

**CHILLI THRIPS, *SCIRTOTHRIPS DORSALIS*: A POTENTIAL THREAT TO COTTON PRODUCTION
IN THE USA****V. Kumar****D. R. Seal****G. Kakkar****TREC-IFAS/UFL****Homestead, FL****C. L. McKenzie****USDA-ARS****Fort Pierce, FL****L. S. Osborne****MREC-IFAS/UFL****Apopka, FL****Abstract**

Several greenhouse studies including host preference, age specific abundance, within plant distribution and seasonal abundance of a newly introduced thrips pest, *Scirtothrips dorsalis* Hood, were conducted to evaluate its pest status on cotton. Cotton was found to be the most preferred host among the three hosts (cotton, pepper, and peanut) evaluated. Highest abundance of *S. dorsalis* was reported on 1-5 week old cotton plants with a maximum damage rating of 3.8 out of 5. Study on within plant distribution suggested abundance of *S. dorsalis* was significantly higher on top young leaves of cotton compared to middle and basal leaves. Significantly higher abundance of *S. dorsalis* larvae and adults were reported in the months of July and August than other times of the year. Our results suggest that this pest could pose as a threat to cotton production in the United States.

Introduction

Chilli thrips, *Scirtothrips dorsalis* Hood, has been a serious problem across the globe. It is an economic pest of various vegetable, cotton, citrus, other fruits and ornamental crops in its principal range of southern and eastern Asia, Africa, and Oceania. Detection of *S. dorsalis* larvae and adults on host plants are difficult due to their thigmotactic behavior and tiny stature (< 2mm in length). Eggs are deposited within plant tissues and may take a week for larval emergence (Seal et al. 2010). Consequently, chances of transportation of *S. dorsalis* all life stages through state, regional and international trade of plant materials are high. Within five years of its introduction into the United States, *S. dorsalis* has become established in 30 Florida counties, 8 counties in Texas with several positive reports of interception in New York, Alabama, Georgia, Louisiana and California (Kumar et al. 2011). Thus, with the aim to determine its pest potential in this region, a preliminary study was conducted using cotton as a host. Results from these studies will help growers and extension personnel in understanding the abundance and distribution of *S. dorsalis* in the cotton field, which are essential components required in developing a sound management program.

Specific objectives

In order to validate pest status of *S. dorsalis* the following studies were conducted using cotton as the host:

1. Host preference of *S. dorsalis* among three important crops
2. Vertical distribution of *S. dorsalis*
3. Within plant distribution of *S. dorsalis*
4. Age specific abundance of *S. dorsalis*
5. Seasonal abundance of *S. dorsalis*

Materials and Methods

In the fall of 2008, experiments were initiated at the Tropical Research and Education Center, University of Florida (TREC-UF), Homestead, (25.28N, 80.28W). Studies were conducted in a well-ventilated greenhouse, using host plants grown into Pro-mix medium (Fafard, Agawam, MA) in 10.1 cm plastic pots. In all the following studies wherever required, treatments were arranged in randomized complete block design with four or more replications. Data was collected once in every wk for 6-10 wk except in the seasonal abundance study where abundance of *S. dorsalis* was recorded biweekly.

Study 1- Host preference of *S. dorsalis* was studied using potted plants of three hosts in the fall 2008 and 2009. Choice and no-choice host preference tests of *S. dorsalis* were conducted on three crops i.e., “Jalapeño” pepper (*Capsicum annum* L.), “Bollgard” cotton (*Gossypium hirsutum* L.) and “Virginia” peanut (*Arachis hypogea* L.). Study 2- Vertical distribution of *S. dorsalis* was studied in the fall of 2009 and 2011 using potted plants at four different heights 45.7, 91.4, 137.1, and 182.8 cm from the soil surface. Study 3- Within plant distribution of *S. dorsalis* was conducted in both laboratory and greenhouse conditions. For lab experiments, apical, middle and basal leaves were collected from a healthy, young, vigorous, pest free cotton plant and were subjected to oviposition by *S. dorsalis*. In the greenhouse study, young cotton plants (5 wk) were selected and divided into three substrates: upper leaf, middle leaf and lower leaf and were subjected to feeding and oviposition by *S. dorsalis*. Study 4- To determine the host age group most vulnerable to *S. dorsalis* attack, age specific host preference of *S. dorsalis* was studied on 1-9 week old cotton plants. Study 5- Seasonal abundance of *S. dorsalis* was studied on cotton in a well-ventilated greenhouse for two years between September 2009 and August 2011.

Statistical analysis

S. dorsalis developmental stage (adult and larvae) data on three hosts, different height, within plant distribution, age specific abundance and seasonal abundance were analyzed independently. Data was transformed using $\log_{10}(x+1)$ or the square-root of $(X + 0.25)$ to stabilize error variance before analysis. The transformed data were then analyzed using one-way analysis of variance (SAS Institute Inc. 2003). Differences among the treatment means were separated using the Tukey’s honestly significant difference (HSD) mean separation test ($\alpha = 0.05$).

Results

Study 1- In no choice and choice host preference test, mean number of *S. dorsalis* larvae were 3.58 and 5.79 per plant, respectively. The number on cotton was significantly higher than peanut and pepper (Tukey, $P < 0.05$). Study 2- Abundance of *S. dorsalis* larvae and adults on the three hosts decreased with the increase in height. Mean number of larvae (33.65) and adults (13.8) per cotton plant placed at 45.7 cm was significantly higher than the plants at other three heights (Tukey, $P < 0.05$). Least larval and adult counts were reported on cotton plants placed at 182.8 cm. Study 3- *S. dorsalis* female achieved higher reproduction rate on new apical leaves than older basal leaves. In both laboratory, and greenhouse studies, highest abundance of *S. dorsalis* larvae and adults were reported on apical leaves followed by medium and basal leaves of cotton plant. Study 4- High abundance of *S. dorsalis* was reported on 1-6 weeks old plants. There were no larvae reported on 9 weeks old plants during the study season. After eight weeks of study, the damage rating (3.8 out of 5) was highest for treatments with one week old cotton plants followed by 2nd and 3rd week old plants. Study 5- *S. dorsalis* population inside greenhouse was found to be very much affected by external temperature and humidity. During both the seasons of study (2009-10 and 2010-11), significantly higher abundance of *S. dorsalis* larvae (34.4 and 27.7/plant) and adults (15.2 and 14.2/plant) were observed during August (mean temperature: 27.4°C) (Tukey, $P < 0.05$) compared to the other months. Significantly lower abundance of thrips was observed between December-March (mean temperature: 17.2°C) during two years of study.

Summary

Cotton was the most preferred host amongst the three hosts in the present study. Preference of *S. dorsalis* for the young plants and leaves suggest that control measures should be adopted at the initiation of infestation during the early stage of cotton plantings. While plants grow older, present information on within plant and vertical distribution study can be used by nursery/farm personnel and extension agents to develop an effective monitoring technique for *S. dorsalis*. In addition, traps can be placed at a height of 45.7 cm or near the plant canopy to record reliable level of infestation. In our study, *S. dorsalis* population occurred year round on cotton grown in the greenhouse. Based on the *S. dorsalis* abundance on cotton, damage potential and our previous experiments (Kumar et al. 2012), it can be concluded that cotton is an important feeding and reproductive host of *S. dorsalis*. Thus, *S. dorsalis* is capable of posing a serious threat to cotton production in this region.

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References

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