EFFECT OF PLANTING DATE ON POPULATIONS OF THRIPS IN COTTON

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Abstract

The importance of planting date in cotton was investigated for thrips, particularly tobacco thrips, *Frankliniella fusca*, the predominant species injuring seedling cotton. However, other species of thrips (Thripidae) were also included as part of the thrips complex. During 2015, cotton without an at-plant insecticide for thrips planted on 1 May near Blackville, SC, experienced higher populations of thrips on 25 May than on earlier planting dates in April and later dates in May and June. Symptoms of feeding injury on seedling cotton from thrips were highest on 25 May in cotton planted on 1 and 8 May, the only two planting dates with injury that exceeded a level that might warrant a foliar application of insecticide. Yields were highest from cotton planted in late May or early June, and significant reductions in yield resulted when cotton was planted in April, early May, or after the first week in June.

Introduction

Thrips generally rank among the top insect pests for acres infested in cotton in the southern USA (Williams 2015), but the severity of their damage can range widely from year to year. Certain known factors have some degree of association with thrips density and/or the severity of the damage they cause. These factors are those that create a high-risk environment for cotton in relation to thrips. For example, later-planted cotton is often less susceptible to thrips injury than earlier-planted cotton. This is because thrips are less abundant on cotton planted later (Slosser 1993) and because cotton seedlings can outgrow injury from thrips quicker during the warmer spring months. Other factors, such as rainfall (Morsello et al. 2010), are also known to affect thrips populations. This has been capitalized on for tobacco thrips in tobacco in the USA. Using a predictive model based on geographical location, temperature, and rainfall, tobacco producers can predict their risk for tomato spotted wilt virus transmitted by thrips (http://www.nc-climate.ncsu.edu/thrips/). The Southeast Row-Crop Entomology Working Group (SERCEWG) has been working on development of a model for cotton. Data sets from multiple years and programs across the Southeast have been used to develop the model. These sets included data on thrips from cotton grown at multiple locations with various varieties, tillage types, soil moisture, temperature, etc. Using these data to develop the cotton model, it may be possible to predict the level of thrips pressure that can be expected for a given year and location, essentially pinpointing where a high-risk environment has been created. Additional data to validate and test the model were provided from the first year of this study.

Materials and Methods

Plots of cotton variety DP1137B2RF were strip-till planted on multiple dates at Clemson University's Edisto Research and Education Center (EREC) near Blackville, South Carolina, and maintained using production practices recommended by the Clemson University Cooperative Extension Service (Jones et al. 2015). Plots of 8 rows by 40 feet on a 38-inch row spacing were arranged in a split-plot design with planting date as the main plot and seed treatment as the sub-plot. Main plot treatments were planted as a randomized complete block design with four replications. Planting dates were: 15 and 24 April; 1, 8, 15, 21, and 29 May; and 5, 12, and 19 June 2015. Seed treatments were either imidacloprid (Gaucho) plus fungicide or fungicide only. Thrips (immatures and adults) were collected by randomly pulling 10 plants from rows 2 and 7 of each plot and dipping them in 48-oz jars of 50% isopropyl alcohol (Greene et al. 2007). After filtration procedures, nymphs and adults were counted from filter paper using dissecting microscopes. Insect counts began at the cotyledon stage and continued until plant size limited sampling (typically, at the four leaf stage). Weekly ratings on insect injury to plants were conducted in all tests by observing the visible foliar damage caused by thrips and assigning a number to each plot with '0' equal to no damage and '5' equal to severe damage (Figure 1). Stand counts were taken by counting the number of plants in

12 row feet per plot. Plant heights were taken weekly by measuring 5 plants per plot (cm from soil to terminal). At about 42 days after planting, five plants per plot from the center four rows were cut at the soil level, weighed for fresh weights, and dried in an oven for at least 48 hr before dry weights were determined. Yields were estimated from the 4 center rows harvested with a mechanical 2-row plot cotton picker. Data were processed using Agriculture Research Manager (Gylling Data Management, Inc., Brookings, SD) and provided to modelers to test/validate model.

