DETERMINING EFFICACY OF VARIOUS SEED TREATMENTS FOR CONTROL OF THRIPS/NEMATODES IN COTTON
BY MONITORING PLANT GROWTH AND DEVELOPMENT
Craig Shelton
Univ. of Arkansas CES
Fayetteville, AR
G. M. Lorenz
University of Arkansas Division of Agriculture
Little Rock, AR
Kyle Colwell
Little Rock, AR
Jarrod T. Hardke
Univ. of Arkansas CES
Little Rock, AR

Abstract

Trials were conducted in Jefferson Co. and Monroe Co. Arkansas in 2006 on thrips and nematode infested fields. Pest populations, plant growth and development, and yield were documented to determine effect of various seed treatments and industry standard in-furrow applied insecticides and nematicides. Results indicated that seed treatments were effective in controlling thrips and were comparable to industry standards. No significant differences were detected for nematode control between the treatments. However trends indicate that treatments including a nematicide had a slight increase in tap root length in the Monroe county reniform nematode location.

Introduction

The development of new seed treatment insecticides and nematicides may provide growers additional options for controlling early season pests in cotton. Seed treatments, like in-furrow compounds, are a one time pre-season treatment decision. These applications are generally systemic, allowing for control of pests that specifically feed on the cotton plant.

Thrips infested 91% of cotton in the U.S. in 2005, causing up to 3% yield losses (Williams 2006). Three species of thrips are found in Arkansas cotton: Tobacco thrips (Frankliniella fusca) being the most common comprising up to 95% of field populations, the Western flower thrips (Frankliniella occidentalis) and Eastern flower thrips (Frankliniella tritici). Severe thrips damage symptoms include silvering of underside of leafs, and leaf crinkling. Heavy thrips populations can stunt growth, cause death of the terminal bud (resulting in “crazy cotton”), delay fruiting, and reduce stand (Layton 2002). Thrips control is accomplished with seed treatments and in-furrow insecticides pre-plant, and under severe infestations foliar applications are often needed.

Nematode yield losses have been reported up to 5% in U.S. cotton. The major nematode pests in Arkansas cotton are reniform, Rotylenchulus reniformis, and root-knot nematodes (RKN), Meloidogyne incognita. Root galling, stunt of plants, delayed maturity and reduced yields are all associated with infestations of RKN. There is also an associated interaction with many diseases such as black root rot (Thielaviopsis basicola) and Fusarium wilt. Recent studies have shown that RKN’s endoparasitic feeding pattern exposes inner root tissue to the soil borne fungus black root rot (Walker et al. 1999). Reniform nematode have similar above ground symptoms to RKN. Damage by reniform nematodes is characterized by a severely stunted tap root and overall decrease in root area. Traditional nematode control in Arkansas is comprised of in-furrow compounds, fumigant nematicides and in recent years seed treatments.

The main objective of these studies was to determine if seed treatments effectively control combined effects of thrips and nematodes.
Materials and Methods

Two trials were conducted on typical production fields. One in Jefferson County known to be infested with RKN and another in Monroe County known to be infested with reniform nematodes. Plots size was four rows (38 inches) by 50 ft (RKN) or 30 ft (Reniform) in length. The cultivar DP 444 was planted on the 15 May (RKN) or 16 May (Reniform). All treatments included a base fungicide application (including the untreated check). Temik (aldicarb) in-furrow (IF) was used as the industry standard compound. All other treatments were seed treatment products and rates are described in Fig 7. A randomized complete block design was used with four replications for both studies.

Thrips sampling was initiated 3 weeks after planting and conducted weekly for four weeks. Ten plants were cut at ground level and placed in alcohol, the solution was then filtered and thrips were counted under a dissecting scope. Nematode samples were taken at planting, first square, first bloom and harvest (RKN study) and every two weeks in the Reniform study. COTMAN data was taken, beginning at first square. Other plant monitoring techniques were utilized in the RKN study; weekly plant heights, stand counts, node counts, and nodes above white flower five.

Plots on the RKN study were machine harvested on 24 October and Reniform study plots were hand harvested (10 ft from center two rows) 12 October. Data was analyzed using Agriculture Research Manager (ARM) software version 7.2.

Results and Discussion

In both studies thrips control was obtained in all treatments compared to untreated check, and there were no differences among treatments as presented in fig. 1 and 4.

RKN study:
Average RKN population densities per sampling date was 5,000 per 500cc soil (Arkansas threshold 240 per 500cc). Nematode densities were not significantly affected by treatments (fig. 1). Products acted systemically, providing resistance, not nematode density reduction. A good way to determine efficacy of treatments during the growing season is root gall ratings. However, average root gall ratings were not significantly affected by treatments (fig. 2). Plant monitoring techniques utilized in this study did not result in significant differences between treatments. No treatments significantly affected yield (P=0.05) (fig. 3). The fact that Temik the industry standard “target” compound did not result in significant yield difference compared to the untreated check makes it difficult to determine the efficacy of other treatments.

Reniform study:
Nematode population numbers were not statistically different among treatments as expected, populations averaged 9,400 Reniform per 500cc (fig. 4) (Arkansas threshold 5,000 per 500cc). Tap root length was not significantly affected by treatments. Trends indicate that treatments which had a nematicide component slightly increased tap root length (fig. 5). COTMAN data indicated no statistical differences in plants growth and development between treatments. Reniform nematodes were not a significant problem under the environmental conditions for this study. Cruiser significantly increased yield compared to the UTC, AERIS, and AVICTA complete pack while all other treatments were intermediate (P=0.05) (fig. 6).

Conclusion

Thrips control was obtained by seed treatments and in-furrow compounds in both studies. The role that nematodes played in these studies is unclear. COTMAN data indicates Reniform nematodes were not as substantial a problem as they have the potential to be, despite populations that exceeded current economic thresholds. It may be that environmental conditions during the studies enabled the cotton to compensate for early season damage. Additional plant monitoring techniques are needed to better understand the combined effect and control of thrips, and the RKN and Reniform nematodes in Arkansas cotton.
Reference


Fig. 1 RKN study: Thrips (seasonal totals) and Average Root Knot nematode per sampling date.

Fig. 2 RKN study: average root gall rating (2 sampling date).
Fig. 3 RKN study: yield pounds per acre lint.

Fig. 4 Reniform study: thrips seasonal total and average reniform population per sampling date.
**Fig. 5** Reniform study: tap root length (inches) six plant average.

**Fig. 6** Reniform study: yield pounds per acre lint.
<table>
<thead>
<tr>
<th>Treatment</th>
<th>Rate</th>
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<tbody>
<tr>
<td>1 UTC Fung Only</td>
<td>3 OZ/CWT</td>
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<tr>
<td></td>
<td>0.75 OZ/CWT</td>
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<tr>
<td>2 GAUCO GRANDE</td>
<td>0.375 MG A/SEED</td>
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<tr>
<td>3 CRUISER</td>
<td>0.34 MG A/SEED</td>
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<tr>
<td>Dynasty</td>
<td>3.95 OZ/CWT</td>
</tr>
<tr>
<td>4 TEMIK</td>
<td>5 LB/A</td>
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<td>5 GAUCO GRANDE</td>
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<td>7 abamectin</td>
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