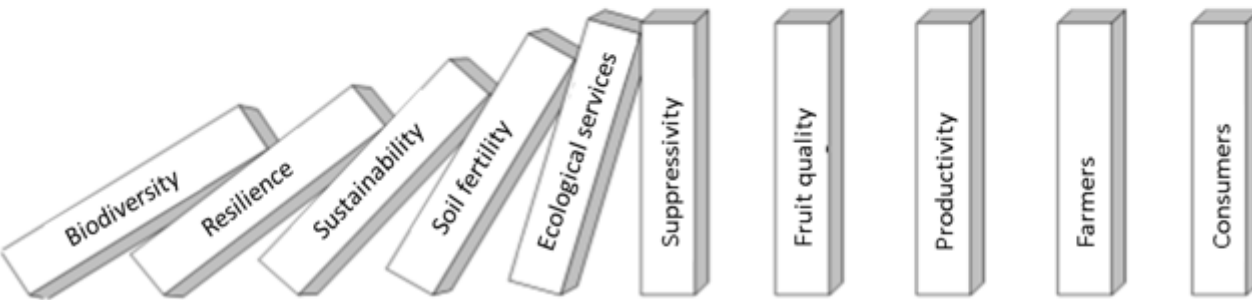


CORE organic **DOMINO**



Dynamic sod mulching and use of recycled amendments to increase biodiversity, resilience and sustainability of intensive organic fruit orchards and vineyards



Dynamic sod mulching and use of recycled amendments
to increase biodiversity, resilience and sustainability of
intensive **organic** fruit orchards and vineyards



Project coordinator:

Davide Neri

Assistant:

Serena Polverigiani

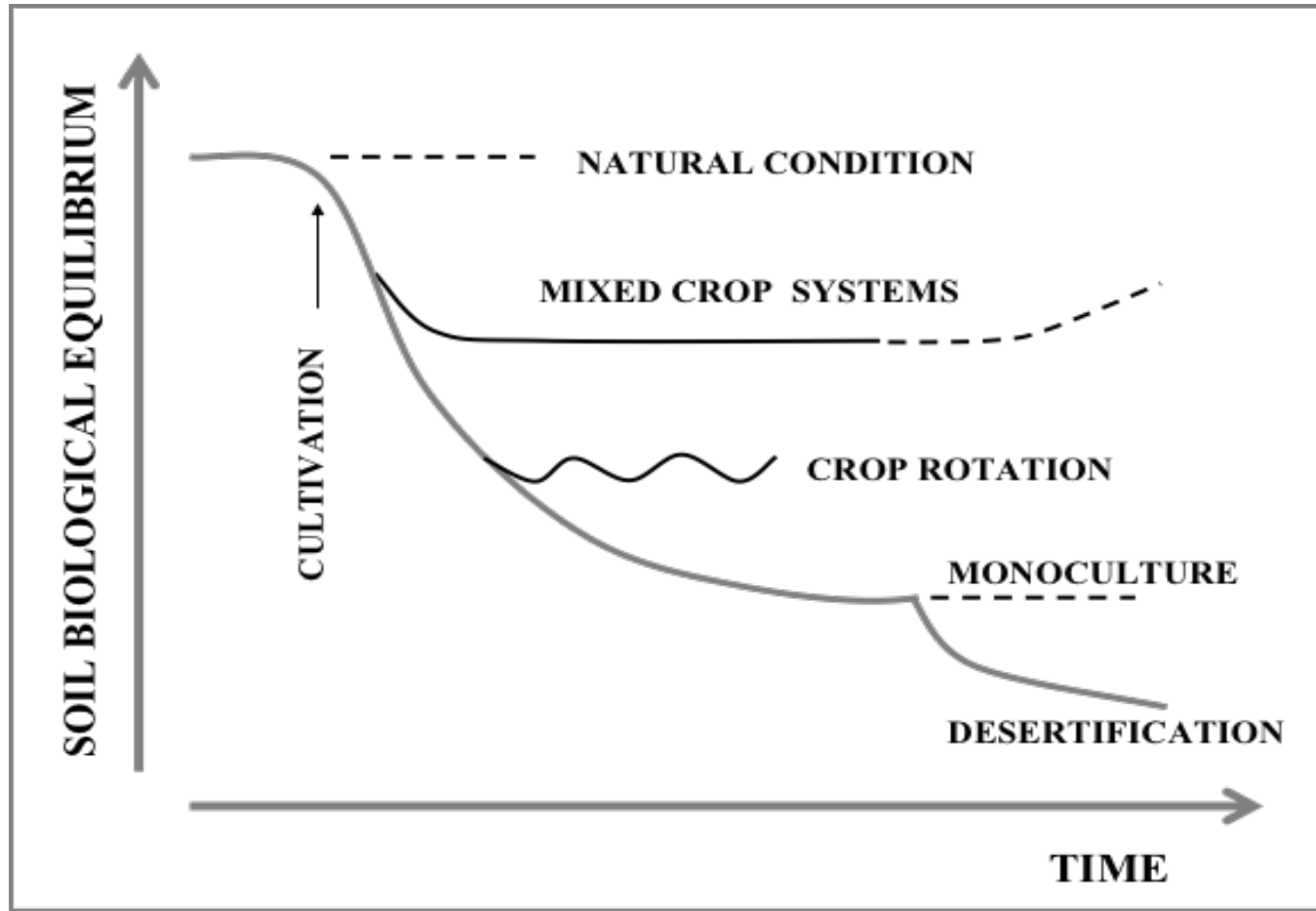
Dept. of Agricultural, Food and Environmental Sciences
Polytechnic University of Marche, Ancona, Italy

Starting date: 1° May 2018



Rationale 1

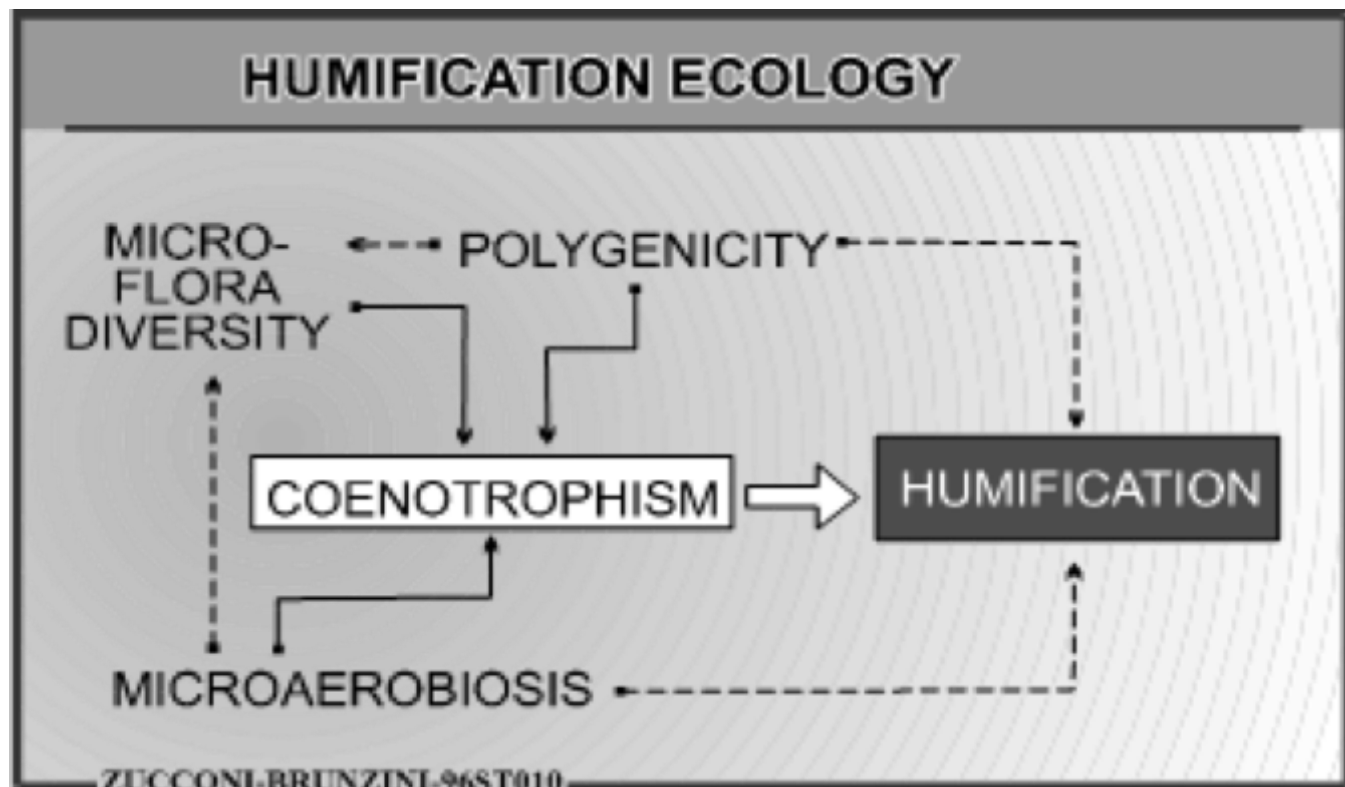
Improve long-term sustainability of **intensive organic orchard** and **vineyard** by innovative strategies expected to **increase biodiversity** as a source of resilience for the agroecosystems, and to **reduce the dependency on external inputs**.

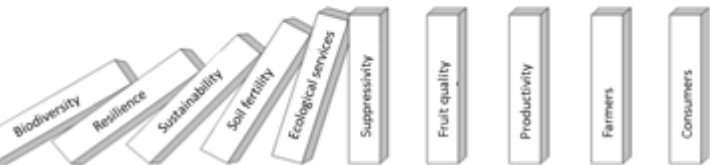


*Modified from
Zucconi, 1996*

Rationale 2

- Focus on the **interaction** of fruit trees with different wild species, organic residues and microbioma.
- To break the paradigm of monoculture in organic fruit growing by the development of new intercropping strategies and amendments to increase the sustainability of organic fruit growing and to maintain ecosystem services.





Portulaca spp.



Fragaria spp.



Menta spp.



Polygonum aviculare



Menta spp.

