

Integrating chemical control with sterile insect releases in an integrated pest management programme for *Thaumatotibia leucotreta*

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Abstract

False codling moth *Thaumatotibia leucotreta* (Meyrick) (Lepidoptera: Tortricidae) is an important indigenous pest of citrus in southern Africa. Successful control is dependent upon integration of area-wide sterile insect releases and other suppression methods. The aim of this work was to test pyrethroid and organophosphate-based insecticides (tau-fluvalinate and chlorpyrifos) for their residual effect on mortality of released irradiated *T. leucotreta* male moths. Both of these insecticides were effective in killing irradiated *T. leucotreta* for 7 days after application on leaves, after which degradation of the active ingredient resulted in a marked reduction in efficacy after 14 days and rendering them harmless. Mortality was found to be similar for irradiated and non-irradiated male *T. leucotreta* after treatment. Consequently, even though these insecticides might have an effect on moths in the field, ratios of sterile:wild moths should not be altered. Supporting field data from six sites in the Sundays River Valley over a season of sterile insect releases showed the conventional chemical crop protection programme to be as effective as an integrated pest management programme in facilitating effective control of *T. leucotreta* through sterile insect releases. The study also confirmed that the ratios of sterile:wild male moths in the commercial citrus orchards were not affected by the application of insecticides. These findings confirm the high potential of sterile insect releases for control of *T. leucotreta* in citrus.

KEYWORDS

area-wide pest management, citrus, pesticide effects, population suppression, South Africa

1 | INTRODUCTION

A large number of insect and mite pests are associated with citrus in South Africa (Bedford, 1998; Grout & Moore, 2015; Smith & Pena, 2002). A significant number of species cause direct damage resulting in significant economic losses in production and export trade. Such pests may be controlled using a wide range of insecticides with varying levels of efficacy. In areas where a sterile insect release programme has been implemented, the impact of a conventional pest management approach on released sterile insects, albeit targeted against other pests in the system, needs to be determined. A sterile insect

technique (SIT) programme for suppression of *Thaumatotibia leucotreta* on citrus in South Africa was commercialized in 2008 in the Western Cape Province (Hofmeyr et al., 2015). In 2011, the application area expanded to the Sundays River Valley and in 2014 to the Gamtoos River Valley, both in the Eastern Cape Province. Twice-weekly aerial releases of sterile moths resulted in considerable reduction in populations of wild *T. leucotreta* and related fruit infestation over time (Barnes, Hofmeyr, Groenewald, Conlong, & Wohlfarter, 2015). In an SIT programme on citrus grown in Spain, pesticides tested for their effect on the Vienna-8 strain sterile male Mediterranean fruit fly (medfly), *Ceratitis capitata* (Diptera: Tephritidae) (Wiedemann), proved harmless