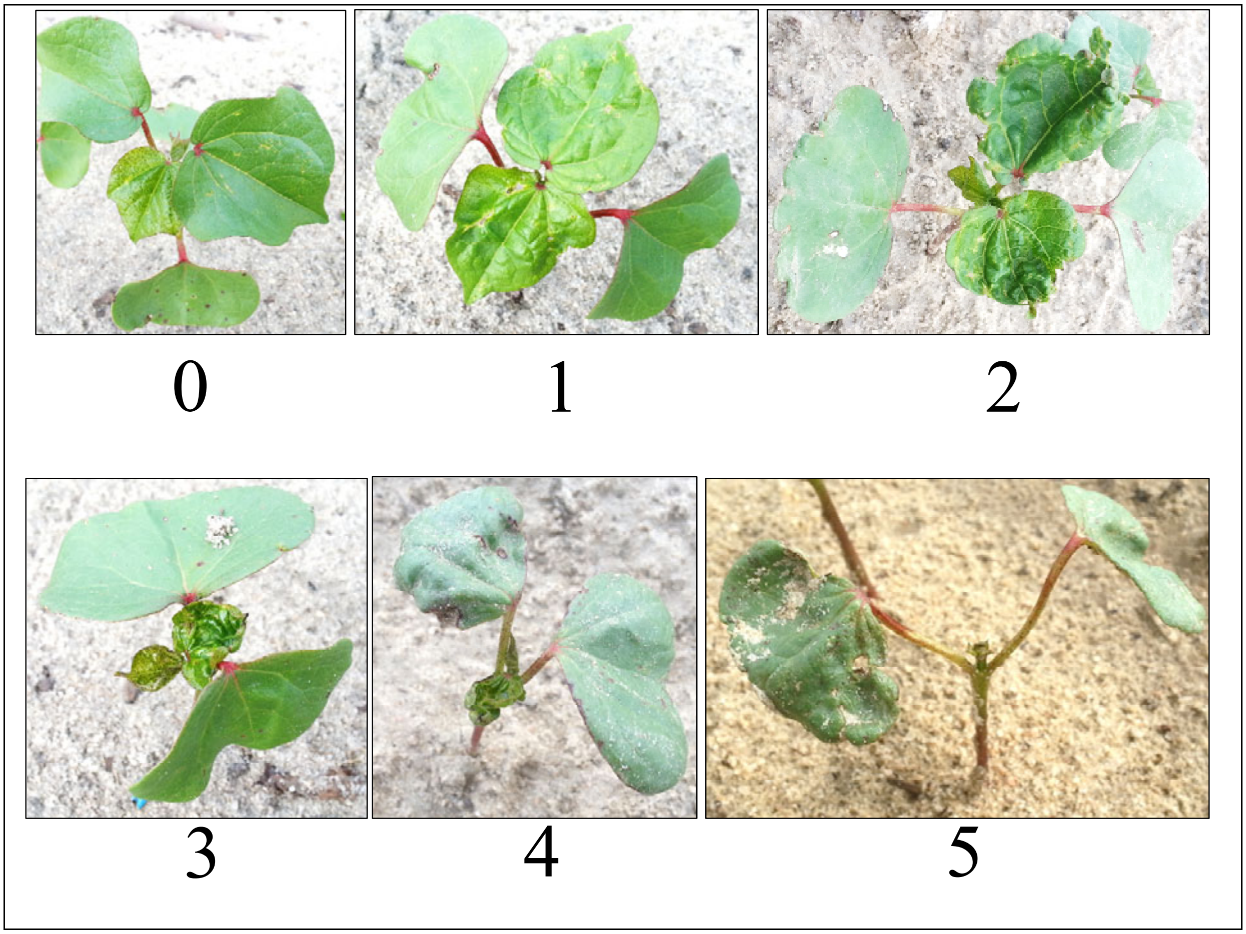

Figure 1. Rating scale for estimating feeding injury to seedling cotton caused by thrips near Blackville, SC (2015).

