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National Peanut Board / Southeast Peanut Research Initiative

EXECUTIVE SUMMARY for 2011 NPB Project # 310, entitled:
"Fertilization, tillage, and phorate interaction on thrips and TSWV incidence in early planted peanuts" – Univ. of Georgia, by R. Scott Tubbs.

Tomato spotted wilt virus (TSWV) has been a historically significant disease problem in southeastern peanut production. Breeding has allowed great strides in reducing the effects of this problem through field resistance, but incidence of TSWV has also been light in recent years. A resurgence of the disease after several light years has happened in the past, and could happen again, so it is important for research to continue to address TSWV issues. Two of the most effective management practices for influencing TSWV incidence include reduced tillage and inclusion of an in-furrow application of phorate insecticide. However, many growers have gone away from conservation tillage because of reduced TSWV concerns and the increase of burrower bug problems, and some growers prefer not to use phorate because of the minor foliage injury that occurs. This research was conducted to determine of use of a starter fertilizer might assist with early season growth to withstand and rapidly grow through thrips feeding and injury, in combination with reduced vs. conventional tillage, and with or without phorate at planting, and the resulting factorial interactions on thrips feeding, TSWV incidence, and agronomic factors (yield and grade).

There were significant differences in yield from tillage and from phorate, but no effect from starter fertilizer was noted. There were also no interactions among treatment combinations. Conventional tillage resulted in higher yields than strip-till, and inclusion of phorate yielded greater than in its absence. Conventional tillage also had better grades than strip-till peanuts.

The number of thrips observed on peanuts were also significant for tillage and phorate treatment effects for early sampling dates (within the first 3 weeks after planting). The heaviest infestation of adult tobacco thrips occurred at the second sample date, which coincided with 21 days after planting (DAP). There half as many thrips in strip-till peanuts than in conventional peanuts on this sample date. By the final sample date (28 DAP), there was a much greater (nearly 4 times as many) infestation of immature thrips on peanuts in conventional tillage plots than in reduced tillage. These thrips numbers likely impacted TSWV incidence, since conventional tillage also had about 150% greater incidence of TSWV in conventional tillage plots than in strip-till, albeit still extremely low levels of TSWV injury (less than 3% overall) regardless of treatment. Very similar trends in thrips populations occurred with and without phorate, with approximately half as many adults in plots with phorate at 21 DAP, and approximately 8 times as many immatures at 28 DAP. However, there was no statistical difference in TSWV incidence resulting from phorate application. Yield differences between phorate treatments were likely a direct result from thrips injury as opposed to transmission of TSWV.

These results defend the impact that tillage and phorate have on thrips feeding patterns in peanut, but thrips feeding does not necessarily result in TSWV incidence or yield impact.

NATIONAL PEANUT BOARD / SOUTHEAST PEANUT RESEARCH INITIATIVE

Final Report for work done under project agreement entitled:
"Fertilization, Tillage, and Phorate Interaction on Thrips & TSWV Incidence in Early Planted Peanuts".

NPB Project # 310
GPC Budget # 4-947-653-5
UGA Account #25-21-RF328-865

INSTITUTION:	University of Georgia
Principle Investigator:	Dr. R. Scott Tubbs
EXPIRATION DATE:	30 June 2012
SPRI CONTACT:	Emory Murphy
NPB CONTACT:	Marie Fenn

Final Report:

A field experiment was established to evaluate peanuts planted using two tillage systems (conventional and strip-till), with and without starter fertilizer (10.9 gal / ac of 10-34-0) in a 2x2 placement at planting (two inches below and to the side of the seed), and with or without phorate insecticide in-furrow at planting (5 lb / ac). A rye cover crop ('Wrens Abruzzi') was planted at 90 lb / ac on November 29, 2010. Cover crop biomass was determined on April 12, 2011, followed by termination with glyphosate (Roundup Weathermax at 2 qt/ac) on April 13, 2011. Conventional tillage plots were harrowed on April 19, and strip-till plots were subsoiled on April 20. Conventional tillage plots were turned and bedded on April 21. 'Georgia-06G' peanut was planted in all plots on April 25 at 6.0 seed / ft of row. A split plot design was used with the two tillage management schemes as the main plot treatment effect, and the starter fertilizer and phorate applications as the sub-treatment effects arranged in a randomized factorial. Herbicide applications of Prowl 3.3EC (1 qt/ac) + Strongarm (0.45 oz/ac) + Valor (3 oz/ac) immediately followed planting and were watered in within 24 hours to activate. Thrips sampling occurred on May 5, 12, and 19 (corresponding with 10, 17, and 24 days after planting) for this location. Plots were dug on September 15, after TSWV ratings and before white mold ratings, and were harvested on September 19, 2011.

