Evaluation Of Surface Application Of Nitrogen Fertilizer Sources In A Conservation Tillage Cotton System

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Surface application of nitrogen (N) fertilizer sources were evaluated for two seasons on cotton grown in a conservation tillage system. The tests were conducted at the Tennessee Valley Research and Extension Center in Belle Mina Alabama. Cotton was planted in late April each season into a heavy rye residue that was terminated approximately three weeks prior to cotton planting. The test area received 20 and 30 pounds per acre of preplant N fertilizer in 2006 and 2007 respectively.

At early squaring, all N fertilizer sources were surface applied. In 2006, 60 and 90 pounds per acre rates of N fertilizer were applied, while in 2007 N fertilizer rates were reduced to 50 and 80 pounds per acre because of an increase in preplant N fertilizer. The rye cover crop provided an almost solid cover over the soil when the N fertilizer sources were applied. In both seasons no rainfall occurred and no irrigation was applied for at least 7 days following fertilizer application. These conditions and warm temperatures each year provided ideal conditions for possible ammonia (NH3) volatilization losses after fertilizer application. In 2006 all N fertilizer sources tested were granular fertilizer products that were weighed and hand applied to all plots. In 2007, two liquid N fertilizers were added that were surface dribbled beside each row using a CO2 pressurized sprayer. Fertilizer sources tested in these experiments include: 1) ammonium nitrate, 2) urea, 3) urea + Agrotain (1 gallon per ton), 4) urea + 4.5% calcium thiosulfate, 5) urea + 7.0% calcium thiosulfate, 6) UAN, 7) UAN + Calcium Chloride, 8(UAN + Agrotain (1 gallon per ton), 9) GP 30-0-0.

Cotton was irrigated and cotton yields were excellent both seasons. Lint yields ranged from 1200 to 1500 pounds per acre each season. Increasing N fertilizer rates increased cotton leaf- N and yields with all fertilizer sources tested in 2006 and 2007. In 2006, ammonium nitrate produced significantly higher cotton yields than urea. Cotton yields with ammonium nitrate, however, were not significantly different than yields produced with urea plus Agrotain or urea plus calcium thiosulfate. In 2007 cotton yields were slightly higher, but significant yield differences between ammonium nitrate and the granular urea fertilizers were not found. Cotton yields with the liquid N fertilizers were also not significantly different than yields with ammonium nitrate in 2007. This data indicates that although there appeared to be significant N loss from surface applied urea in 2006, these results were not repeated in 2007. Lower rainfall in 2007 may have kept the soil surface drier and reduced possible N volatilization losses after application.

"From Spider Mites To Plant Bugs: Putting The Odds In Your Favor"

Presented by Dr. Angus Catchot
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Introduction

Over the last decade we have seen dramatic shifts in the relative status of insect pests in cotton throughout the mid-south region. Two of the most notable events have been successful implementation of boll weevil eradication and the introduction of transgenic B.t. technology. These two events have eliminated insecticide sprays targeted for boll weevil and tobacco budworm. Prior to 1995, boll weevil and tobacco budworm were major pests of cotton in the mid-south. Since that time their status as major pests has

been greatly reduced. In fact, 1999 was the last year that Mississippi documented any losses associated with boll weevils. Since it's introduction in 1996, producers throughout the mid-south region have readily adopted B.t. cotton. Most mid-south states have adoption levels of 85-95% over the last 5 years. While many acres still require at least one spray for cotton bollworm, the threat from tobacco budworm has been essentially removed, barring any future event of resistance.

As with most biological systems, when one factor is removed, others quickly fill the void. The same is generally true for pests attacking row crops. With reduced sprays coupled with increasing insecticide resistance we have seen tarnished plant bugs quickly move from secondary pest status to the new number one pest of cotton in the mid-south region. Also, in the last three years producers in the mid-south have seen increased spider mites in cotton, particularly early in the season. Spider mites have been infesting cotton in the mid-south as far back as records have been kept but their status was one of occasional pest and infestations were largely limited to late in the season.

Tarnished Plant Bug

Prior to 2007, the record average number of insecticide applications made in the Mississippi delta region was 5.2 in 2004. In 2007, the number is estimated at 7-8. In a recent survey that represented 35% of the cotton acres in the MS delta, 45% of the acres surveyed received 10 or more applications for TPB while another 37% received between 7-10. In a more recent survey 22,000 acres represented had between 14-16 applications. Given the events in 2007, many producers want answers to two questions: (1) why were TPB populations so high in 2007 and (2) What can we do reduce our risk of being in this situation again? Both questions are valid and need to be addressed but unfortunately there are no "clear" answers. However, these topics have been discussed at length through the mid-south entomology working group and plausible explanations are available.

