EU CAP NETWORK

EU CAP NETWORK PRESENTATION

Cross-visit ‘Circular and organic soil management’

Basilicata, Italy
28-29 June 2023

Funded by
the European Union

FEASR 2014-2020 PSR BasilicataEuropa

REGIONE BASILICATA

Unione Europea
Fondo Europeo Agricolo per lo Sviluppo Rurale:
l'Europa investe nelle zone rurali

TINNOGEPRA

TInnoGePra – **Technological transfer** of innovative agricultural practices within **fruit and horticultural ecosystems**

B. Dichio, A. Mininni.

EU CAP NETWORK CROSS-VISIT CIRCULAR AND ORGANIC SOIL MANAGEMENT – JUNE 2023

UNIVERSITÀ DEGLI STUDI DELLA BASILICATA 1982

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

bartolomeo.dichio@unibas.it

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TINNOGEPRA

TInnoGePra – **Technological transfer** of innovative agricultural practices within **fruit and horticultural ecosystems**

SECTOR: Fruit and horticultural systems
COORDINATOR: University of Basilicata

Scientific coordinator: Bartolomeo Dichio

Start of activity: 23 May 2018
End of activity: 31 October 2022

OG OBJECTIVES: creating a bridge between research and the real needs of the productive fruit and vegetable world, disseminating and transferring mature techniques and technologies both at regional and interregional level.

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Dipartimento delle Culture Europee e del Mediterraneo

12 beneficiary partners including 4 research institutions

SOGGETTO
Università degli studi della Basilicata - DIPARTIMENTO DELLE CULTURE EUROPEE E DEL MEDITERRANEO: ARCHITETTURA, AMBIENTE, PATRIMONI CULTURALI (DICEM)
Soc. Coop. Agr O.P. APOFRUIT ITALIA
SOC. COOP. AGR. ASSO FRUIT ITALIA
Azienda Agricola Battifarano Francesco Paolo
Università politecnica delle Marche - Dipartimento di scienze agrarie, alimentari ed ambientali
Consorzio Jonico Ortofrutticoltori Soc. Coop. A r.l.
FICHI DI TERRE MATERANE SRL AGRICOLA
ISTITUTO DI BIOSCIENZE E BIORISORSE (IBBR) del CNR
Agenzia Lucana di Sviluppo ed Innovazione in Agricoltura (ALSIA). Azienda Agricola Sperimentale Dimostrativa Pantanello
ENEA Agenzia nazionale per le nuove tecnologie, l'energia e lo sviluppo economico sostenibile – Dipartimento Sostenibilità dei sistemi produttivi e territoriali
SOC. AGR. CONS. COMPAGNIA DELLE PRIMIZIE srl
sco. coop. agr. O.P. Ancona
Agreenment

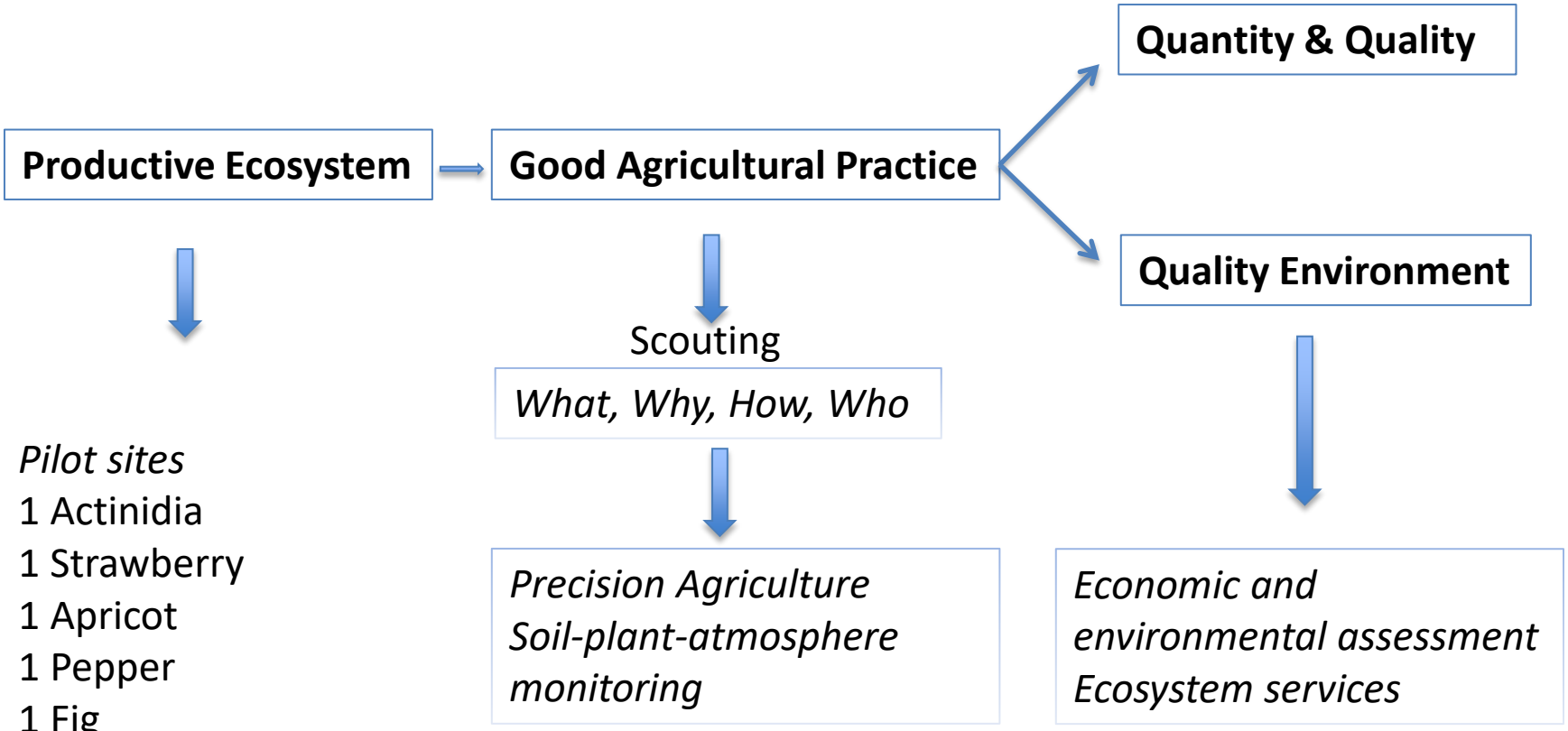
11 Non-beneficiary partners

Fichi di terre del materano srl

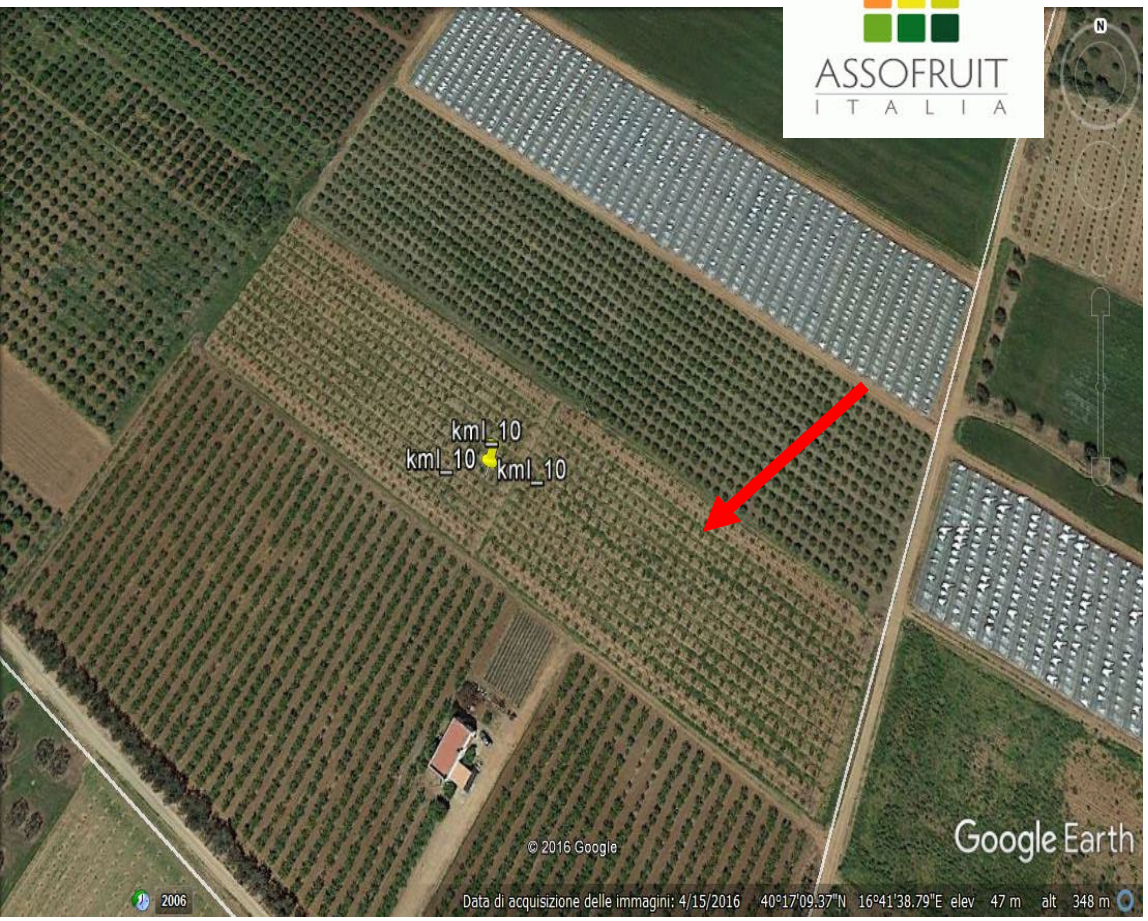
Op ANCONA

Az. Agr. Battifarano

TInnoGePra – **Technological transfer** of innovative agricultural practices within **fruit and horticultural ecosystems**

