LOW COST SUBSTRATE ADOPTION ON *CUCURBITACEAE* CROPS: SYNTESIS OF EXPERIENCES CARRIED OUT IN SARDINIA

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Introduction

- Virulent desease affect *Cucurbitaceae* crops in open air and in greenhouse conditions.
- In areas where *Cucurbitaceae* crops are diffused MB utilise is common.
- Organic and inorganic substrate utilising in soilless culture is an effective alternative.

The trials

- From 1992 several trials were carried out in Sardinia in order to verify the cropping possibility of the more important *Cucurbitaceae* by utilizing low cost substrates in Mediterranean environment.

- Melon, watermelon and squash (zucchini) were compared on different low cost substrates:
  - Organic:
    - Distillery marc
    - *Posidonia oceanica* L.
  - Inorganic:
    - Volcanic lapillo
    - Expanded clay
    - Perlite
- Cucumber was not included due to its scarce economical interest in Sardinia.

The trials

- Greenhouse trials were carried out from the end of February to the half of July, adopting a randomized block design with four replications.
- Mineral supply was carried out by utilizing a 12 mel^{-1} of N nutritive solution, according to the Coic-Lesaint methodology.
- Nutritive solution distributed volumes were determined on reference evapotranspiration basis. The volumes were corrected considering the waste solution ratio (15% on average).
- Biometric data, yield and qualitative characteristics were monitored.

Results

- The tested species evidenced their adaptability to soilless cropping method.
- Common problems between species were evidenced in relation to different substrates.
- Bio-morphological and productive data analysis showed a negative response when were utilised unbalanced substrate between macro and micro porosity and, consequently, between air and water ratio at roots system level.
- These substrates determined plant stress condition and reduced crops yield.

Results

- These problems were observed by utilizing:

- Inorganic substrates: volcanic lapillo and expanded clay; characterised by high macroporosity (> 50 %) and low microporosity (< 20%).

- Organic substrates: distillery marc; characterized by high microporosity (> 50%) and low macroporosity (< 25%). In this substrate, the microbial activities determined a progressive physical degradation.

- In these conditions the *Cucurbitaceae* roots systems are exposed to frequent stress due to scarce air presence.
- The adoption of mixed substrates with opposite characteristics (distillery marc + volcanic lapillo, distillery marc + expanded clay) did not solved the problem, probably due to mixing difficulties.

Results

- Positive results were obtained utilising more equilibrated substrates:

- Organic substrates: *Posidonia oceanica* L.

  Characterised by macroporosity < 50 % and microporosity > 35 %, that influenced a good root system development and reduced the stress risk.
  Moreover, it showed a low microbial degradation.
  Melon and watermelon evidenced a good vegetative activity, while squash (zucchini) showed a lower adaptability, probably caused by the higher sodium content.

- Inorganic substrates: Perlite;

  Characterised by 48 – 50 % of macroporosity and about 40% of microporosity and also characterized by a good physical stability.
  On this substrate, the tested Cucurbitaceae showed the best results over the years.

Conclusions

- Melon, watermelon and squash (zucchini) evidenced different adaptability between low cost substrates; it can be related to *Cucurbitaceae* root systems high sensibility to stress.
- Between tested substrates, *Posidonia oceanica* and perlite can be suggested for soilless culture melon and watermelon, while squash cropping should be carried out on perlite.
- The others tested substrates did not show sufficient physical characteristics to guarantee regular growth and crop productivity.
- Considering the quality aspects, watermelon and squash production reached good levels when on *Posidonia oceanica* and perlite;
- Soilless melon culture evidenced a qualitative reduction (low °Brix level). The increasing of solution electrical conductivity during the ripening phase, did not solved the problem.

  Encouraging results were obtained by reducing over the cycle the distributed solution volumes to the 75% of reference evapotranspiration.
- The scarce diffusion of melon, watermelon and squash in soilless culture evidenced the presence of technical and economical difficulties.