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Interactions between the Mycoherbicide *Fusarium oxysporum* F. sp. *strigae* and Sorghum Roots

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Abstract

The potential mycoherbicide, *Fusarium oxysporum* F.sp. *strigae* (Foxy 2), expressed high efficacy in controlling the root-parasitic weed *Striga hermonthica* in pot experiments. Preliminary microscopic investigations of *Striga*-free sorghum roots showed that hyphae of Foxy 2 digested root cortical cells but could not cross the endodermal barrier into the central cylinder. However, sorghum roots infected by *Striga* revealed hyphae of Foxy 2 within *Striga* haustoria growing into the central cylinder of sorghum. We performed light and transmission electron microscopic studies to understand this tissue specific reaction. The endodermal barrier of roots was overcome by wounding and were inoculated to observe for possible colonisation. Light Microscopy showed that hyphae had invaded the central cylinder close to the wound but were not found a few centimetres from the wound indicating that they could not grow within the central cylinder. Sorghum therefore manifested a tissue specific reaction (incompartibility) against Foxy 2 within the central cylinder. Furthermore, the action of Foxy 2 in sorghum was compared with a pathogenic strain *F. proliferatum* using the seed coating delivery system. Coated seeds were grown on filter paper and semithin sections of roots showed that both Foxy 2 and *F. proliferatum* colonised and digested the cortical cells but Foxy 2 was slower. *F. proliferatum* invaded and destroyed the cells of the central cylinder three weeks after sowing while the hyphae of Foxy 2 where blocked at the endodermis. Transmission electron microscopic studies revealed that sorghum reacted to the presence of both strains by manifesting osmiophilic material and distorted cytoplasm in cortical cells which was not observed in the control roots. Protein analysis was used to evaluate the possible production of PR (pathogenesis related) proteins by sorghum infected with Foxy 2. Proteins were extracted and analysed for differences in the protein expression pattern of infected and non-infected roots. Results to date suggested that Foxy 2 probably did not cause the production of such potential PR-proteins. However, further investigations are needed to clarify these host-mycoherbicide interactions and to assess potential risks in the application of such biological control mechanisms.

Keywords: Biocontrol, *Fusarium oxysporum*, mycoherbicide, PR proteins, sorghum, *Striga hermonthica*

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