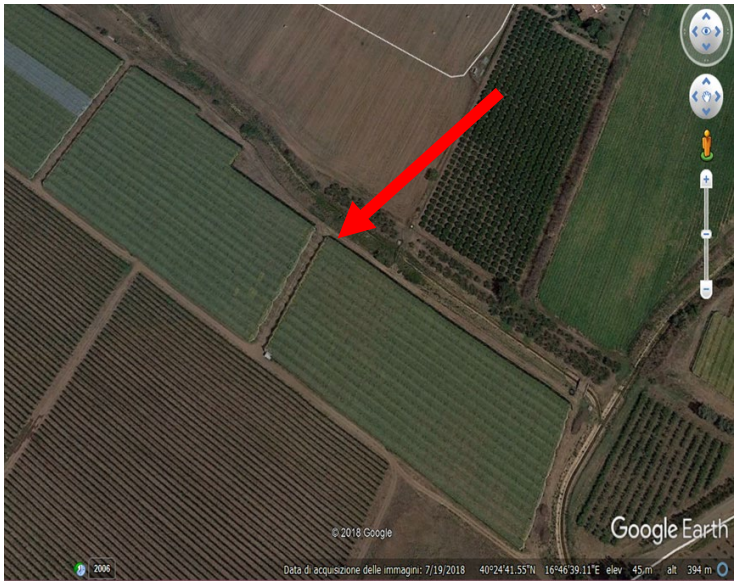


Valicenti Giuseppe Farm



Company	Valicenti Giuseppe
Crop	Apricot
Variety	Mogador
Rootstock	Mirabolano 29C
Year of planting	2015
Distance between rows (m)	4
Distance on the row (m)	4
N° of plant	854
Utilized Agricultural Area (UAA) m^2	13664
Irrigation method	single drip line
Length of the drip irrigation line	3416
Emitters distance	0,6
No. of the emitters	5693
Emitter capacity (L/H)	2,3
Sector flow rate m^3/H	13,09
Flow rate L/sec	3,64
N° of Sectors	1

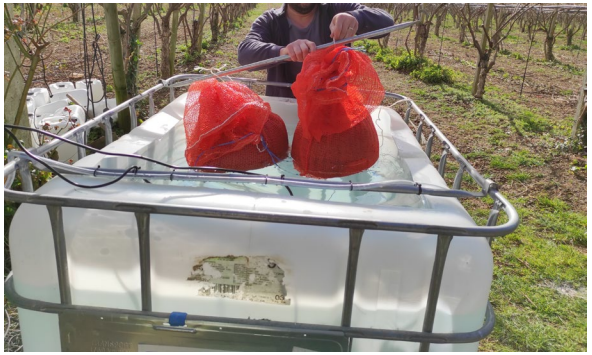
F.OR Apofruit - farm: Xiloyannis Giulio
Actinidia chinensis (G3)



Azienda	**Xiloyannis Giulio**	
Specie	Actinidia chinensis	
Varietà	G3	
Portinnesto	D1	
Anno d'impianto	2013	
distanza tra le file (m)	4,9	
distanza sulla fila (m)	2	
n° piante	2666	
SAU mq	26127	
metodo irriguo: doppio impianto	doppia alla gocciolane	microjet
lunghezza ala disperdente	10664	5332
distanza erogatori	0,6	4
n° erogatori	17773	1333
portati erogatori (L/H)	2	40
portata settoreMC/H	35,55	53,32
portata L/sec	9,87	14,81
N° SETTORI	4	4
portata settoreMC/H	2,47	3,70

F.OR Apofruit - farm: DIMITRA

Actinidia chinensis (G3)



F.OR Fratelli Ancona

Farm ‘’Az. Agr. Francesco Battifarano’’: Pepper 'CRUSCO' of Basilicata

Nova Siri Town
FGL 43 p.lle 145-20
UAA 2.40.00 HA

Farm: ‘’Fichi di terre materane s.r.l. Agric.’’

Trial 1: Mature sheep manure, about 2 kg per plant for 100 plants (200 kg per parcel);
Trial 2 : Commercial organic fertilizer in pellets allowed in organic farming about 2.5 kg per plant;
Trial 3: Biochar, about 2 kg per plant for 100 plants + 4 treatments with tea compost (obtained from the extraction of sheep manure)

- Soil fertility

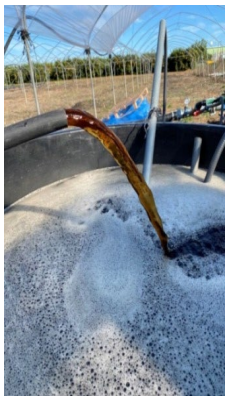
- Application of organic amendments

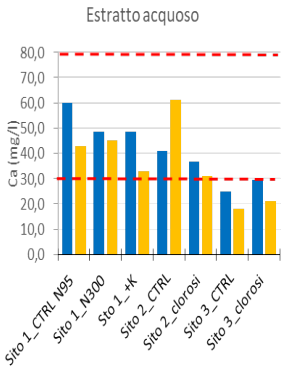
- Soil nitrate monitoring

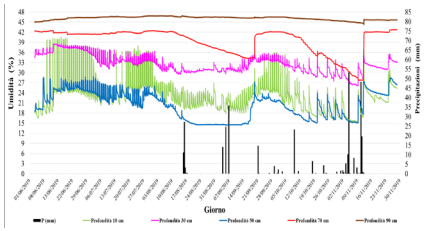
- Irrigation management

- Fruit quality

- Valorization of fruit products (LCA)

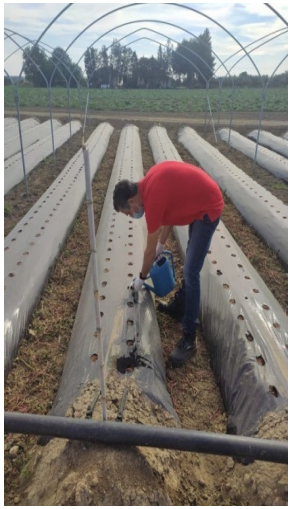






Sustainable Management Practices

Minimum tillage, cover crops, retention and mulching of pruning residues



Application of compost, tea compost, microbial products

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COSTITUZIONE E GESTIONE DEI GRUPPI OPERATIVI (GO) DEL PARTENARIATO EUROPEO PER L'INNOVAZIONE (PEI) - MISURA 16 COOPERAZIONE Sottomisura 16.1 – Sostegno per la costituzione e gestione dei gruppi operativi del PEI in materia di produttività e sostenibilità dell'agricoltura

TINNOGEPRA

Trasferimento tecnologico di innovazioni gestionali delle pratiche agricole negli **ecosistemi ortofrutticoli**

08 Marzo 2019, ore 9.00

GIORNATA FORMATIVA IN CAMPO SULLA DISTRIBUZIONE DEL COMPOST

OR2: Scouting of equipments for field measurement: discontinuous

LAQUA: of Nitrate and potassium measurement

NITRACHECK: of Nitrate measurement

Fertilizer detector test equipment

Continuous measurement

Field test

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Unione Europea

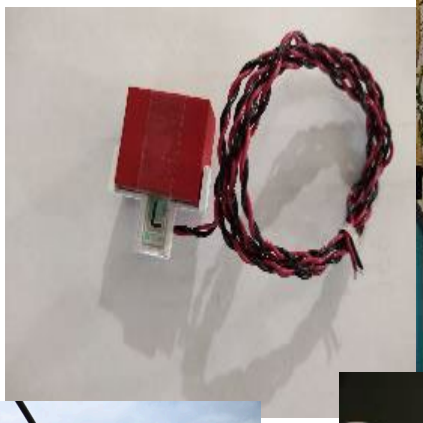
COSTITUZIONE E GESTIONE DEI GRUPPI OPERATIVI DEL PARTENARIATO EUROPEO PER L'INNOVAZIONE (PEI) – MISURA 16 COOPERAZIONE Sotto
Sostegno per la costituzione e gestione dei gruppi operativi del PEI in materia di produttività e sostenibilità dell'agricoltura

TINNOGEPRA

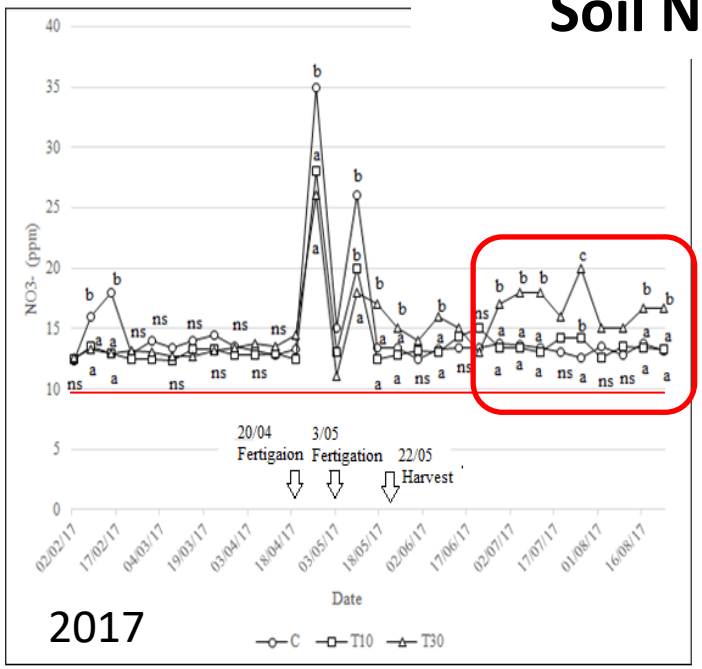
Trasferimento tecnologico di innovazioni gestionali delle pratiche agricole neg
ecosistemi ortofrutticoli

