

Biofortification of Maize with Zinc using AMF and PGPR

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Abstract—Amongst the staple crops, maize is considered to be the third most important kharif season cereal crop in India. One of the most extensive abiotic stresses in world agriculture is low availability of Zn in alkaline sandy soil ($pH > 6.3$) and calcareous soils, particularly in India which comprises of more than 50% of the total agricultural soil. The current method for Zn fortification through application of Zn fertilizers is neither economical nor environment friendly in the long run. This study focuses on the biofortification of Zn in maize using soil microorganisms such as arbuscular mycorrhizal fungi (AMF) and nitrogen fixing bacteria. AMF's are obligate symbiont which forms mutualistic relationship with several agricultural crops including maize. AMF mycelium emerges from the root system and can acquire mineral nutrients that are inaccessible to the root as fungal hyphae are thinner than roots and can penetrate the smaller pores in soil. *Piriformospora indica* (*Serendipita indica*) and *Azotobacter chroococcum* WR5 are the two endophytic microbes that are used in the study for biofortification of maize with zinc. In the pot experiment there was a significant increase in all agro-physiological parameters and zinc concentration in root and shoot system of the inoculated plants as compared to the control. Zinc concentration in grains was found to be increased by 41%, 31% and 70% in plants treated with *P. indica*, *Azotobacter* and both in combination respectively. 52%, 32% and 58% increase in the total root length, root total surface area and number of tips respectively was found in the inoculated plants as compared to Control. This shows the altered root architecture system of the inoculated plants which may help in the better uptake of the zinc from soil.