LIFE17 ENV/IT/000347 – LIFE SUBSED

Sustainable substrates for agriculture from dredged remediated marine sediments From ports to pots

18th Months Monitoring Meeting

ACTION B2 − Demonstration of the use of remediated sediments as a substrate for nursery production

B2.2 − Nursery production of olive and citrus

Grafted plantlets cv FRANTOIO

Foreseen:
5 plants x 5 substrates x 3 irrigation systems x 3 replicates

Total = 225 plants

New experimental design:

5 plants
5 substrates
2 irrigation systems
3 replicates

Total = 150 plants

(TS)

Substrates:
MIX 1 − 100% treated sediment

MIX 2 − 75% TS
MIX 3 − 75% TS
MIX 4 - 50% TS
MIX 5 − 25% TS

Expected results: 150 olive grafted plantlets growing

ACTION B4 – Demonstration of the use of remediated sediments as a substrate for food crops production

B4.1 – Basil

2 commercial cultivar
Total 14400 seeds

Experimental design:

20 seeds (~ 50 g of seeds) in a 20 cm Ø plastic container

total 7200 seed/cv = 360 containers

20 containers x 3 substrates x 3 replicates x 2 irrigation systems

MIX1
MIX2
MIX3

ACTION B4 – Demonstration of the use of remediated sediments as a substrate for food crops production

B4.2 – Blueberry

Foreseen:

2 cultivar x 4 plants x 3 substrates x 2 irrigation systems x 3 replicates

Total = 216 plants

New experimental design:

2 cultivar
3 plants
3 substrates ⟶ MIX1
2 irrigation systems   MIX2
3 replicates   MIX3

Total = 108 plants

ACTION B4 − Demonstration of the use of remediated sediments as a substrate for food crops production
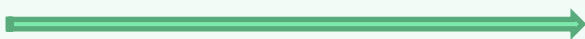
B4.2 − Woodland strawberry

Foreseen:

1 cultivar x 5 plants x 3 substrates x 3 irrigation systems x 3 replicates

Total = 135 plants

New experimental design:

1 cultivar
5 plants
3 substrates ⟶ MIX1
2 irrigation systems   MIX2
3 replicates   MIX3

Total = 90 plants

C3.1 – Olive

C3.2 – Basil – Blueberry – Woodland strawberry

NURSERY PRODUCTION
Procedures for **Olive** (grafted plantlets)

1. Plants and leaves
Data collection (non destructive analysis) on 20 grafted plantlets/treatment (or as differently indicated)
Recurrence: every 20 days from planting time (included) or as differently indicate in each parameter

Cultural practices: irrigation, pest control and fertilization to be performed as typically done in the area of production

1.1. Mortality (number; percentage)
1.2. Stem diameter
1.3. Stem height (tallest part in absolute)

1.4. Leaf surface (on 20 leaves from each cv-substrate plot) (early September)
1.5. Leaf blade colour (L, a, b coordinates) (on 20 leaves from cv-substrate plot) (early September)
1.6. Chlorophyll content (on 20 leaves from each plot) early September)

1.7. Nutritional foliar analysis (on one sample per cv-substrate) once soon after fruit harvesting.
N, P, K, Ca, Mg, Na, B, Mn, Fe, Zn, Cu, Mo

1.8. Appearance of leaves

Pictures for each cv-substrate every 20 days

Data collection (destructive analysis) - Recurrence: only at the end of the trial
1.9. Fresh weight of the whole plant
1.10. Dry weight of the whole plant
1.11. Fresh weight of stem (aerial part)
1.12. Dry weight of stem
1.13. Fresh weight of root system
1.14. Dry weight of root system

Analysis of contaminants (end of trial)
1.15 Heavy metals on roots
1.16. Heavy metals on stems
1.17. Heavy metals on leaves
1.18. Other contaminants (to be defined in relation to analytical results of sediments)

Procedures for Woodland Strawberry
(plant and fruit evaluation)

1. Plants and leaves
Data collection (non destructive analysis) on all the plants (or as differently indicated)
Recurrence: every 30 days from planting time (included) or more

Cultural practices: irrigation, pest control and fertilization to be performed as typically done in the area of production (Murcia and Tuscany); stolons to be removed as soon as they appear

1.1. Plant mortality (number; percentage)
1.2. Crown diameter
1.3. Plant height (tallest part in absolute)
1.4. Number of fully expanded leaves

1.5. Leaf surface (on 10 leaves from each plot; 30 leaves per cv-substrate) soon after fruit harvesting
1.6. Leaf blade colour (L, a, b coordinates) and chroma index ($a^2 + b^2)^{1/2}$(on 10 leaves from each plot; 30 leaves per cv-substrate) soon after fruit harvesting
1.7. Chlorophyll content (on 10 leaves from each plot; 30 leaves per cv-substrate) soon after fruit harvesting
1.8. Nutritional foliar analysis (on one sample per cv-substrate) once soon after fruit harvesting. (N, P, K, Ca, Mg).