There were no two-way or three-way interactions of tillage, starter fertilizer, and phorate application for any variable. There were also no differences for any variable with respect to starter fertilizer application. Yield was affected by tillage (Fig. 1) and phorate (Fig. 2) treatments. Grade (Fig. 3) and Tomato spotted wilt virus (TSWV) incidence (Fig. 4) were also affected by tillage.

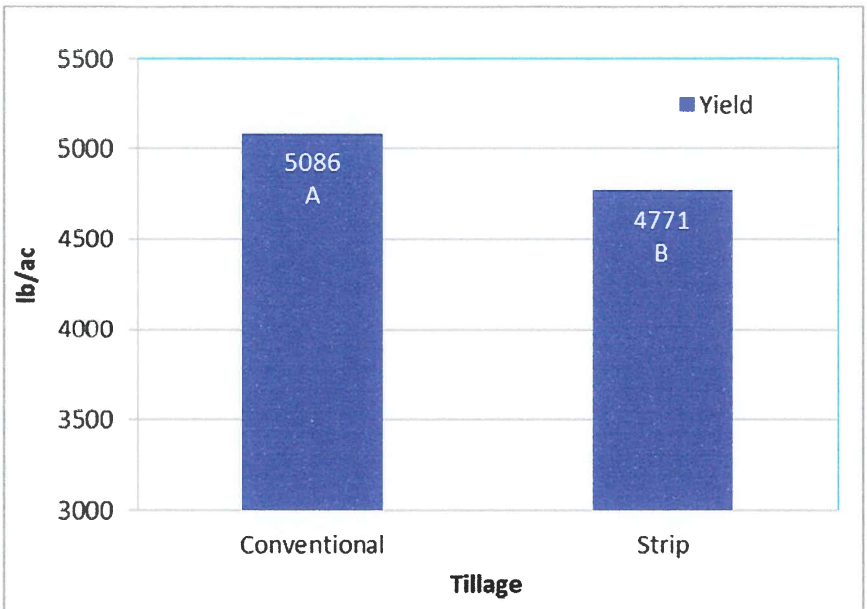

Fig. 1. Yield of peanut as influenced by tillage; Tifton, GA 2011.

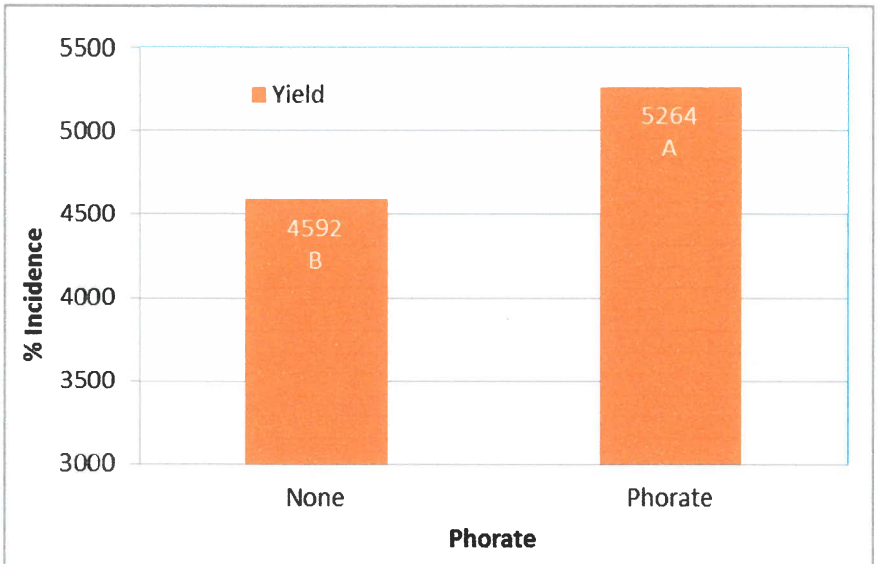

Fig. 2. Yield of peanut as influenced by phorate; Tifton, GA 2011.

