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"Development on the margin"

A Molecular Detection Tool for the Biocontrol Agent *Fusarium oxysporum* F.sp. *strigae*, a Putative Mycoherbicide for *Striga hermonthica*, in Soil

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Abstract

The parasitic weed *Striga hermonthica* is one of the major constraints to cereal production in Sub-Saharan Africa affecting the livelihood of about 100 million people. *S. hermonthica* significantly affects crop yield of maize, and sorghum, sometimes leading to 100 % crop loss in the field. Biocontrol agents (BCA) of *S. hermonthica* such as the putative, soil-borne mycoherbicide, *Fusarium oxysporum* f.sp. *strigae* (acronym: Foxy 2) have been shown to effectively control *S. hermonthica*. For its application in the field, it is necessary to assess persistence and survival of Foxy 2 in the soil to evaluate if the target BCA is still useful in the preceding growing season and if it potentially induces undesired negative side-effects on the natural, sorghum-associated soil microbial community. As a prerequisite for this required field evaluation, a reliable detection tool needs to be developed to monitor the fate of Foxy 2 in the field. Cultivation-independent, nucleic acid-based molecular methods such as quantitative polymerase chain reaction (qPCR) may be appropriate as this technique has been proven as superior in detecting and monitoring microbes in soils as compared to other conventional, cultivation-dependent procedures such as estimating colony forming units (cfu). In the presented study, a laboratory experiment was performed in which two contrasting tropical soils were inoculated with 4.56×106 microconidia per gram fresh soil and incubated at 28°C for 16 weeks. To assay a potential competitive effect of the natural soil microbial community, one proportion of each soil was sterilized. At defined time intervals, soil samples were obtained from which DNA for qPCR as well as cfu were isolated to determine the fate of Foxy 2 in the soils. Our results showed that Foxy 2 was able to survive and propagate over time in the soils; however, abundance of Foxy 2 was clearly reduced in the unsterilized soils showing a potential competition effect of natural microorganisms. In conclusion, the used molecular detection tool was suited to study, complementary to cultivation-dependent cfu counting, the fate of Foxy 2 under controlled conditions, but may further tested in the presence of sorghum and *S. hermonthica* under natural field conditions.

Keywords: Biological control agents, *Fusarium oxysporum* f.sp. *strigae*, *Striga hermonthica*

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