PRACTICE ABSTRACT

Mycorrhizal fungi – How to produce your own bio-fertilizer

Problem

Mycorrhizal products offered as bio-fertilizers and plant strengtheners by many companies are rather expensive and often lack quality control.

Solution

This practice abstract provides an easy-to-follow guide describing the process on how to produce home-made mycorrhizal inoculants and how they can be applied as bio-fertilizers in the nursery and during field transplantation of crop plants.

Outcome

Application of mycorrhizal fungi is a simple technique for improving the growth as well as tolerance against biotic and abiotic stresses of a wide range of crop plants. In addition, they can help to improve the soil structure and to prevent nutrient leaching.

Applicability box

Theme
Nutrient management; soil quality and fertility; biotic and abiotic stress tolerance

Geographical coverage
Global

Application time
Sowing, field transplantation

Period of impact
Current and succeeding crop

Equipment
Material to build propagation unit, sand and co-substrate, mycorrhizal starter inocula, urea/compost

See 'practical recommendations' section

Best in
Nurseries, under stressful climatic conditions, in low fertile soils

Practical recommendations

- Propagation unit: Depending on the required amount of mycorrhizal inocula, different types of propagation units can be established: container, pot or concrete units. Container units consist of a plastic beaker with holes at the bottom (to allow water passage) (figure 1a), concrete units consists of a tank made e.g. from cement or PVC tubes (figure 1b), and pot units of two pots with a garden fleece in between (to prevent inoculate leakage) (figure 1c). Beaker and pot units should be placed on a hard surface (e.g. stone, wood or a saucer) to prevent roots growing through. Units should be placed in a wind and rain protected place.
- Propagation substrate: The propagation substrate consists of 1 part sand mixed with 9 parts co-substrate such as Perlite or Vermiculite. Light co-substrate are recommended in order to facilitate the handling and transport. For fertilization urea (100 mg nitrogen per kg substrate) and/or mature, pathogen-free compost (1% of the substrate) is mixed into the substrate.
- Host plants: A mixture of at least two plant species is recommended such as sorghum-barley, sorghum-flax, maize-barley or leek-flax. Seeds can be soaked in water for several hours before sowing.
- Starter inocula: Is added at a rate of 2% of the propagation substrate. It should be purchased from a reliable company.

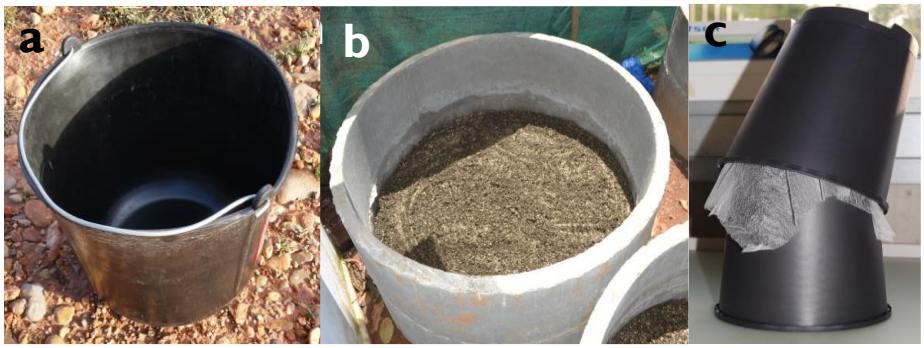

Figure 1: Different types of mycorrhizal propagation units: container (a), concrete (b) and pot (c) unit.
(Photos: Sarah Symanczik, FiBL)

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Figure 2: Steps to set up a container type mycorrhizal propagation units. (Photos: Sarah Symanczik, FiBL)

- Set-up and harvest: Units are filled with pre-mixed substrate and irrigated (figure 2a). Starter inocula is added as a layer 5-8 cm below the substrate surface (figure 2b) and covered with another layer of substrate (figure 2c). Host plant seeds (amount dependent on host plant species) are distributed onto the surface (figure 2d), covered with a layer of substrate (figure 2e) and irrigated. Ninety days after sowing, irrigation is stopped to dry the substrate completely. Shoots are removed and roots are cut inside the propagation unit into small pieces of 1- 1.5 cm using scissors and mixed with the substrate. Then the mycorrhizal inoculate is ready. For quality check, root samples can be taken before drying the substrate to measure mycorrhizal colonization (%RLC) and subsamples of the dried inoculants to assess spore abundance and purity (see practice abstract “Mycorrhizal assessments”).
- Application: Mycorrhizal inocula can be used for applications at the nursery stage by adding 100 ml inocula to the root system and during field transplantation by spreading 200 ml inocula into the planting hole below the root system.

Use the comment section on the SolACE discussion forum to share your experiences with other farmers, advisors and scientists! If you have any questions concerning the method, please contact the first author of the practice abstract by e-mail.

Further information

Further reading

- Symanczik et al. (2018): Mycorrhizal fungi as natural bio-fertilizers: How to produce and use. Technical handbook.

Weblinks

- www.fertiledatepalm.net

About this practice abstract and SolACE

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SolACE: The project is running from May 2017 to April 2022**.** The goal of SolACE (Solutions for improving Agroecosystem and Crop Efficiency for water and nutrient use) is to help European agriculture face major challenges, notably increased rainfall variability and reduced use of N and P fertilizers

Project website: www.solace-eu.net

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