Results and Discussion

Tobacco thrips, *Frankliniella fusca*, have been the predominant species of thrips encountered in cotton at Clemson University's Edisto Research and Education Center (EREC) near Blackville, SC, in recent years (Figure 2). Previous identifications of thrips to species from research trials at EREC have also resulted in similar results regarding species composition, where tobacco thrips has overwhelmingly been the predominant species. Densities of thrips were highest, exceeding 9 thrips/plant, on 25 May in cotton planted on 1 May 2015 without an at-plant treatment for thrips (Figure 3). On the same sampling date (25 May), numbers of thrips were next highest in untreated cotton planted on 15 April and 8 May. Densities of thrips from cotton planted after 8 May did not exceed 3 thrips/plant (Figure 3). Ratings of feeding injury were also highest on 25 May in untreated cotton planted on 1 and 8 May (Figure 4) and represented the only planting dates when injury exceeded an approximate visual threshold level of damage ('3') that might justify an application of foliar insecticide. All other ratings of injury from cotton planted before 1 May (15 and 24 April) or after 8 May (15, 21, and 29 May; 5, 12, and 19 June) were at levels that would not warrant a foliar spray for thrips. Harvest data indicated that maximum yields were observed from cotton planted around the end of May or during the first week in June (Figure 5). Significant reductions in yield occurred when cotton was planted after 5 June or before 15 May. For the conditions experienced in 2015 at this location, the optimal time for planting cotton was near the end of May. Although the test area received overhead irrigations multiple times during the growing season, only 0.18 inch of rainfall was recorded near the test area during the month of May. There were 4.21 and 2.62 inches of local rainfall in April and June, respectively.

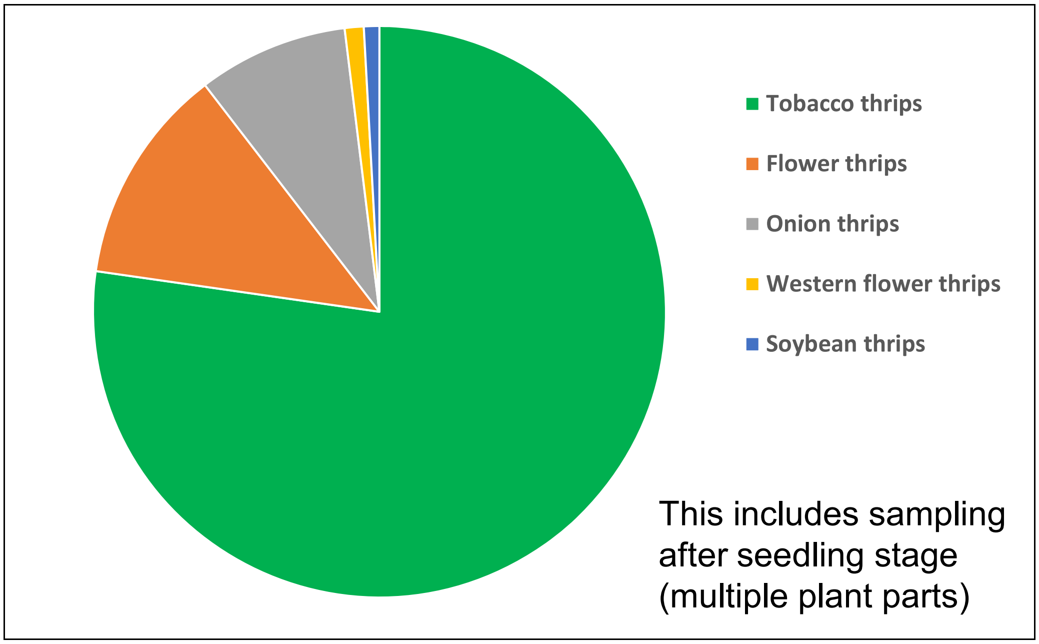

Figure 2. Proportion of thrips species sampled from cotton near Blackville, SC, during 2013 and 2014.