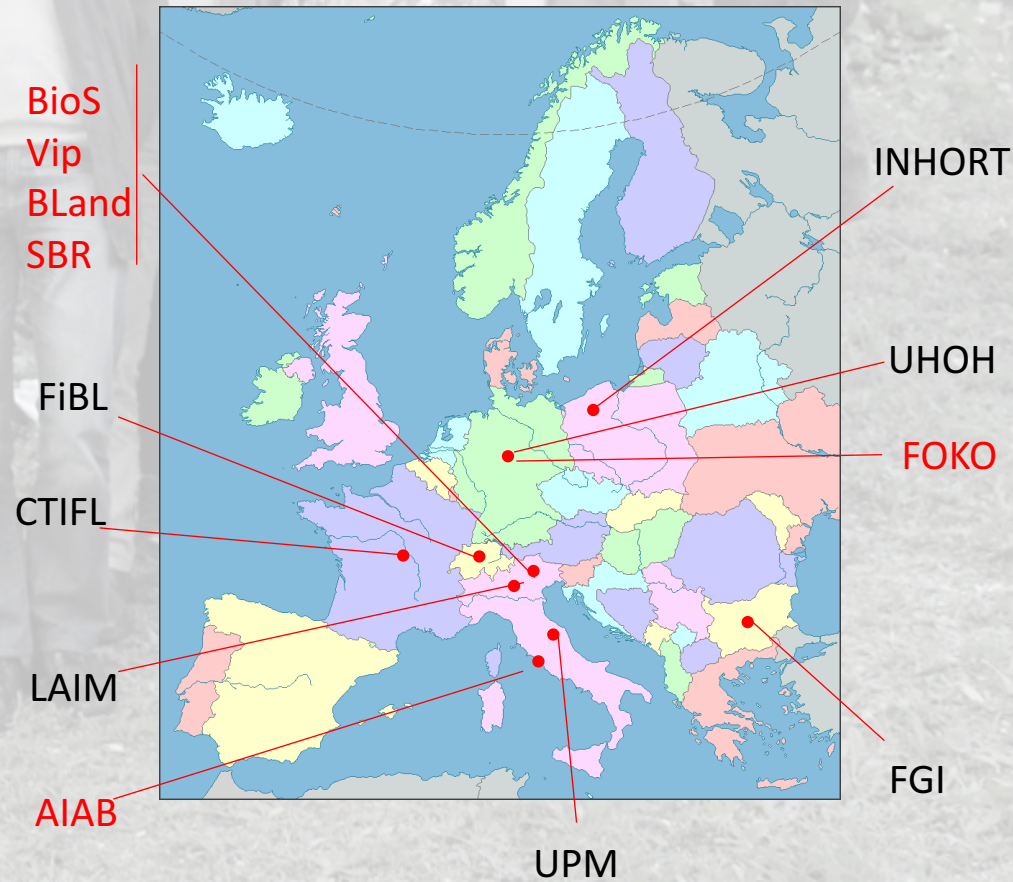


Potentilla spp.

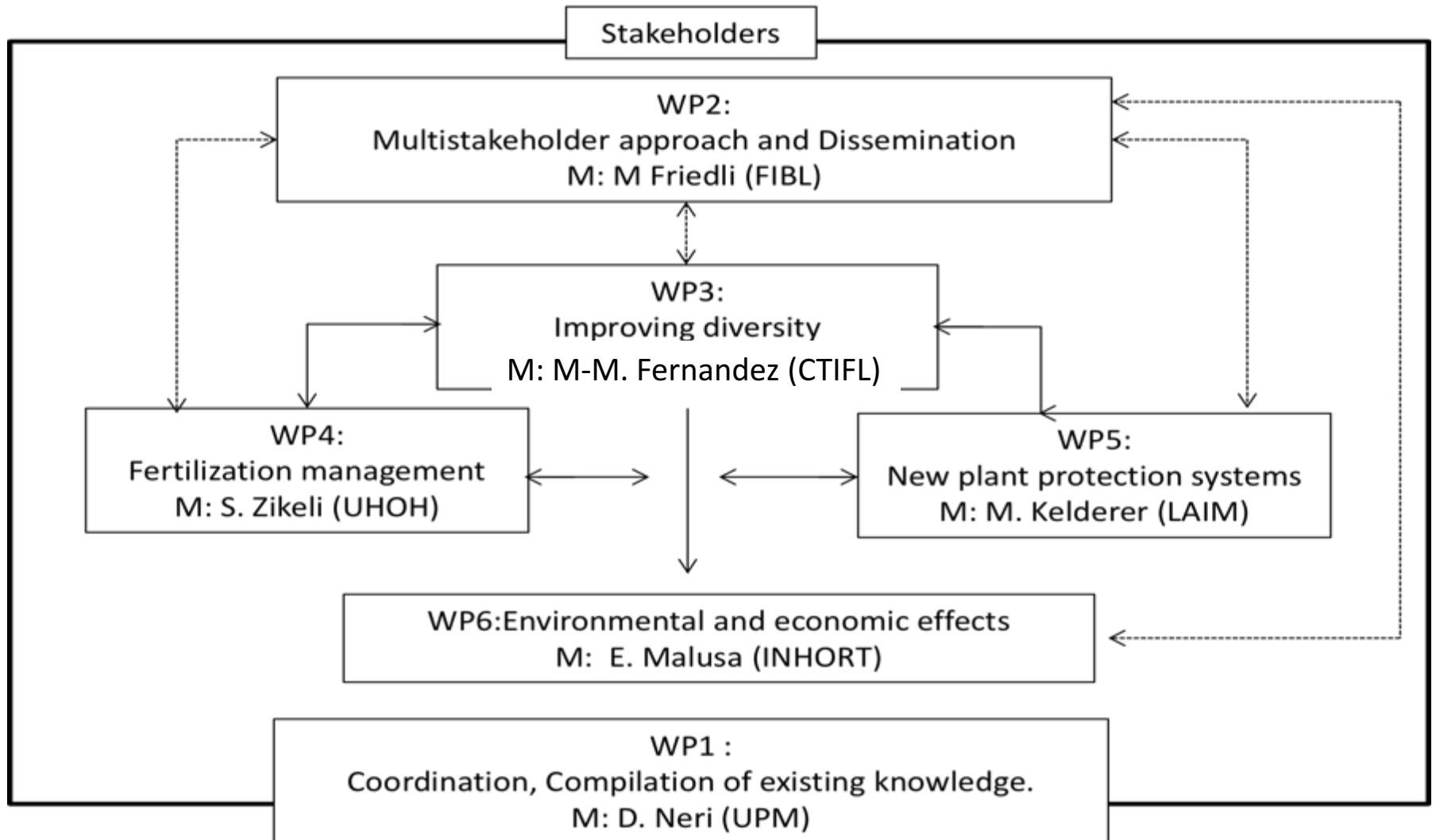
DOMINO consortium and location

UPM Polytechnic University of Marche, IT
FGI Fruit Growing Institute, BG
LAIM Laimburg Research Centre, IT
INHORT Institute of Horticulture, PL
CTIFL C.T.I. Fruits Légumes, FR
FiBL R.I. of Organic Agriculture, CH

BioS BioSudtirol, IT
Vip Vi.P Bio Vinschgau, IT
BLand Bioland Südtirol, IT
SBR SBR organic, IT
AIAB Ass. It. Agricoltura Biologica, IT
UHOH University Hohenheim, DE
FOKO Fördergemeinschaft
Ökologischer Obstbau e.V., DE



Structure of the DOMINO consortium and interaction among WPs



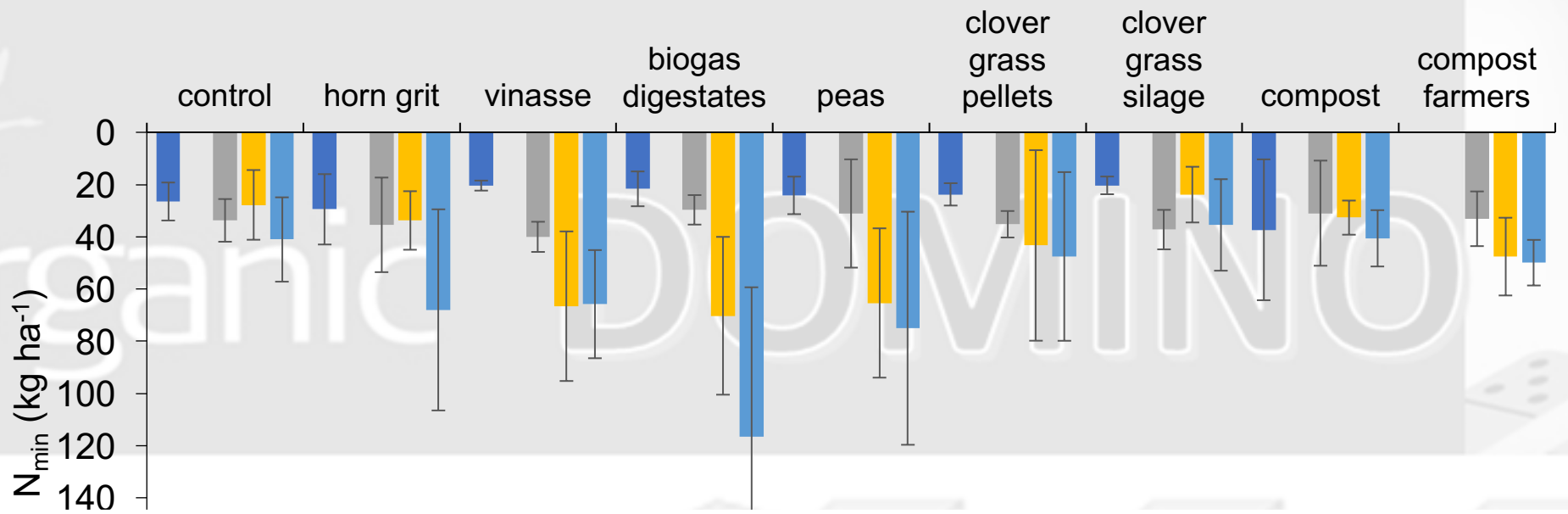
The proposed strategy includes:



Introduction of new cash intercropping **species**, expected to contribute to plant nutrition and protection while increasing biodiversity;

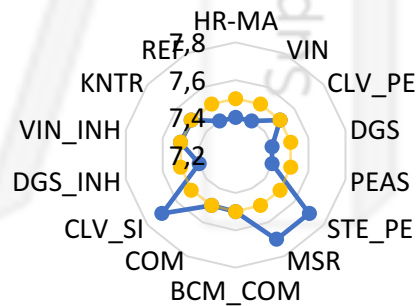


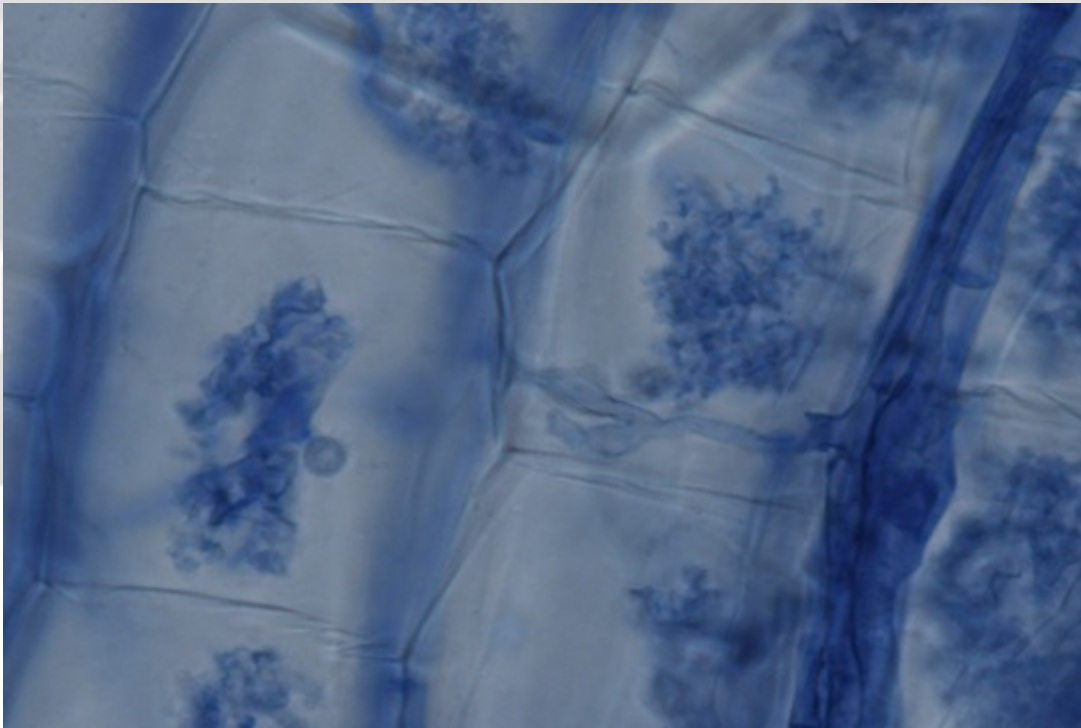
Mentha piperita



The use of recycled organic amendments from composted waste and digestate to improve soil fertility and suppressiveness, as well as carbon balance of the system;

