RESIDUAL EFFICACY OF SELECTED AT -PLANTING SOIL APPLIED INSECTICIDES ON SEEDLING THRIPS POPULATIONS IN NORTHEAST LOUISIANA

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Abstract

Field trials were conducted to evaluate the efficacy of selected at-planting insecticides across three soil environments. These trials were conducted on an alluvial silt loam (Commerce silt loam), an alluvial clay (Sharkey Clay), and a loessial silt loam (Gigger silt loam). Across soil environments, the Temik 15G treatment (0.5 lb AI/acre) provided significantly greater control of adult thrips compared to all other treatments, except for the Orthene 90S treatment (0.9 lb AI/acre). In the Commerce silt loam trial, all of the insecticide treatments resulted in significantly lower population densities of immature thrips compared to the untreated control. In the Sharkey clay trial, all of the insecticide treatments resulted in significantly lower population densities of immature thrips compared to the untreated control. Also, Temik 15G and Gaucho 480S (4.0 oz AI/acre) provided significantly greater control of immature thrips compared to Orthene 90S or Orthene 80S (6.4 oz AI/cwt). All of the insecticide treatments resulted in significantly lower population densities of immature thrips compared to the untreated control, in the Gigger silt loam trial. Also, the Temik 15G treatment provided significantly greater control of immature thrips compared to the Orthene 90S or Orthene 80S treatments. Across soil environments, all of the insecticide treatments significantly improved crop maturity compared to the untreated. However, the insecticide treatments did not significantly improve lint yield compared to the untreated control.

Introduction

Thrips are usually the first insects that may cause significant damage to cotton (Burris et al. 1989). Between 1991 and 1996, $\geq$ fifty percent of Louisiana's cotton acreage was infested with seedling thrips and > fifty percent of the infested acres were treated. Annual yield reductions were estimated to be < percent (Head 1992, 1993; Williams 1994, 1995, 1996, 1997). These losses occurred despite the use of seed protectants and/or in-furrow treatments.

The silvery appearance of plant tissue injured by thrips is a result of cellular fluids being replaced by air (Telford and Hopkins 1957, Reed and Reinecke 1990). Distortion, malformation, and tearing of leaves occurs at the site of injury as leaf size increases. Also, leaf margins curl upward and inward toward the mainstem (Telford and Hopkins 1957). Severe thrips infestations may result in damage or death to the apical meristem (Telford and Hopkins 1957, Reed 1988). Thrips injured seedlings sometimes display a proliferation of vegetative branches (Gaines 1934). The unusual growth pattern, commonly referred to as "crazy cotton", results from the loss of apical dominance. This growth response to thrips injury results in delayed crop maturity (Gaines 1934, Dunham and Clark 1937, Watts 1937, Carter et al. 1989, Bourland et al. 1992, Parker et al. 1992) and sometimes, reductions in yield (Watts 1937, Race 1961, Leigh 1963, Davis et al. 1966, Davis and Cowan 1972, Leser 1985, Parker and Huffman 1985, Burris et al. 1994, Roberts 1994, Burris et al. 1995, Graham 1995).

A significant portion of the cotton acreage in northeast Louisiana encompasses Mississippi River delta clay soils and Macon Ridge soils with low water holding capacity. Soil texture can influence the efficacy of soil applied insecticides. Efficacy of soil applied insecticides tends to be lower in clay soils than in sandy or loamy soils due to the cation exchange capacity of clay minerals (Bailey and White 1964, Achik et al. 1989, Monke and Mayo 1990). Also, insecticide efficacy may be reduced at low soil moisture levels or in soils with low water holding capacities (Bromilow 1973) as a result of decreased competition between water and insecticide molecules for adsorption sites on soil particles (Bailey and White 1964).

Materials and Methods

Insecticide efficacy trials were conducted at both locations of the Northeast Research Station in 1997. Treatments were arranged in a randomized complete block design with four replications. Plots were four rows wide (40 inch centers) x 45 ft. Stoneville 474 cotton seed were planted on Commerce silt loam and Sharkey clay soils at the St. Joseph location, and Gigger silt loam soil at the Winnsboro (Macon Ridge) location. A split plot arrangement of treatments with location as main plot was utilized for data summary across soil environments. The treatments included in these trials consisted of two in-furrow sprays; Orthene 90S (0.9 lb AI/acre) and Admire 2F (0.2 lb AI/acre), two seed protectants; Orthene 80S (6.4 oz AI/cwt seed) and Gaucho 480S (4.0 oz AI/cwt seed), the in-furrow granule Temik 15G (0.5 lb AI/acre), and an untreated control.

Control of thrips was measured by randomly selecting 5 plants per plot at 7, 11, 16, 19, 23, 27, 31, and 35 DAE in 1997. Plant samples were processed by using whole plant washing procedures to remove insects (Burris et al. 1990).

Plots of the Commerce silt loam trial at St. Joseph were harvested on 19 Sep and 2 Oct. The Sharkey clay trial at St. Joseph was harvested on 19 Sep and 2 Oct. The Gigger silt loam trial at Winnsboro was harvested on 30 Sep and 20

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Oct. Plots in all trials were harvested using a John Deere spindle-type picker.

Thrips population data for individual sample dates were pooled to determine mean treatment effects during the entire sampling period. All data were subjected to analysis of variance (ANOVA) to determine significant treatment effects. Fisher's Protected LSD was used to compare treatment means (SAS Institute 1988). Significant interactions between insecticide treatments and soil environments interactions were reanalyzed and the data presented within each soil environment.

