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TRAINING FOR SMALL-SCALE CORN PRODUCERS ON THE USE AND APPLICATION OF MICROBIAL BIOINOCULANTS

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Abstract: A strategy for transferring knowledge to small corn producers in southern Mexico is proposed, applying a homemade strategy to measure the pH of their agricultural soils and learn about the benefits of using microbial bioinoculants to improve their yields. Men and women of various ages participated, and finally, the bioinoculant was activated with water and molasses to be applied to their plots.

Keywords: small producers, bioinoculants, pH, agricultural soils, and corn

Introduction

The use of agrochemicals in agricultural production systems has various side effects, including environmental pollution, soil degradation, loss of species biodiversity, low yields of agricultural products, and high costs. The serious effects on human health have led to the search for environmentally friendly strategies, one of which is the use of bioinoculants based on plant growth-promoting microorganisms. high costs, and serious effects on human health. This has led to the search for environmentally friendly strategies, one of which is the use of bioinoculants based on plant growth-promoting microorganisms as a proposal for incorporation into corn crops, mainly in southern Mexico. There are many studies on the success of using these bioinoculants in various crops, with corn production doubling, as described by Sanchez Ceja et al. in 2024. However, one limitation is that small producers must know, understand, and articulate the information on how bioinoculants can change traditional agriculture to more environmentally friendly techniques (XX). To do this, it is important that they know the characteristics of their soils, including

the pH, which plays a fundamental role in the availability and movement of nutrients to the plant, using simple methods that can be efficiently incorporated into this sector. Therefore, various communities were visited and training was provided on the use, effect, and determination of pH (Figures 1 and 2) and the physical characteristics of their soils so that small producers could learn about their soils and also incorporate alternatives such as compost, regulate pH with agricultural lime, and finally use microbial bioinoculants such as plant growth promoters () (Figures 3 and 4).

Men (80%) and women (20%) participated in this workshop, which makes the transfer of knowledge and technology from universities to the field a viable strategy for disseminating and adapting proposals for improvements in the agricultural field. Microbial bioinoculants include safe microorganisms evaluated in research laboratories, including beneficial bacteria and fungi such as *Bacillus sp.*, *Trichoderma sp.* (Rojas-Badía et al. 2020, Cortés-Hernández et al. 2023), and selected yeasts to improve crop yields in tons/hectare, improve soil conditions, and reduce side effects on health, the environment, and the costs of purchasing agrochemicals. In terms of pH, 85% of the soils were found to be acidic and the rest neutral. It was shared that the use of agrochemicals acidifies agricultural soils and that to recover them, organic matter and agricultural lime must be incorporated and amendments used so that the nutrients in the soil can be utilized by plants. On the other hand, bioinoculants improve agricultural production, as they understand that they help plants fix nitrogen, solubilize phosphorus, and produce phytohormones so that plants produce more leaves, better roots, and fruits. They

are also amazed to learn that these microorganisms protect plants from certain pathogens that cause crop rot, and that they are easy to activate and apply as shown in Figure 3. All you need is a 200L container of water, plus molasses, and it's ready to apply. For each liter of this concentrate, they scale up to 20L of water again, and 5% molasses. They let it sit for 3 days until they see bubbles, then use 1 liter plus 19 liters of water in a manual sprayer and spray directly on their crops.

Conclusion

Small farmers in rural areas should continue to be trained with the aim of reducing the use of agrochemicals and migrating towards sustainable practices with the application of microbial bioinoculants, understanding the pH of their soils to mobilize nutrients in plants and, with the help of microorganisms, improving their yields and soils with great enthusiasm.



Figure 1. Small producers participating in the workshop on the use and application of bioinoculants for corn production.



Figure 2. Determination of the pH of agricultural soils belonging to small corn producers in southern Mexico using homemade methods.



Figure 3. Activation of bioinoculants for distribution among small producers

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