Soil pH after 60 days



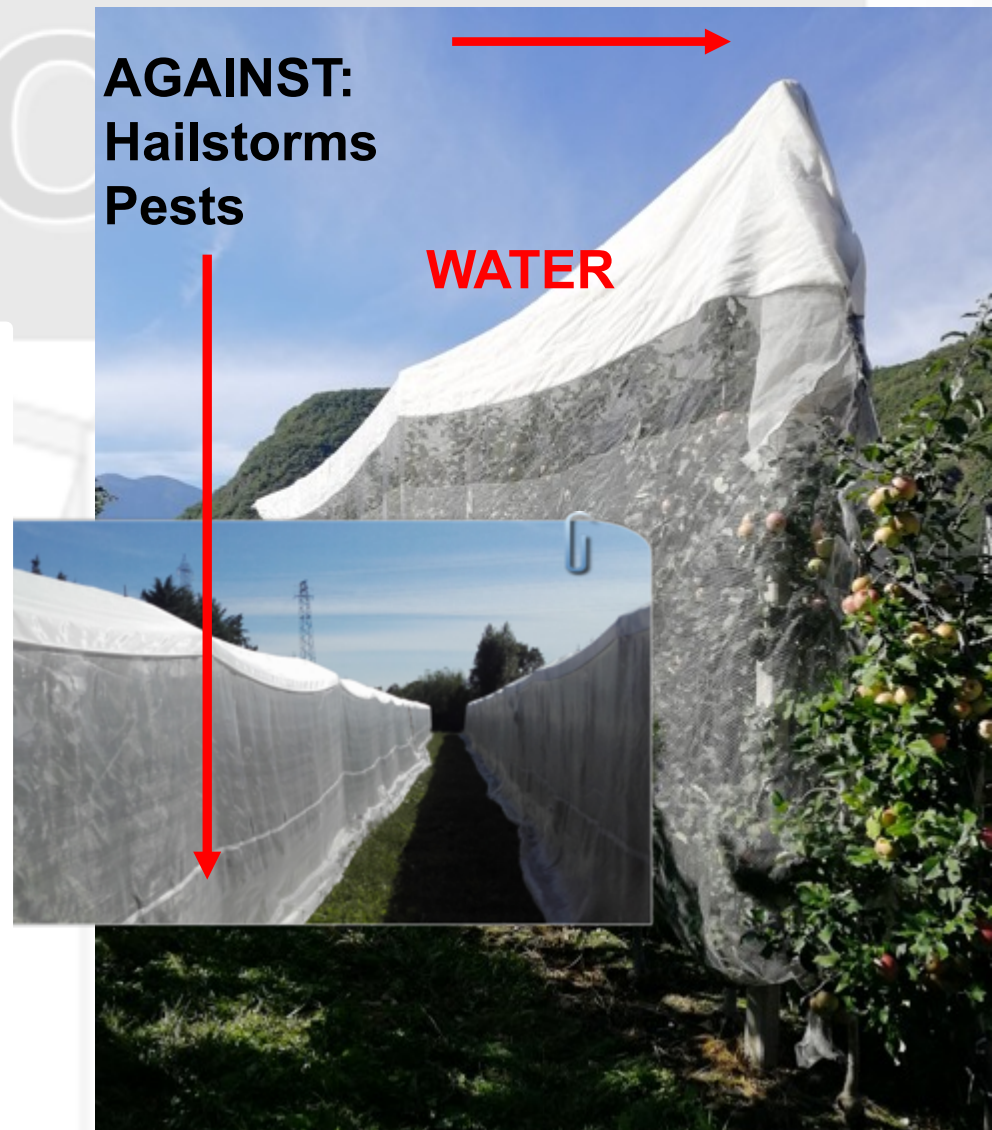


MINO



Introduction of microbial-based products
for plant nutrition and protection to promote
soil biodiversity and enhance inputs efficiency;

Introduction of
overhead netting
and partial cover
systems for crop
protection;





UNIVERSITY OF
HOHENHEIM



Overall designing of orchard management to promote eco-services.

white clover Liflex (inter-row)



Ctifl



ppressivity

Fruit quality

Productivity

Dissemination tools

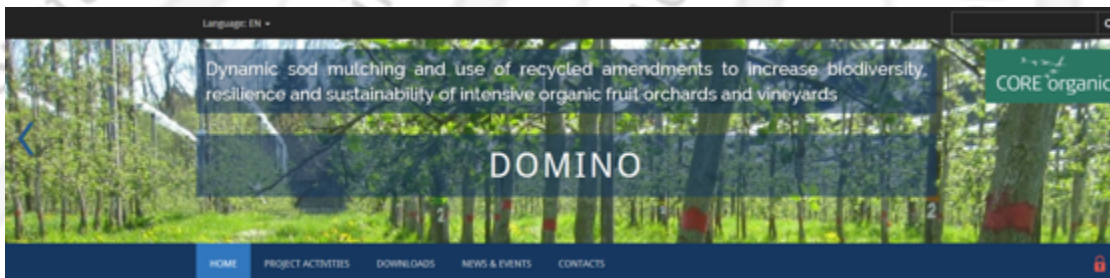


National technical journals



Videos

<http://www.domino-coreorganic.eu/>

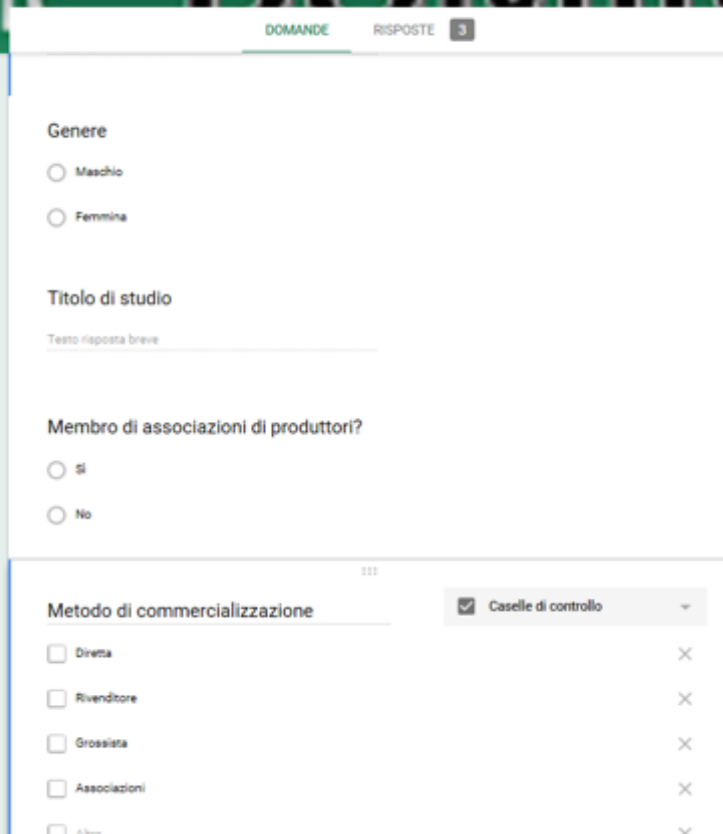


Domino-Project-Core-Organic



Methodology

The project is based on a multi-stakeholder approach which includes different actors (farmers, extension, researchers, agricultural administration)



DOMANDE RISPOSTE 3

Genere

☐ Maschio

☐ Femmina

Titolo di studio

Testo risposta breve

Membro di associazioni di produttori?