Pictures for each cv-substrate at every monitoring

Data collection (destructive analysis) - Recurrence: only at the end of the trial
1.10. Fresh weight of the whole plant
1.11. Dry weight of the whole plant
1.12. Fresh weight of stem (aerial part)

Procedures for BASIL
(Plant evaluation)

4-5 days – 1 week from sowing:
1. seed germination - all the seeds (number and percentage)

once a week:
2.1 plant survival – all the plants (number and percentage)
2.2 growth stage (number of leaves) – on a sample of 30-50 plants per tray

At the end of the experiment (presumably after about 4 weeks, growth stage 2-3 couples of true leaves) – only shoots:
3.1 plant survival – all the plants
3.2 number of leaves – on a sample of 10-20 plants per tray
3.3 plant height – on a sample of 10-20 plants per tray
3.4 leaf area – on a sample of 10-20 plants per tray
3.5 chlorophyll content (SPAD values) – on a sample of 10-20 plant per trays
3.6 fresh weight – all the remaining (not used for leaf area determination) plants (to be expressed on a single plant basis)
3.7 dry weight – all the weighed fresh matter

Chemical composition and organoleptic quality:
3.8 mineral element concentration
3.9 nitrate content (Cataldo method)
3.10 Total polyphenols
3.11 Antioxidant activity
3.12 Vitamin C
3.13 Organic acids
3.14 Sugars
3.15 Essential oil content
3.16 Analysis of organic and inorganic contaminants

Procedures for BLUEBERRY
(plant and fruit evaluation)

Cultivars: Duke and Bluecrop

1. Plants and leaves
Data collection (non destructive analysis) on all the plants (or as differently indicated)
Recurrence: every 30 days from planting time (included) or more

Cultural practices: irrigation, pest control and fertilization to be performed as typically done in the area of production

1.1. Plant mortality (number; percentage)
1.2. Plant width(widest part in absolute)
1.3. Plant height (tallest part in absolute)
1.4. Number of shoots (longer than 15 cm)

1.5. Leaf surface (on 10 leaves from each plot; 30 leaves per cv-substrate) soon after fruit harvesting
1.6. Leaf blade colour (L, a, b coordinates) and chroma index ($a^2 + b^2)^{1/2}$(on 10 leaves from each plot; 30 leaves per cv-substrate) soon after fruit harvesting
1.7. Chlorophyll content (SPAD) (on 10 leaves from each plot; 30 leaves per cv-substrate) soon after fruit harvesting
1.8. Nutrient content (N, P, K, Ca and Mg) in the blueberry leaves (on one sample per cv-substrate) once soon after fruit harvesting.

Pictures for each cv-substrate at every monitoring

Data collection (destructive analysis) - Recurrence: only at the end of the trial
1.9.Fresh weight of the whole plant
1.10.Dry weight of the whole plant
1.11.Fresh weight of stem (aerial part)
1.12.Dry weight of stem
1.13.Length of root system
1.14.Fresh weight of root system
1.15.Dry weight of root system

2. Phenology
2.1. Re-growth time (second year)
2.2. Flowering time (first flower - first two completely open flowers in one plant; peak of flowering - 50 % of completely open flowers; last flower)

ACTION C4 – Monitoring of socio-economic impact of the project and LCA

Collection of information from previous actions

LCA Inventory - First phase

TRANSPORT

(Technical characteristics of vehicle for transport; diesel consumption; volume of soil transported; number of travels)

LANDFARMING

Plastic film (origin , material, dimensions, reuse/end life) ; technical characteristics of machines, hours of work, consumpiont; resources used (es water for irrigation)

LCA Inventory - Second phase

TRIALS SET AND CULTIVATION

For each species and each treatment all the information are needed

Plants origin; container (dimension, material, etc.); substrates (origin, composition, etc.); machines; irrigation and fertilization; treatments against pest and diseases.

Grazie.

www.carbonsink.it
info@carbonsink.it