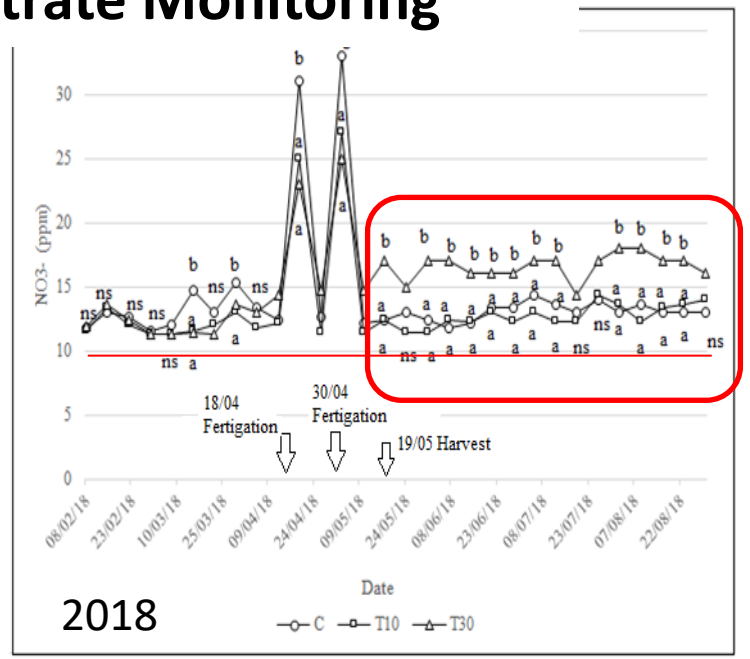
Giornata formativa 08 Giugno 2021, ore 15.30

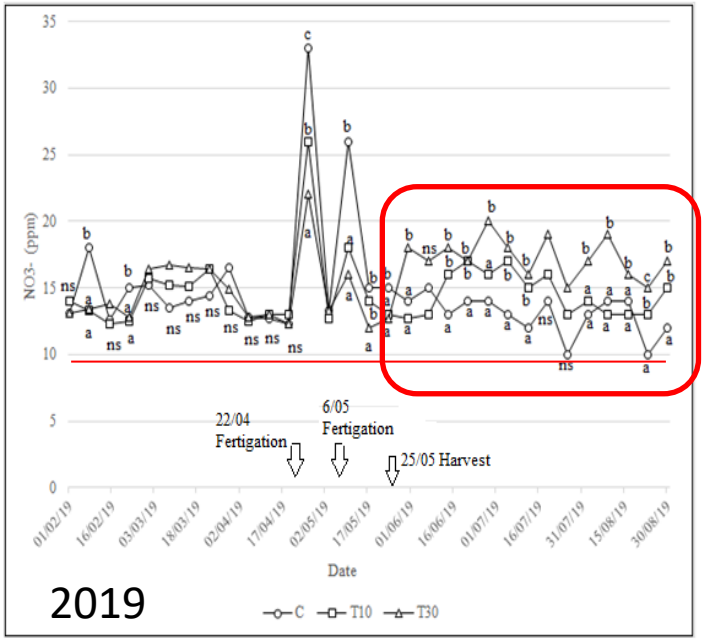
MONITORAGGIO DEI NUTRIENTI NEL SUOLO



Soil Nitrate Monitoring







- Concentration [N] in trials T30 > T10 for pre and post harvest
- In the 2nd and 3rd year, probable nitrogen mineralization from organic substance applied during the previous year

(F. Manicone PhD thesis)

EXPLOITATION OF PRODUCTION: LCA ANALYSIS

Life Cycle Assessment

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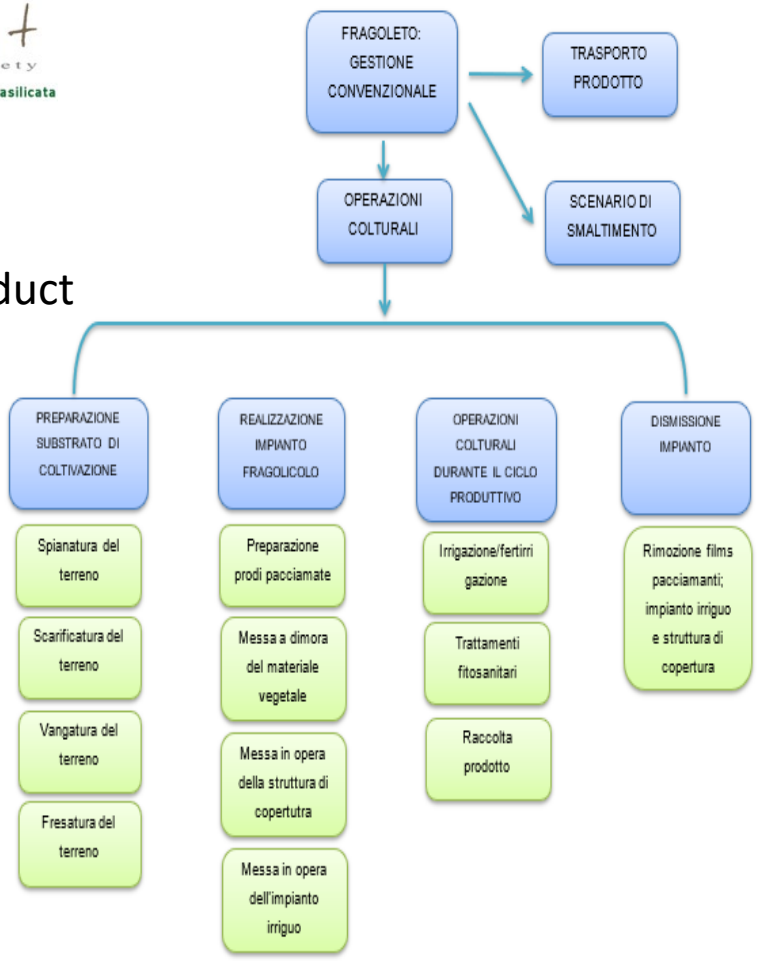
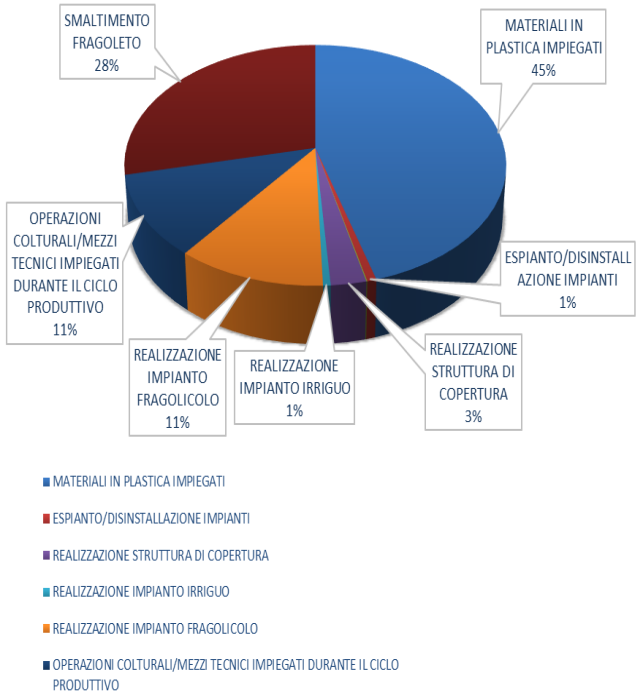
Agreement towards a green society

Spin Off Accademico - Università degli Studi della Basilicata

GRUPPO APOFRUIT

Ecoprofile of the product





CFP = 1537,6 kg di CO_2 eq per ton

Results of LCA analysis integrated with C stock changes in soil and CO_2 sequestration in plant organs at the end of the cycle

Crop	Sustainable management (kg CO_2/t)	Conventional management (kg CO_2/t)	Average annual production (t/ha)	Cycle years (n.)	Plants/ha (n.)
Olive tree	-176	+122	12	40	333
Vine	-80	+82	8	20	4.400
Apricot	-68	+115	25	20	400
Actinidia	-40	+161	30	30	625

Olive tree	21 t/ha CO_2
Vine	6,5 t/ha CO_2
Apricot	17 t/ha CO_2
Actinidia	12 t/ha CO_2

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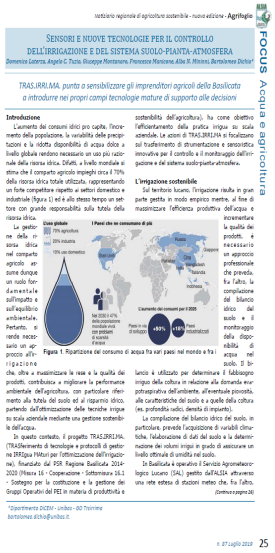
TINNOGEPRA

TECHNICAL MEETINGS, TRANSFER AND DISSEMINATION OF PROJECT RESULTS (OR7 - Dissemination through conferences, seminars and training courses, web platform)	
Seminars, Conferences and Webinars	**10**
Workshop and Training Days in Field	**6**
Publications	**11**



Notiziario regionale di agricoltura sostenibile - nuova edizione - Agrilogia

FOCUS Acqua e agricoltura

SENSORI E NUOVE TECNOLOGIE PER IL CONTROLLO DELL'IRRIGAZIONE E DEL SISTEMA SUOLO-PIANTA-ATMOSFERA

Domenico Laterza, Angela C. Tucci, Giuseppe Montanaro, Francesco Manicone, Alba N. Mininni, Bartolomeo Dichio*

TRAS.IRRI.MA, punta a sensibilizzare gli imprenditori agricoli della Basilicata a introdurre nei propri campi tecnologie mature di supporto alle decisioni

Introduzione

L'aumento dei consumi idrici pro capite, l'incremento della popolazione, la variabilità delle precipitazioni e la ridotta disponibilità di acqua dolce a livello globale rendono necessario un uso più razionale della risorsa idrica. Difatti, a livello mondiale si stima che il comparto agricolo impieghi circa il 70% della risorsa idrica totale utilizzata, rappresentando un forte competitore rispetto ai settori domestico e industriale (figura 1) ed è allo stesso tempo un settore con grande responsabilità sulla tutela della risorsa idrica.

