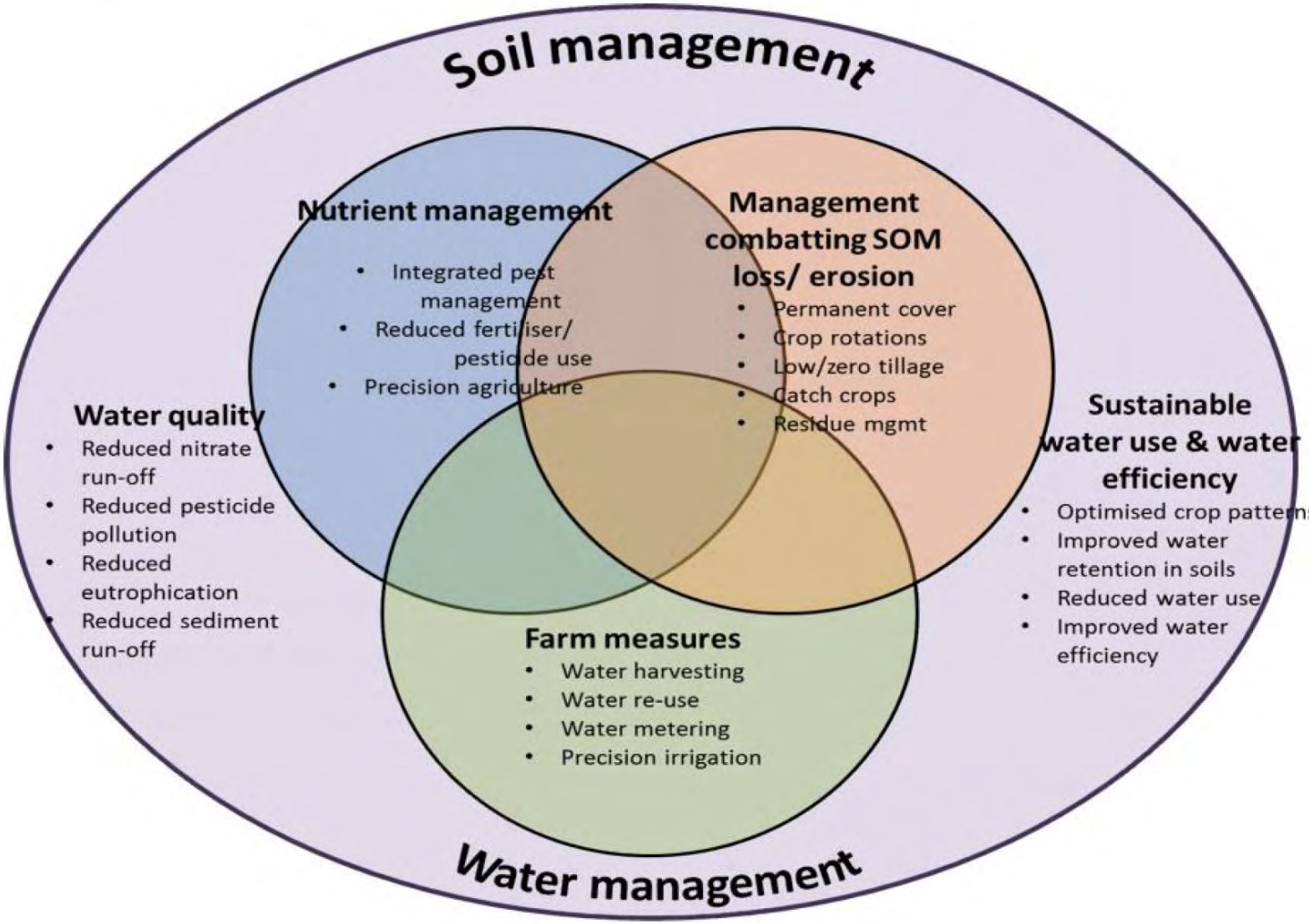
Climate-Smart Agriculture (sustainable) is needed

CSA is agriculture that

- **increases yields (poverty reduction & food security),**
- **makes yields more resilient in the face of worsening weather conditions (adaptation), and**
- **transforms the farm into a solution to the climate change problem (mitigation).**

(World Bank , 2012)

Potential win-wins strategy for Sustainability



Sustainable

Peach orchard
cv.Super Crimson/GF667
500 tree/ha

conventional

Untilled soil
spontaneous grass

Soil management

Compost (15 t ha-1)
Mineral N if necessary

Fertilization

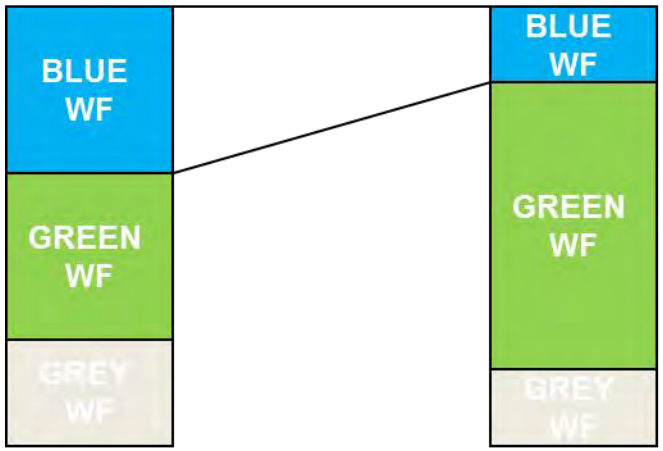
Mineral
fertilizers

Pruning material

Guided drip irrigation
Crop evapotraspiration and
Soil Water Balance

Cipping pruning residues into
the soil

Strategie



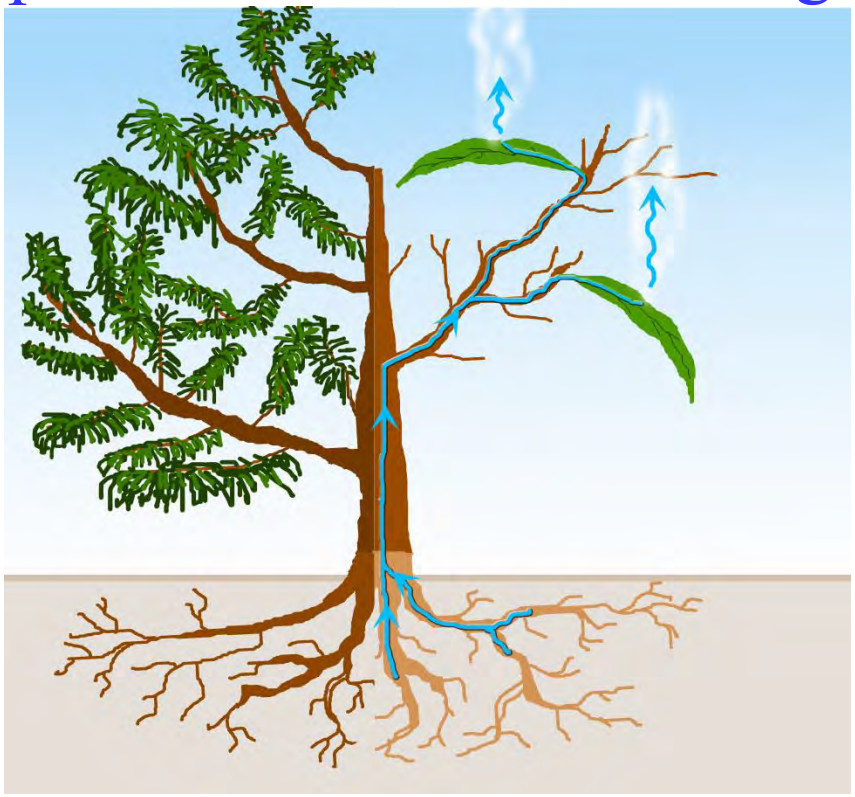
- Ottimizzare la gestione del metodo irriguo
  corretta gestione dei contenitori
  strategie di deficit idrico controllato

-Integrare attuali conoscenze di fisiologia dell'assorbimento e trasporto idrico

- migliorare l'efficienza dell'uso dell'acqua della pianta

- migliorare l'immagazzinamento nel suolo dell'acqua piovana

Optimization water use in Agroecosystem



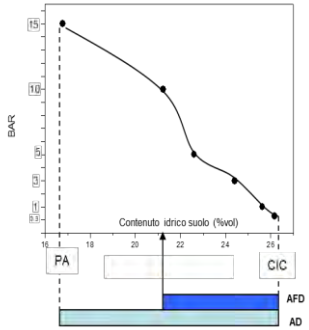
$$WUE = \frac{\text{Biomass} \quad (Kg)}{\text{Transpired Water} \quad (m^3)}$$

$$WP = \frac{\text{Marketable Yield value}}{\text{Irrigation water}}$$

WP = Water Productivity

Water balance implementation

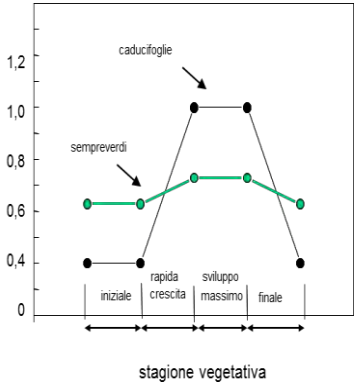
Weather Parameters (ET_0)