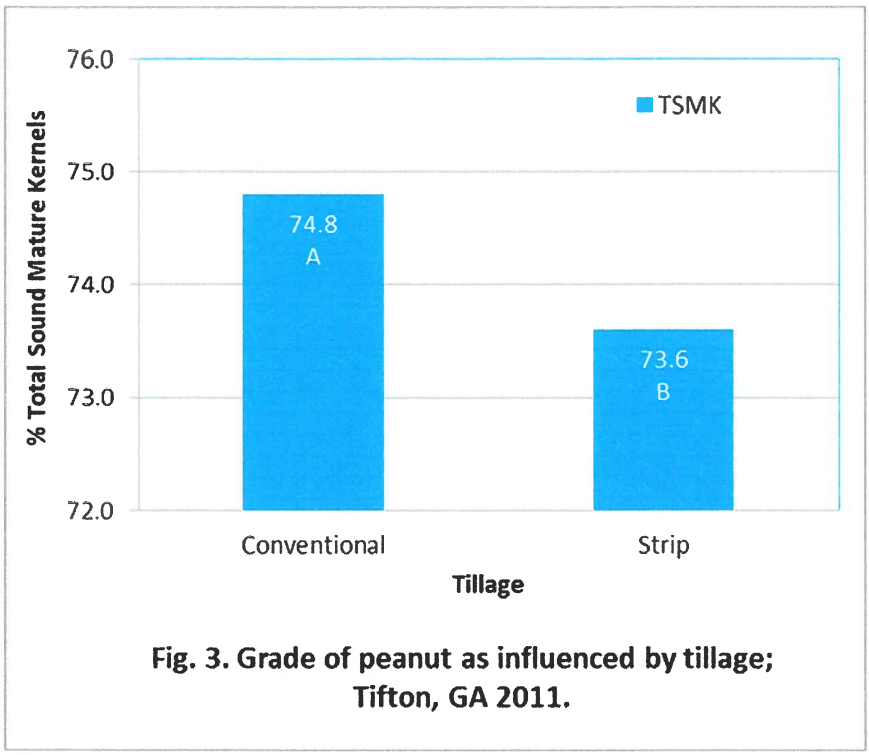

Fig. 3. Grade of peanut as influenced by tillage; Tifton, GA 2011.

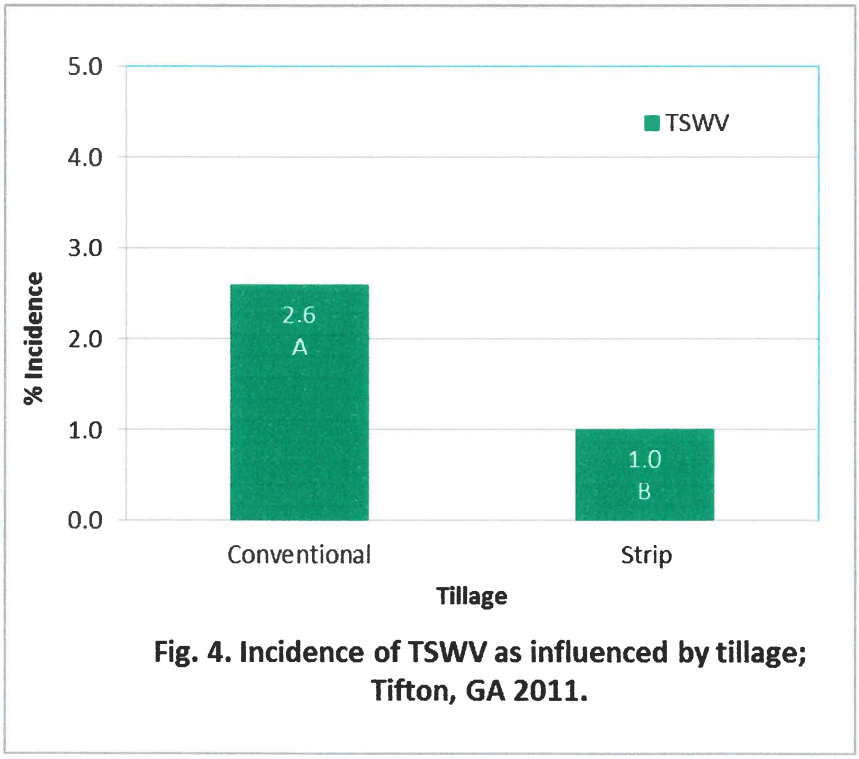

Fig. 4. Incidence of TSWV as influenced by tillage; Tifton, GA 2011.