☐ Sì

☐ No

Metodo di commercializzazione

☒ Caselle di controllo

☐ Diretta

☐ Rivenditore

☐ Grossista

☐ Associazioni

☐ Altri

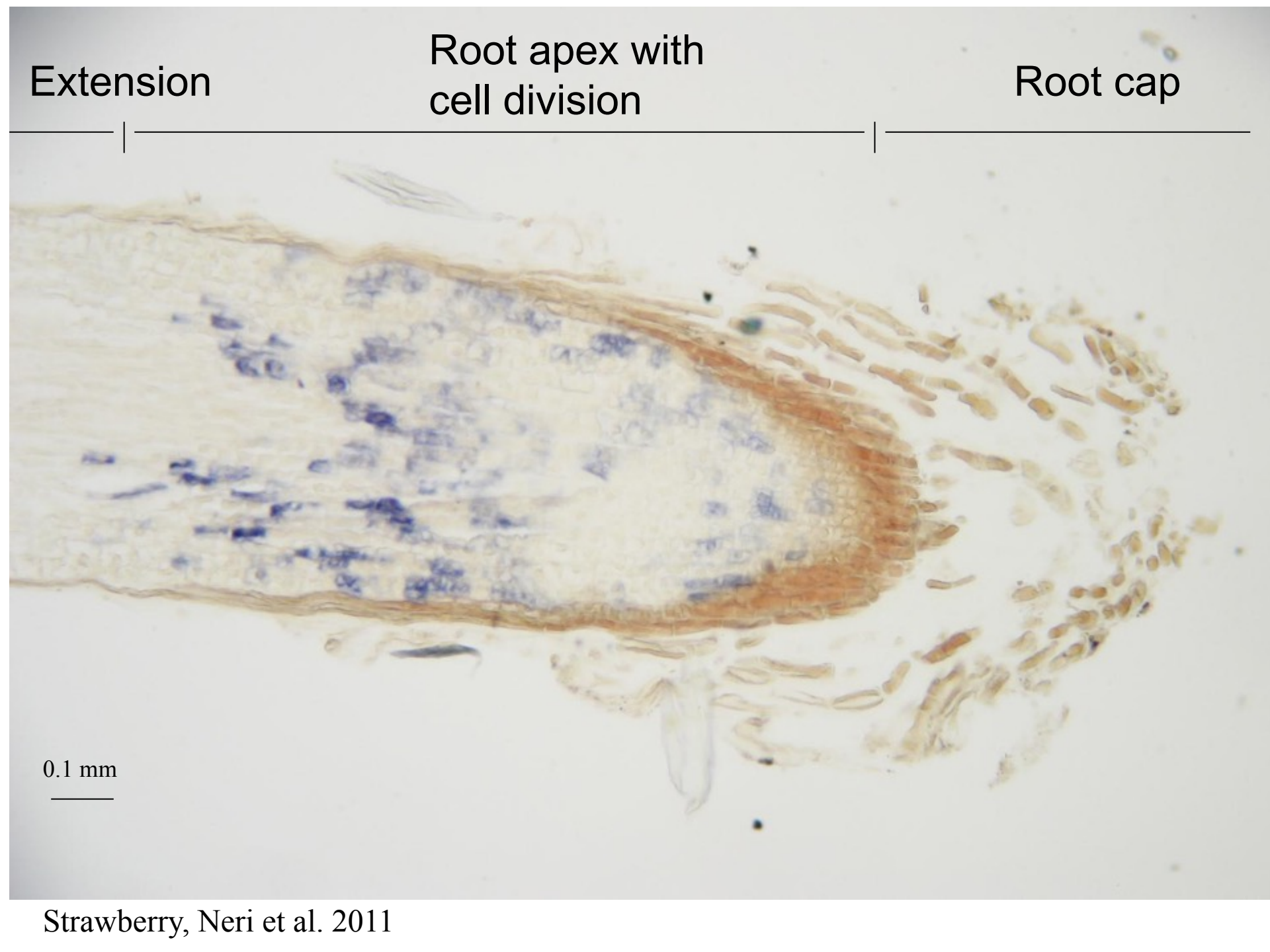


Extension

Root apex with
cell division

Root cap

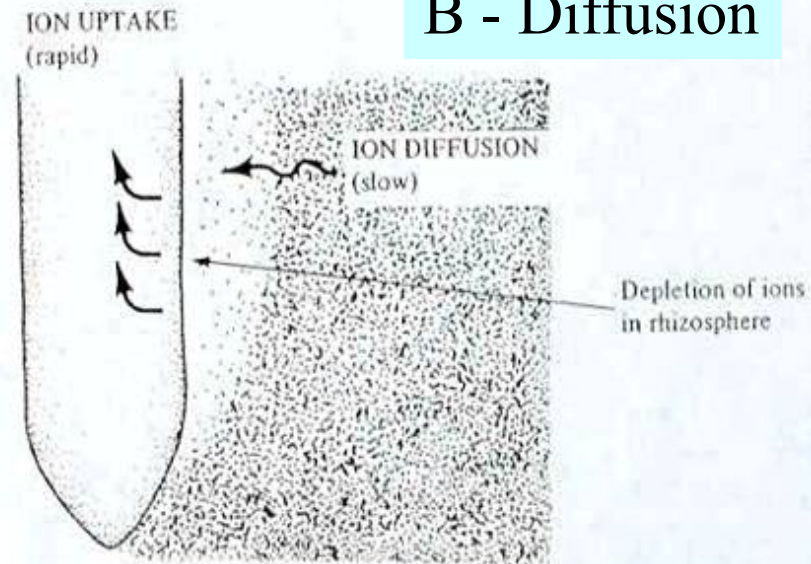
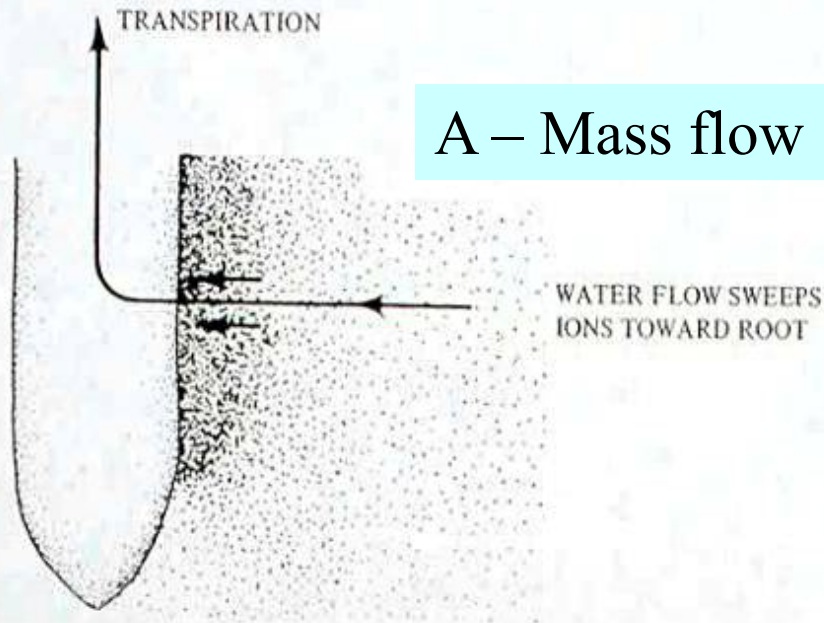
0.1 mm



SOIL NUTRIENT “MOBILITY” AND AVAILABILITY

1. ION MOVEMENT TOWARD ROOT(S)

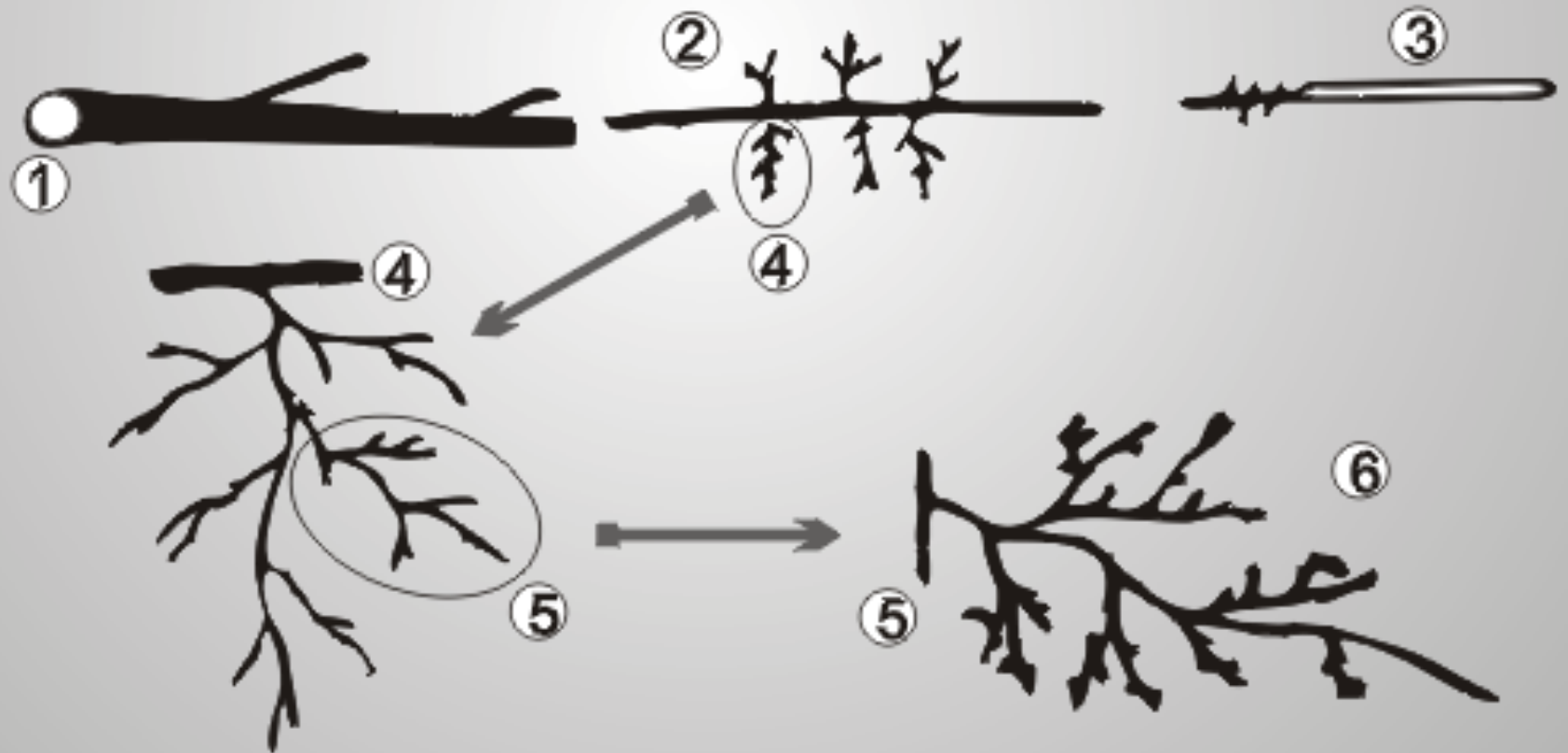
- a.) Mass flow in soil solution.
- b.) Ionic diffusion to root