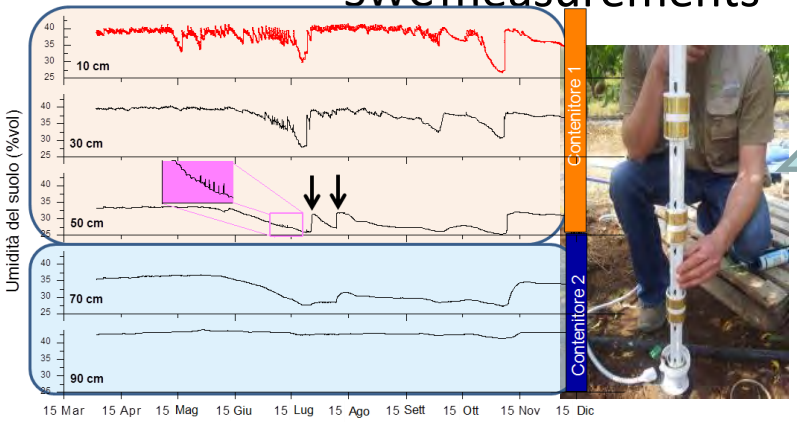
Soil data

Soil water balance

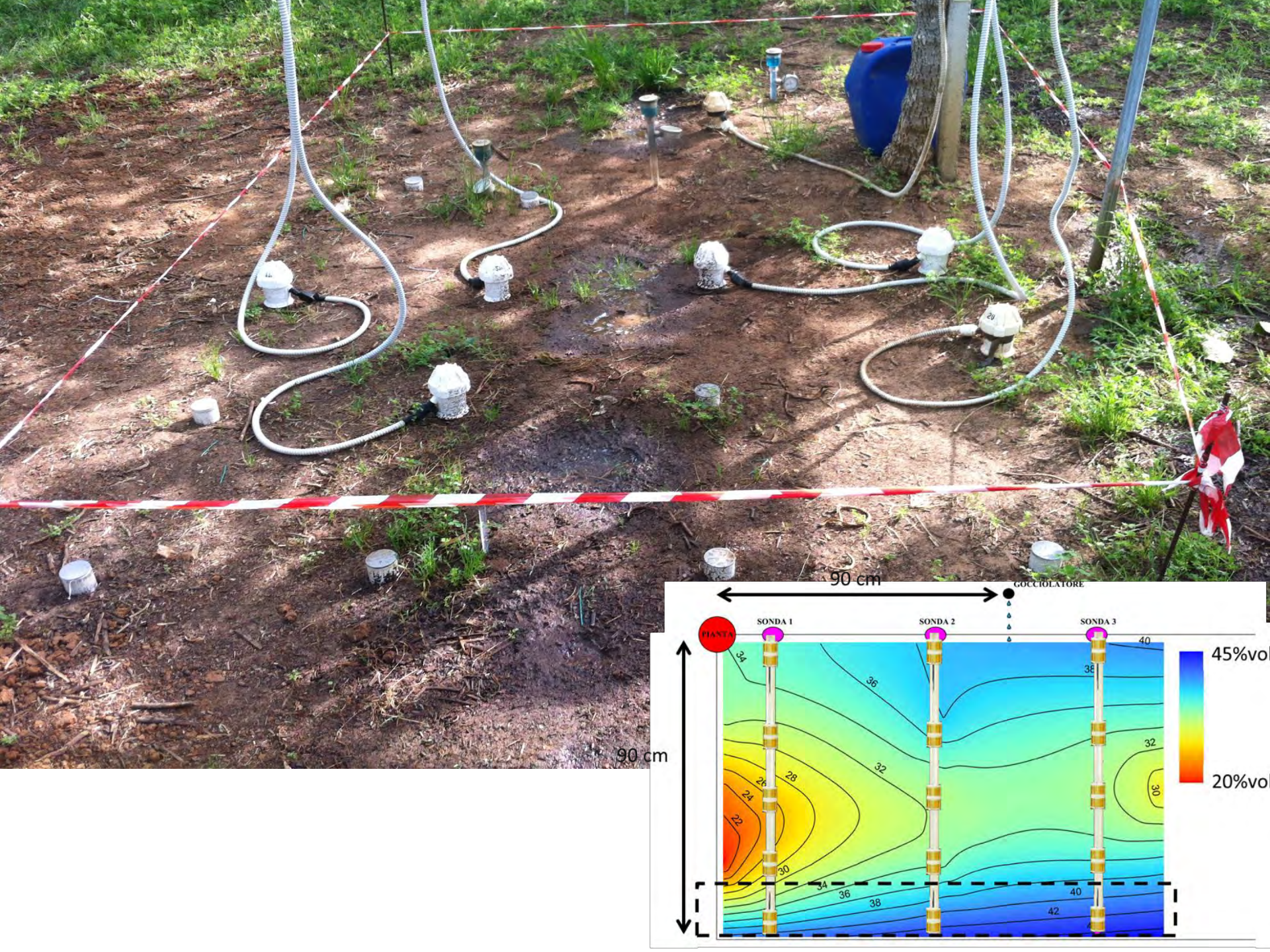
Crop data

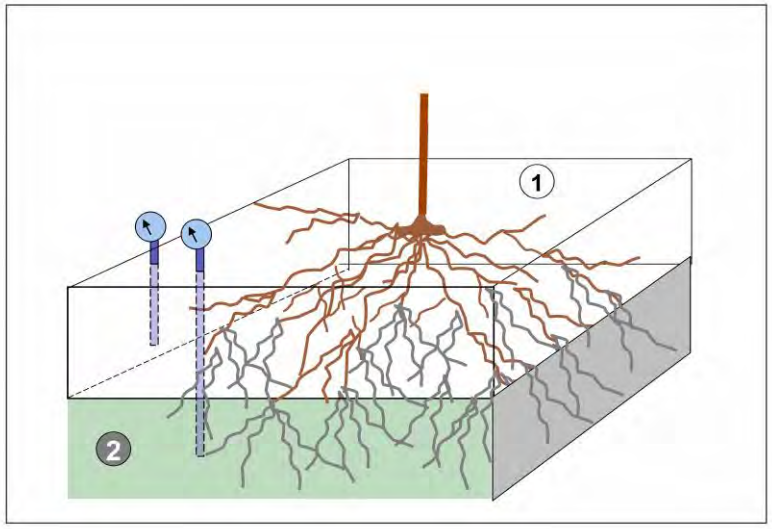


SWC measurements

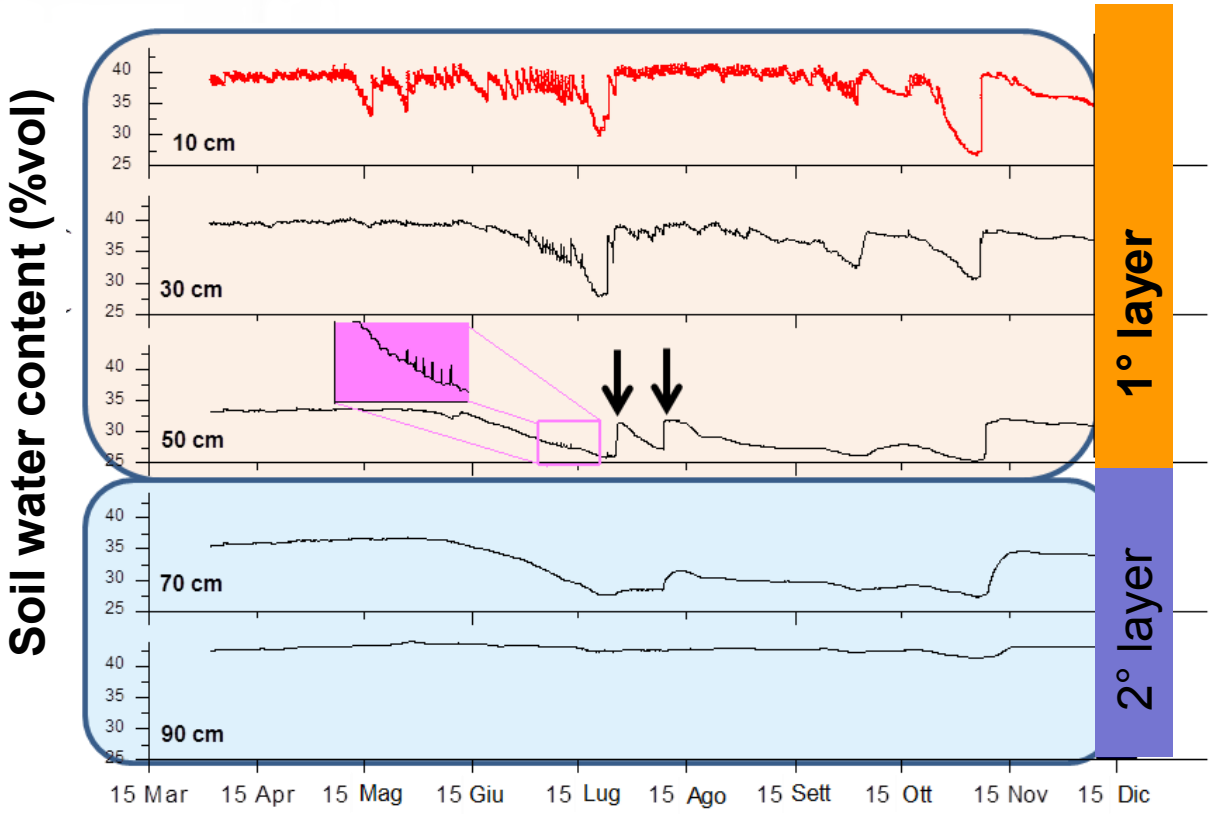


Water balance Optimased


90 cm
90 cm
GOCCIOLATORE
PIANTA
SONDA 1
SONDA 2
SONDA 3
45%vol
20%vol
34
36
38
40
32
28
26
24
22
30
42