Similar to results from many tillage trials conducted in recent years, conventional tillage resulted in higher yields than strip-till. There was also a higher grade from conventional tillage management. As expected, TSWV incidence was higher in conventional tillage plots, but incidence was extremely low for the entire trial, with less than 3% incidence on average regardless of treatment effect. The inclusion of phorate also improved peanut yield, despite low incidence of TSWV. This defends the concept that despite visible injury to peanut foliage as a result of using phorate, there is no concern for yield loss by using this insecticide.

Thrips Sampling Data

Thrips infesting individual plants were sampled weekly at 14, 21, and 28 days after planting. In each individual plot, 5 random plants were extracted from the soil and quickly inverted into a 500 ml glass jar filled with 100 to 200 ml of 70% ethyl alcohol. Adult and immature thrips were enumerated and adults were identified to species.

Experimental design was a three way factorial arranged in a split plot with tillage (deep turn or strip till) as the main plot and two subplot plot factors. There were four replications at each location. Subplot factors were starter fertilizer (no starter vs. 10 gallons of 10-34-0 in a 2 by 2) and phorate (no phorate vs. 5.25 lb of Thimet 20G) applied in furrow. Statistical analyses were performed by week of sample using PROC GLIMMIX in SAS (V 9.2). Data were plotted using SigmaPlot 12.0 (Systat Software Inc.).

Species composition was dominated by tobacco thrips. In fact, over 99% of the adult thrips at Headland were tobacco thrips. There were a total of 252 adults recovered during the first sampling interval, 634 thrips during the second interval, and 539 adult thrips during the final sampling interval. Immatures were only observed during the final sampling interval, but they were present in large numbers (2492 immatures during final sampling interval). A few western flower thrips were evident at Tifton, but their number never exceeded 15% of the total number of adult thrips per sampling interval. During the first interval at Tifton, there were a total of 134 tobacco thrips and 18 western flower thrips. Those numbers significantly increased to 548 tobacco thrips and 4 western flower thrips during the second interval and then decreased slightly to 321 tobacco thrips and 49 western flower thrips during the final sampling interval. A large number of immatures (3046 individuals) were observed during the final sampling interval at Tifton.

Starter fertilizer was never a significant factor that influenced the number of adult or immature thrips. This is not surprising since there are no insecticidal properties associated with fertilizer. However, it is possible that the plants receiving starter fertilizer were able to compensate for early season thrips injury. Those data will be available in the final research paper.

There were generally significant effects attributed to tillage during the first two sample dates. For example, more adult tobacco thrips were observed in the deep turned plots during the second sampling interval at Headland (Fig. 1) and Tifton (Fig. 2). There were

never any differences attributed to tillage in the number of adult thrips during the final sampling interval. However, the total number of adults was decreasing at this time.

In furrow application of phorate generally decreased the number of adult thrips observed at 14 and 21 days after planting. For example, there were approximately one half the number of thrips in the phorate treated plots compared to the plots without phorate at both Headland (Fig. 3) and Tifton (Fig. 4). Interestingly, there were no differences in adult thrips numbers attributed to phorate during the final sampling interval. This result suggests that phorate thrips suppression lasts about three weeks after planting.

The most obvious differences attributed to treatments were observed in the number of immature thrips collected during the final sampling date. Statistical differences were detected for both tillage and phorate at Headland (Fig. 5) and Tifton (Fig. 6). Although the treatment effects were not evident until the final sampling date, the eggs for those immatures would have been deposited during the first two sampling weeks when the treatment were still active as observed on adult thrips numbers.