Figura 1. Ripartizione del consumo di acqua fra vari paesi nel mondo e fra i

L'irrigazione sostenibile

Sul territorio lucano, l'irrigazione risulta in gran parte gestita in modo empirico mentre, al fine di massimizzare l'efficienza produttiva dell'acqua e incrementare la qualità dei prodotti, è necessario un approccio professionale che preveda, tra l'altro, la compilazione del bilancio idrico del suolo e il monitoraggio della disponibilità di acqua nel suolo. Il bilancio è utilizzato per determinare il fabbisogno irriguo della coltura in relazione alla domanda evapotraspirativa dell'ambiente, all'eventuale pioggia, alle caratteristiche del suolo e a quelle della coltura (es. profondità radici, densità di impianto).

La compilazione del bilancio idrico del suolo, in particolare, prevede l'acquisizione di variabili climatiche, l'elaborazione di dati del suolo e la determinazione dei volumi irrigui in grado di assicurare un livello ottimale di umidità nel suolo.

In Basilicata è operativo il Servizio Agrometeorologico Lucano (SAL) gestito dall'ALSIA attraverso una rete estesa di stazioni meteo che, tra l'altro,

(Continua a pagina 26)

*Dipartimento DiCEM - Unibas - ALSIA Trisaia
bartolomeo.dichio@unibas.it

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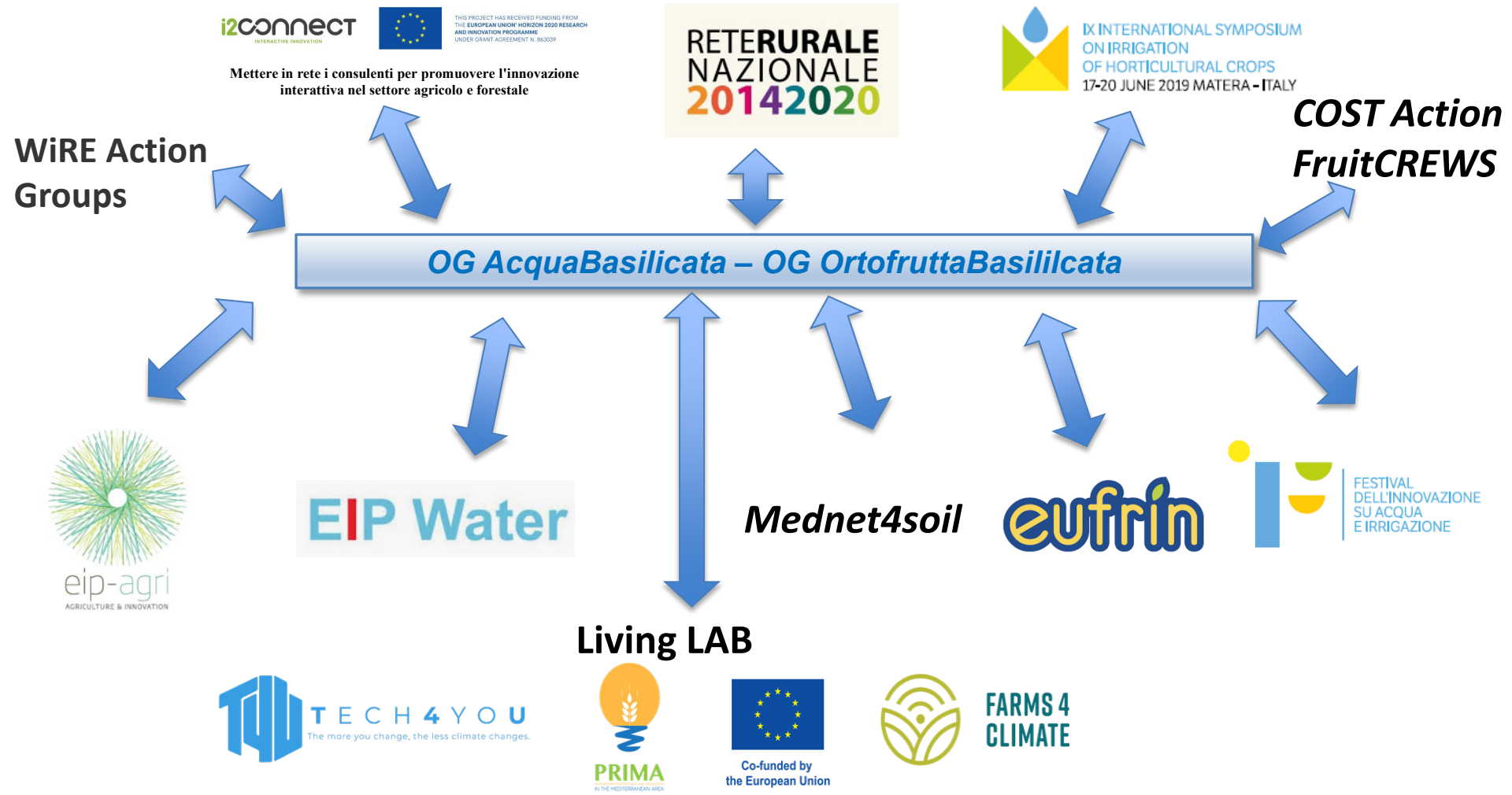
NETWORK



The UNIBAS Research Group

- Prof. C. Xiloyannis
- Prof. B. Dichio
- Prof. V. Nuzzo
- Prof. G. Montanaro
- Prof. A. Sofo
- Dr. A.N. Mininni
- Dr. A. Pietrafesa
- Dr. R. Di Biase
- Dr. M. Calabritto
- Dr. A. Tuzio
- Dr. G. Carlucci
- Dr. T. Berloco
- Dr. C. Loiudice
- Dr. D. Laterza
- Dr. E. Lardo

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FARMS 4 CLIMATE

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PON

RESO

Zespri KIWIFRUIT

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Agreenment towards a green society

PSR 16.1 - TRAS.IRRI.MA.

TINNOGEPRA

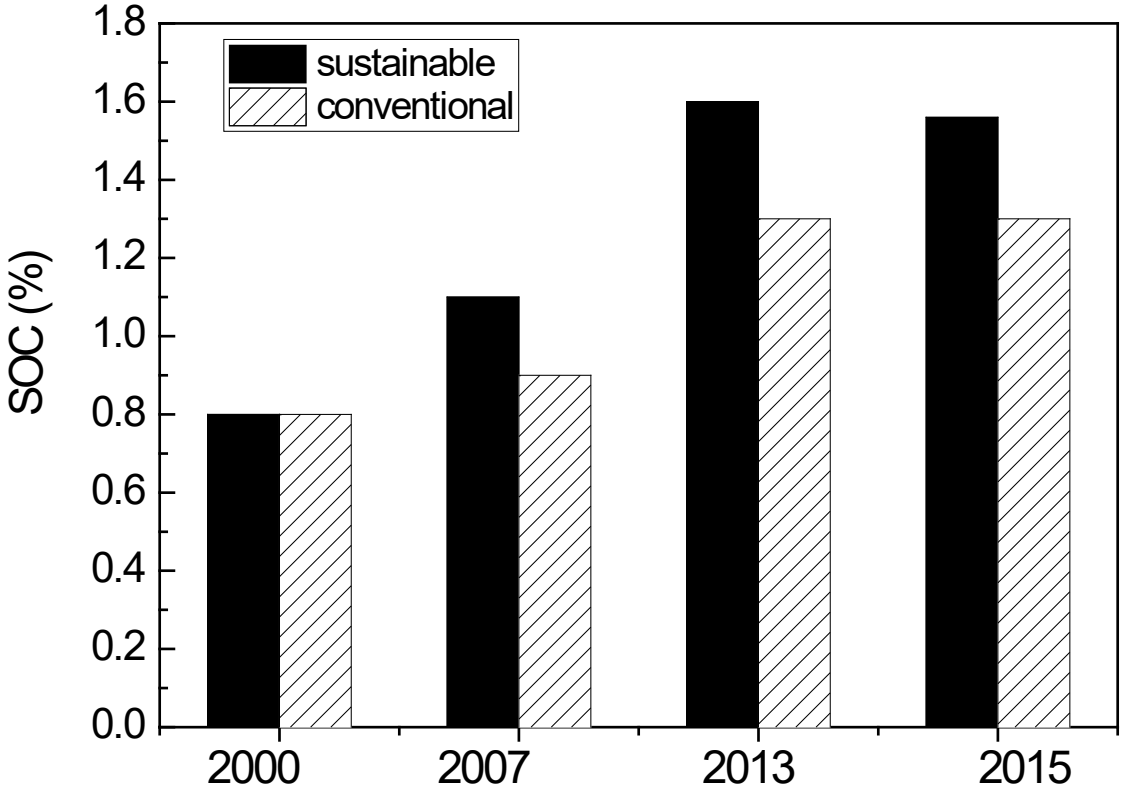
Basilicata Gruppo Operativo Inno_Olivo&Olio

eip-agri

Basilicata Gruppo Operativo Vite & Vino

ALSIA

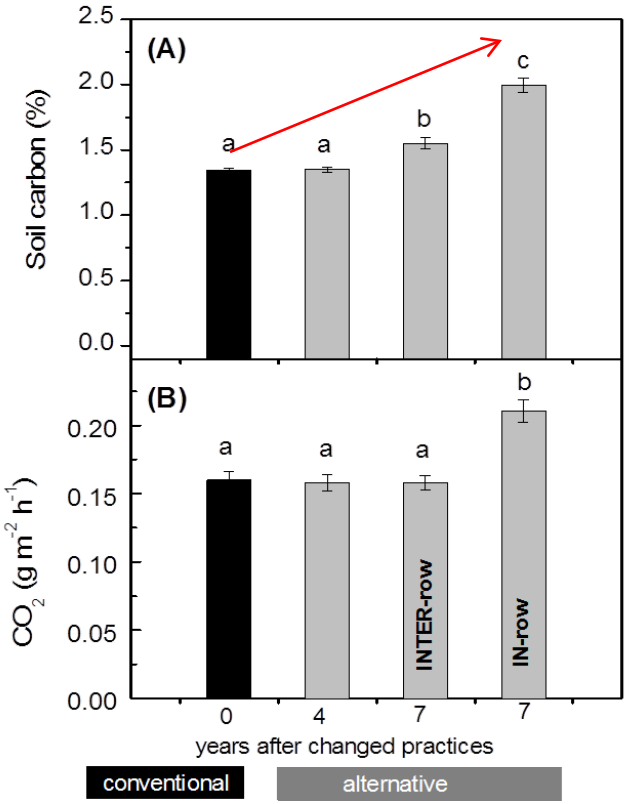
Higher SOC with Sustainable Management



About 1% of increase

SOIL FERTILITY

C stored in SOC and dead organic matter (litter) (IPCC, 2006)