2. ROOT MOVEMENT (I.E., GROWTH) TOWARD NUTRIENT

C - Interception

Root morphology

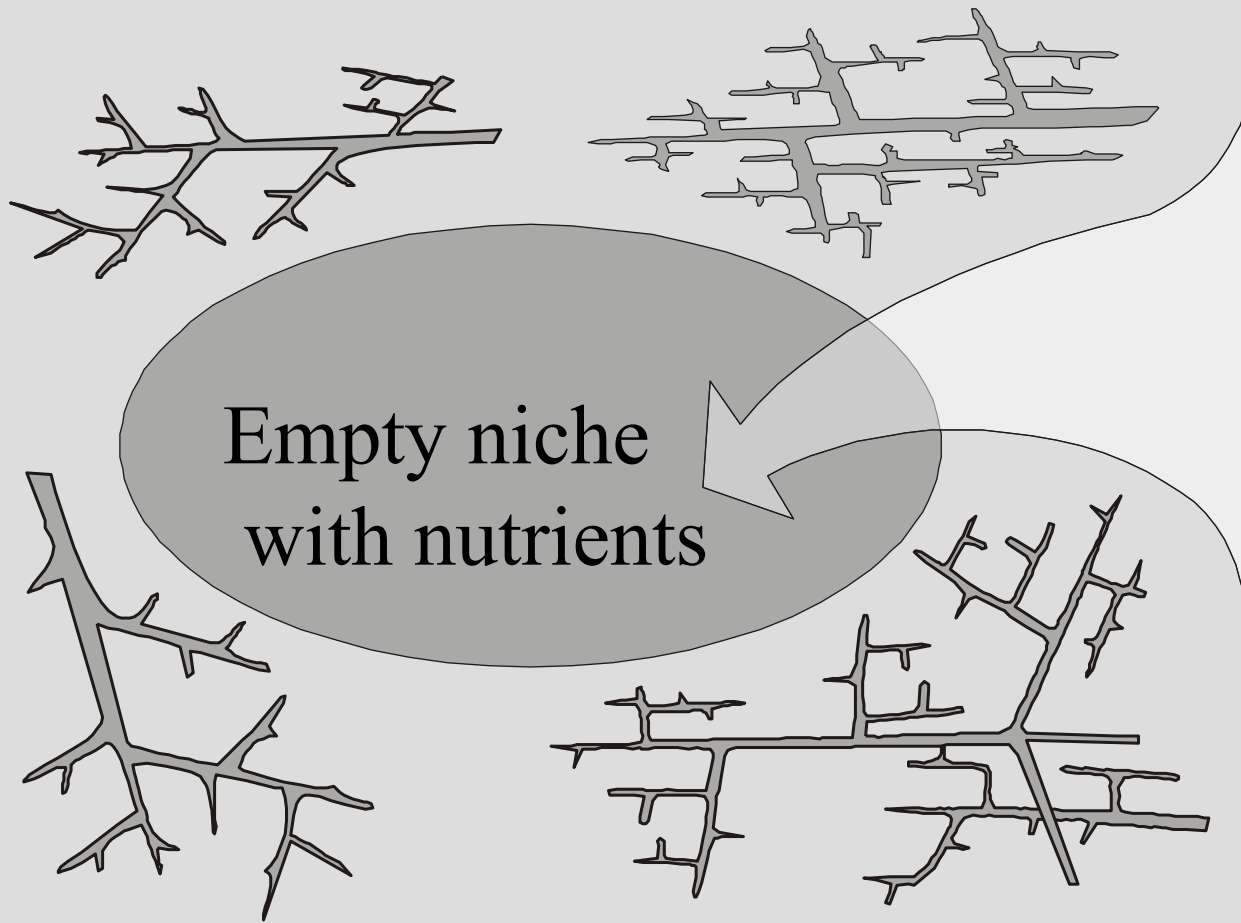


(Zucconi 1996)

ZUCCONI-BRUNZINI-96ST440

- 1 – root skeleton
- 2 – transport and sustain
- 3 – macro migration

- 4 – sustain root micromigration
- 5 – absorption (micromigration)
- 6 - mycorrhizae



Roots

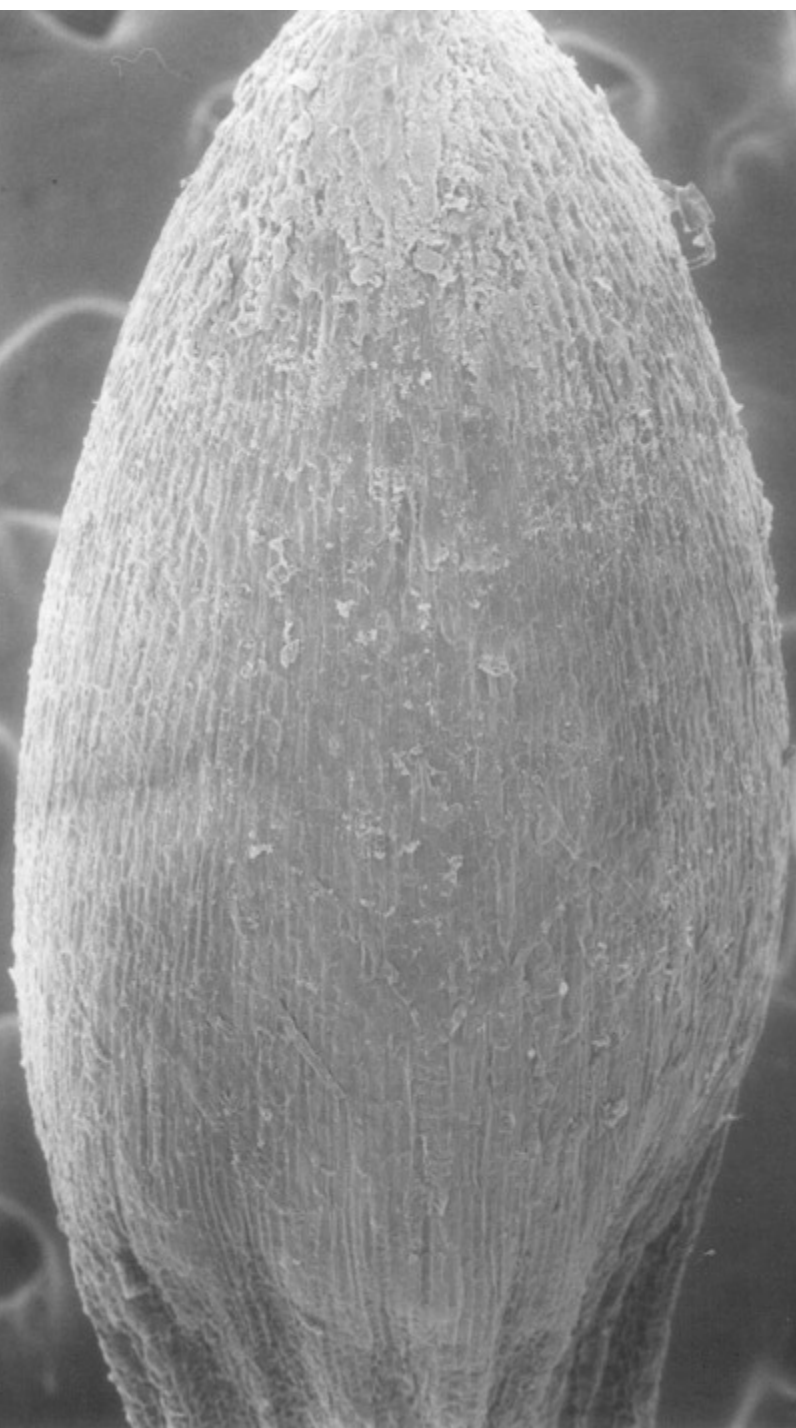
ZUCCONI-BRUNZINI-96SL053

ROOT PLASTICITY

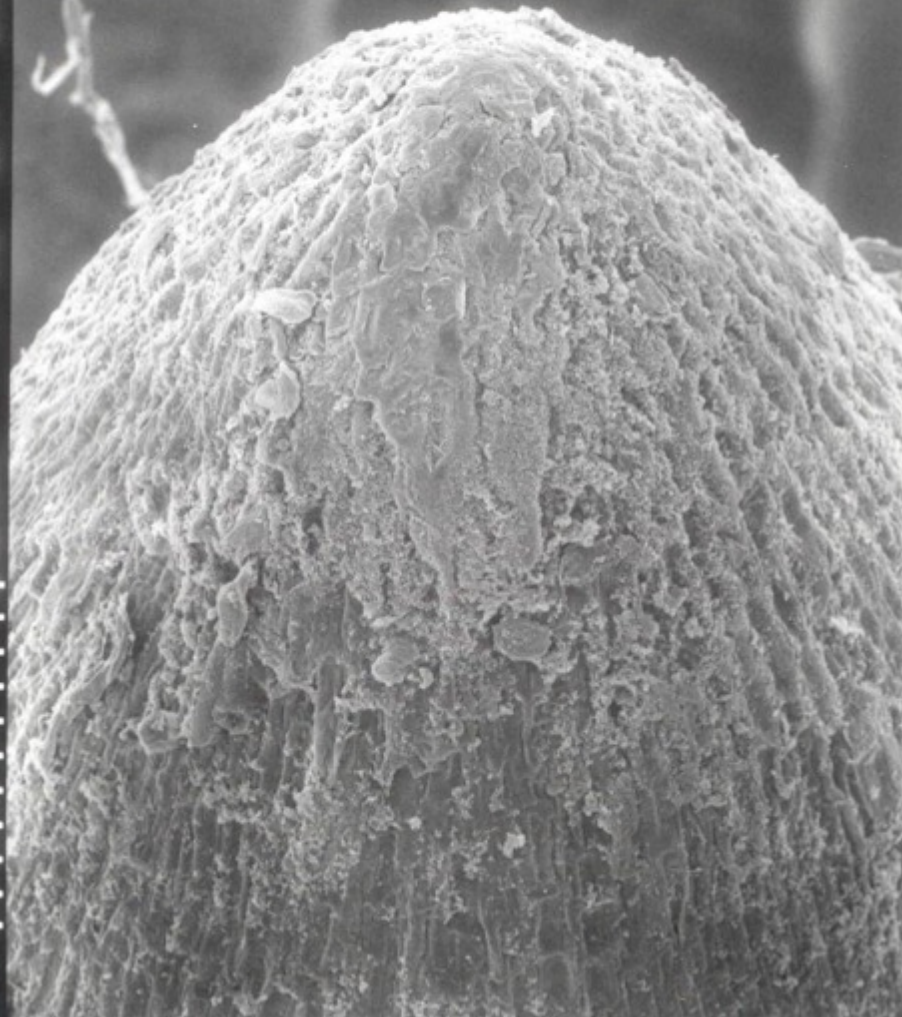
(Zucconi 1996)

Strawberry root apex
(cv. Tochiotome)

146V93 10.0kV X90.0 333μm



146V94 10.0kV X202 149μm



OLIVE

A photograph of an olive tree in a dry, sandy environment. The tree is the central focus, with its dense green foliage and a thick, gnarled trunk. It is surrounded by other similar trees in the background. The ground is reddish-brown sand. Several black plastic mulch trenches are visible, running horizontally across the foreground and middle ground. The sky is overcast and grey.