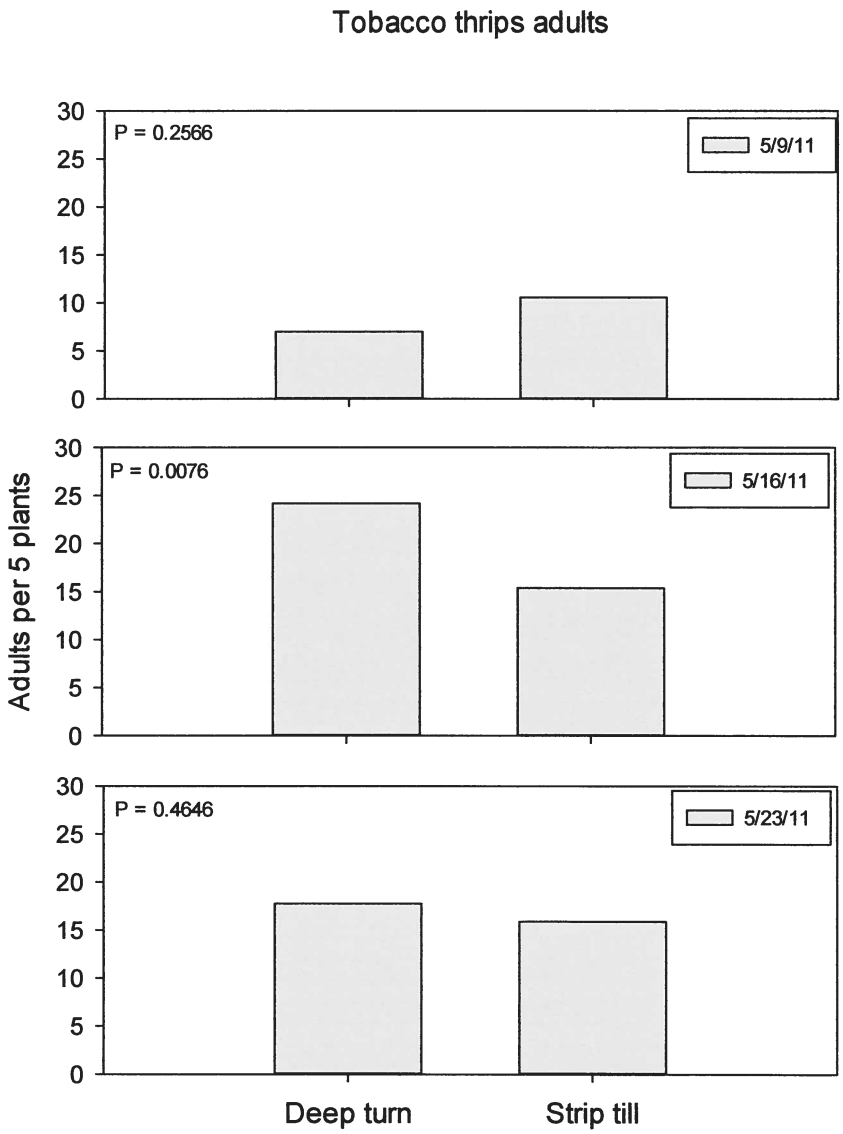

Fig. 1. Mean number of adult tobacco thrips observed in plots by tillage treatment at Headland, AL.