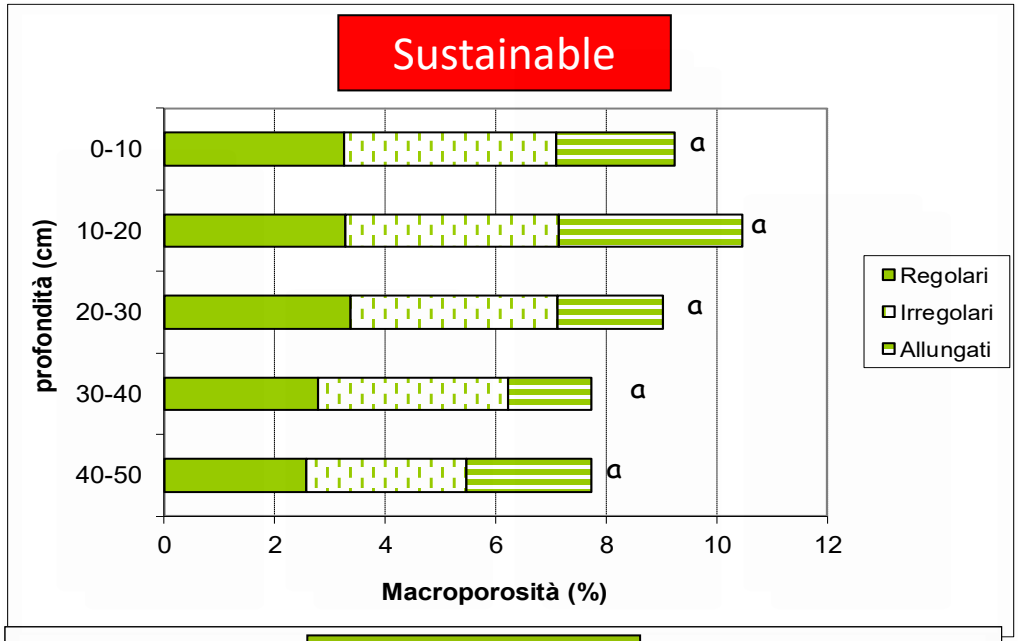


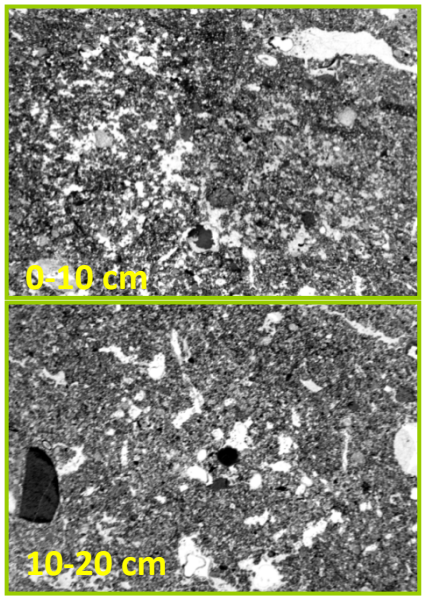
	g C m^{-2} yr^{-1}	
	Sustainable	Conventional
SOC	94.0±3.7	-
Litter	62.5±4.7*	4.0±1.6
Total soil C pool	156.5±8.1*	4.0±1.6

Montanaro et al., 2016 AGEE

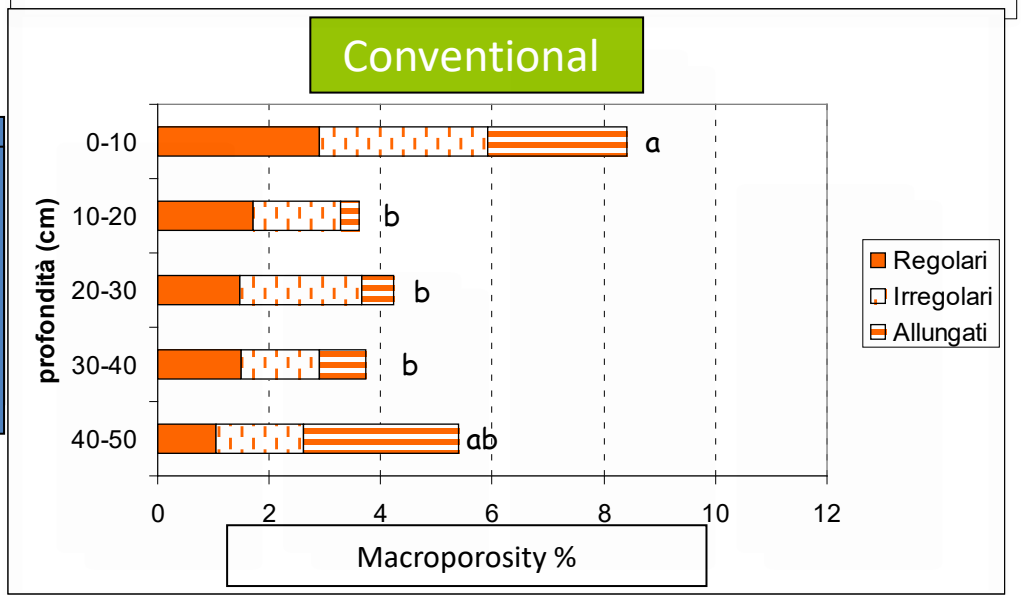
Effects on SOIL MACROPOROSITY

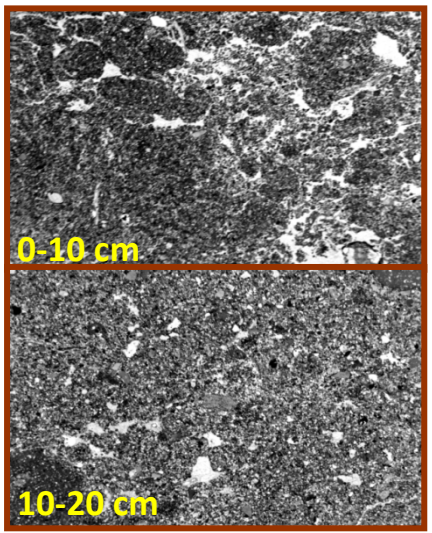
Depth cm





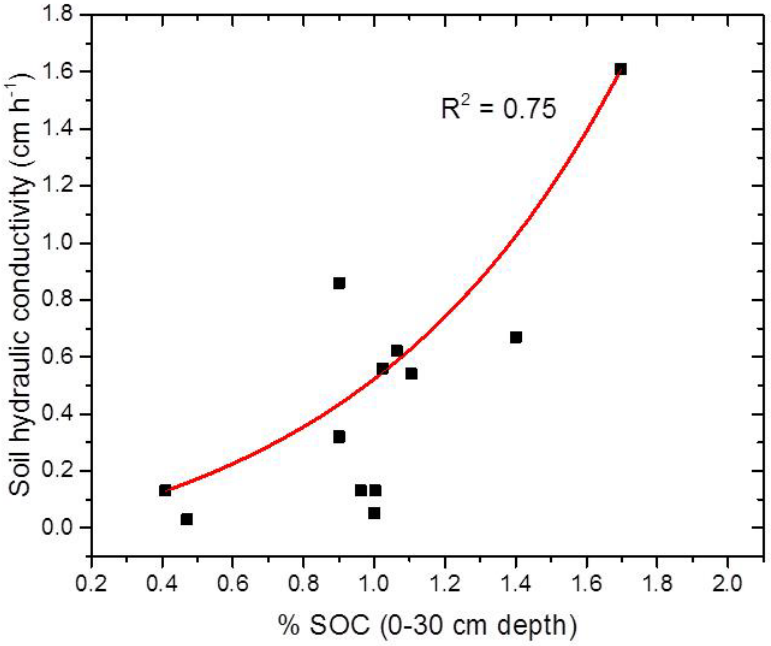
Depth cm





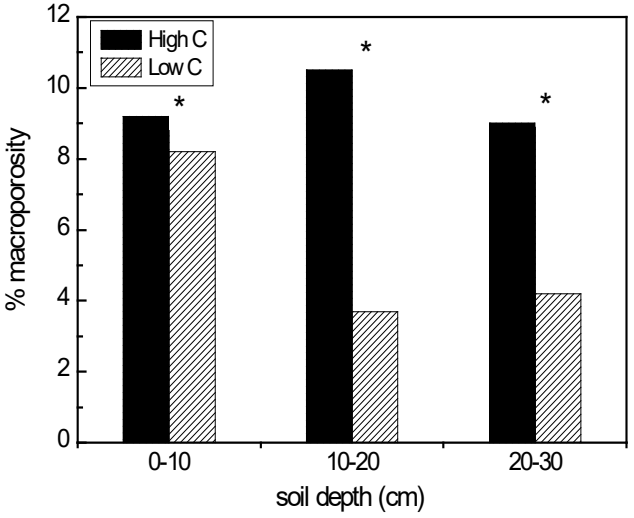
Increasing SOC means increasing soil hydraulic conductivity

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



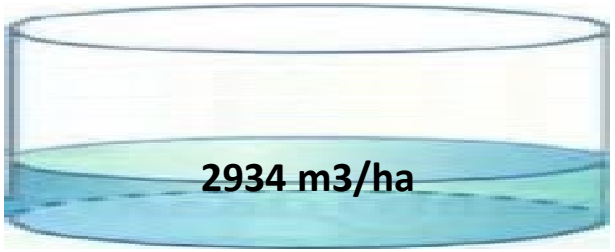
….and soil porosity

Redrawn from Palese et al., 2014



Adapted from Palese et al., 2014

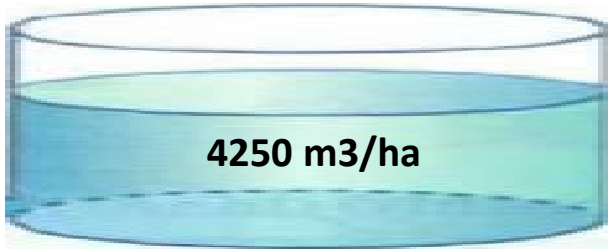
Improving soil water retention capacity



Mechanical tillage reduces water infiltration causing runoff and erosion processes