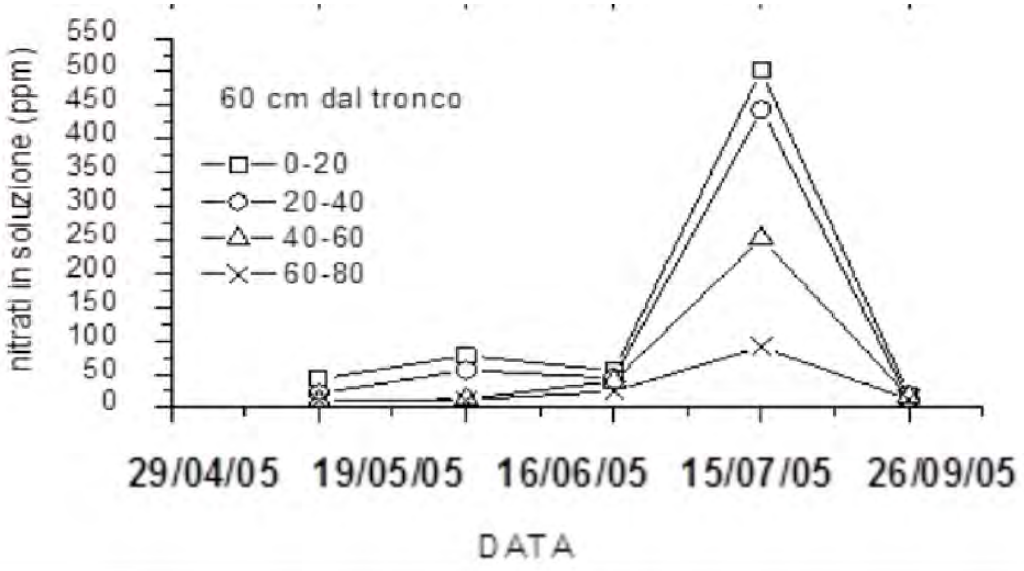


the continuous monitoring of soil water content along the soil profile give us information to correct the irrigation scheduling

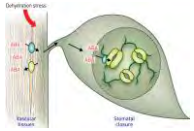


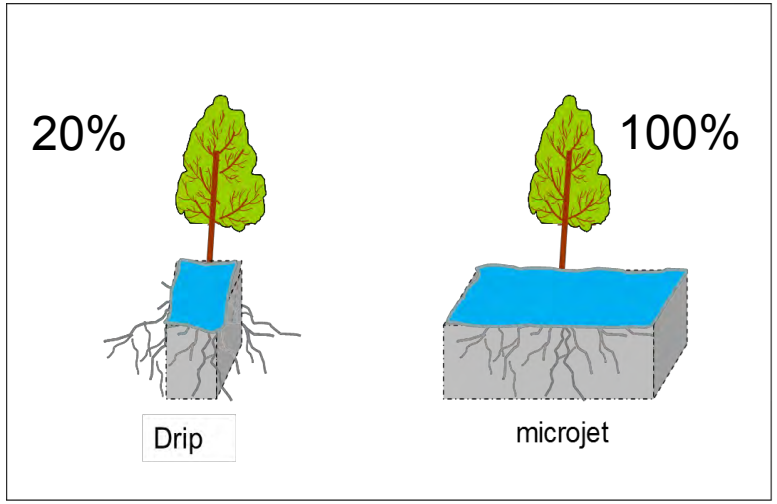
Wetted soil by irrigation 90 cm

Water Table 120 cm



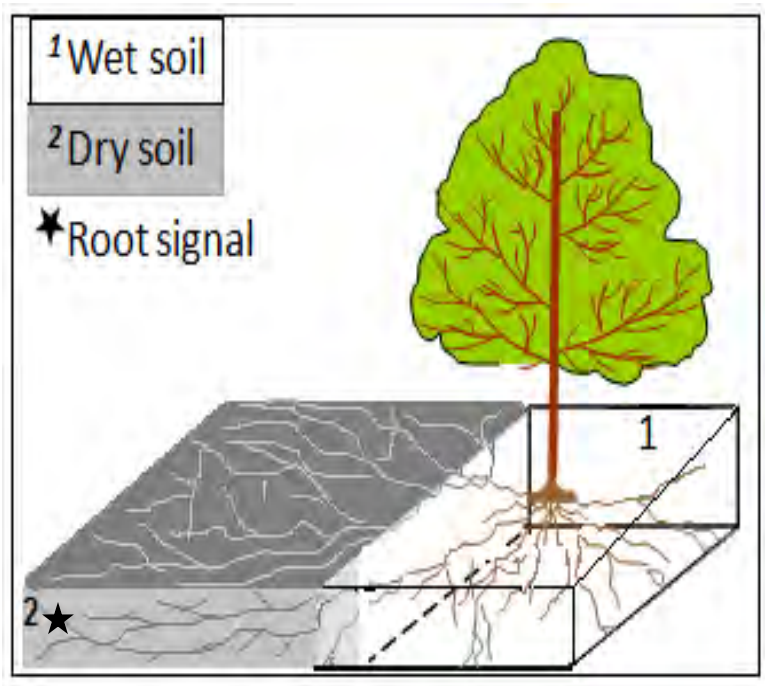
Irrigation requirement for drip-irrigated Trees Is different?

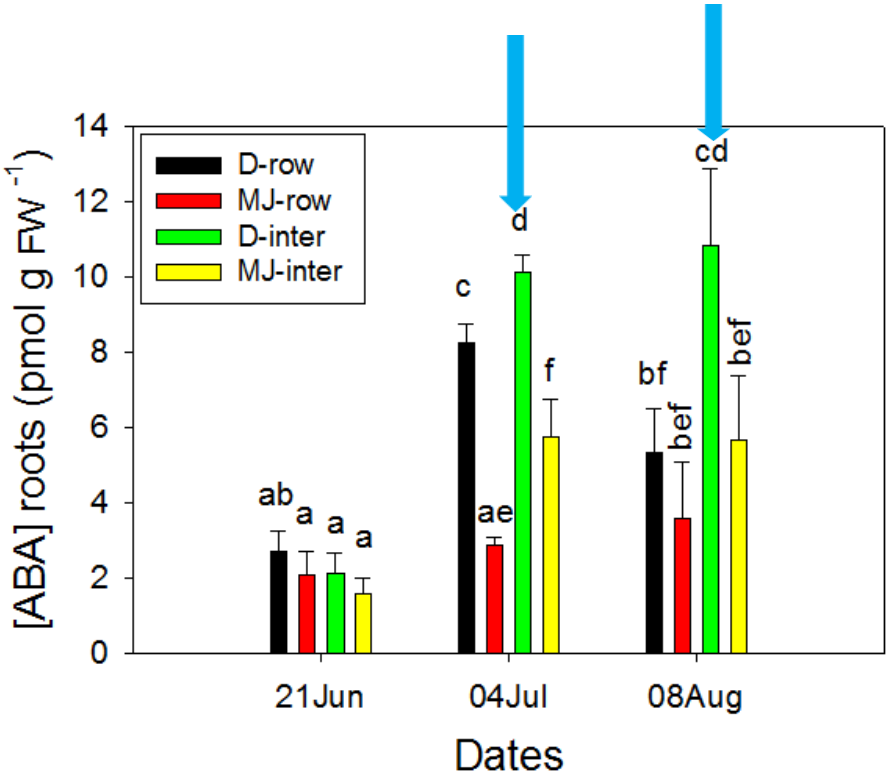




Research Hypothesis:

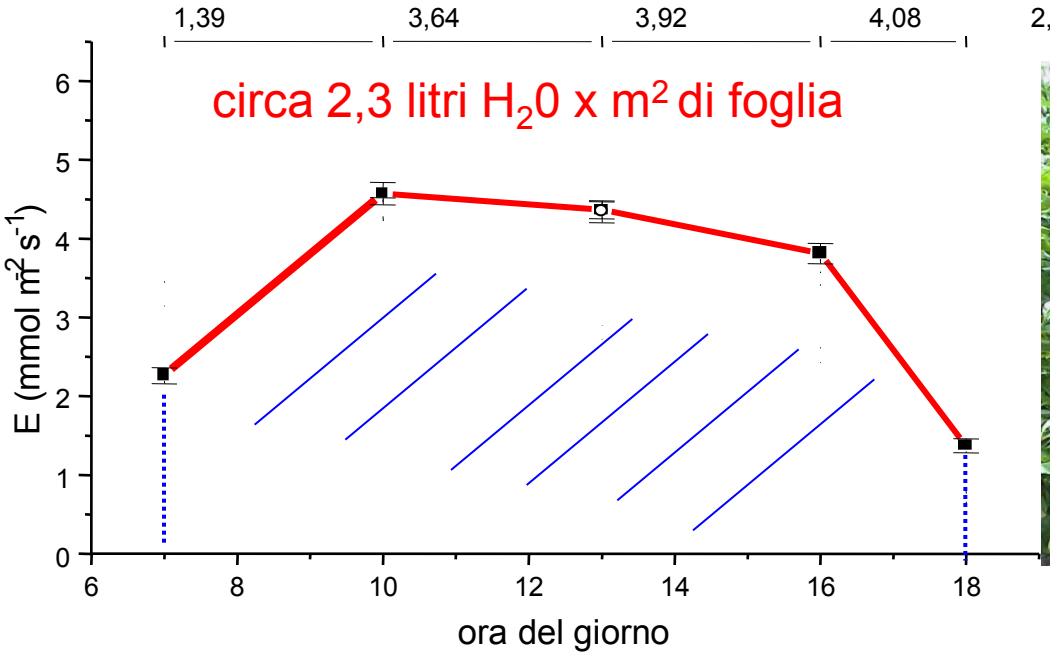
Drip-irrigated trees Although plant water status is optimal, dehydrated roots at inter-row increase [ABA] reducing gs, leading to higher WUE.





Drip-inter shown a big increase a about 2-fold compared the MJ –row and inter

Quanta acqua si può risparmiare con la potatura verde?