Most believe one factor was the major increase in corn acres. In 2007, producers planted 980,000 acres of corn in MS, a 60% increase compared to 2006. While we know corn can serve as a host for TPB, it is a complex interaction not easily explained. Sampling corn for TPB often yields highly variable results, some fields have extremely high levels of TPB and others have none. The TPB increase is more likely attributed to several factors working together. In 2007 we saw unusually warm weather extended over a 3-week period during the month of March. Entomologists with USDA-ARS in Stoneville, MS reported extremely high levels of TPB reproduction occurring. Next we went through and early drought period that caused a reduction in wild hosts about the time cotton was beginning to square and corn and group IV soybeans were flowering and being irrigated. TPB simply utilized these hosts to sustain the large populations that reproduced in March and we saw continued emigration out of these alternate crops into a cotton crop that was reduced in acres by 46%.

What can we do to reduce our risk of being in this situation again? With very few new insecticides available to control TPB, entomologist are beginning to reach deep into the bag to make producers aware of management practices that could help reduce the number of insecticide sprays. Several methods include: treating only when threshold numbers are present, reducing the "edge effect" next to corn, manage broad leaf weeds in ditch banks, equip sprayers with correct nozzles for insecticides, utilize nectariless cotton when available, increase GPA, etc.

Spider Mites

Over the last three years, the frequency of spider mite treatments has greatly increased in the mid-south. Since treating spider mites is extremely expensive, producers are looking for ways to better manage this pest. Many have speculated as to why mite problems are increasing. Some believe that it is due to the switch from Temik to insecticide seed treatments. Preliminary data, from Mississippi State University shows that the risk of spider mites is slightly greater with a seed treatment, but the results are highly variable. While there are numerous factors likely involved, the single biggest factor is likely

extended periods of drought during the growing season the last several years, which is favorable for spider mite development and reproduction.

A factor associated with early season spider mite infestations seems to be wild hosts either within or near fields. Delayed weed burndown greatly increases the risk for early season infestations of spider mites. If spider mites happen to be present on winter annuals and burndown is delayed, mites simply move off dying weeds onto the crop. Growers should try and have weeds dead at least 3 weeks prior to planting. Recent host plant work has found henbit to be one of the major early season hosts for spider mites. Other weeds include; honeyvine milkweed, vervain, white clover, and coneflower.

Summary

The first step in being able to reduce risk from a pest is a basic understanding of the biology and association of the pest with that crop and the environment. With some basic understanding of these concepts we can start removing requirements or introducing obstacles so that these pests are less likely to reach an economic threshold. An attempt has been made to introduce several of the factors that often play key roles in the likelihood of these pests reaching economic status in a given year. Furthermore, many of the concepts mentioned are cultural in nature, and require very little input on the part of the producer to implement, and enable the producer to minimize insecticidal inputs.

▸ Recognizing Potential Cotton Pest Problems In A Multi-Crop Environment

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Introduction

The recent increase in grain prices has motivated many producers to broaden their cropping systems to include combinations of wheat, field corn, soybean, grain sorghum, and cotton. Many southern arthropod pests infest more than one of these plant hosts and crop diversification has the potential to increase overall pest pressure and influence the costs of plant production strategies. This report will briefly illustrate examples of pests that may be influenced by crop diversity on individual farms and in local areas. In addition, several suggestions for common sense management tactics will be discussed.

Arthropod (Insects and Spider Mites) Pests and Cropping System Interactions

In many cases, the initial infestations of cotton pests do not occur across the entire field and are discovered as localized problems in specific areas. Usually these areas are associated with field borders and may be adjacent to a number of landscapes such as crops, fallow fields, pastures, woodland, WRP-CRP fields, and wetlands. There is only one arthropod pest, boll weevil, which is specific to cotton and not found attacking other crops. Infestations of other pests in cotton fields usually originate from populations in other native host areas or crop fields and immigrate to cotton fields. This event usually occurs as the result of cotton plants becoming more attractive as hosts for those specific pests than those plants where the population first originated.

Examples of cotton arthropod pests that are found in other crops are common. Thrips often develop on native winter and spring grasses or grain crops such as wheat. As wheat plants mature, high numbers of thrips migrate into adjacent cotton fields and attack seedlings. Tarnished plant bugs are often found infesting native vegetation, field corn, soybeans, and even grain sorghum fields. As these crops become unfavorable hosts, populations can migrate to adjacent cotton fields for an extended period. The corn earworm or bollworm prefers corn plants during the silking stage of development. As corn plants mature beyond this stage of development, this pest moves into cotton fields that are usually are in their reproductive stages of plant development. The fall armyworm is a migra-