Growth and Yield Responses of Maize (*Zea maize*) to Inoculants of Plant Growth Promoting Rhizobacteria under Field Conditions

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Rhizobacteria with abilities to solubilize phosphate, fix atmospheric nitrogen and produce growth hormones enhance growth and yield of crops. A field experiment was conducted to assess the effectiveness of a rhizobacterial inoculant comprising three phosphate solubilizing bacteria (PSB) and a diazotroph (*Azospirillum* sp.) on growth and yield of maize under field conditions. The inoculant was added either to seeds (SI) or to compost pellets (ICP) and evaluated along with a fertilizer mixture containing urea and triple super phosphate at 2/3 and 3/4 of recommended rates, respectively and compared with recommended fertilizer (RF) and non-fertilized treatments. Nitrogen and P concentrations in leaves and available N and P in soils were analyzed and shoot height and biomass were recorded at the vegetative growth stage. Cob weights were recorded at the milky stage. Leaf N and P concentrations of SI and ICP treatments varied from 46 to 52 mg g^{-1} and from 1.6 to 1.7 mg g^{-1} dry matter, respectively and comparable to RF treatment. The same trend was observed for shoot biomass in inoculated (53-64 g) and RF (59 g) treatments. Plant dry weights correlated with leaf N concentrations ($r= 0.68$, $P<0.05$). Fresh cob weights of inoculated treatments (0.21 – 0.25 kg) were significantly higher than that of RF treatment (0.2 kg) implying that N and P were not limiting in the inoculated treatments. A positive correlation between cob weight and soil available P ($r=0.83$, $P<0.01$) and high root infection by arbuscular mycorrhizae resulting in > 78% of arbuscules implied that yield was limited by the P. Both SI and ICP effectively enhanced growth and yield of maize irrespective of fertilizer cut down and optimum soil P levels for maize should be identified.

Keywords: *Azospirillum* sp., Growth, Maize, Phosphate solubilizing bacteria, Yield

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