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Potassium Solubilizers, *Aspergillus* sp. and *Trichoderma* sp. Promote Growth in Tomato

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Abstract

Potassium (K) is the third most significant plant macronutrient that plays a crucial role in growth and development of plants. K is abundant in soil, but 90-98% of K exists as insoluble minerals and only 1-2% becomes available to the plants. Certain microbes, K solubilizing microbes (KSMs), can solubilize unavailable forms of K and making it available to plants. The objective of the current study was to evaluate the growth promotion ability of two previously (2019) isolated KSMs, *Aspergillus* sp. and *Trichoderma* sp *in-vitro* and under greenhouse conditions using feldspar as the K source. Khandeparkar's selection ratio calculated based on K solubilizing assay on Alexandrov medium showed that *Aspergillus* (1.72±0.16) has a higher and faster K solubilization ability than *Trichoderma* (1.0±0.16). Effect of KSMs was assayed in a Tomato seed germination assay carried out in Petri plates with KSMs treated and non-treated soils. Both *Aspergillus* (58%) and *Trichoderma* (72%) showed enhanced percentage germination of tomato seeds under *in vitro* conditions compared to that of controls (*Aspergillus* sp.: 24%, 14%, 22.7%, 51.3%, 39.3%, *Trichoderma* sp.: 22%, 12%, 13%, 59%, 51%) which was statistically significant (*Aspergillus*, P=0.026; *Trichoderma,* P=0.003) at 0.05 confidence level. Seedling length (P=0.102, P=0.028) and root length (P=0.453, P=0.002) of tomato were enhanced when raised in non-autoclaved natural soil than autoclaved natural soil inoculated with *Aspergillus* and *Trichoderma* respectively. The greenhouse experiment was carried out with same experimental set up as an *in vitro* assay. No significant difference was observed in shoot length, number of leaves and length of leaves of tomato plants planted in soil treated with *Aspergillus* (P=0.093, P=0.906, P=0.260) and *Trichoderma* (P=0.334, P=0.239, P=0.243) respectively in comparison to controls during the vegetative stage (2 months after sawing). However, flowering was started four days early in plants planted in non-autoclaved soil treated with *Aspergillus* sp. suggesting that the impact of *Aspergillus* sp. starts to become visible in the reproductive stage. The results suggest that K solubilizing ability of *Aspergillus* sp. and *Trichoderma* sp. seem to show a positive effect on germination ability of tomato, however, only *Aspergillus* sp. seems to have a positive effect on the later stages of plant growth where K is mainly needed for flower and fruit development. Therefore, *Aspergillus* sp. can be a potential candidate to be used in up scaling the natural K fertilizers such as feldspar after intensive future experimentation.

Keywords: Plant Growth Promoting Microbes (PGPMs), Growth promotion, K deficiency