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Mobilizing natural enemies for sustainable plant pests and diseases management

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Abstract

Smallholder farmers contribute approx. 70% of food supply in Africa. They produce for their subsistence use and sell the surplus in the local market. These farmers make a substantial contribution to sustainable food security in the global south. Their capacity to upscale production is however constrained by shrinking land sizes, high cost of agricultural inputs, impact of climate change as well as damage by pest and disease. Majority of smallholder farmers rely on cultural techniques to keep pests and diseases below economic threshold level. However, persistent use of agricultural chemicals predispose them to risks associated with mishandling and misuse of pesticides. Besides, consumers are exposed to adverse effects of pesticides due to chemical residue in food. To boost food production, there is need for ecologically sustainable pest control methods to minimise agri-pollution, boost productivity and promote biodiversity in Africa. Such methods include use of natural enemies (biocontrol agents) for pests and diseases management. We carried out a survey for potential fungal microbes that parasitize and destroy plant nematode eggs for use as biocontrol agent against potato cyst nematodes (PCN) *Globodera rostochiensis* and *G. pallida* in Kenya. Soil samples were collected from smallholder farms in six leading potato-producing counties of Kenya. The samples were processed in the laboratory and PCN cysts extracted using floatation techniques in Fenwick can. Extracted cysts and eggs were visually examined for fungal infestation. Those showing symptoms of fungal infestation were selected, culture on PDA media and incubated at room temperature, fungal growth were monitored for several days. Fungal colonies were sub-cultured to generate pure culture for further analysis. Ninety-five percent of the soil samples tested positive for PCN infestation. However, the prevalence of PCN in the six counties differed significantly ($p < 0.05$). Fifteen fungal isolates were found associating with PCN cysts and eggs. Characterisation of these fungal isolates is under way. The efficacy of these isolates is being tested *in vitro* and *in vivo* before being processed for use as biocontrol agent against PCN. If successful, the natural enemy will significantly contribute in reduction on use of synthetic chemicals in nematode management besides boosting potato production.

Keywords: Biocontrol, *Globodera* spp., nematophagous fungi