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Action of the Mycoherbicide *Fusarium oxysporum* F. sp. Strigae ‘foxy 2’ on *Striga hermonthica*: An Anatomical Study

NDAMBI BENINWECK ENDAH¹, HELLER ANNEROSE², ABULEGASIM ELZEIN¹, GEORG CADISCH¹,
MICHIEL DE MOL²

¹University of Hohenheim, Institute of of Plant Production and Agroecology in the Tropics and Subtropics,
Germany

²University of Hohenheim, Institute of Botany, Germany

Abstract

Proper delivery and timely establishment of the potential biocontrol agent *Fusarium oxysporum* f. sp. strigae “Foxy 2” in the appropriate infection zone of the root parasite *Striga hermonthica* is necessary for ensuring a high biocontrol efficacy and facilitating field application and integration. In this study, anatomical investigations using light microscopy were performed to assess the pattern and extent of infection and colonisation of *Striga* by Foxy 2. When applied as seed coat, Foxy 2 was able to proliferate on coated seeds and the fungal mycelia started slowly colonizing the roots of sorghum, the potential infection zone of *Striga* without damaging sorghum plants. Observations of the sorghum roots-*Striga* seedlings interface showed that *Striga* was able to penetrate and start to invade the central cylinder of its host sorghum to obtain access to water and nutrients, but further development was stopped by Foxy 2. Hyphae of Foxy 2 invaded all tissues of the young *Striga* seedling (including the endophyte, the entire hyaline tissue and xylem elements), 21 days after sowing the Foxy 2 coated sorghum seeds. Hyphae were able to completely destroy *Striga* seedlings 26 days after sowing. This proved the ability and aggressiveness of Foxy 2 against *Striga* and additionally prevented some *Striga* emergence. For emerged *Striga* plants (above ground), both longitudinal and cross sections showed a lot of hyphae masses in the xylem. Hyphae had penetrated, proliferated and colonised vessels forming masses over long distances and were identified even to the top of the shoots. Some vessels were blocked such that no space larger than 1µm could be seen between the hyphae in cross sections. This caused clogging of shoots by hyphae and contributed to wilting and subsequent death of *Striga*. The prevention of *Striga* emergence reduces its further seed production and seed bank build up that may lead to improvements in crop yield in subsequent years. These findings support the suitability and appropriateness of seed treatment for the delivery and field application of the mycoherbicide.

Keywords: Anatomical studies, biocontrol, delivery system, *Fusarium oxysporum*, light microscopy, seed treatment, sorghum root colonisation, *Striga hermonthica*