Traspirazione giornaliera 66 lt/pianta

Potatura verde 10,34 m^2 p^{-1}

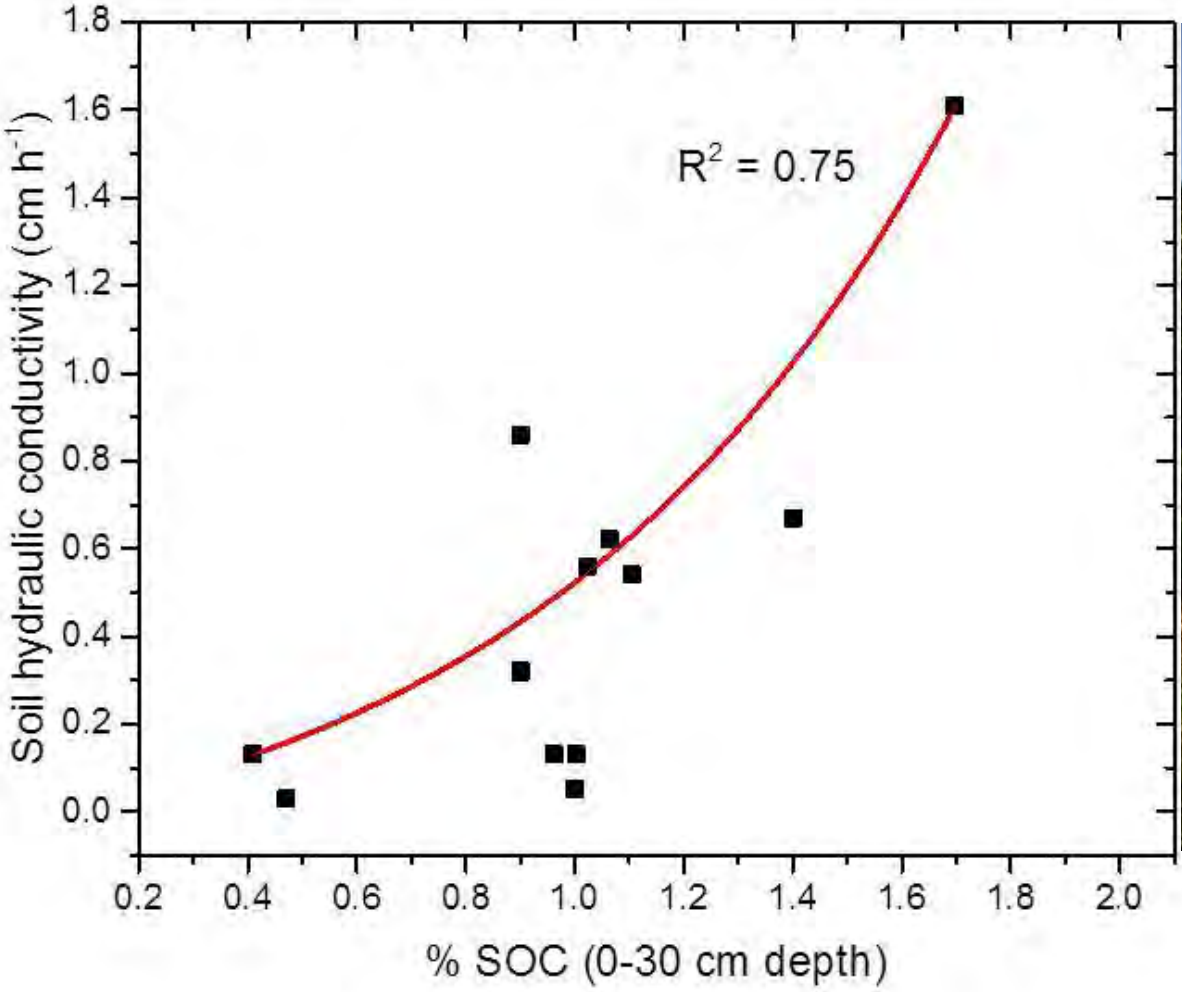
24 litri $g^{-1}p^{-1}$ → 60-80 g

circa 750 m^3/ha

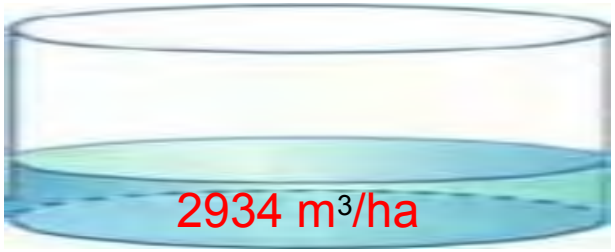
circa 1000 m^3/ha

Increasing SOC improves soil hydraulic conductivity

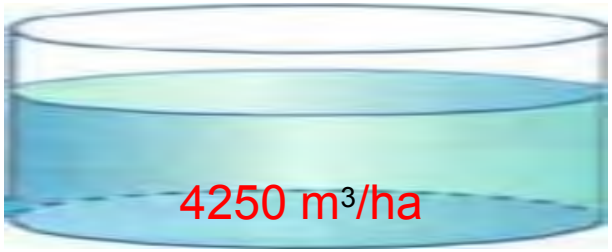
data from peach, kiwifruit, apricot and olive orchards are grouped



Increase soil water holding capacity



Mechanical tillage reduces water infiltration causing runoff and erosion processes



Sustainable management practices increase infiltration rate and water storage in soil

>1.300 m3/ha

Optimization and Application of Regulated deficit irrigation

From bud break

To Harvest 100% ETc

Post - harvest

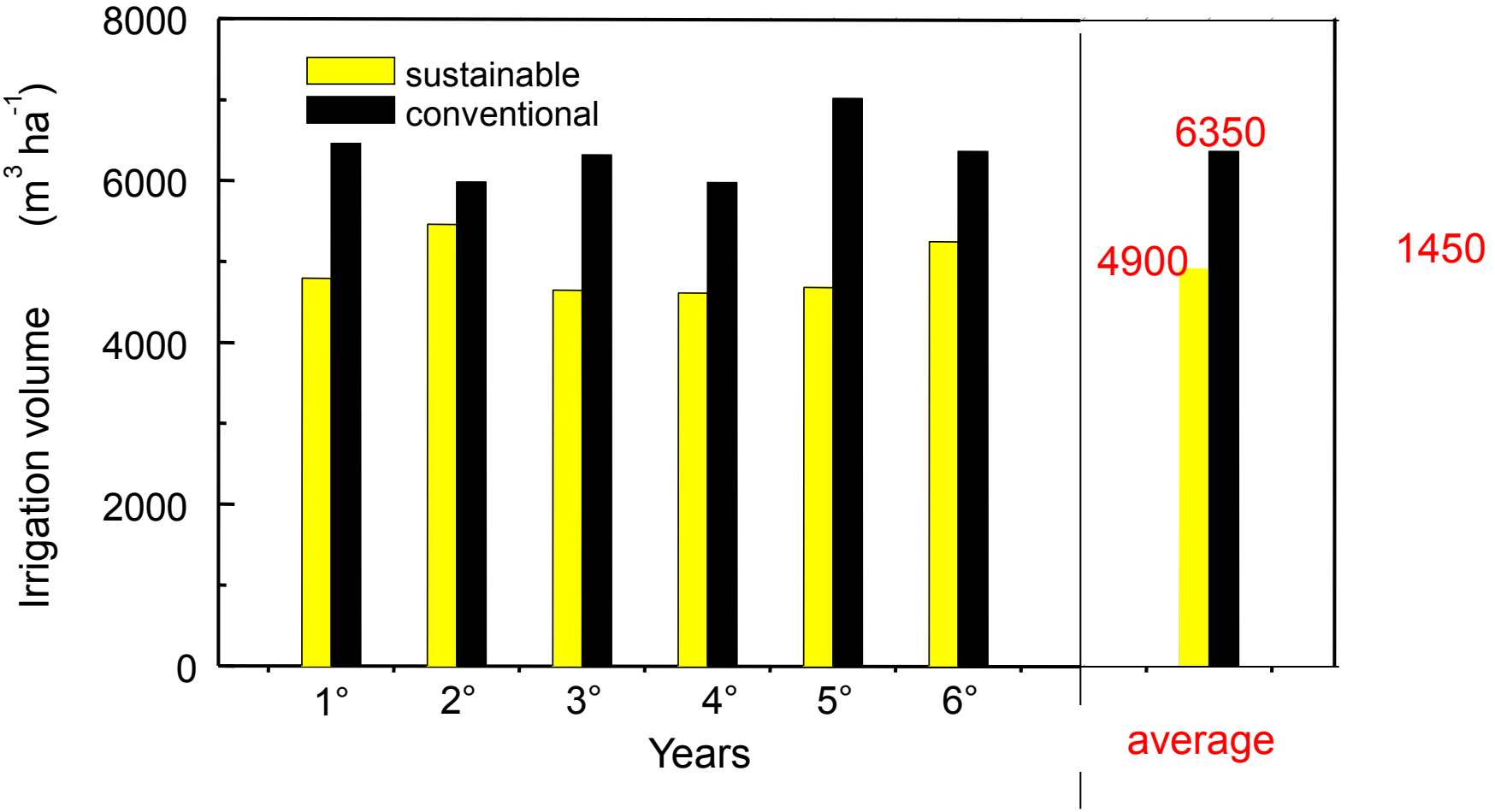
Deficit application
50% ETc

march/July.