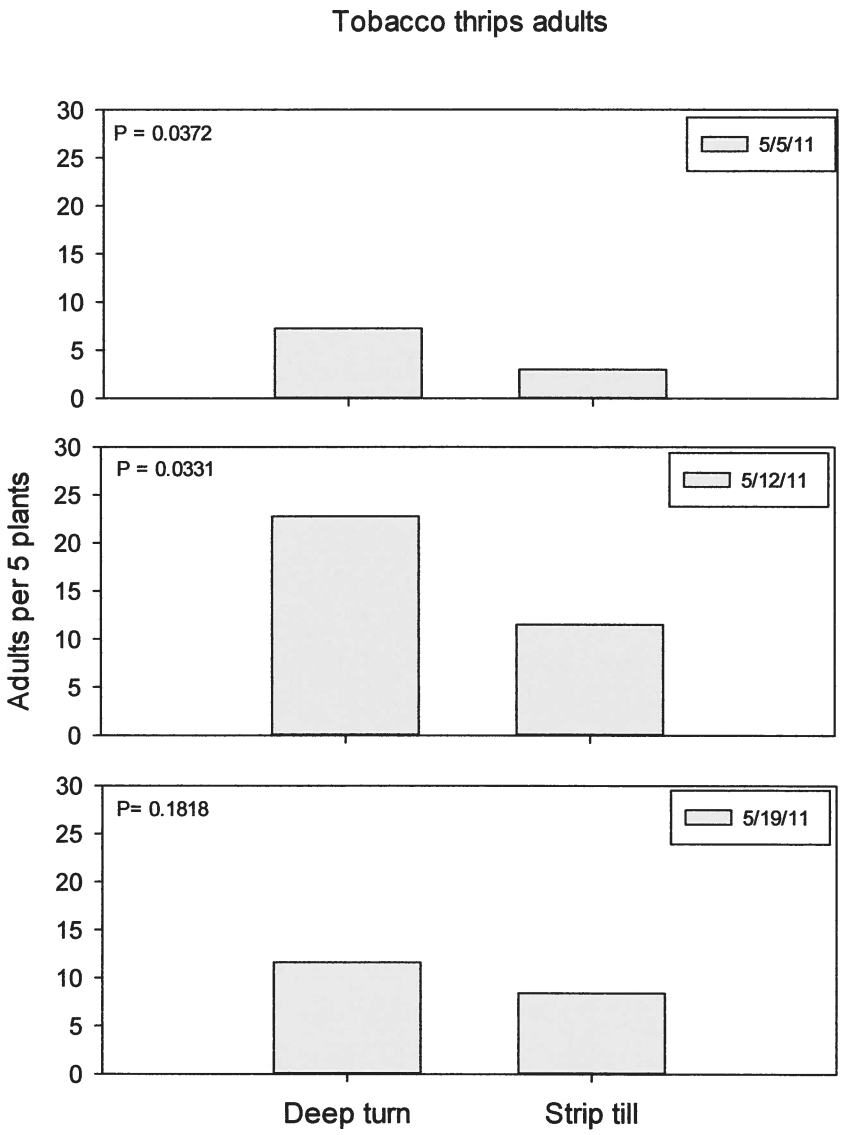

Fig. 2. Mean number of adult tobacco thrips observed in plots by tillage treatment at Tifton, GA.

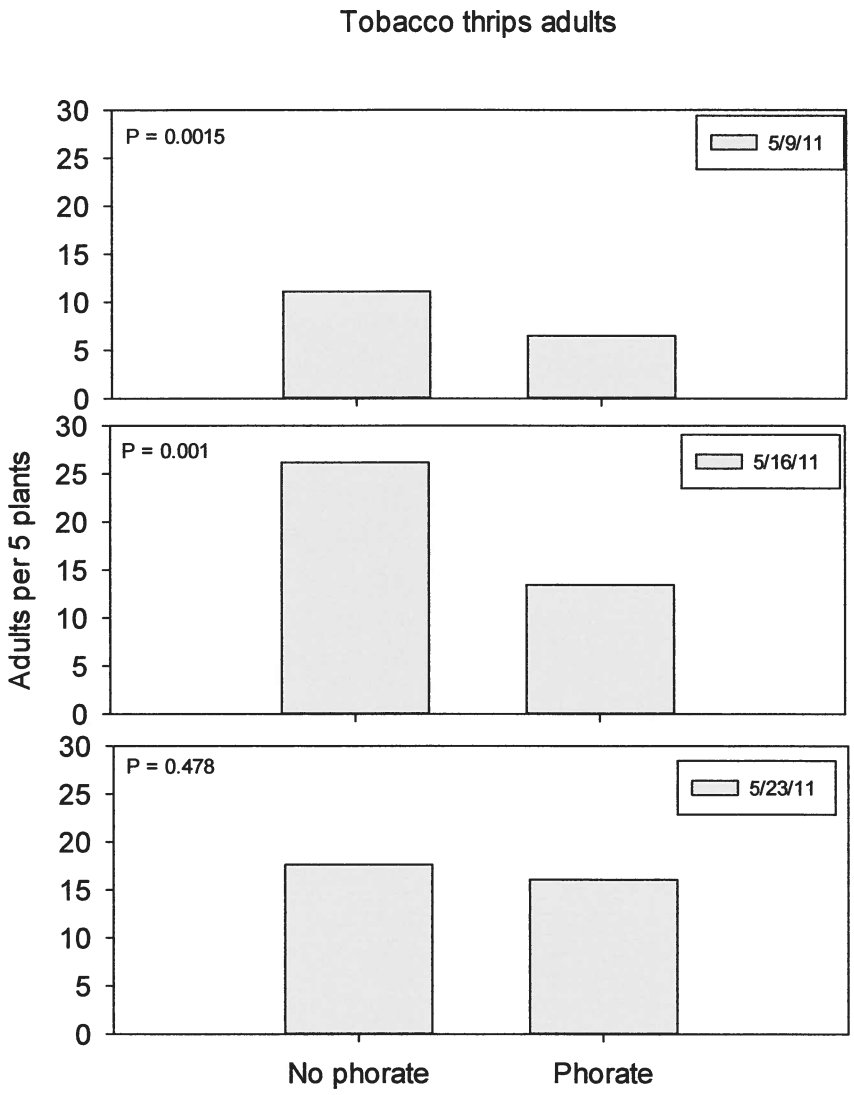

Fig. 3. Mean number of adult tobacco thrips observed in plots by phorate treatment at Headland, AL.