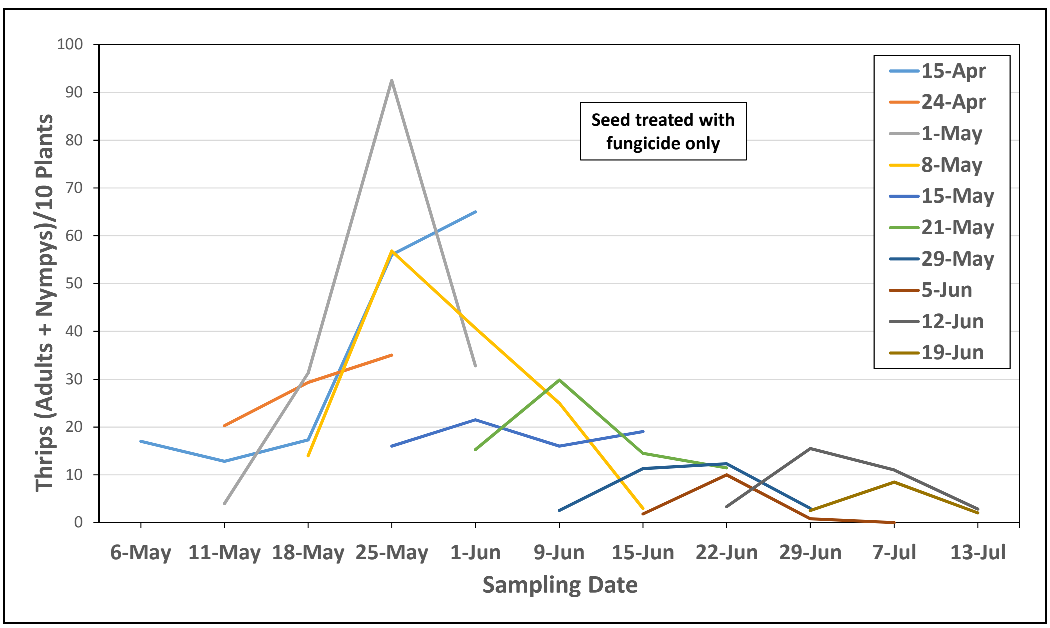

Figure 3. Densities of thrips on seedling cotton from varying planting dates near Blackville, SC, during 2015.