Soil losses

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

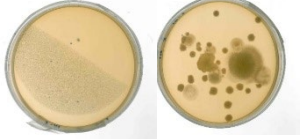


Sustainable management practices increase infiltration rate and water storage in soil

Soil losses

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

Impact of microorganisms' management



pagepress

International Journal of Plant Biology 2015; volume 6:6011

Phyllosphere and carposphere bacterial communities in olive plants subjected to different cultural practices

Silvia Pascazio,[1] Carmine Crecchio,[1] Patrizia Ricciuti,[1] Assunta Maria Palese,[2] Cristos Xiloyannis,[2] Adriano Sofo[3]

plants for microorganisms, namely phyllosphere for leaves and carposphere for fruits, is normally colonized by a variety of bacteria, yeasts and fungi. Bacteria are by far the most numerous colonists, often being found at levels of 10^6–10^7 cells cm^{-2} of leaf surface.[4] Phyllosphere and carposphere are unique and dynamic habitats, with microbial communities subjected to irregular, and sometimes relatively large changes in temperature, UV radiation

Correspondence: Adriano Sofo, School of Agricultural, Forestry, Food and Environmental Sciences, Basilicata University, Viale dell'Ateneo Lucano 10, 85100 Potenza, Italy.
Tel.: +39.0971.206228.
E-mail: adriano.sofo@unibas.it

Key words: Bacterial diversity; carposphere; endophytic bacteria; Olea europaea L.; phyllos-

Soil Use and Management

Soil Use and Management, March 2014, **30**, 160–167 doi: 10.1111/sum.12097

Soil microbial diversity and activity in a Mediterranean olive orchard using sustainable agricultural practices

A. Sofo[1], A. Ciarfaglia[1], A. Scopa[1], I. Camele[1], M. Curci[2], C. Crecchio[2], C. Xiloyannis[3] & A. M. Palese[3]

TECHNICAL ARTICLE

Genetic, Functional, and Metabolic Responses of Soil Microbiota in a Sustainable Olive Orchard

Adriano Sofo,[1] Assunta Maria Palese,[1] Teresa Casacchia,[2] Giuseppe Celano,[1] Patrizia Ricciuti,[3] Maddalena Curci,[3] Carmine Crecchio,[3] and Cristos Xiloyannis[1]

Table 1 Total bacterial and fungal counts in soils sampled from the sustainable (ST) and conventional (CT) treatments

	Fungi (CFU × 10^4/g dry soil)	Bacteria (CFU × 10^6/g dry soil)
ST	21.4 ± 11.8 a	35.6 ± 16.7 a
CT	2.9 ± 1.9 b	10.0 ± 2.6 b

Values are means ± standard deviation ($n = 4$). Means with different letters are significantly different between the two treatments at $P \leq 0.05$, according to Duncan's multiple comparison test.

SPECIFIC BACTERIAL COUNTS

Bacteria involved in nitrogen cycle (*Azotobacter*, proteolytic bacteria, ammonifying bacteria and *Pseudomonas*) were identified and counted in specific culture media.

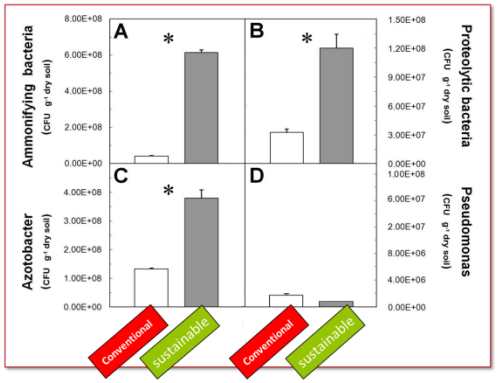


Figure. *Ammonifying bacteria (A), proteolytic bacteria (B), Azotobacter (C) and Pseudomonas (D) in the CT (white bars) and ST (grey bars). Asterisk: significant difference at $P \leq 0.05$.*

(Sofo et al.,)

Table 1. Classification of the bacterial species from olive fruit pulp (mesocarp) identified on the basis of their genomic sequences (NCBI BLAST® hits).

N. species	Phylum	Class	Order	Family	Genus	Species
Sustainable						
8	Proteobacteria	γ-Proteobacteria	Enterobacteriales	Enterobacteriaceae	*Rahnella*	aquatilis
5	Firmicutes	Bacilli	Lactobacillales	Enterococcaceae	*Enterococcus*	unknown
5	Proteobacteria	γ-Proteobacteria	Enterobacteriales	Enterobacteriaceae	*Kluyvera*	*intermedia*
4	Actinobacteria	Actinobacteridae	Actinomycetales	Microbacteriaceae	*Curtobacterium*	unknown
2	Proteobacteria	γ-Proteobacteria	Enterobacteriales	Enterobacteriaceae	*Averyellaa*	*dalhousiens*
1	Actinobacteria	Actinobacteridae	Actinomycetales	Microbacteriaceae	*Frondihabitans*	*suicicola*
1	Proteobacteria	γ-Proteobacteria	Enterobacteriales	Enterobacteriaceae	*Hafnia/Rahnella*	*alvei*
1	Proteobacteria	α-Proteobacteria	Rhizobiales	Methylobacteriaceae	*Methylobacterium*	unknown
1	Proteobacteria	γ-Proteobacteria	Enterobacteriales	Enterobacteriaceae	*Pantoea*	unknown
1	Proteobacteria	γ-Proteobacteria	Enterobacteriales	Enterobacteriaceae	*Serratia/Rahnella*	unknown
1	Proteobacteria	γ-Proteobacteria	Enterobacteriales	Enterobacteriaceae	*Serratia*	unknown
Conventional						
2	Proteobacteria	γ-Proteobacteria	Enterobacteriales	Enterobacteriaceae	*Pantoea*	*agglomerans*

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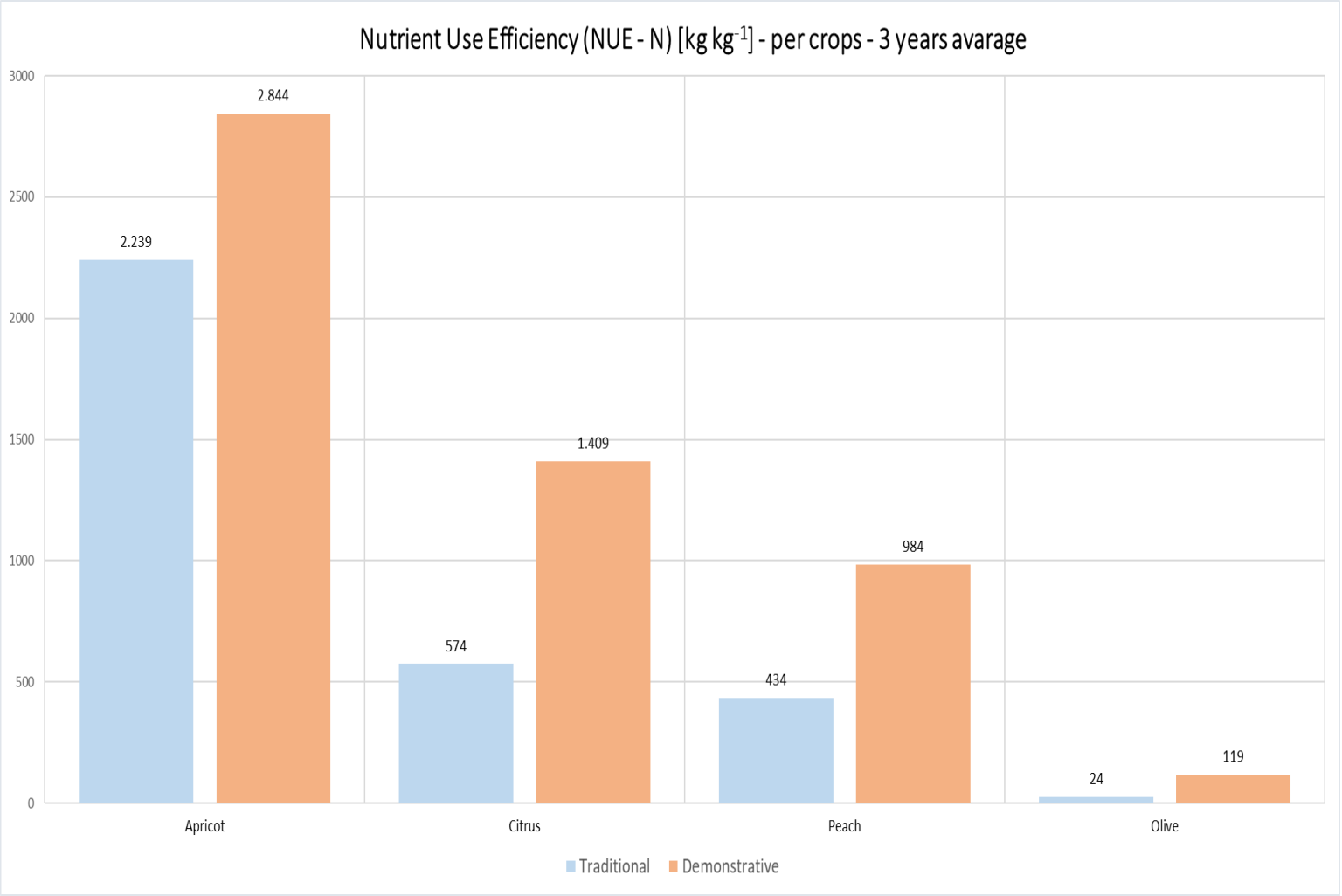
l'Europa investe nelle zone rurali

Dissemination and training

Results – Nutrient Use Efficiency NUE



- **Reduction of mineral fertilizer Nitrogen from 66% to 100%** compared to conventional management

