SHORT, NON-REFEREED PAPER

SUGARCANE THRIPS, *FULMEKIOLA SERRATA* (THYSANOPTERA: THRIPIDAE) DISPERSAL STUDIES

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Abstract

Fulmekiola serrata Kobus (Thysanoptera: Thripidae) (thrips) is a major pest in the South African sugarcane industry. Currently leaf spindles are sampled to survey for the pest to determine abundance and distribution. However, processing the samples is time consuming and labour intensive. Moreover no information is obtained about the aerial populations of winged adults dispersing within the sugarcane crops and surrounds. Sticky impact traps may provide an alternative. Preliminary field trials were conducted in the Umfolozi mill region. The ratio of adult to nymph present in leaf spindles and absolute catches of adults on traps were inversely correlated. Significantly more *F. serrata* were trapped above the sugarcane canopy compared with below. No colour preference was shown for traps sited above canopy, whereas below canopy significantly more *F. serrata* were trapped on the clear than the blue traps. These results provide knowledge about the dispersal behaviour of *F. serrata* and will help in the setting up of future plans of action.

Keywords: Fulmekiola serrata, sugarcane, card trapping, colour preference, dispersal

Introduction

In 2004, sugarcane thrips, *Fulmekiola serrata* Kobus (Thysanoptera: Thripidae) was discovered in the South African sugarcane industry at Umfolozi in KwaZulu-Natal (Way *et al*., 2006). It causes significant yield decline (Way *et al*., 2010) and within one season, the pest had spread throughout the geographical range of the industry (Way, 2006). Therefore, population of this pest is likely to quickly move between fields, decreasing the efficiency of eradication if no commune and coordinate action is taken. Different conclusions were drawn about their mode of dispersion depending on the thrips species and the optimum trap colour to employ in the field (Lewis, 1997, Teulon *et al.*, 1999). Since there is a paucity of such information about *F. serrata* this preliminary study was conducted to investigate two aspects: first the relation between *F. serrata* populations in the leaf spindles and the trap catch, and second the effectiveness of blue and clear sticky impact traps placed at different heights in sugarcane fields.

Method

Two parallel trials were carried out in different fields of N41 and N25 (28°27'S; 32°12'E and 28°28'S; 32°10'E) in the Umfolozi mill area in KwaZulu-Natal. The irrigated sugarcane was three months old at commencement of the trials. Randomised trial designs tested height and colour preference simultaneously. Blue and clear plastic sticky cards (12.5x7.5 cm) were set below the canopy (25 cm above ground) and above the canopy (from 50 to 120 cm, changing as the crop grew). These unidirectional cards were orientated at right angles to the cane row. Each station of four traps (two blue and two clear) was replicated four times 10m apart along three transects in each field. Weekly catch was determined under the microscope. Trials were repeated on five separate occasions from November 2010 and February 2011. For each trial period 20 leaf spindles were sampled for *F. serrata* taken adjacent to each transect using the method described by Way (2006). The proportion of adults in the thrips population recovered in the 20 leaf spindles was calculated as a percentage with the formula (adults / adults + nymphs) x 100.

Results

Totals of 128 and 321 individuals were trapped in fields planted with N25 and N41 respectively, giving a mean count of 0.82 *F. serrata* per trap. In the leaf spindles (100 of N25 and N41 each) a total of 237 nymphs and 459 adults, and 565 and 929 were recovered, respectively. There was an inverse correlation (R^2=0.642, p<0.005) between the percentage of adults in the leaf spindles and the absolute catch of adults on the traps (Figure 1).

