Effect of *Trichoderma Harzianum* and Arbuscular Mycorrhizal Fungi on Growth of Tea Cuttings, Napier Grass and Disease Management in Tomato Seedlings

Mwangi Margaret Wanjiru

**Department:** *Plant and Microbial Sciences*

**Supervisors:**
- Dr. Ethel O. Monda
- Dr. Sheila Okoth
- Dr. Joyce M. Jefwa

A greenhouse study was conducted to investigate the ability of an isolate of *Trichoderma harzianum* (P52) and Arbuscular mycorrhizal fungi (AMF) in enhancing growth in tea cuttings, tomato seedlings and napier grass cuttings. *Trichoderma harzianum* is a saprophytic fungus that enhances plant growth through solubilization of nutrients and is antagonistic to many soil pathogens. Arbuscular mycorrhizal fungi forms symbiotic associations with plant roots promoting phosphorous absorption and also protect plants against pathogens. The effect of these two fungi were compared to Diammonium phosphate (DAP) fertilizer and uninoculated control. The interactions of these three; P52, AMF and DAP was also investigated. The effect of the two fungi in controlling vascular wilt caused by *Fusarium oxysporum* f. sp. *lycopersici* in tomato was also investigated. The test plants were grown in plastic pots filled with sterilized soils in the green house. A completely randomized design was used and growth measurements were taken on heights, shoot and root dry weights. It was observed that isolate P52 and DAP fertilizer individually enhanced growth in Napier, tea and tomatoes. It was further observed that combination of isolate P52 and DAP had a significant (P=0.05) cumulative growth effect on experimental plants. In tea and Napier, treatment with a combination of P52 + AMF + DAP also had a significant (P=0.05) growth effect, but this could have been mainly due to isolate P52 and DAP fertilizer and not AMF since, individually it had no effect on growth. Arbuscular mycorrhizal fungi (AMF) enhanced growth in tomatoes unlike in tea and Napier. Treatments that significantly (P=0.05) enhanced growth were AMF + DAP, P52 + DAP, P52 + AMF + DAP. Diammonium phosphate significantly (P=0.05) enhanced growth but only in the shoot dry weight. Isolate P52 may have enhanced growth by solubilization of minerals in the soil making them available for plant growth and production of plant growth hormones. Diammonium phosphate fertilizer may have enhanced growth through proliferation of the root
system, promoting enhanced uptake of water and mineral elements. Arbuscular mycorrhizal (AMF) could have enhanced growth through uptake of phosphorous and mineral salts. Disease severity was generally lower in tomato plants grown with isolate P52 and AMF fungi either individually or when combined together, though the effect was not statistically significant (P=0.05). A treatment combination of P52 + AMF had less trend of severity as compared to each individual fungus. The results indicate that combination of AMF fungi with *T. harzianum* isolate P52 will bring about improved disease control. *Trichoderma harzianum* and AMF can also be used as biofertilizers to reduce on chemical inputs in the perspective of sustainable agriculture and conservation of natural resources. *Trichoderma harzianum* is an aggressive colonizer and once introduced in the nursery can persist during the life time of a plant.