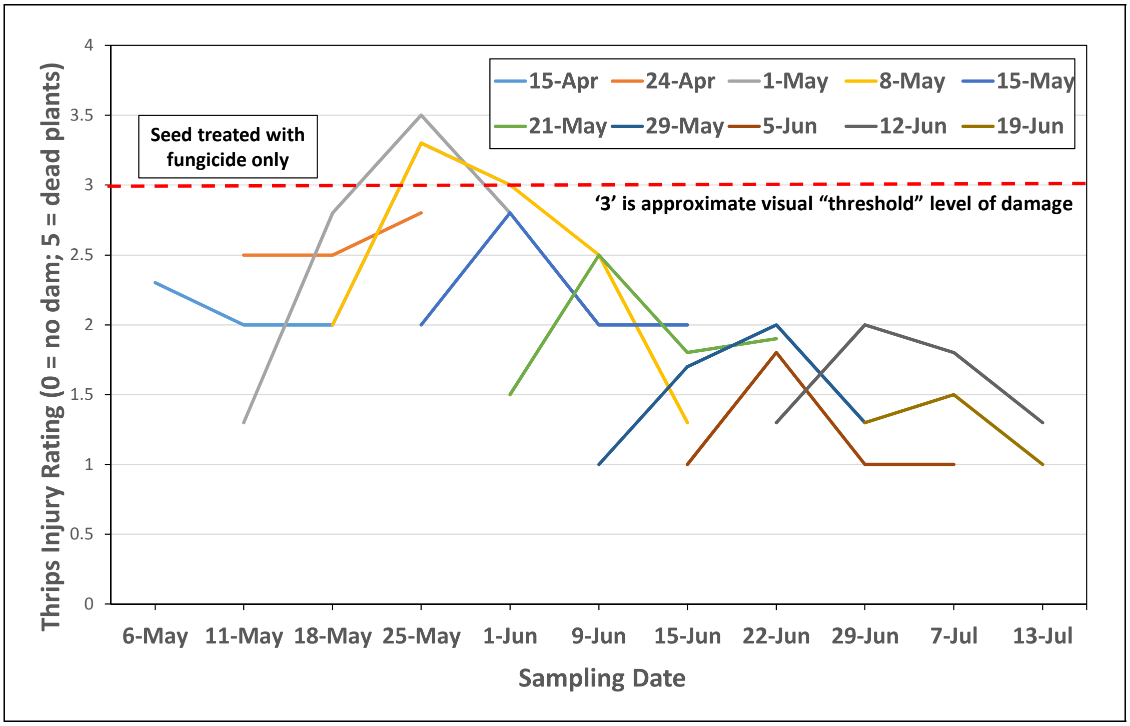

Figure 4. Ratings of feeding injury caused by thrips on seedling cotton from varying planting dates near Blackville, SC, during 2015.

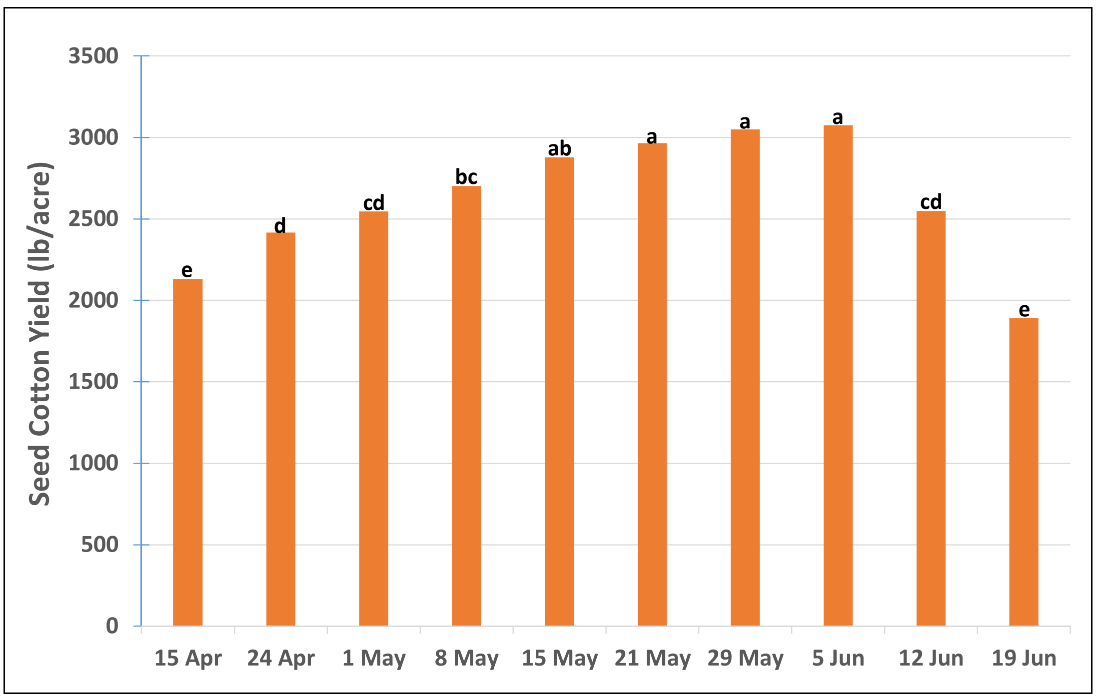

Figure 5. Seed cotton yields from varying planting dates near Blackville, SC, during 2015.

Summary

Levels of infestation and injury from thrips in cotton are clearly temporal. Date of planting can significantly affect population levels of and injury from thrips in cotton. Because thrips can cause delayed maturity and/or yield losses, and planting date can influence pressure from thrips in the crop, planting times should be considered when planning pest management programs at the farm level. Cotton planted at certain times will be more susceptible to injury from thrips than at other planting dates. Determining when the most susceptible dates will be during a given year is the dilemma. Data generated from this and other planting date trials are being used to validate a model for determining when cotton will be at elevated risk from injury by tobacco thrips. Hopefully, the model will be able to assist pest managers in planning for intervention with insecticides during well-defined periods of heightened risk.

Acknowledgements

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