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FINALISTS : Abiel Trevino Garza
Israel Adrian Blanco Cruz

COUNTRY : Mexico

Prototype for the production of Biofertilizer

Abiel Trevino Garza1

Israel Adrian Blanco Cruz1

Dr. Gonzalo Guevara Guerrero2

Abstract

The Latin American and Caribbean regions have one of the biggest cultivable areas in the world, calculated at around 576 million hectares. Nevertheless, 16% of this land its affected by a kind of soil degradation. Previous studies have shown that the vesicular- arbuscular mycorrhizae (VAM) can fix phosphorus and other elements to plants, is an important micronutrients transporter, increases the water potential of plants, can bioremediate the lands affected and prevents lixivation. These effects are very convenient and can replace the chemical fertilizers which produce collateral damage to the environment. For the reasons mentioned above, this prototype for the production of vesiculararbuscular mycorrhizae, denominated as a biofertilizer, is presented.

The prototype consists of an aeroponic system which disperses, in aerial form, nutrients to the host/trap plant roots where the fungus produces its mycelium web. The fungus propagation consists of an artificial union of isolated and identified spores of the mycobiont ,which we want to propagate, with the trap plant roots. The specimen identification consisted in a staining and clarification method (Phillips-Hayman), and a taxonomical identification. In order to prove the (VAM) benefits, two experiments using Sorghum spp. were carried out. One consisted of a comparison between the plants with VAM and a control without VAM. The second one consisted of a chemical comparison between control/fertilizer/ VAM plants. These two experiments were subjected to a water stress test for 10 days.

The prototype achieved a production of roots mycorrhizae between 50-65% of colonization. The taxonomic identification corroborated that the mycobionts propagated and the controls were the same species. Experiment One demonstrated that the mycorrhizae treatment has more height, stem diameter, fresh/dry weight than the control which doesn't have VAM. We also conducted the Student’s t Test to check the previously mentioned hypothesis. In Experiment Two, the control and fertilizer treatments had a similar percentage of Nitrogen and Potassium, and the mycorrhizae treatment significantly increased these two elements; nevertheless, the fertilizer and mycorrhizae treatment obtained a similar percentage of Phosphorous. The water stress test was for 10 days - one month after planting. The results were: the fertilizer and mycorrhizae treatment had the same resistance to the stress, the mycorrhizae recovered faster from the stress and the control specimens presented a lower shrivel percentage than the other plants.

One of the principal gains which this prototype has is that the trap plant doesn't die after collection, and the plant only needs to be inoculated once in the plant’s life because we only prune the roots. In nature 90% of plant species present some type of mycorrhizae association, hence the feasibility of this prototype for introduction, use and application of the fungus as a biofertilizer.

1 Centro de Bachillerato Tecnologico Industrial y de servicios N°24

2 Instituto Tecnologico de Ciudad Victoria

評語

This project describes an efficient way to produce myconhizal, which can be used as biofertilizer. Their data showed that this kind of biofertilizer can improve crop productivity drought tolerance. This has great potential for agnialture.