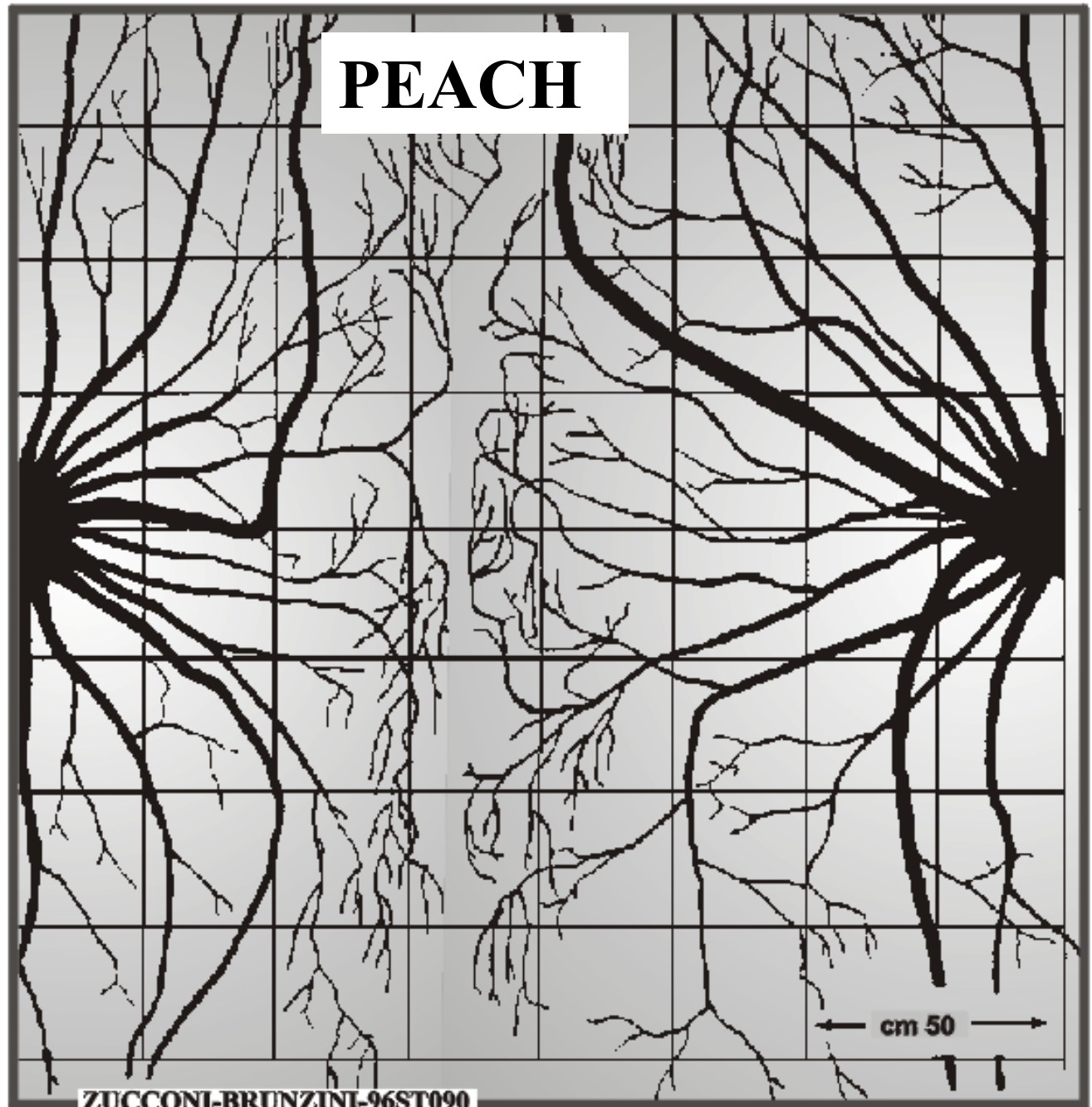
Compost in trenches in two sides



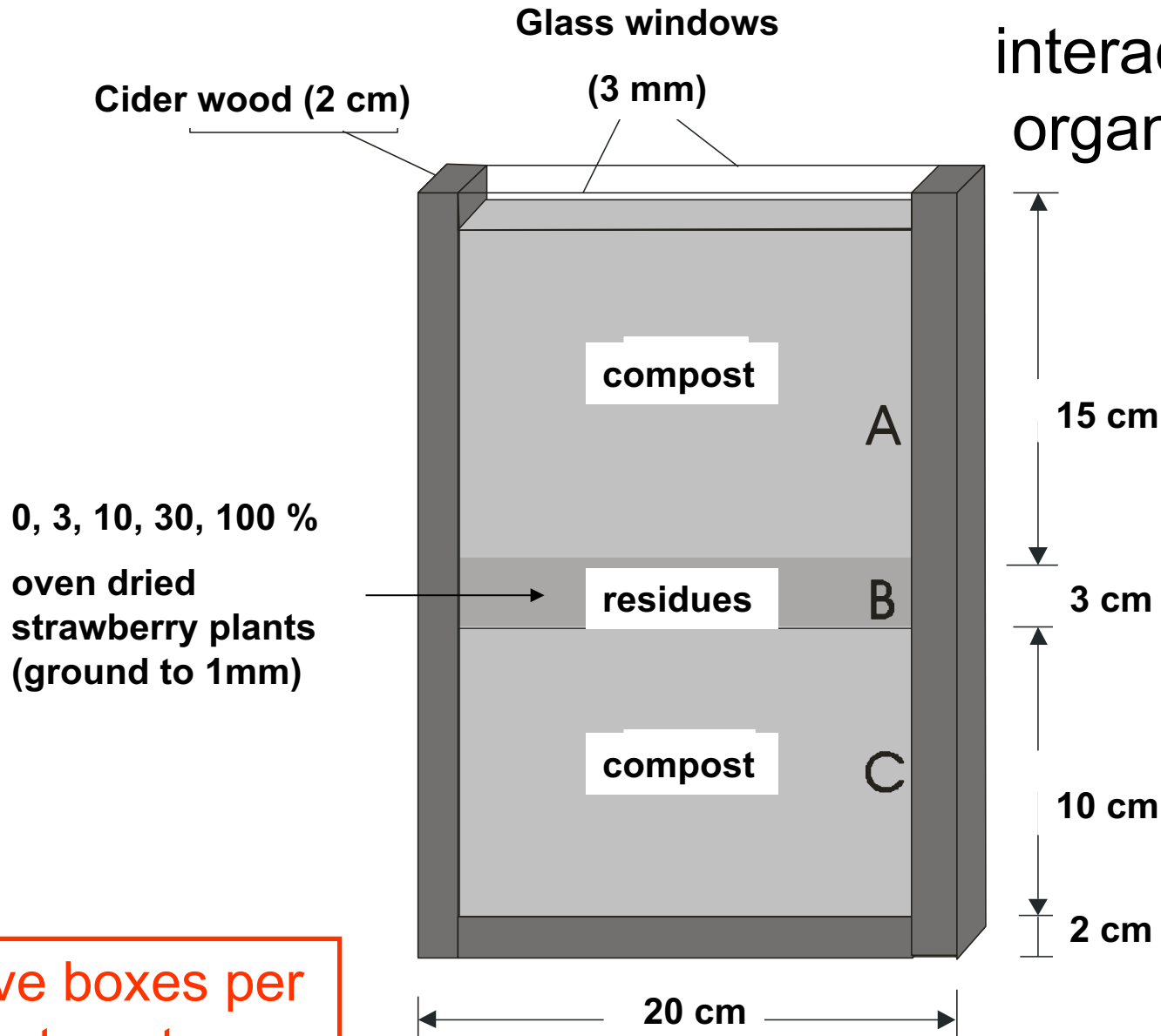
PEACH

Allelopathy

If the roots of adult trees are maintained in monospecific orchards there is a toxic reaction

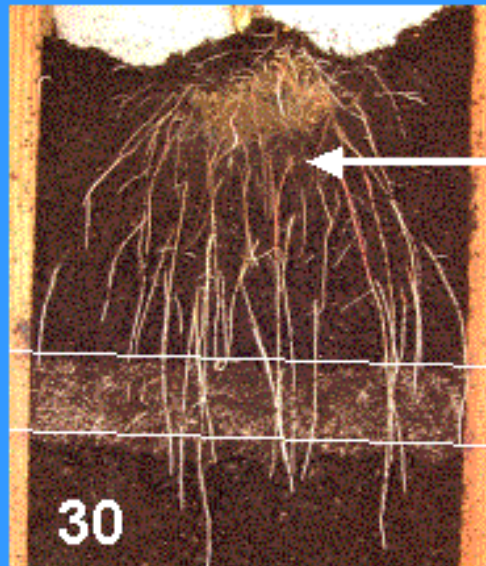
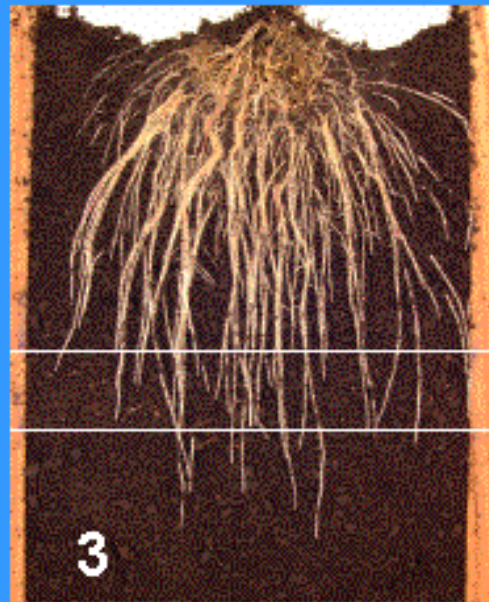
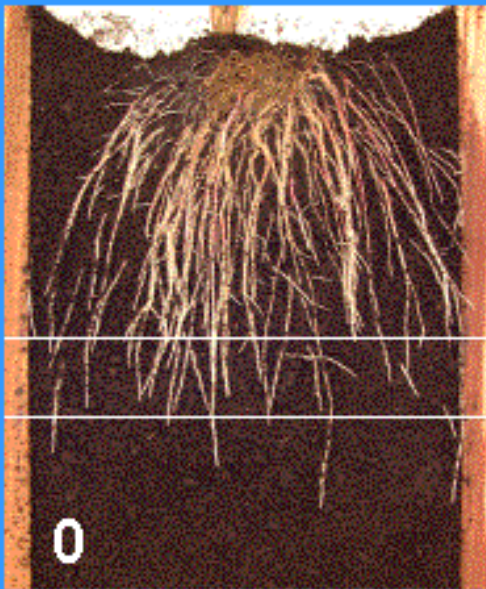


To observe root
interaction with
organic residues



Five boxes per
treatment

(Neri, Sugiyama, Inujima, 2002)



12 days
after
planting

(Neri, Sugiyama, Inujima, 2002)