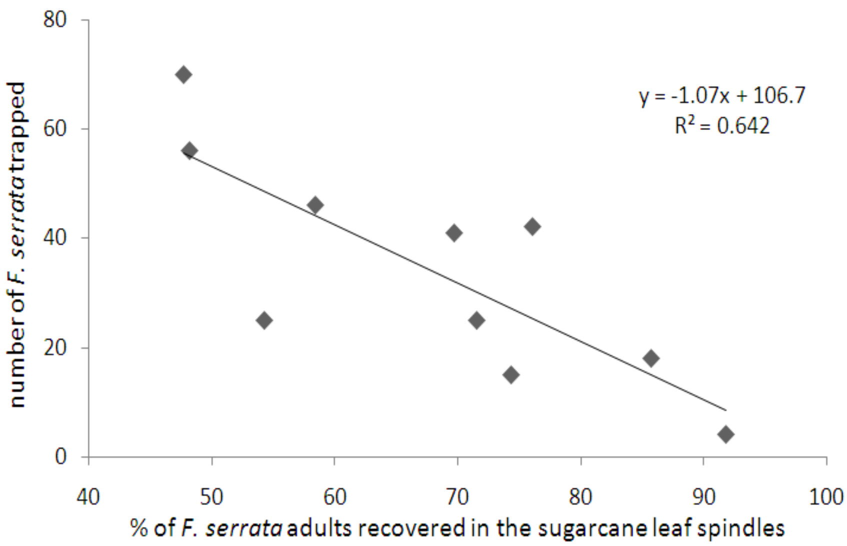

Figure 1. Correlation between the percentages of adult *F. serrata* recovered in the sugarcane leaf spindles and the number of *F. serrata* adults trapped on sticky traps in the Umfolozi mill region of KwaZulu-Natal. Each dot represents the mean percentage of adults found in 20 leaf spindles correlated to the total capture on 48 traps.

During all the experiments there was a bias towards males trapped (62%), but numbers were not significantly higher compared with females (Wilcoxon test, V=6.5, p=0.066). Figure 2 shows that significantly more *F. serrata* were trapped (76.3%) above the sugarcane canopy compared with below (Wilcoxon test, V=3, p<0.05). No colour preference was shown for traps sited above canopy (49.0% trapped on blue traps; Wilcoxon test, V=22.5, p=1). However, below canopy significantly fewer *F. serrata* were trapped (31.9%) on blue compared with clear traps (Wilcoxon test, V=3.5, p<0.05).

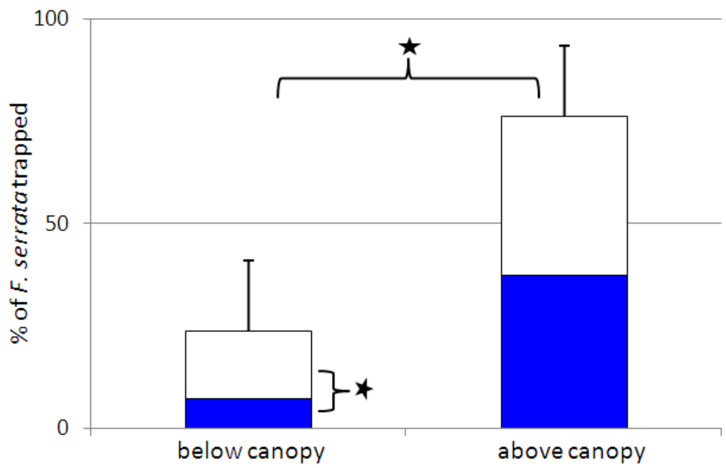

Figure 2. Percentage of *F. serrata* captured on blue or clear sticky traps placed above and below the canopy of sugarcane at Umfolozi in KwaZulu-Natal. Error bars represent the Standard Error of capture (n=10). Stars represent statistically different means determined by Wilcoxon test (p<0.05).

Discussion

The leaf spindle sampling method is routinely employed to monitor *F. serrata* in sugarcane in South Africa. These were the first exploratory trials using sticky card impact traps. The trap method provided temporal and spatial distribution data. Such knowledge is required to understand the biology of the insect in relation to the crop cycle (phenology) which is used to determine the mode of infestation into adjacent crops on an area-wide scale.

During periods when proportionally more adults are present in the leaf spindles, compared with nymphs, fewer adults are trapped, meaning the aerial populations of winged adults dispersing is lower.

Air velocity above the canopy was higher than below canopy (data not shown). Given that more *F. serrata* were trapped on traps above canopy it suggests that the mode of dispersal is passive, i.e. the insect is blown by the prevailing wind. In contrast, the insect appeared to be able to actively fly below the canopy, as was observed in their preference for the clear traps. This result concurs in some cases within dispersion of other thrips spp. (Lewis, 1997; Pearsall and Myers, 2001; Arévalo and Liburd, 2007). However, invasion into fields was found to be active in some thrips spp. (Lewis 1997; Teulon *et al.* 1999; Pearsall and Myers

2001). Within sugarcane it will be interesting to understand the cues to which *F. serrata* is responding. Behavioural and biological information can ultimately be incorporated into developing efficient control tactics.

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