

Development of a fungal based-product for the control of Western flower thrips

***Frankliniella occidentalis* (Pergande)**

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ABSTRACT

The Western flower thrips *Frankliniella occidentalis* is an important economical pest of crops throughout the world. Entomopathogenic fungi are the most promising alternative to chemical pesticides. However, larval stages of *F. occidentalis* are often considered to be refractory to fungal infection as compared to the adults; hence, screening of 10 isolates of *Metarhizium anisopliae* (Metschnikoff) Sorokin and 8 of *Beauveria bassiana* (Balsamo) Vuillemin showed that *M. anisopliae* isolates ICIPE 7, ICIPE 20, ICIPE 69 and ICIPE 665 had the shortest LT₅₀ value. In dose-response mortality, ICIPE 69, ICIPE 7 and ICIPE 20 had the lowest LC₅₀ values. ICIPE 69 produced significantly more conidia than the other two isolates on WFT larvae. ITS sequence comparison indicated the presence of a restriction site SfoI on ICIPE69, which could be due to the difference in geographical origin. These results coupled with previous studies on its virulence and field efficacy to other thrips species make *M. anisopliae* isolate ICIPE 69 a suitable candidate for development as fungal biopesticide for thrips management.

Chitinase genes are crucial for fungal activity; however their use the genotyping and characterizing virulence of ICIPE *M. anisopliae* isolates which have shown difference in virulence on various arthropod pests suggests that chitinase genes might not be appropriate, there is need to target other functions such as conidiation.

Metarhizium anisopliae isolate ICIPE 69, is compatible with abamectin and imidacloprid were highly compatible with *M. anisopliae*; thiamethoxam was compatible, whereas Neem and L-cyhalothrin, spiromesifen, carbendazim, probineb, copper-hydroxide were toxic to the fungus. The association of *M. anisopliae* ICIPE 69 with imidacloprid or thiamethoxam did not affect its virulence. Results of this study suggest their integration in IPM strategy in pest control.

The intra and inter specific effects of host-plant; French bean, *Phaseolus vulgaris* L. var. *Alexandria*, *Julia* and *Samantha* and Snow pea *Pisum sativum* L. on the virulence of *M. anisopliae* on *F. occidentalis* was assessed. There were significant differences in mortality between host-plants. The comparison of LT₅₀ values showed that thrips were more susceptible when reared on *Alexandria*. Results suggest that intra-specific and inter-specific host-plant effects need to be taken into consideration when developing a biopesticide.

In autoinoculation experiment, thrips acquired more conidia in the fungus-treated semiochemical-baited device than in the device without semiochemical. The overall thrips mortality was also higher in the fungus-treated semiochemical-baited device as compared to the device without the semiochemical. However, conidial viability was considerably reduced in the device with semiochemical. Thrips density per plant was significantly reduced in both treatments as compared to the control. These results demonstrate the prospects of autoinoculation device strategy for dissemination of *M. anisopliae* in the control of thrips, particularly in screenhouses.

The study of the effect of sublethal doses of *M. anisopliae* on tospovirus acquisition and transmission by thrips showed that: although there was no significant effect of *M. anisopliae* infection on tospovirus titer in adult thrips, virus transmission was significantly reduced by fungal infection and this is probably due to reduction in feeding punctures. Application of *M. anisopliae* even at sublethal can contribute in the reduction of tospovirus transmission.