21 DAP

100
residues

100
residues

Root aging

Substrate
hostility

Root clusters

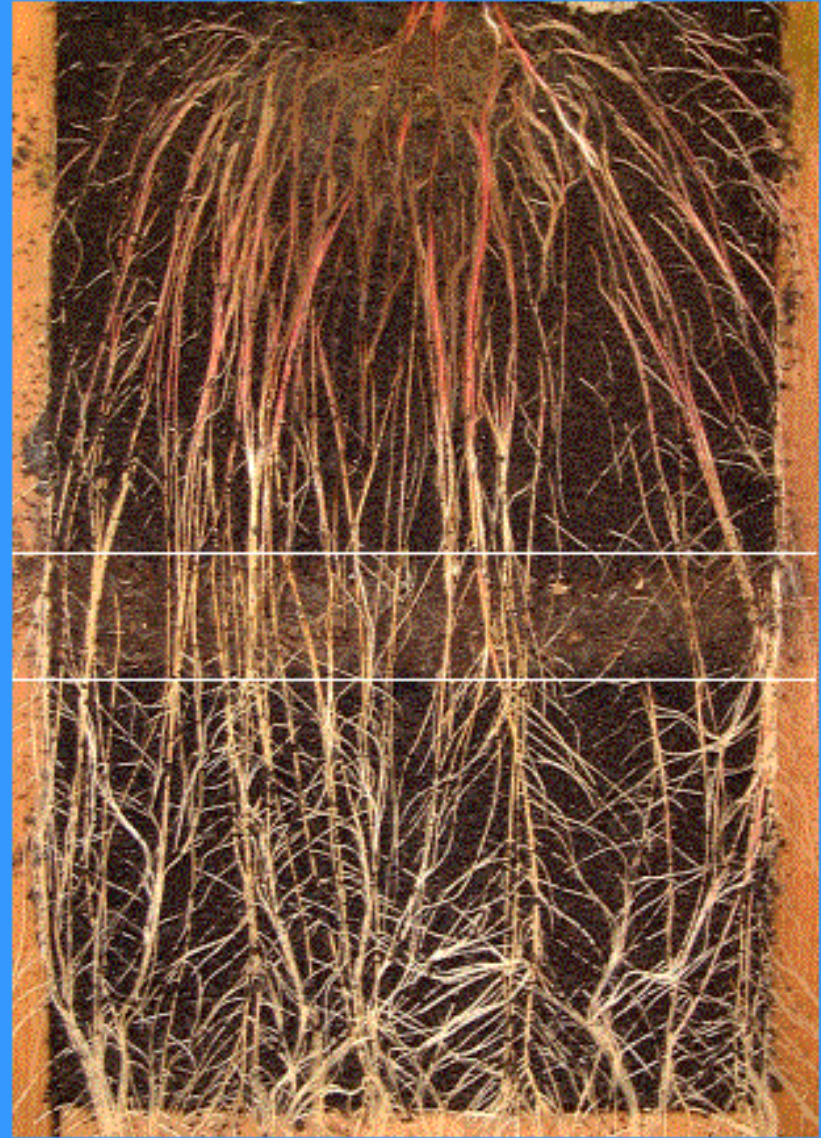
Deeper Roots

Strong Root
branching

30 days after planting



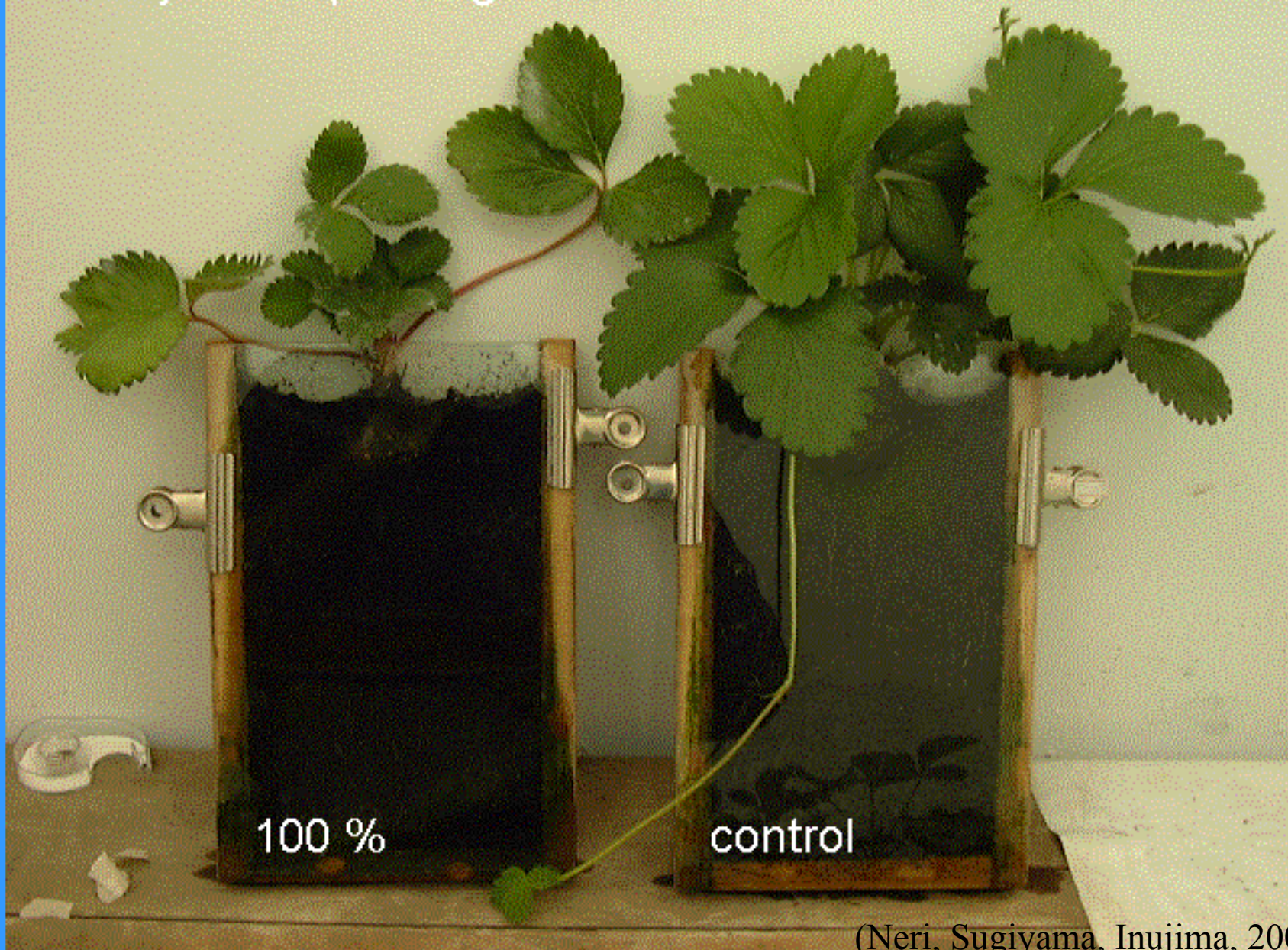
Control



100 %

(Neri, Sugiyama, Inujima, 2002)

30 days after planting



(Neri, Sugiyama, Inujima, 2002)