At the end of september

B. DICHIO, C. XILOYANNIS, A. SOFO, G. MONTANARO (2007). Effects of post-harvest regulated deficit irrigation on carbohydrate and nitrogen partitioning, yield quality and vegetative growth of peach trees. PLANT AND SOIL (ISSN:0032-079X). 127- 137. 290;

Irrigation volume (m^3 ha^{-1})



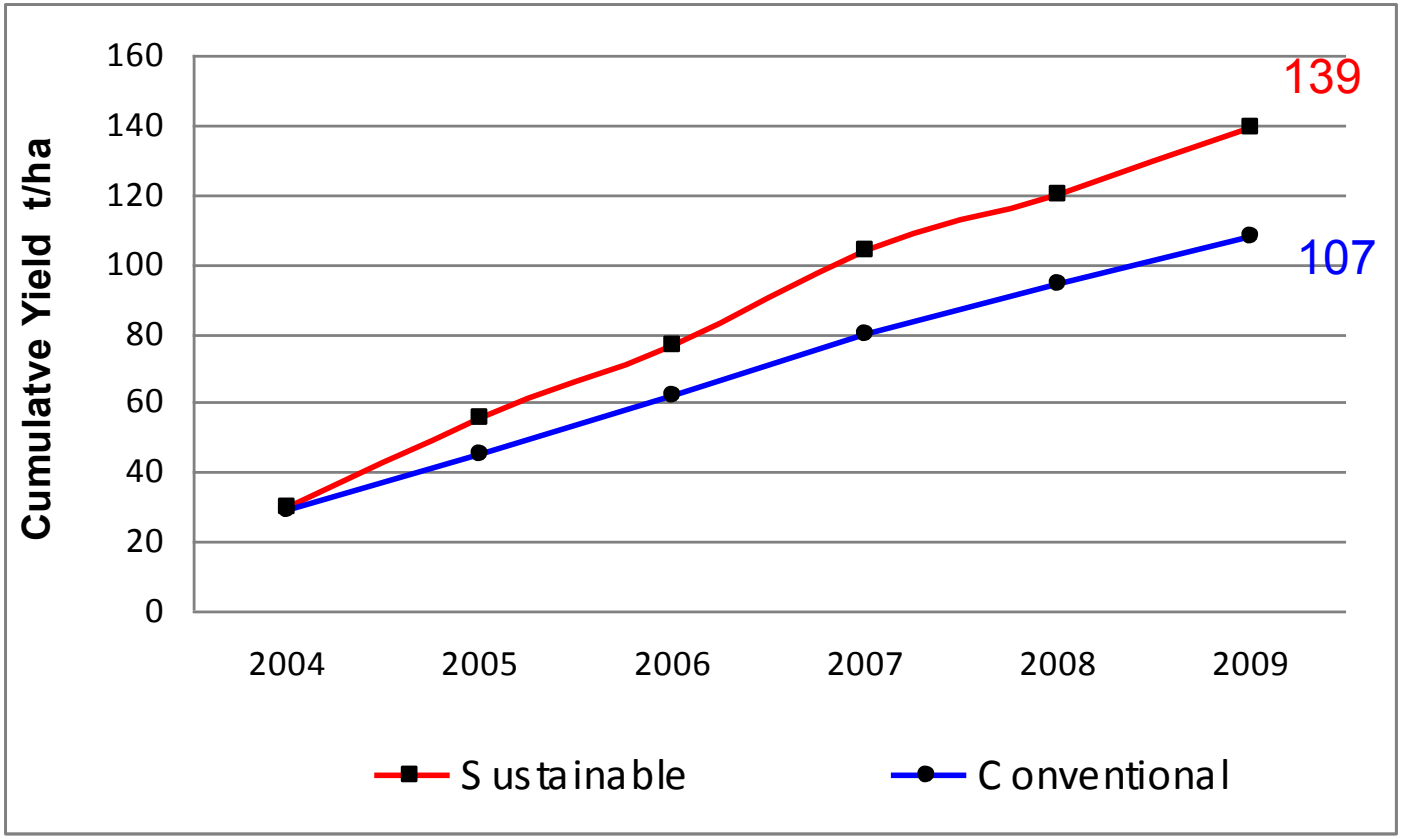
Dichio et al. 2011

$$W.P. = \frac{\text{Marketable Yield value (€)}}{\text{Irrigation water (m}^3\text{)}}$$

Water footprint (L) /Kg of fruit

Sustainable	220
Conventional	380

Sustainable	€ 2,11
Conventional	€ 1,34



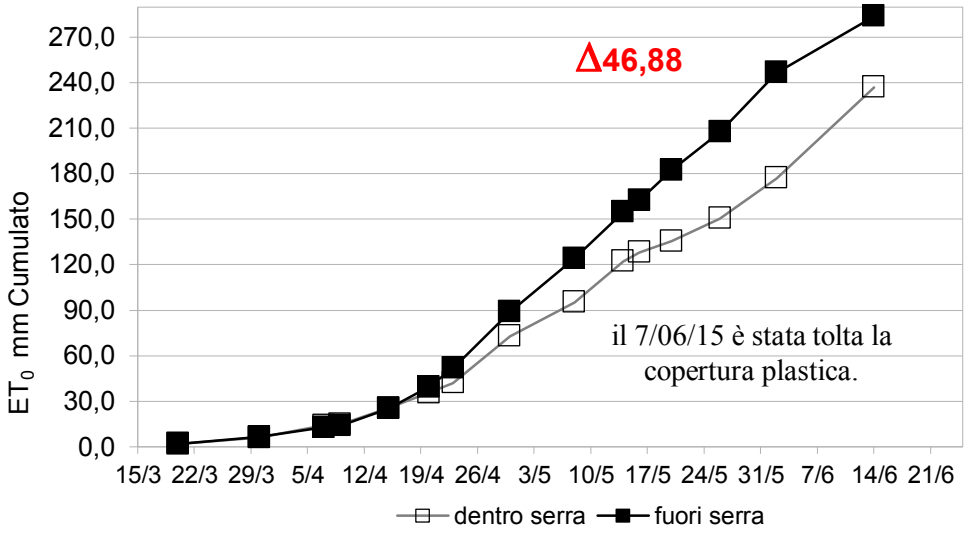
Azienda	coltura	fase vegetativa	periodo	Volume medio erogato	Eto mm Alsia medio	Kc medio derivato
		pre-invaiatura	*2014-2015*	897,9	170,9	0,5
Defilippis Maria	Albicocco	*invaiatura-raccolta*	*2014-2015*	805,1	175,7	0,5
	Orange Rubis	*post raccolta*	*2014-2015*	*1749,8*	*705,1*	*0,2*
Volumi totali				***3452,7***		
		pre-invaiatura	*2014-2015*	816,8	141,9	0,6
Fortunato A.Lisa	Albicocco	*invaiatura-raccolta*	*2014-2015*	995,5	154,5	0,6
	Orange Rubis	*post raccolta*	*2014-2015*	*2294,1*	*503,7*	*0,5*
Volumi totali				***4106,3***		
		pre-invaiatura	*2014-2015*	440,0	155,0	0,3
Sabato Vito	Nettarina	*invaiatura-raccolta*	*2014-2015*	800,0	154,5	0,5
	Big Bang	*post raccolta*	*2014-2015*	*1950,0*	*592,9*	*0,3*
Volumi totali				***3190,0***		
		pre-invaiatura	*2014-2015*	512,4	155,0	0,3
Sabato Antonio	Nettarina	*invaiatura-raccolta*	*2014-2015*	835,6	154,5	0,5
	Big Bang	*post raccolta*	*2014-2015*	*2392,5*	*592,9*	*0,4*
Volumi totali				**3740,5**		

15/20 giugno

7/8 giugno

Azienda	coltura	tesi	Volume irri 2014 (mc)	Volume irri 2015 (mc)	Produzione 2014 (t/ha)	Protuzione 2015 (t/ha)	WUE mc/Kg 2014	WUE mc/Kg 2015	Water Pr euro/mc
Defilippis Maria	Albicocco	*Prova*	3064,8	3840,7	*11,48*	*58,74*	0,267	0,065	6,94
"	"	*Controllo*	3300,0	3954,0	*17,31*	*53,02*	0,191	0,075	6,92
Fortunato A.Lisa	Albicocco	*Prova*	4287,0	3925,7	*22,3*	*40*	0,192	0,098	5,78
"	"	*Controllo*	5087,0	5502,0	*22,1*	*40*	0,230	0,138	4,39
Sabato Vito	Nettarina	*Prova*	2780,0	3600,0	*26,04*	*28,72*	0,107	0,125	4,97
"	"	*Controllo*	3074,0	3747,0	*22,44*	*27,84*	0,137	0,135	4,24
Sabato Antonio	Nettarina	*Prova*	4026,0	3455,0	*11,41*	*18,45*	0,353	0,187	2,38
"	"	*Controllo*							
Lepenne Donato	Actinidia	*Prova*		6843,0		*63,5*		0,108	3,25
"	"	*Controllo*		9252,0		*64,9*		0,143	2,46

monitoraggio Eto frutticoltura coperta

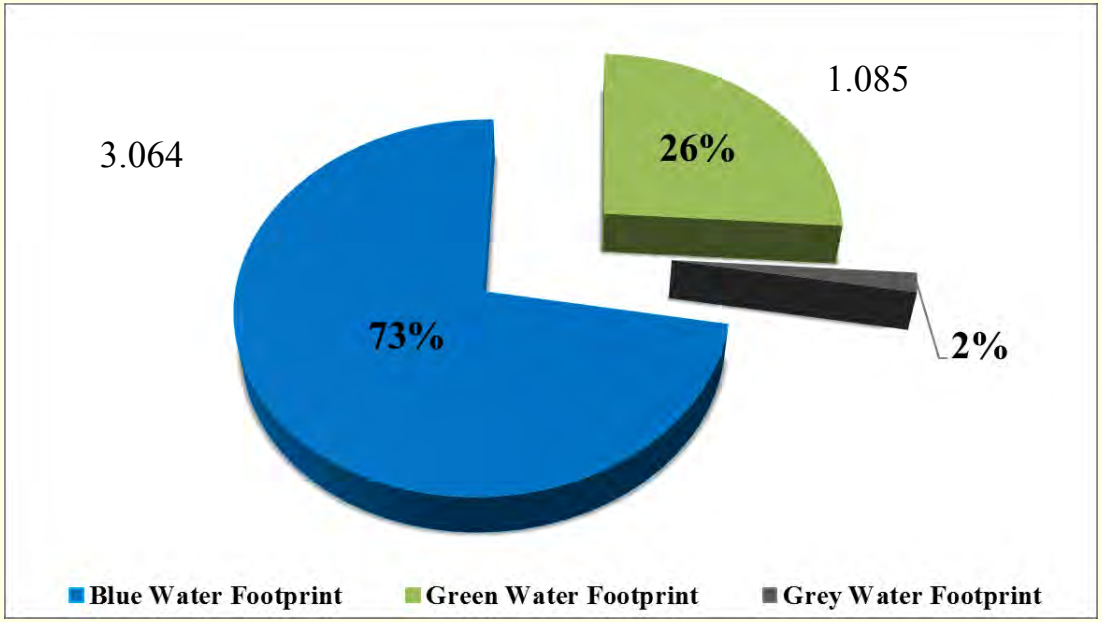


$$WF_{proc,green} = \frac{CWU_{green}}{Y} \quad [\text{volume/mass}]$$

$$CWU_{green} = 10 \times \sum_{d=1}^{lgp} ET_{green} \quad [\text{volume/area}]$$

