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Effects of co-inoculation of AMF and PGPR on Wheat Root Architecture and Zinc Accumulation

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Abstract—*Wheat is a staple food for most of the global population. India ranks second in world wheat production. In the current world scenario, zinc deficiencies affect more than 3 billion people across the globe. Zinc deficiencies in the staple crops are thought to be major reason behind this mass deficiency. Biofortification of staple food, can help to improve micronutrient availability to every strata of the society. Arbuscular mycorrhiza (AM) forms symbiotic association with approx. 80% of the land plant species. The extensive extra radicle hyphal meshwork of AM explores greater volume of rhizosphere, beyond the depletion zone. Thus, AM helping plants to increase micronutrient uptake and accumulation in edible parts of plants. Piriformosporaindica (Serendipitaindica) (Sebacinales), a mycorrhizal fungal endophyte, mediates increased transport of micronutrients to its host plants. Azotobacterchroococcum* WR_5 *has been found to promote growth of P.indica. Therefore, in our study, effect of P. indica, Azotobacter and their consortium was observed on two wheat genotypes, that vary in nutrient use efficiency. Increased AM fungal root colonization was found to be positively correlated to plant physical parameters and zinc accumulation. The physical parameters displayed divergent variations among genotypes, soil types and also among the endophytes used. Initially, accumulation of zinc was found to be higher in roots as compared to shoots. Later, micronutrients were relocated and deposition was found to increase in grains by 43%, upon co-inoculation of endophytes. Endophytes helped to increase the yield as well, by about 48%. Endophytes, upon inoculation, cause changes in the root architecture of the host plant. Co-inoculation of the endophytes caused about 80%, 41%, 18% and 276% increase in total root length, total surface area, average diameter and number of tips respectively. The major changes in root architecture are supposed to be responsible for increased transport of zinc in inoculated plants.*