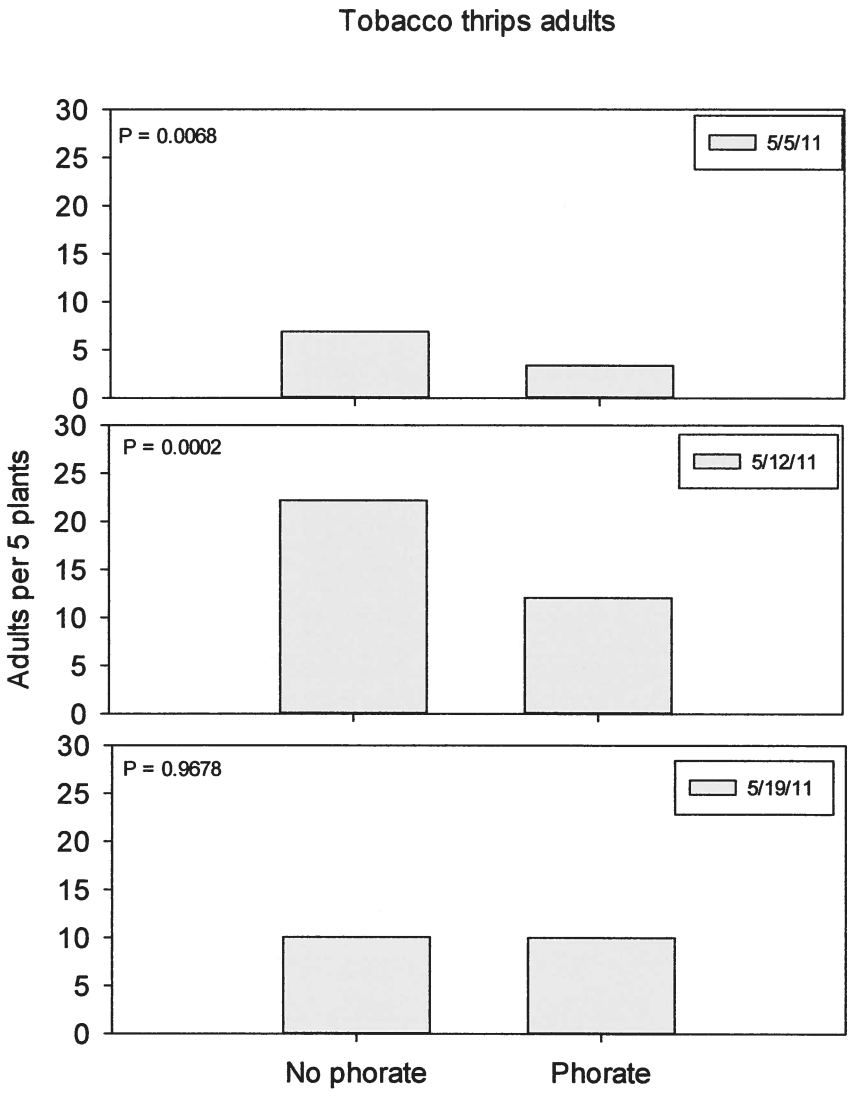

Fig. 4. Mean number of adult tobacco thrips observed in plots by phorate treatment at Tifton, GA.