WATER FOOTPRINT PER LA CRESCITA DELLA COLTURA			
Componente	**Simbolo**	**Unità di Misura**	**Valore**
Blue Water Footprint	WF_{blue}	m^3/ton	266,98
Green Water Footprint	WF_{green}	m^3/ton	94,54
Grey Water Footprint	WF_{grey}	m^3/ton	6,18
Resa della Coltura	Y	ton/ha	11,48
Water Footprint	**WF**	**m^3/ton**	**367,70**

ALBICOCCO
(azienda agricola De Filippis Maria)



LIFE 14 CCA/GR/00389 - AgroClimaWater

European Water Stewardship EWS

LIFE 14 CCA/GR/00389 - AgroClimaWater

Promoting water efficiency and supporting the shift towards a climate resilient agriculture in Mediterranean countries

Project Beneficiaries:

SPYRIDIS A. - KOUTALOU V. O.P. HYETOS (Coordinator) www.yetos.gr

Hellenic Agricultural Organization "Demeter" Directorate General of Agricultural Research • Institute for Olive Tree, Subtropical Plant and Viticulture, www.nagref-sha.gr • Soil and Water Resources Institute www.ini.gr

Rodaskgro Ltd Environment & Quality www.rodaskgro.gr

University of Basilicata Dipartimento delle Culture Europee e del Mediterraneo www2.unibas.it/dicem/index.php/it

Agricultural Cooperative Partnership Mirabello Union S.A. www.eaem.gr

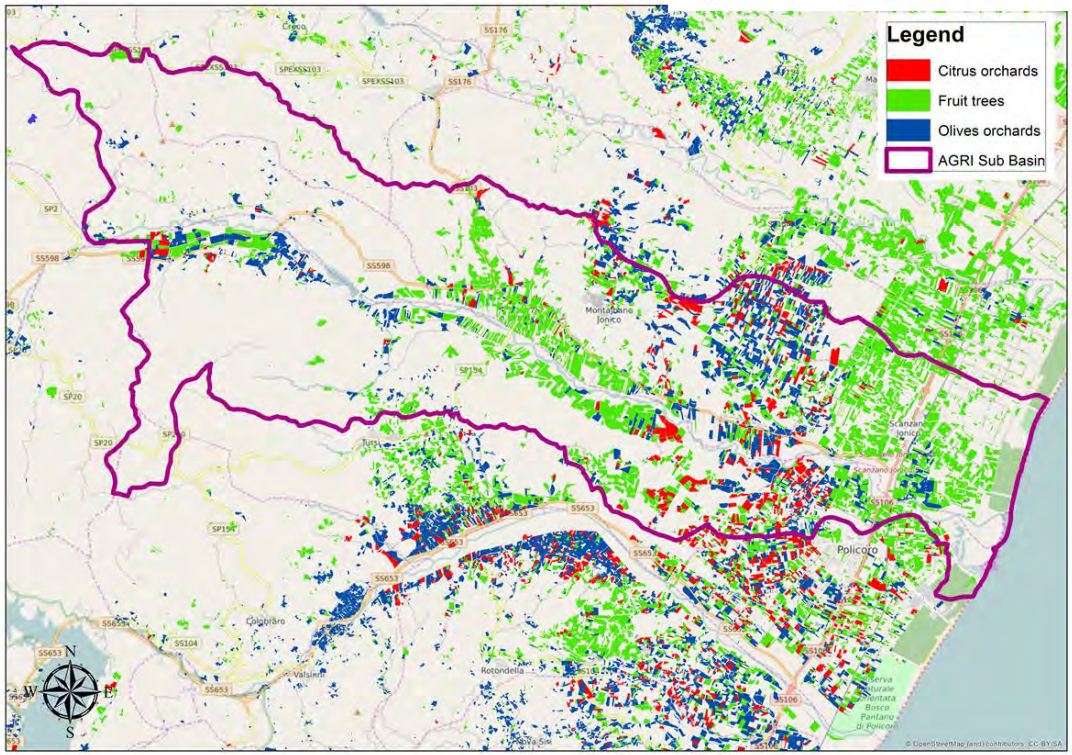
Platanias Municipality Development Enterprise www.platanias.gr

Assofrutt Italia Società Cooperativa Agricola www.assofrutt.com

Project LIFE14 ENV/GR/000389 – AgroClimaWater is implemented with the contribution of the LIFE Programme of the European Union and project's partner scheme

INFORMATION

T.: +30 2310 250601-3, e-mail: yetos@otenet.gr, site: www.lifeagroclimawater.eu



ERIAFF Network
European Regions for Innovation in Agriculture, Food and Forestry

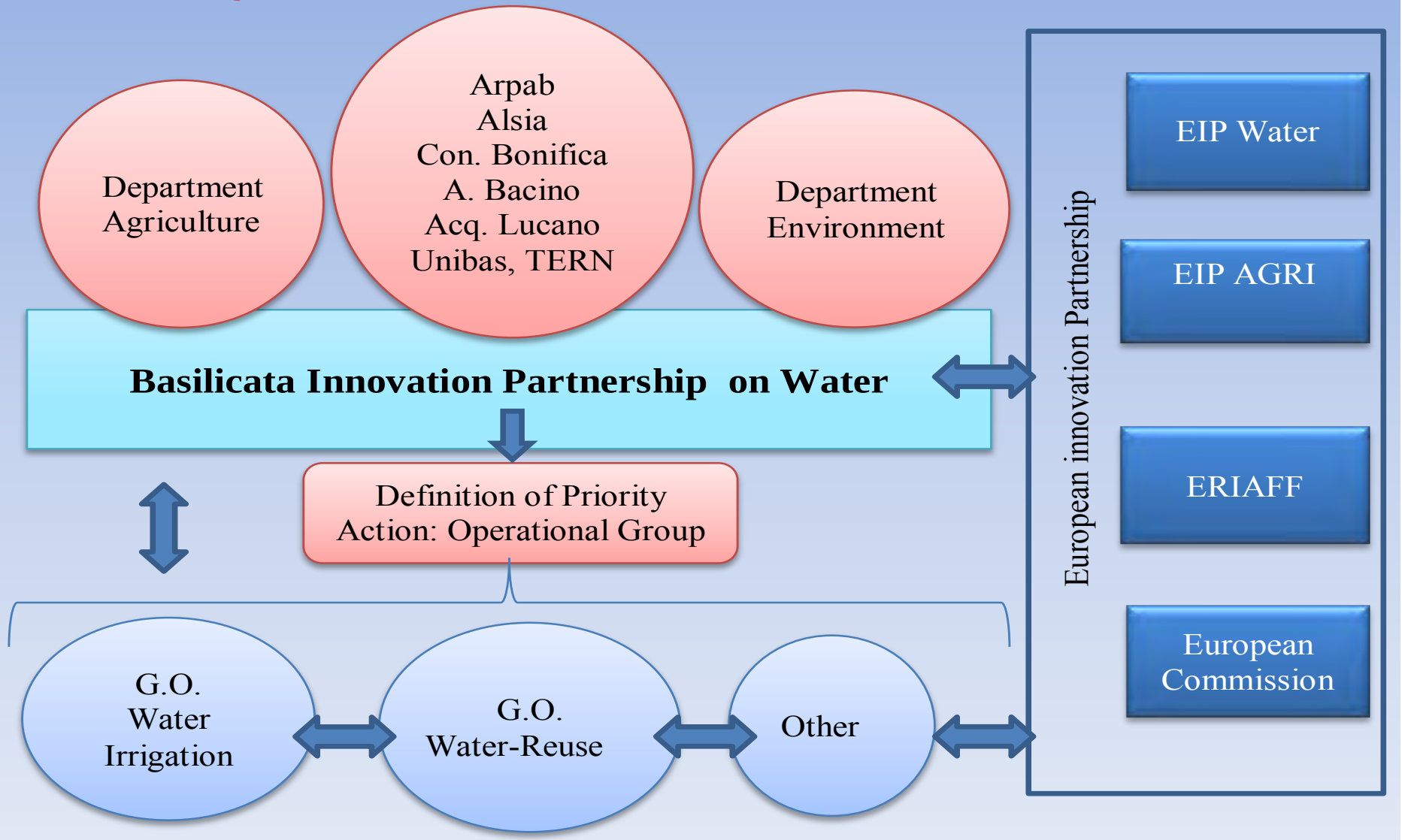
A JOINT
ERIAFF – WIRE WORKSHOP

WIRE
EIP Water Action Group

REGIONE BASILICATA

Inform – Prioritize - Collaborate

Regional Innovation Partnership on Water



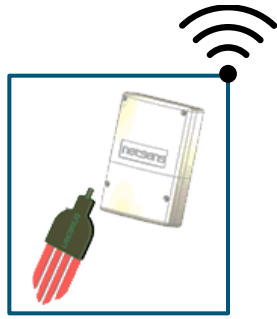
Validation and implementation of the innovations at field level (testing, scaling up, demonstration, training)