Summary

There was no significant interaction between insecticide treatment and soil environment observed for population densities of adult thrips (P = 0.21). Combined across soil types, all of the insecticide treated plots had significantly lower population densities of adult thrips compared to the untreated plots (Figure 1). Also, plots treated with Temik 15G had significantly fewer adult thrips compared to any of the other insecticide treated plots, except for those treated with Orthene 90S.

A significant interaction between the insecticide treatments and soil environments was observed for population densities of immature thrips (P = <0.01). In the Commerce silt loam trial at St. Joseph, all insecticide treatments resulted in significantly lower population densities of immature thrips than the untreated control (Figure 2). However there were no significant differences in the number of immature thrips among the five insecticide treatments.

In the Sharkey clay trial at St. Joseph, all of the insecticide treated plots had significantly lower population densities of immature thrips compared to the untreated plots (Figure 3). Also, plots treated with Gaucho 480S or Temik 15G had significantly fewer immature thrips compared to plots treated with Orthene 90S or Admire 2F.

In the Gigger silt loam trial at Winnsboro, all insecticide treatments resulted in significantly lower population densities of immature thrips than the untreated control (Figure 4). Also, plots treated with Temik 15G had significantly fewer immature thrips compared to plots treated with Orthene 90S or Orthene 80S.

There was no significant interaction between insecticide treatments and soil environment observed for percent first harvest (P = 0.53) or lint yield (P = 0.80). Combined across soil types, all insecticide treatments resulted in significantly greater percent first harvest in both years (Figure 5). There were no significant differences among treatments for lint yield (Figure 6).

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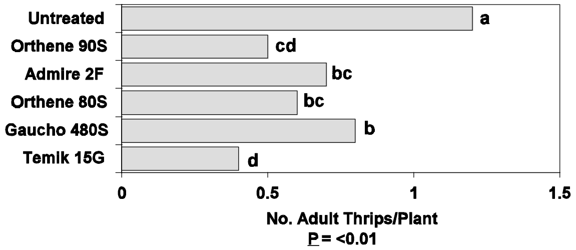

Figure 1. Efficacy of at-planting soil applied insecticides against adult thrips across soil environments.

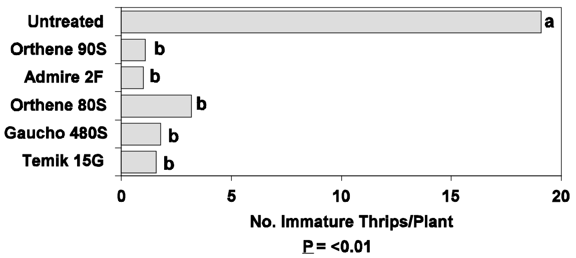

Figure 2. Efficacy of at-planting soil applied insecticides against immature thrips; Commerce silt loam trial, St. Joseph location.

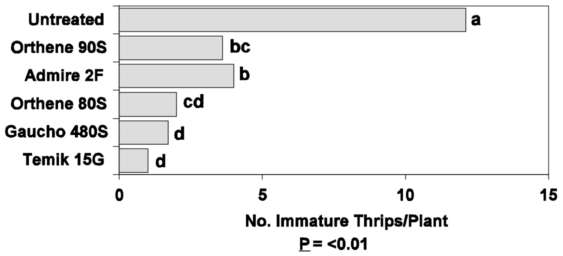

Figure 3. Efficacy of at-planting soil applied insecticides against immature thrips; Sharkey clay trial, St. Joseph location.

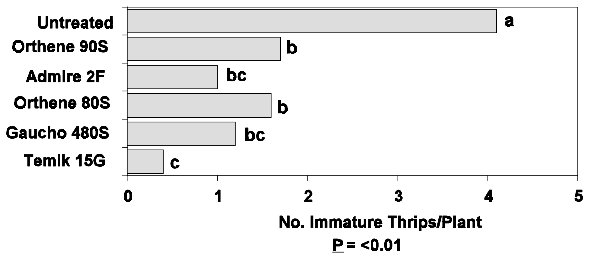

Figure 4. Efficacy of at-planting soil applied insecticides against immature thrips; Gigger silt loam trial, Winnsboro location.

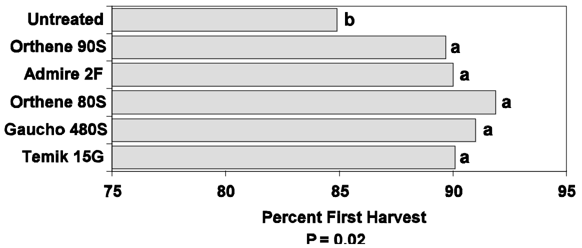

Figure 5. Influence of at-planting soil applied insecticides on crop maturity across soil environments.

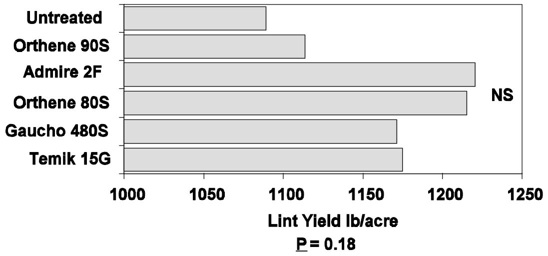

Figure 6. Influence of at-planting soil applied insecticides on lint yield across soil environments.