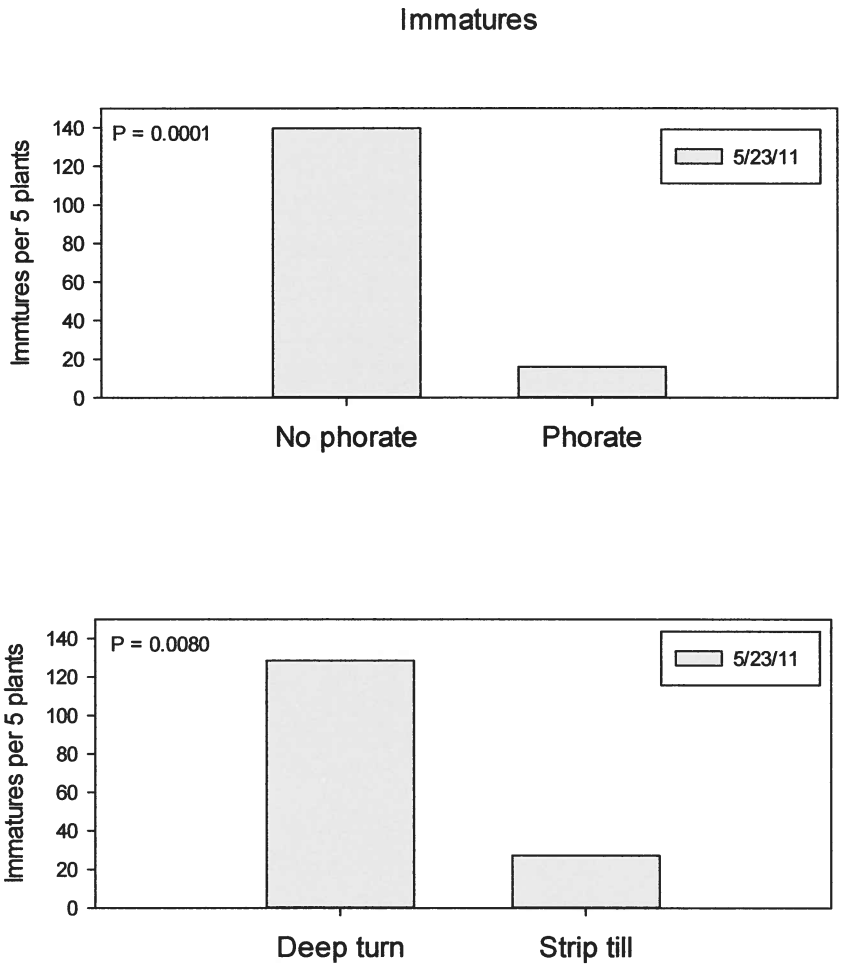

Fig. 5. Mean number of immature thrips observed 28 days after planting by phorate treatment (top) and tillage treatment (bottom) at Headland, AL.

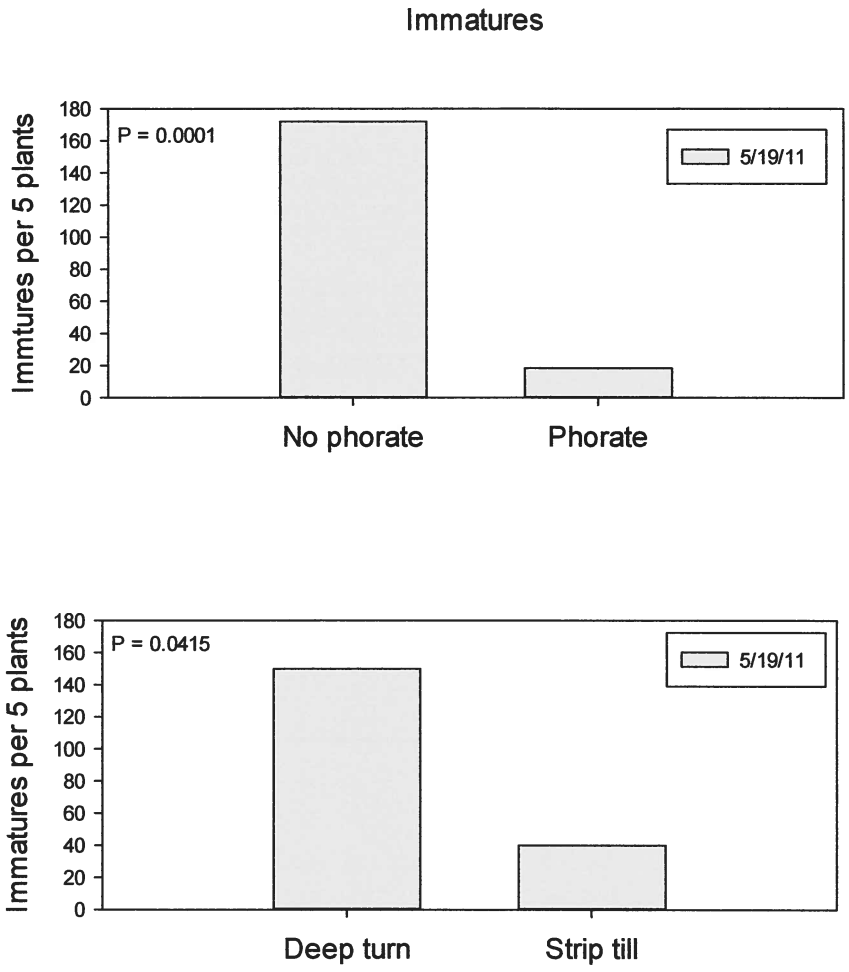

Fig. 6. Mean number of immature thrips observed 28 days after planting by phorate treatment (top) and tillage treatment (bottom) at Tifton, GA.