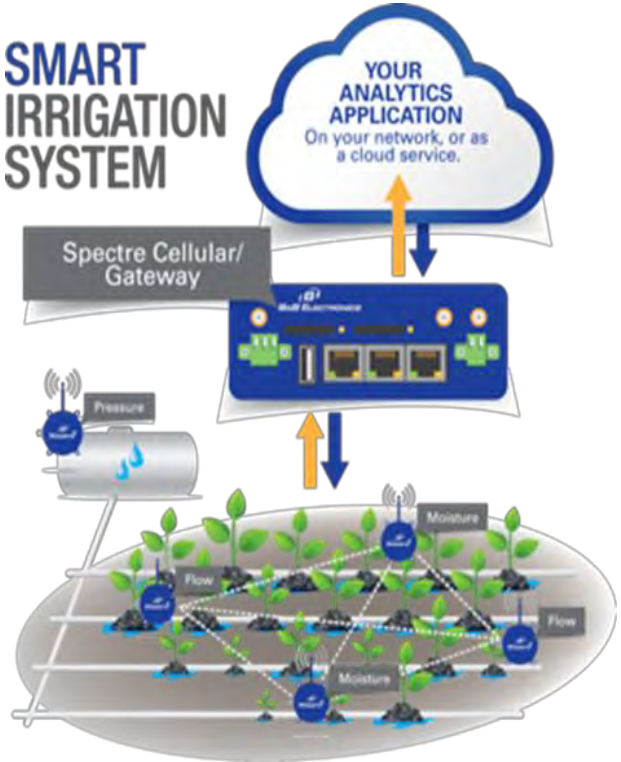
IRRISAT

FIGARO
PRECISION IRRIGATION TECHNOLOGIES

Irriframe
IL PORTALE DELL'IRRIGAZIONE

Bluleaf
Agricoltura Consapevole
www.bluleaf.it





MATERA 2019
EUROPEAN CAPITAL OF CULTURE

VENUE FOR

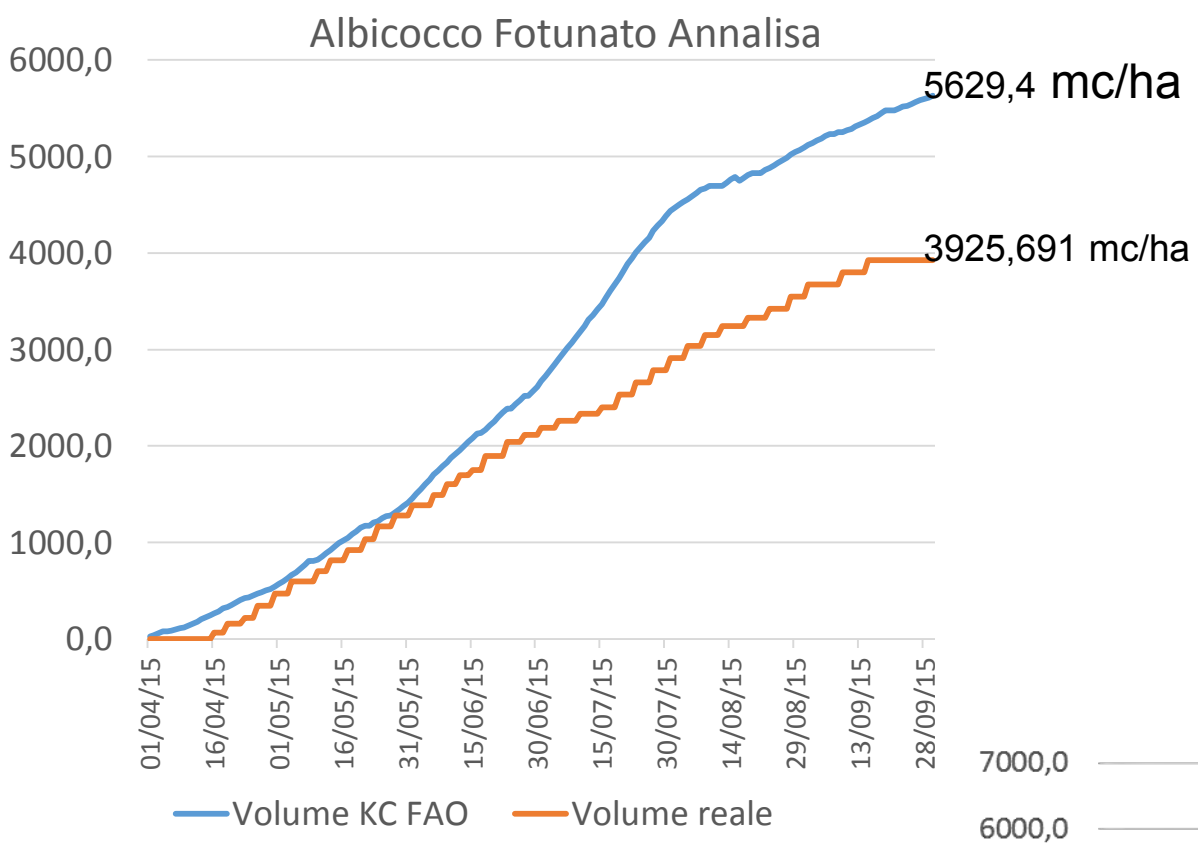
IX ISHS INTERNATIONAL SYMPOSIUM
ON IRRIGATION OF HORTICULTURAL CROPS.

Conveners

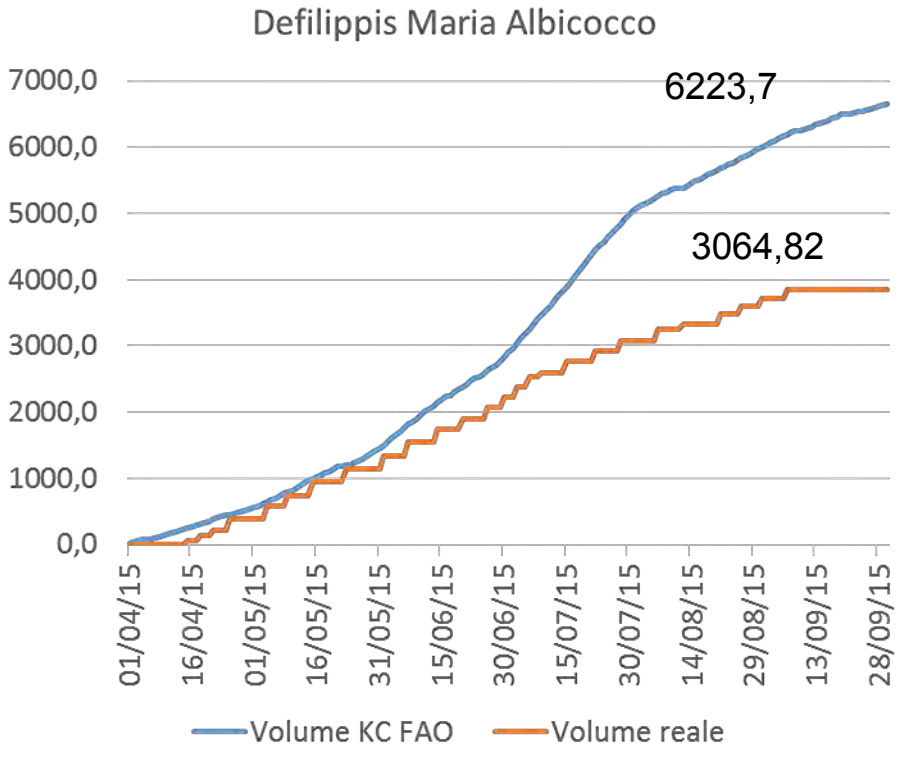
Prof. Bartolomeo Dichio — **Prof. Cristos Xiloyannis**


