Determining the favorable sampling time for *Frankliniella intonsa* on cotton

Ekrem Atakan and A. Faruk Özgür
University of Cukurova, Faculty of Agriculture, Department of Plant Protection, 01330-Adana, Turkey.
E-mail: eatakan@mail.cu.edu.tr

Abstract: The favorable sampling time for *Frankliniella intonsa* (Trybom) in cotton field was determined by using yellow sticky traps and collecting 15 white and red flowers at hourly intervals in mid-August in Cukurova region of Turkey. There was no thrips flight activity during the night. Numbers of total thrips caught on traps were more abundant between hours 05:30-8:30 and then slightly decreased during pre-mid day (hours 08:30-11:30) and mid-day (hours 11:30-14:30). Flights of female thrips were similar to that of total thrips. Population densities of males remained at similar levels during hours 05:30-14:30 and then significantly decreased during evening hours. Population densities of total thrips on white flowers were very low at hour 05:30. No significant difference in the number of thrips was observed among the hours 11:30-17:30. Population levels of female thrips increased after hour 05:30 and remained at similar level, whereas the population of males slightly increased during the hours 08:30-14:30. The population of thrips was more abundant on red flowers at early morning hour 05:30, however, decreased until 11:30. Population density of larvae in white flowers regularly increased during hours 05:30-17:30.

Introduction

Flower thrips, *Frankliniella intonsa*, is causing the shedding and scarring of young bolls and leaves when critical population densities occur in cotton at flowering period. Thrips damage was particularly important in late-planted cotton fields in Eastern Mediterranean region of Turkey (Cukurova region) (Atakan, 1998).

Although insecticides have been widely used to suppress *F. intonsa* populations on cotton, they are not capable in keeping the population of *F. intonsa* at low level.

A problem in management of *F. intonsa* is that the favorable sampling and insecticide application times for *F. intonsa* have been not yet established in cotton fields in Cukurova region. Cotton growers monitor the population of thrips in white flowers (newly opened flowers) in early morning. Because of the not well-known dispersion times of *F. intonsa* from red flowers (flower pollinated one day before) to white flowers in cotton fields of Cukurova, there may be still a considerable amount of thrips inside of the red flowers during the monitoring of thrips or insecticide applications.

Thrips in red flowers are not directly exposed to insecticides and they start to build up population at short period after insecticide applications. Therefore cotton growers have used insecticides in short intervals (3-5 day interval) and in high doses.

In this study we aimed to determine favorable sampling and insecticides application times for *F. intonsa* on cotton, studying the diurnal flight activity of thrips on yellow sticky traps and population densities of thrips in flowers at different sampling time intervals during the day.

Material and methods

We conducted the field studies at Haciali in Adana province (Cukurova region) in 1996. To determine the diurnal daily flight activity of *F. intonsa,* three yellow sticky traps sized 03x15x20 cm were adjusted at 2 m height. Two plates were positioned in west – east direction, the other two faced to south–north. Plates were replaced with new ones at each sampling hours (05:30, 08:30, 11:30, 14:30, 17:30 and 20:30) and thrips were recorded under stereomicroscope in laboratory.

Flowers were sampled at hours 05:30, 08: 30, 11:30, 14:30, and 17:30. The sampling of red flowers were terminated after hour 11:30, because the red flowers turned to young green bolls. 10 white and 10 red flowers (one upper flower from each plant) were taken randomly at every sampling time and individually placed into plastic boxes within an ice-chest. Back in the laboratory, flowers were stored in a deep-freezer for one or two hours to inactivate the thrips. Thrips were counted under stereomicroscope.

Experiments were replicated four times in the same cotton field in mid-August.

Results and discussion

F. intonsa were more active during the day than at night (Fig. 1.). The higher numbers of total thrips were caught on traps hours 05:30-08:30. Numbers of trapped thrips were low in pre-mid day (hours 08.30-11:30) and mid day (hours 11:30-14:30) then slightly increased at evening hours, 17:30-20:30

The flight activity pattern of females was similar to that of total thrips. Males were caught in similar numbers between hours 08:30-14:30. Population density of males was significantly decreased after hour 14: 30, whereas population of females increased.

A few total thrips were found in white flowers at early morning hour 05:30 (Fig. 2). Numbers of thrips in white flowers were increased after hour 08:30. Although population of thrips slightly increased there was no found significant differences in population densities of thrips among the hours 11:30-17:30 ($P<0.05$).

A few females were encountered in flowers at hour 05:30. Numbers of females were increased and very similar after hour 5: 30. Males were not found in flowers at hour 05:30. Numbers of male thrips was highest at hour 14:30 and then declined to low level.

Mean number of larvae in white flowers was low at hour 05:30 then regularly increased. Larvae peaked (64.4 larvae / flower) at hour 17:30.

Numbers of total thrips in red flowers were more abundant (138.8 thrips/ flower) at hour 05: 30 on the contrary of white flowers. Number of thrips was lower at hour 11:30. Dispersing of thrips to white flowers may have a role in regularly decreasing of thrips populations in red flowers.