Apple M9



at the end of the 2^o year without residues



Apple residues $<1\text{mm}$ at the end of the 2^o year



M9 at the end of the 2^o year with apple residues in the top layer



M9 at the end of the 2^o year with apple residues in the bottom



control



with apple residues

M106 at the end of the 2^o year

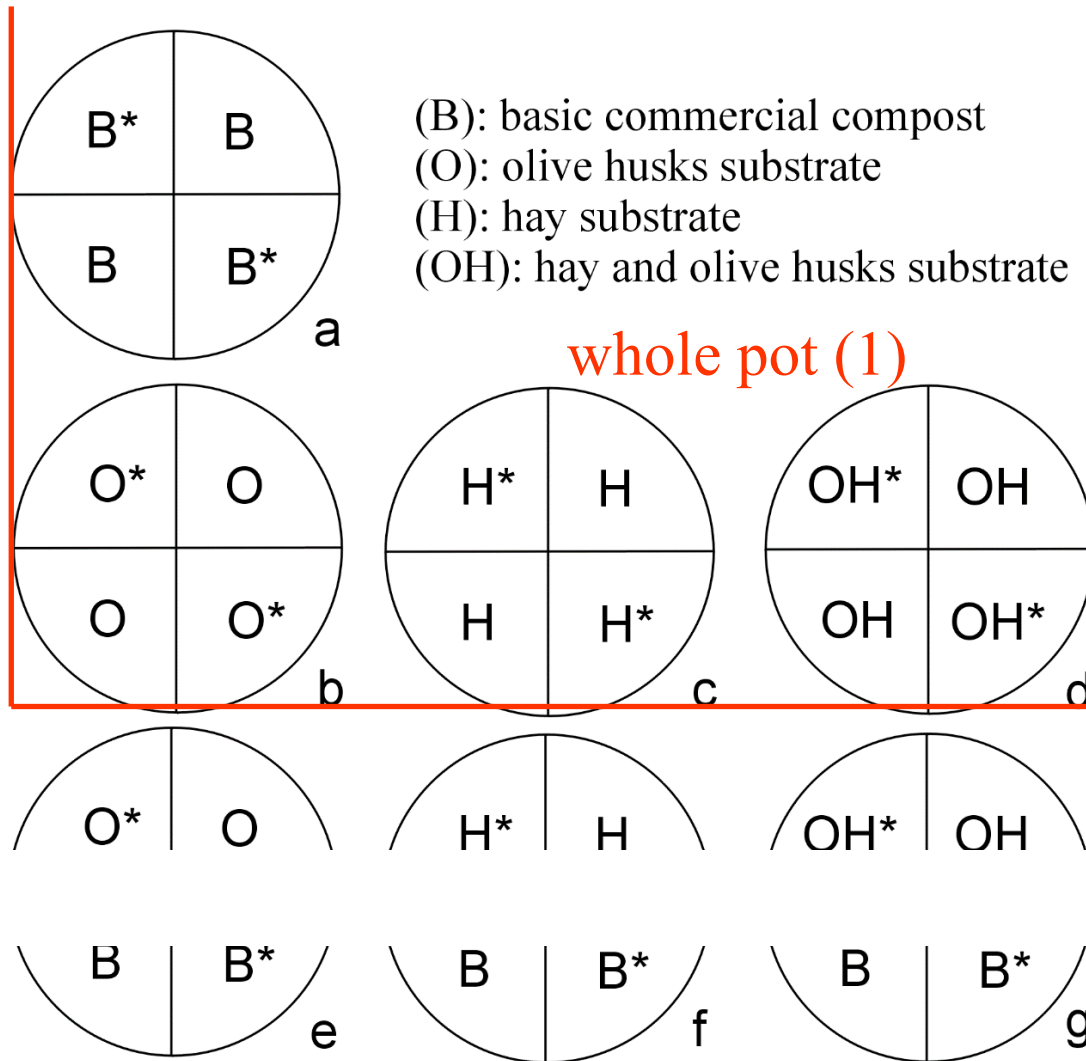


M9 at the end of the 2^o year with peach residues

Olea europaea: pomace fitotoxicity

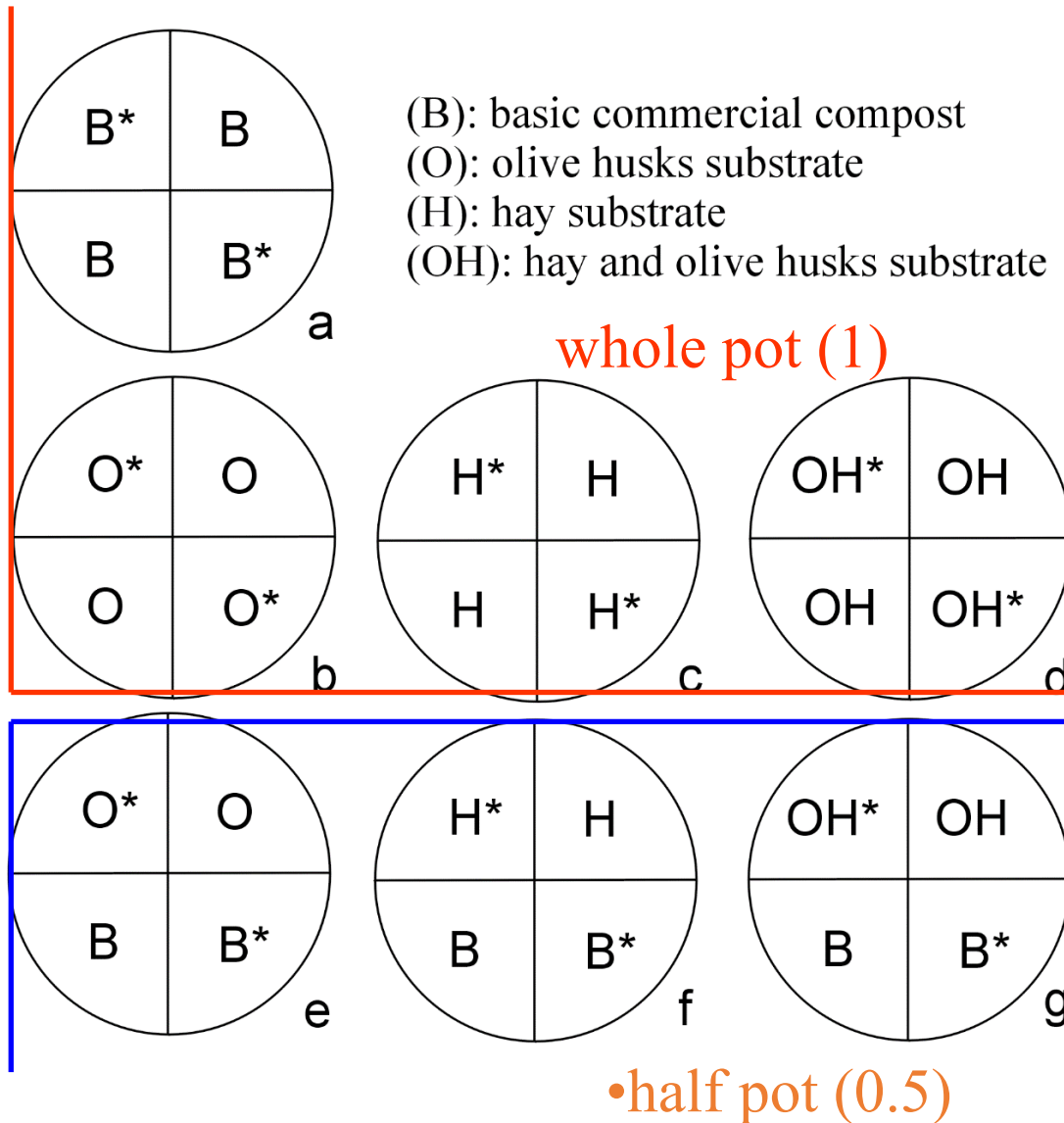
Giorgi, Neri, Lodolini, Savini 2008





Two factors experiment

- **Substrate**
compost
pomace (olive husk)
hay
hay plus pomace
- **Location:**
whole pot (1)
half pot (0.5)

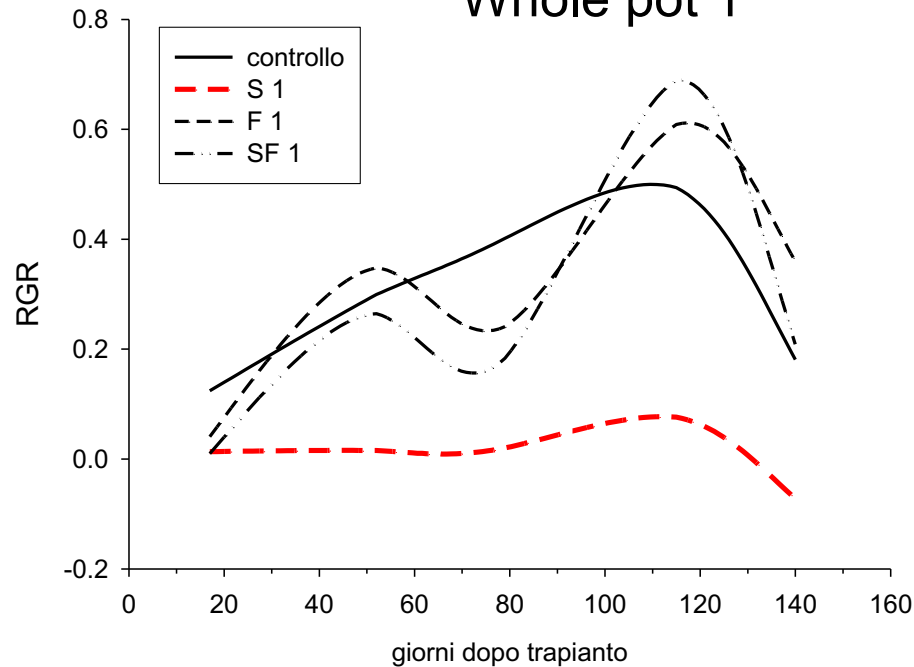


Two factors experiment

- Substrate
compost
pomace (olive husk)
hay
hay plus pomace
- Location:
whole pot (1)
half pot (0.5)

(8 replicates)

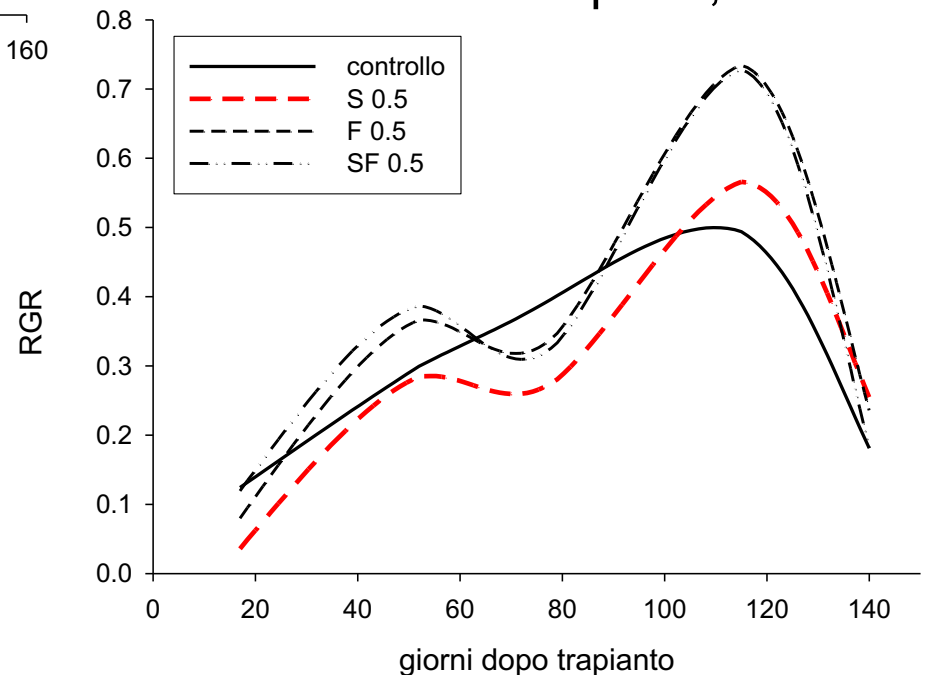
Whole pot 1



Shoot growth rate

Niche effect

Half pot 0,5



RGR = relative growth rate

$$RGR = (L2 - L1) / L1$$

Environmental mitigation of organic waste



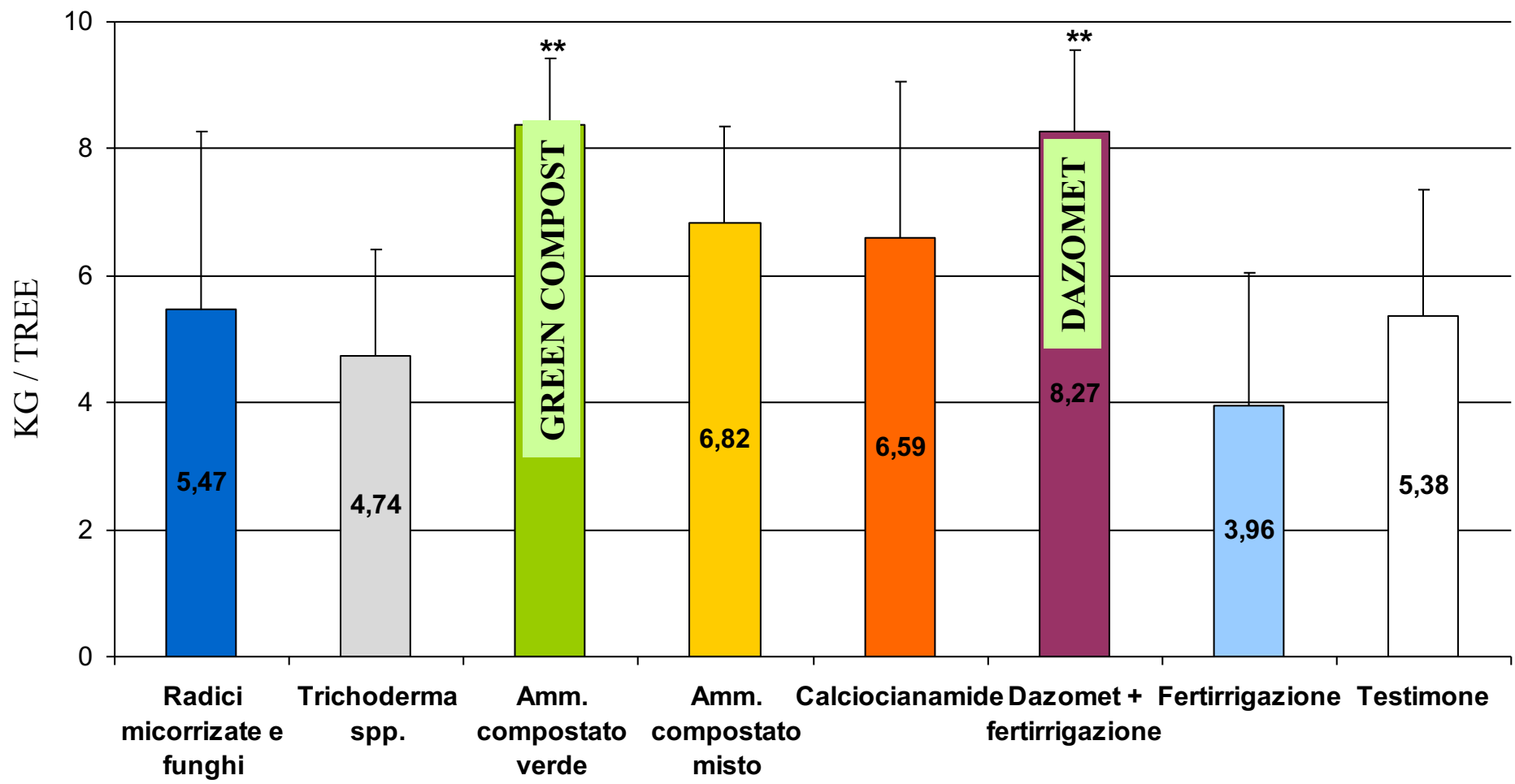
Bovine manure

(Mascanzoni, Zucconi, Neri 1996)

Organic alternatives to soil disinfection in apple replant



FRUIT PRODUCTION PER TREE AT THE SECOND YEAR



(CRESO 2012)

Organic alternatives to soil disinfection in apple replant

Treatment	microbic C (mg/kg d.m.)
GREEN COMPOST	688,3 ($\pm 58,0$)
DAZOMET	386,1 ($\pm 52,0$)
NOT TREATED CONTROL	347,1 ($\pm 19,1$)

Grazie!!

