MANAGEMENT OF SHORT-HORNED GRASSHOPPERS AND THRIPS IN CONSERVATION TILLAGE USING INSECTICIDE-HERBICIDE TANK MIXES WITH ROUNDUP-READY AND LIBERTY LINK COTTON

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Introduction

Short-horned grasshopper (Acrididae) infestations are increasing in conservation tillage cotton, with damaging populations associated with small grain cover crops and grassy fallow areas that are planted with minimal or no plowing. Reduced tillage has the reverse effect on thrips, in several years' tests where tobacco thrips infestations were monitored on cotton seedlings, numbers were always fewer in conservation tillage as compared to plow tillage plots. The project proposed to develop information on cost effective management of short-horned grasshoppers, thrips, and other early season pests in conservation tillage cotton using replicated field experiments at the UGA Southeastern Branch Research and Education Center (SEBREC) near Midville and the Plant Sciences Farm (UGAPSF) near Athens. The objective was to examine the influence of different surface residue management procedures, particularly use of insecticide-herbicide tank mixes in Roundup-Ready and Liberty Link cotton on pest management. The project also had the purpose of evaluating alternative thrips management procedures to cope with the regulatory loss of Temik and to seek cost effective management systems for early season pests in conservation tillage.

Materials and Methods

Two fields were planted in wheat at the SEBREC and a fallow area was used for conservation tillage cotton at the UGAPSF. A randomized complete block experiment was established in the test fields with seedbed preparation of strip tillage plots having wheat or fallow cover killed with either glyphosate or paraquat. Treatment plots had insecticide-herbicide mixtures applied 3 weeks before planting (glyphosate) or at planting time (paraquat). The experimental plots were 8 rows at SEBREC and 4 rows wide at UGAPSF x 40 (SEBREC) or 30 (UGAPSF) feet long. Selected plots were sprayed with an appropriate herbicide for weed control and certain plots were sprayed with a herbicide+insecticide mixture.

The insecticides that were evaluated in in-furrow application or herbicide tank mixes were Thimet @ 1.0# a.i./A (planting time application of granules in the seed furrow at Midville only), Orthene (acephate) @ 0.75# a.i./A, and Diamond (novaluron)+thiamethoxam) @ 0.06#a.i./A. Herbicide systems for the FM 1944 (Roundup-Ready and Liberty Link) cotton was glyphosate plus 2,4-D or glyphosate plus flumioxazin (Valor) for the 3 week burn down treatments and paraquat (Gramoxone) for the planting time burn down treatments.

Thrips populations and damage to cotton were sampled 14 and 35 days after planting by washing 10 plants/ plot in alcohol to remove adult and immature insects. The fields were monitored for short-horned grasshopper infestations weekly by walking 2 x 4 ft wide transits across the field while counting all short-horned grasshoppers. Short-horned grasshopper specimens were returned to the laboratory and identified. Yields were taken at the end of the season by harvesting the two middle rows of each plot.

Results and Discussion

Thrips populations were very low at 14 days and 35 days after planting at both the SEBREC and UGAPSF with fewer than one adult or immature per plant at either test site. Low thrips populations in cotton were observed in other tests with FM 1944 and other cotton. The cotton was treated with Cruiser @ 0.25 mg a.i. thiomethoxam/seed and was probably responsible for low thrips numbers. The Thimet 1.0 # a.i./A in furrow treatment did not enhance thrips control in the Midville test, nor the Orthene @ 0.75 # a.i./A or Diamond @ 0.06# a.i. treatments at both locations.

