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“Bridging the gap between increasing knowledge and decreasing resources”

Combination of Soil-Applied Azadirachtin with Entomopathogens for Integrated Management of Western Flower Thrips, *Frankliniella occidentalis*

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Abstract

Biological control has received more attention due to increasing concern about overuse of pesticides in controlling Western Flower thrips (WFT). However there is no satisfactory and reliable single biological control technique that can efficiently control WFT, particularly on high value crops because of their low damage threshold levels. Therefore including low-risk pesticides with selective application seems to offer a sustainable control strategy. This study aims to develop an integrated system for control of Western Flower thrips (WFT) *Frankliniella occidentalis*. We tested the potential of biocontrol agents such as soil applications of Entomopathogenic Nematodes *Steinernema carpocapsae* Nemastar® (E-Nema GmbH, Germany), isolates of *Metarhizium anisopliae* (IPP 2539 & ICIPE-69) and *Beauveria bassiana* (Naturalis® - BioGard, Italy) and two Neem formulations, Neem Azal-T (1 % Azadirachtin A) and Neem pellets (7 % Azadirachtin in inert carrier material) (Trifolio-M GmbH, Germany) alone and in combinations. All possible single and combined treatments were analysed for inducing acute mortality and we checked surviving individuals for retarded development of mycosis as possible cause of secondary mortality. In addition interactive effects amongst different combination treatments were also analysed using a general linear model (GLM). The bioassay results of the single treatments indicated between 40 % to 60 % control with NeemAzal-T solution proving to be the most efficient one. However all the cadavers with EPF treatments showed development of mycosis. Therefore the total mortality attributed to the Entomopathogenic fungi amounted > 87 %. Combinations of treatments with Steinernema, NeemAzal-T and Metarhizium (ICIPE) further improved fast control effects and resulted in total mortalities between 95–97 % when late mortality by mycosis was considered too. Out of 7 treatment combinations between *S. carpocapsae*, *M. anisopliae* ICIPE-69 and both Neem Azal-T and Neem pellets, 2 gave synergistic response, 4 additive and one antagonistic response. The combined use of Neem Azal-T with the entomopathogens may be the most promising to increase the efficacy and reliability of biocontrolling WFT.

Keywords: Azadirachtin, soil application, western flower thrips