Agricultural systems and climate change

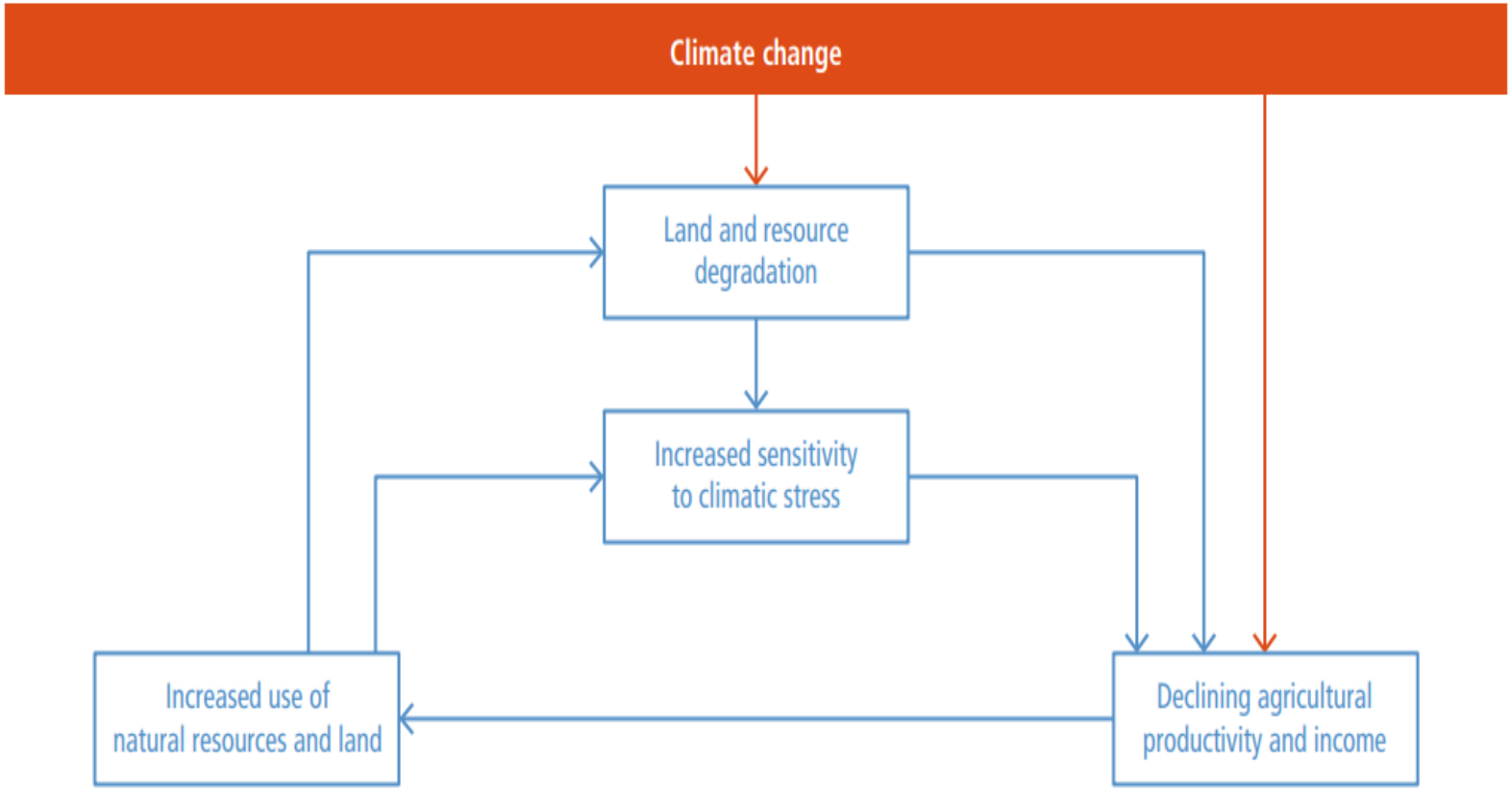
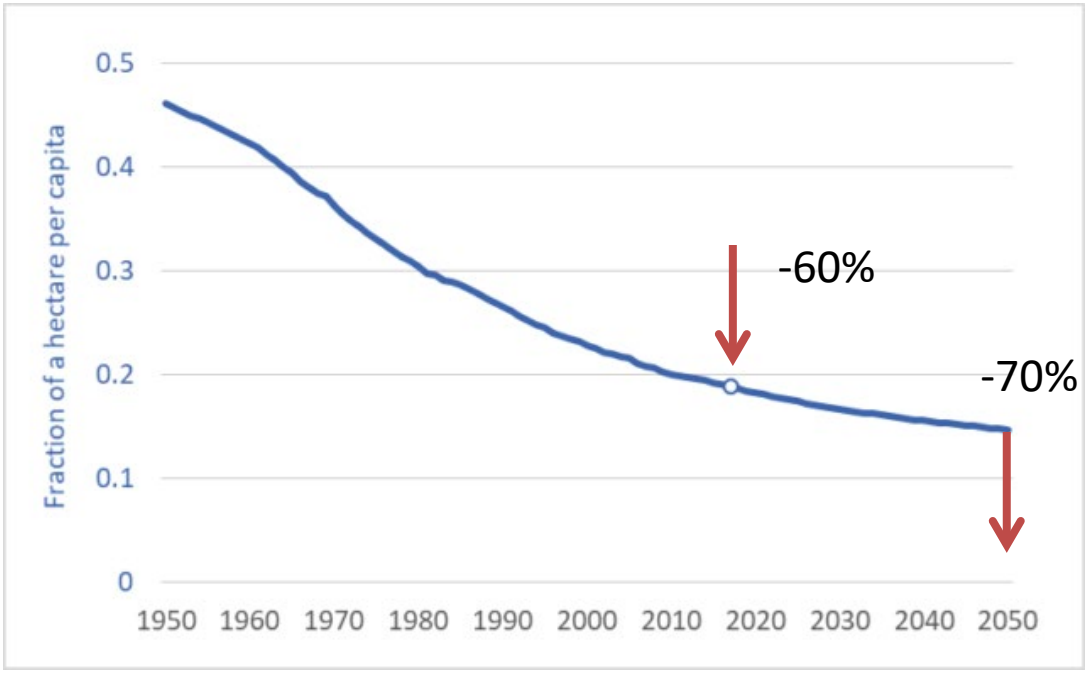


Figure 4.6 | Schematic representation of links between climate change, land management and socio-economic conditions.

IPCC, 2021

Per capita soil reduction and productive potential



The UN predicts a global population of 9.8 billion by mid-century

Based on these factors, the **United Nations** UN projects that food production in 2050 will have to be 70 percent higher than in 2005 https://www.darrinqualman.com/per-capita-farmland/

Role of Agroecosystem Management

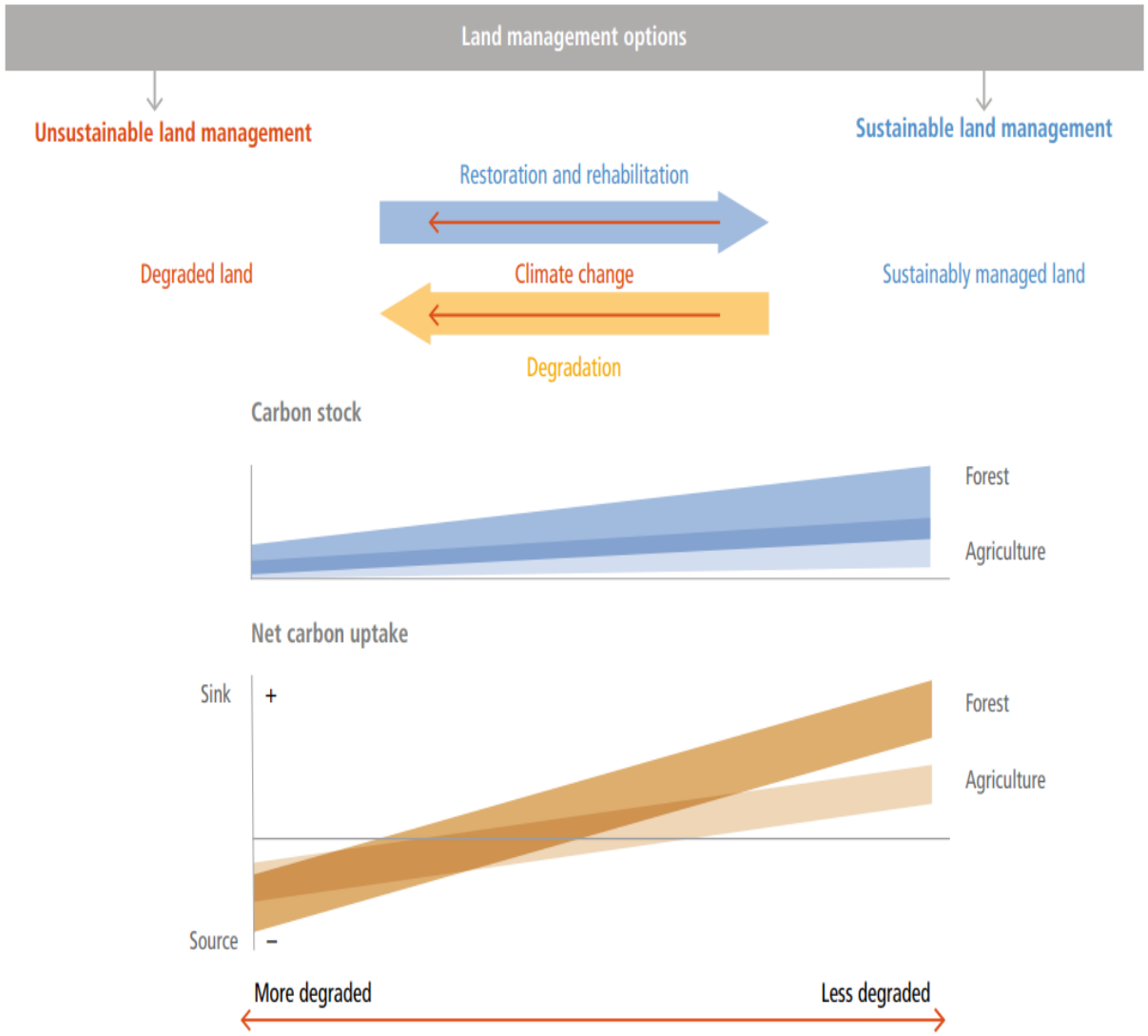


Figure 4.1 | Conceptual figure illustrating that climate change impacts interact with land management to determine sustainable or degraded outcome.