Short-horned grasshopper (differential grasshopper, *Melanoplus diffferentialis* and red-legged grasshopper *M. femurrubrum*) populations were low at both locations, but were highest at the SEBREC during the season. Figure 1 shows that numbers of adults and large immature short-horned grasshoppers were highest in plots that received herbicide burn down at planting time as compared to chemical application 21 days before planting. The planting time applications of Orthene @ 0.75 # a.i./A and Diamond @ 0.06 # a.i./A reduced short-horned grasshopper numbers to similar levels as in the 21 day herbicide + insecticide burn down treatments, whereas the Thimet @ 1.0 # a.i. in-furrow treatments did not control short-horned grasshoppers. Yield at either location was not significantly different, but at the UGAPSF there was a trend for higher yield in non-insecticide treated plots (up to 50% greater in certain Roundup Weathermax treatments and 40% greater in gramoxone plots without insecticide tank mixes as compared either of the two herbicide + insecticide treatments) which may indicate that a negative cotton growth interaction occurred with the herbicides and insecticide tank mixes. Cotton yields at the SEBREC were similar among the treatments.

In 2012 tests, insect populations were low at the SEBREC and UGAPSF, but the data supports previous research indicating that timing of weed burn down prior to planting conservation tillage cotton influences short-horned grasshoppers and thrips. In previous research, higher thrips occur in 21 or 35 day burn down no till cotton systems as compared to applying herbicides at planting time, whereas grasshopper numbers are higher in planting time burn down treatments. Further research with higher insect populations is needed in order to verify the dynamic impact that conservation tillage and weed management have on early season cotton insect pest management.

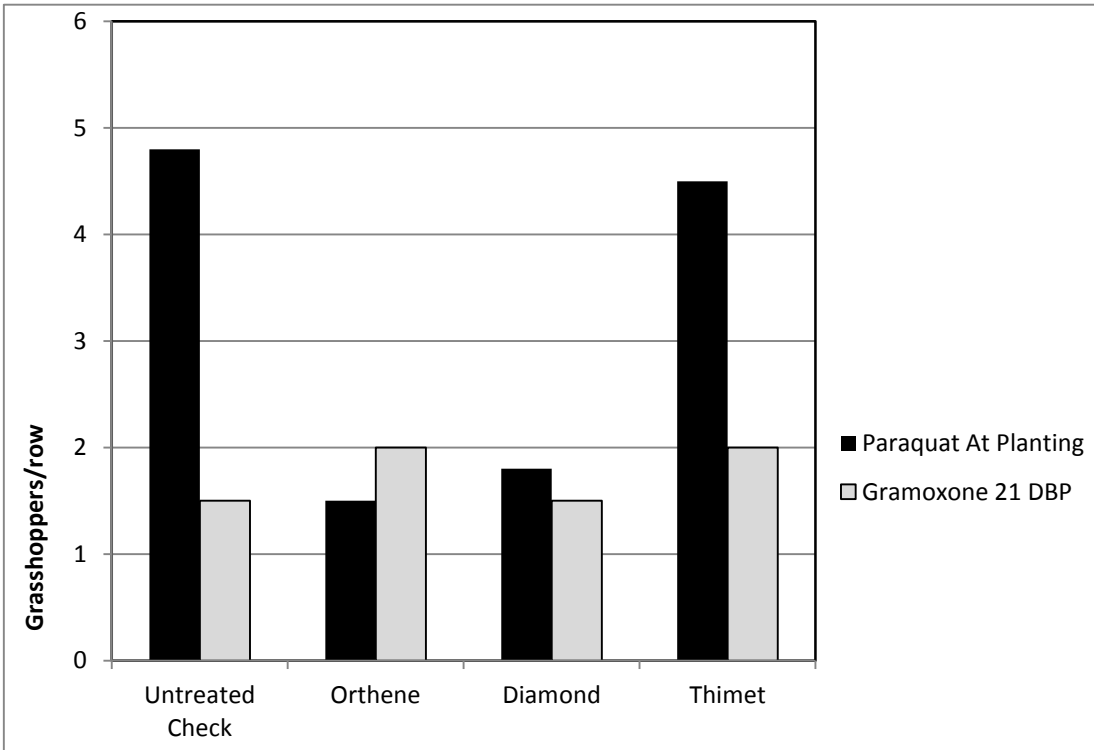

Figure 1. Short-horned grasshopper populations during 30 days after planting in no-till cotton treated with herbicide + insecticides in burn down applications 21 days before planting or at planting, SEBREC.