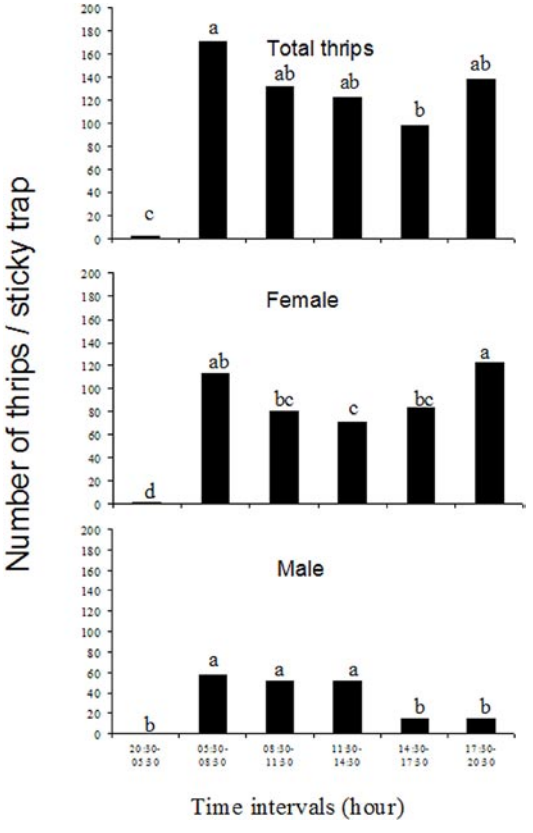

Fig 1. Daily flight activity of *Frankliniella intonsa* in cotton field. Bars with same letter indicate that means are not significantly different (LSD: $P<0.05$).

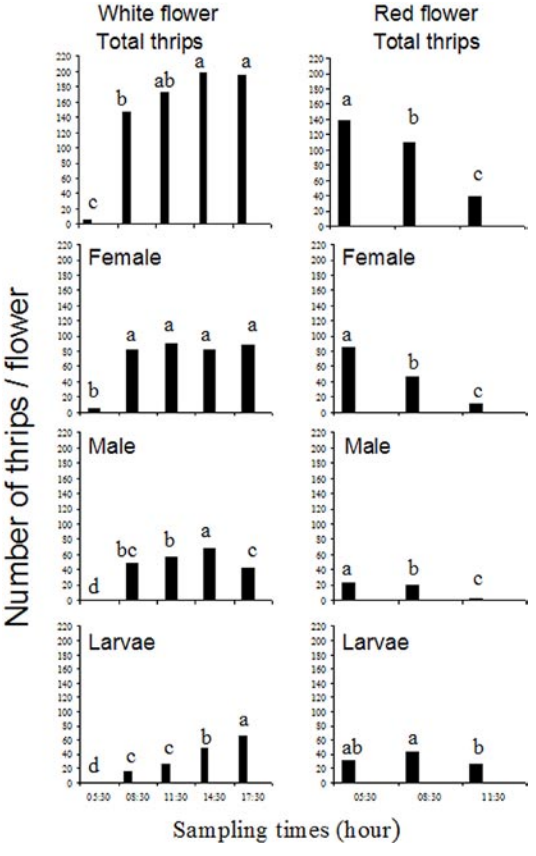

Fig 2. Population density of *Frankliniella intonsa* in white and red flowers at different sampling hours. Bars with same letter indicate that means are not significantly different (LSD: $P<0.05$).

Numbers of larvae in red flowers were higher at hour 08:30 and then declined but remaining number of larvae in red flowers were higher compared to those of females and males.

We did not study how climatic conditions mainly temperature and relative humidity affect the activity of flower thrips on cotton. Daily flight activity on sticky traps and interplant dispersion of thrips showed that thrips were not more active during the warm temperatures in cotton field. Mass flights of thrips occurred in early morning when white flowers were fully opened. Interplant flights and migration of thrips from surrounding vegetation to cotton may have played a role in recording higher numbers of adult thrips on traps in early morning. We observed that sudden decrease of temperature and cloudy weather conditions hampered the activity of thrips in cotton fields during the late summer in Cukurova. Watts (1936) stated that greatest activity of *Frankliniella tritici* (Fitch) occurred in cotton field between 10:00 and 16:30 h, after which lower temperatures and higher humidity diminished thrips activity. Similarly, *Frankliniella occidentalis* (Pergande) did not exhibit any dispersion trends on onion plants during the early morning and night hours, which corresponded with the lowest temperature and highest humidity (up to 78%) of the day (Sites et al. 1992). Although movement of adult thrips between red and white flowers was reduced in mid day an afternoon hours, dispersing of larvae to white flowers regularly increased during the day. In addition to migration of larvae from red flowers, larvae moved from fresh leaves and bolls to feed on pollen and nectar of white flowers. This dispersion of larvae may have contributed to the increasing population level of larvae in white flowers. Some reports stated that pollen and nectar are important food sources for development and eggs productivity of thrips (Trichilo and Leigh, 1998; Murai, 1988; Teulon and Penman, 1991).

In conclusion, population of thrips in white flowers can be sampled after hour 08:30 and spraying of fields for thrips can be done between hours 08:30-11-30, at a time when thrips are more active and white flowers are fully opened. Some circumstance for example sudden decreases in temperature or cloudy weather, movement of thrips to white flowers may be reduced. Under these circumstances or if flowers will be sampled in early morning (before hour 08:00), it is useful to monitor the population of thrips in red flowers.

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