IPCC, 2021

Intergovernmental Panel on Climate Change

Orchard systems: Adaptation and Mitigation

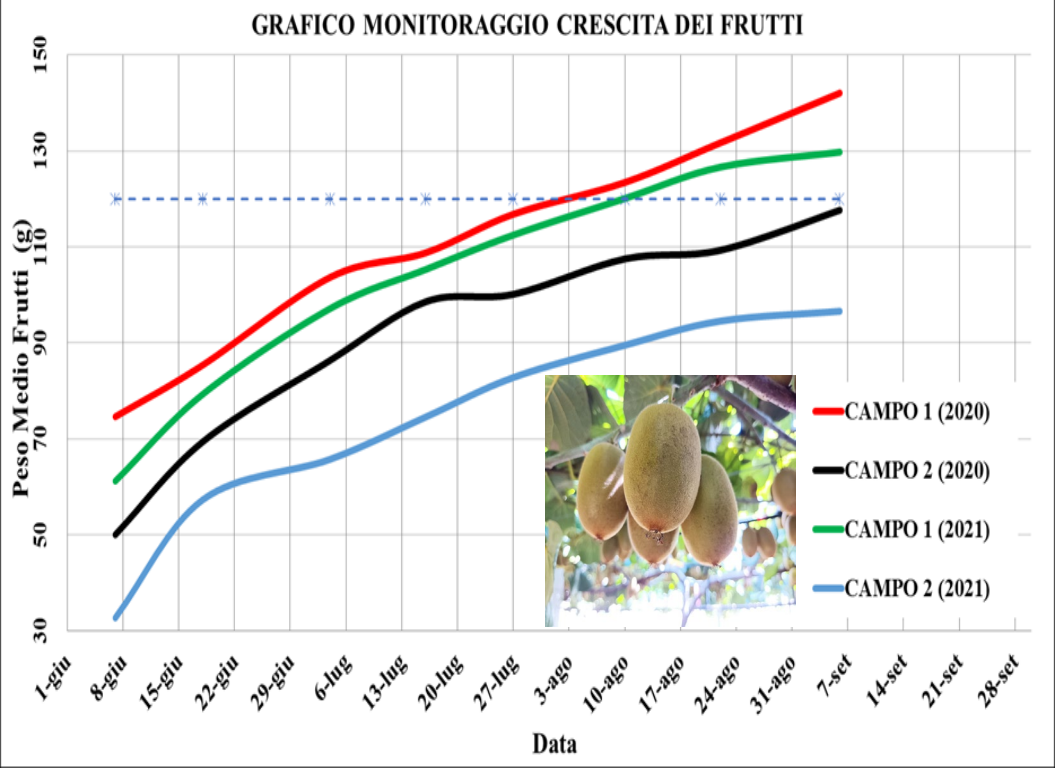
Adaptation encompasses a combination of natural, engineered and technological options, as well as social and institutional measures to moderate harm or exploit beneficial opportunities from climate change.

Mitigation comprises human interventions to reduce the sources or enhance the sinks of greenhouse gases (GHGs).

Climate-Smart Agriculture (Sustainable) is needed

UNESCO, 2021

Fruit quality monitoring to reduce fruit waste in field



KIWI GIALLO							
N. Frutto	Peso Fresco Frutto	COLORE		BRIX	SOSTANZA SECCA (06/09/2022)		
		COLORE 1	COLORE 2		Peso Fresco	Peso Secco	Sostanza Secca
	(g)	(h)	(h)	(°Brix)	(g)	(g)	(%)
1	118,73	110,76	110,35	6,2	12,05	2,09	**17,34%**
2	112,61	106,06	110,95	5,1	10,71	1,87	**17,46%**
3	107,11	112,60	114,15	5,7	13,90	2,43	**17,48%**
4	114,76	111,87	111,61	5,5	11,11	1,69	**15,21%**
5	107,86	112,46	111,24	4,9	7,76	1,31	**16,88%**
6	84,19	110,92	110,72	8,0	9,87	1,69	**17,12%**
7	113,85	110,88	109,90	5,5	11,61	1,90	**16,37%**
8	100,71	111,37	112,17	5,2	9,50	1,51	**15,89%**
9	110,44	109,01	107,51	5,2	14,17	2,41	**17,01%**
10	95,65	109,45	110,19	4,7	13,37	2,07	**15,48%**
	106,59	**110,54**	**110,88**	**5,6**			**16,63%**

TINNOGEPRA

Trasferimento Tecnologico di Innovazioni Gestionali delle Pratiche Agricole degli Ecosistemi Ortofrutticoli

AGRARIA
D3A - DIPARTIMENTO DI SCIENZE AGRARIE, ALIMENTARI E AMBIENTALI

UNIPM - Strawberry growing in Metapontino area - TInnoGePra

UNIVERSITÀ POLITECNICA DELLE MARCHE

Prof. B. Mezzetti

Prof. F. Capocasa

Dott. L. Mazzoni

MAIN RESEARCH ACTIVITIES OF UNIPM IN STRAWBERRY FIELD

Development of new plant propagation protocols

which have higher production efficiency to obtain nursery material of better phytosanitary quality

New variety development

Different aims for several Breeding Programs

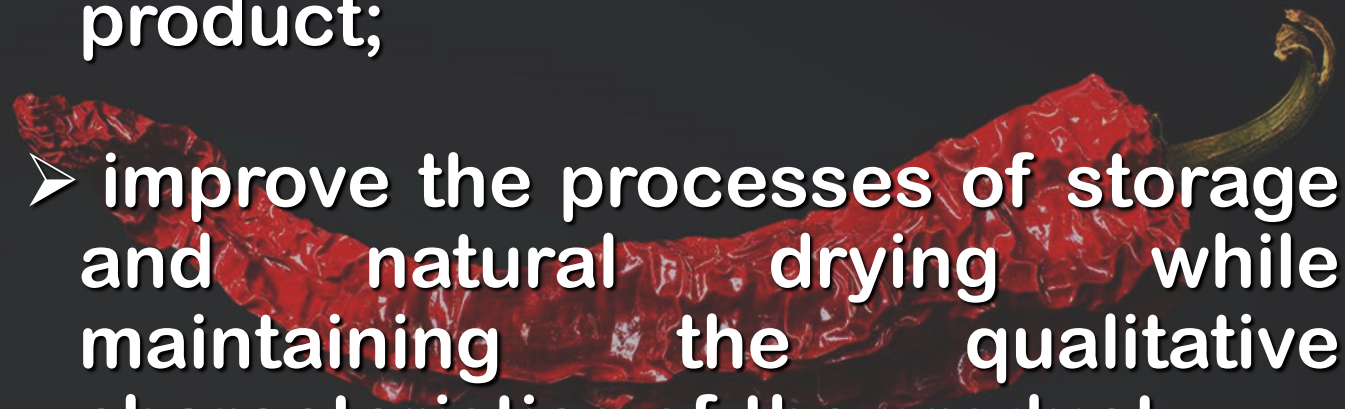
Improvement of the qualitative characteristics of the "Pepper Crusco Lucano"

MARIELLA FINETTI SIALER - VINCENZO MONTESANO

Consiglio Nazionale delle Ricerche
Istituto di Bioscienze e BioRisorse

Project Objectives

- selection of the germplasm in order to stabilize and improve the quality characteristics of the product;



- improve the processes of storage and natural drying while maintaining the qualitative characteristics of the product.

Agenzia nazionale per le nuove tecnologie,
l'energia e lo sviluppo economico sostenibile

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Fondo Europeo Agricolo per lo Sviluppo Rurale:
l'Europa investe nelle zone rurali

Innovative techniques of the drying process of the Senise pepper

PSR 16.1 - TInnoGePra " Technological transfer of innovative agricultural practices within fruit and horticultural ecosystems
"

Ambrico A. – Magarelli R. – Trupo M. – Larocca V. – Spagnoletta Anna – Palazzo S. – Oriolo G.

PSR 16.1 - TInnoGePra

Project Goal:

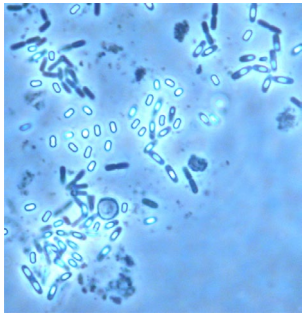
Identification of innovative strategies to reduce product losses during the drying phase of the Senise pepper caused by fungal pathogen .

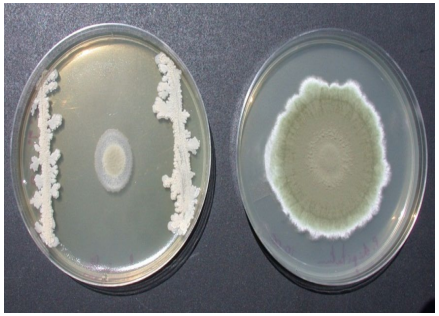
Problem highlighted by the European Community in Recommendation (EU) 2022/553 on the monitoring of the presence of Alternaria toxins in food.

Ventilated stoves with hot air

Continuous and discontinuous cycle

Microbial antagonists





Microbial antagonist

Preparation of the Experimental Field at “Az. Agr. ‘Battifarano Francesco’’

BATTIFARANO

Vini • Cultura • Agricoltura

EU CAP Network cross-visit ‘Circular and organic soil management’

28-29 June 2023, Basilicata (Italy)

All information on the cross-visit is available on the event webpage:

https://eu-cap-network.ec.europa.eu/events/eu-cap-network-cross-visit-circular-and-organic-soil-management_en