Co-inoculation of Arbuscular Mycorrhizae Fungi (AMF) and Phosphate Solubilizing Bacteria (PSB) to Enhance Growth and Yield of Potato (*Solanum tuberosum* L.)

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Potato is a main tuber crop grown in soils with high phosphorous (P) reserves in the up country of Sri Lanka. A field experiment was conducted to assess the effectiveness of seed inoculants of Arbuscular Mycorrhizal Fungi (AMF) and Phosphate Solubilizing Bacteria (PSB) in mobilizing of P reserves from soils in a randomized complete block design with seven treatments; no fertilizer (T1), recommended NPK fertilizers (T2), recommended N+K+½P (T3), T3+PSB (T4), T4+AMF strain 1 (T5), T4+AMF strain 2 (T6), T4+AMF strain 3 (T7) with three replicates. Plants were uprooted in 6 weeks after planting (WAP) and 9 WAP. Shoot, root and tuber weights were recorded at both sampling whereas tissue N, P and Zn concentrations and root infection of AMF were assessed at 6 WAP. Tissue P content was significantly higher in T5 (1517 g/kg) than in T2 (1190 mg/kg). Treatment with only PSB showed a significantly higher Zn accumulation in tissues (47.8 mg/kg) than in all other treatments (6.5-36.0 mg/Kg). Inoculation of AMF resulted in significantly higher root infections of hyphae (74 -79%) and arbuscules (24 - 37%) than non-inoculated treatments (15-56 % and 2-14%, respectively). Significantly higher shoot dry weights were reported in T5 (52.7g) than in T2 (33.4g) at 9 WAP. Tuber weights per plant was significantly higher in T5 (162 g) than in other (99-146 g) at 6 WAP but on par with T2 (T2=421 g; T5=423 g) at 9 WAP. Correlation analysis indicated that tuber weights depend on tissue P ($r=0.60$, $P<0.05$), tissue Zn ($r=0.66$, $P<0.01$), hyphae infection ($r=0.67$, $P<0.01$) and shoot ($r=0.67$, $P<0.01$) and root ($r=0.63$, $P<0.01$) weights. Results suggest that co-inoculation of AMF strain 1 and PSB could effectively enhance P and Zn uptake and thereby growth and yield of potato irrespective of 50% cut down of TSP.

Keywords: Arbuscular mycorrhizae fungi, Phosphate solubilizing bacteria, Phosphorous, Plant uptake, Potato

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