illy

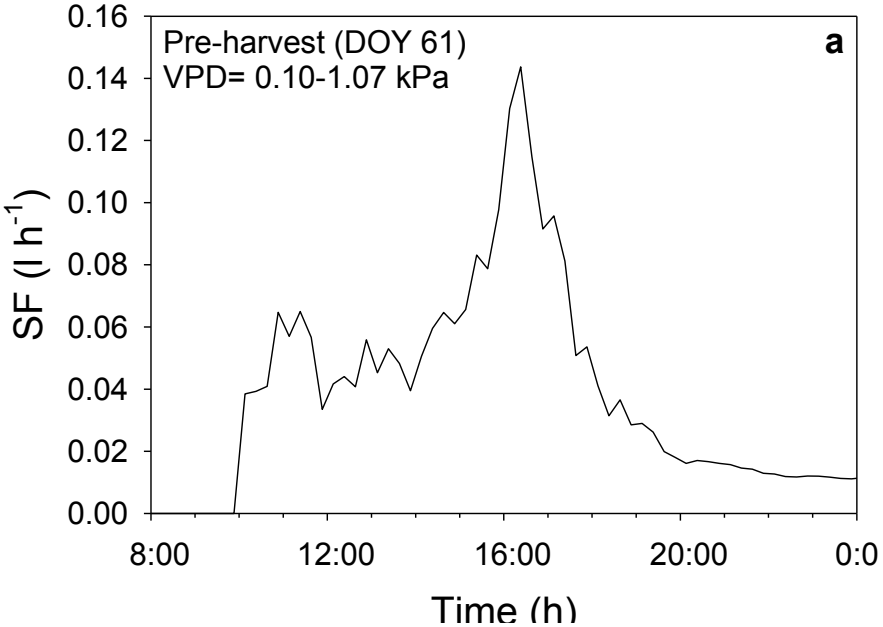
THANKS

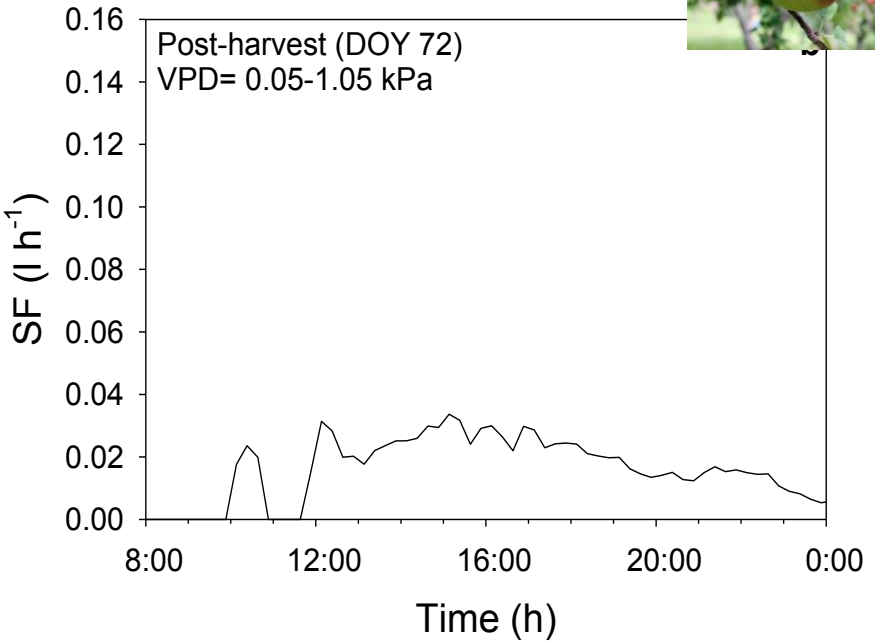


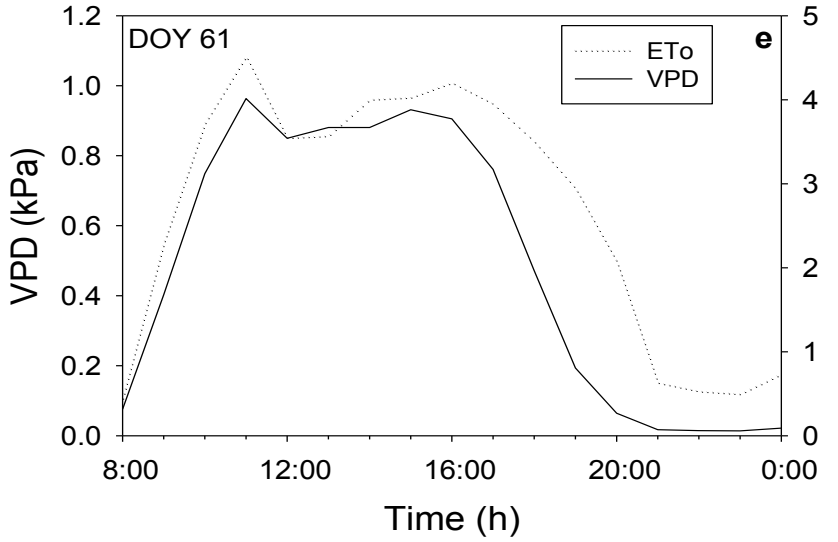
Orange Rubis

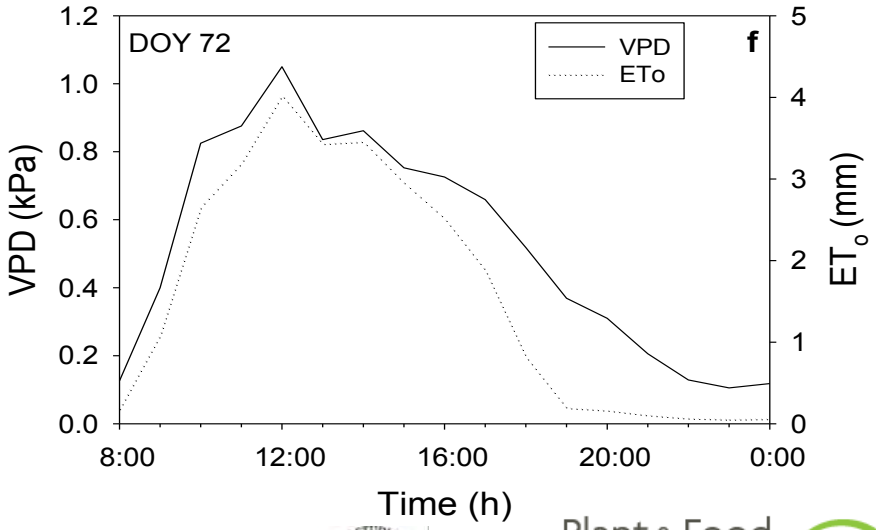


Transpiration reduction after fruit Harvest



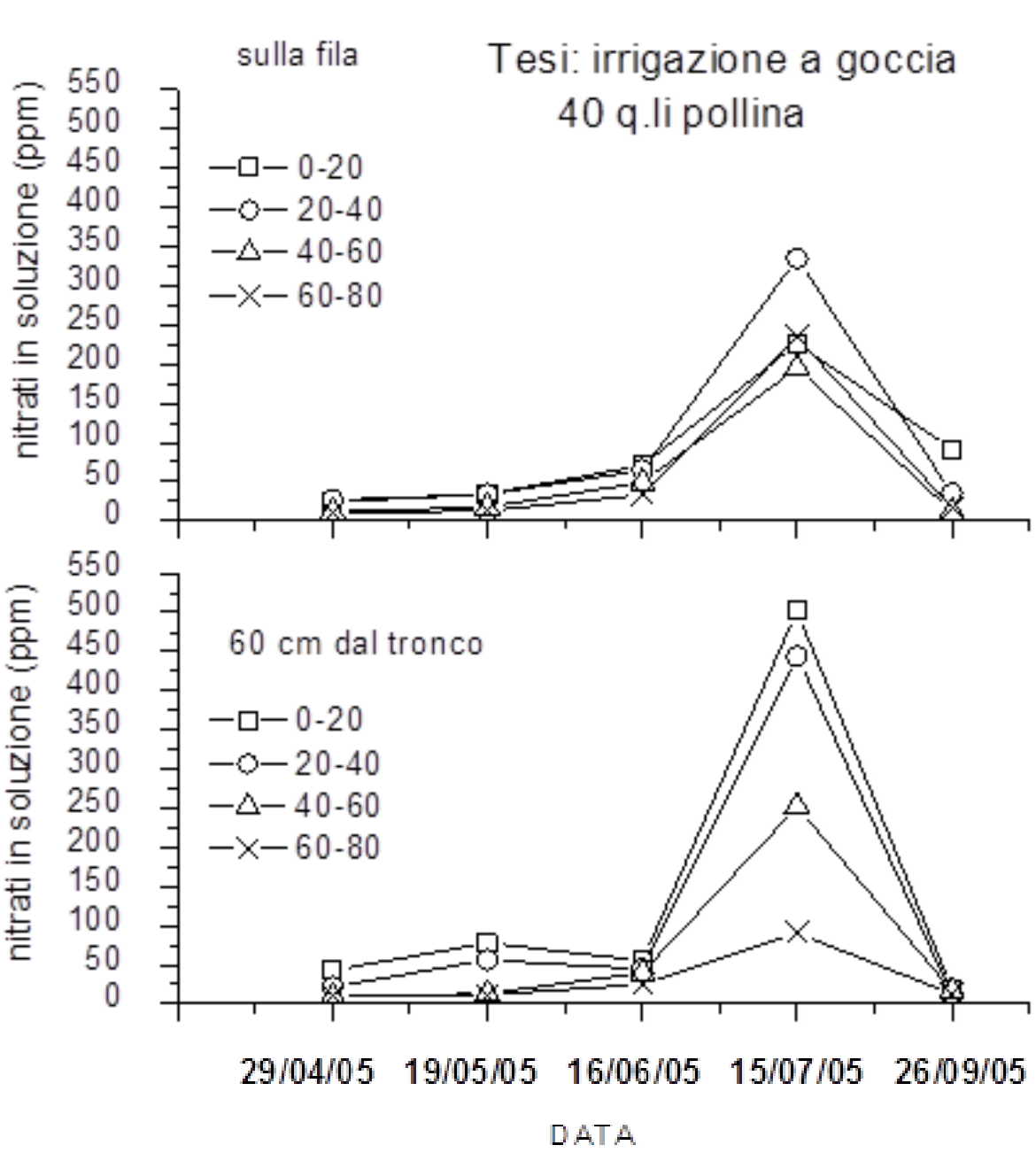






Evangelos Xilogiannis 2014 PhD thesis

Plant & Food RESEARCH
RANGAHAU AHUMĀRA KAI


sulla fila
Tesi: irrigazione a goccia
40 q.li pollina
nitrati in soluzione (ppm)
550
500
450
400
350
300
250
200
150
100
50
0
0-20
20-40
40-60
60-80
60 cm dal tronco
29/04/05
19/05/05
16/06/05
15/07/05
26/09/05
DATA


Zetafert
POLLIN
CONCIME ORGANICO NP
POLLINA ESSICCATA
CONSENTITO IN
AGRICOLTURA BIOLOGICA
PESO NETTO Kg. 25