THE FALL ARMYWORM: AND I THOUGHT WE HAD IT MADE

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Abstract

Insect control costs have declined and cotton acreage has exploded in the U.S. Southeastern Cotton Belt. New insect pests are appearing and growers, scouts and consultants are having to learn how to deal with these new problems. Introducing new insecticides is only one part of the solution. Revising cultural practices may also be an answer.

Introduction

An old adage says "Poverty follows cotton". Reviewing cotton growing's history, one can say that this statement was probably true before the days of synthetic fertilizers and pesticides. Cotton production's high profit potential tends to make growers adapt a continuous cropping monoculture without regard to it's consequences. When native soil fertility was depleted and insects and diseases built up, cotton production ceased to be profitable. Growers either switched to other crops or moved on. Nowadays there are few alternative crops and few places to migrate to that offer virgin soil. Thus modern cotton growers have to remove the hurdles to profitable cotton production.

One of the major hurdles is insect control costs. The cotton industry has placed special emphasis on this major production cost area for many years. The Boll Weevil Eradication Program (BWEP) has been very successful in the Southeastern states. Growers have been able to reduce insect control costs significantly. Consequently, cotton acreage has exploded in these states, while declining in boll weevil infested areas of the Cotton Belt. Genetically engineered cotton containing the Bt gene promised to reduce insect control costs even further. In boll weevil free areas, the Bt cotton seemed to be a perfect fit. Many growers planted Bt cotton with the expectation of not having to apply any insecticides for worms at all. They thought they had it made. Some were rudely disappointed. It seems that every time that we solve one problem, another crops up. Mother Nature certainly has a sense of humor. This year the punch line was the fall armyworm (FAW), and it was no joke.

Materials and Methods

Whole Plant Inspection

For several years we have been using the Whole Plant Inspection Protocol (WPIP) developed by Drs. Mike Williams and Randy Lutrell of Mississippi State University. (Williams, 1991) Experienced consultants have probably used this method for many years, but Drs. Williams and Lutrell systematized the procedure. Most importantly, they and their staffs have done extensive research and statistical analysis which proves that this method is better than the commonly used random sample method.

Most consultants hire scouts to enable them to cover enough acres to earn a living. Oftentimes these scouts are young and inexperienced, though dedicated and conscientious. Although the WPIP takes more time, it is by far, the best and safest training method for new scouts. The consultant's worst nightmare (outside of death, heart attack and cancer) is to have a scout miss the worms and/or eggs, the population level explode, and economic damage occur. Well trained, motivated scouts working on a 4 day inspection interval can only cover about 1000 acres per day (100 acres / hour). Allowing for a day off, one scout can only cover about 3000 acres of cotton. Sampling only the terminals and/or top fruiting forms, a scout may cover more ground, but this method is risky. Our philosophy is "Dress for the Crash, not the Ride." We stay ahead of the worms and avoid the "wreck" by using the Whole Plant Inspection Protocol (WPIP).

Tag Worms

We have experienced this phenomena every year during late June and early July, whether it be the Mississippi Delta, the Coastal Bend of Texas or Southwest Georgia. Using the WPIP method, tag worms can be discovered before they do economic damage. We theorize that high temperatures and/or synthetic pryrethroid use drives the Helicoverpa moths to lay in or on the white and pink, especially the closing, blooms. Most of these blooms stick, probably due to the heavy dews and/or high moisture conditions under sprinkler irrigation. Because these eggs are hidden down in the canopy, oftentimes in or under the stuck blooms, they are difficult to find. They are even more difficult for insecticides to cover effectively (Hood, 1993). After the reported experiences of this year, it seems that these tag worms are difficult for even Bt cotton to control.

Forewarned is Forearmed

The fall armyworm is not a "new" cotton pest. He's been around for years, but never in the high numbers as seen in the Gulf Coast and Southwest Georgia region in 1996. There have been isolated outbreaks but never the widespread devastation as this year. High population levels were reported in Baldwin County, Alabama in mid July. Thanks to Dr. Ron Smith's "Hot Line" (sponsored by VALENT) the news of this event was spread throughout the Southeast. Dr. Smith correctly predicted their movement to the northeast. By mid July FAW's were being reported in extreme southwest Georgia, and population levels began to build. This area had experienced hot, dry weather and scattered rainfall in June. Most dry land cotton had not

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"lapped" the middles, and was not rank and lush. Thus, it was attractive to beet armyworms (BAW's). However, the FAW's seemed to prefer the lush, rank cotton. Our observations were that FAW's preferred the tall, rank, lush growth of over-fertilized, over-irrigated cotton. Cotton fields that had proper fertilization and water management and maintained an open canopy were not nearly as attractive to the FAW's.

Being acutely aware of and intensively looking for tag worms using the WPIP reaped an unexpected benefit. The WPIP enabled us to discover the FAW's while they were small and still in the top of the plant. The small ones were usually on the bracts of a "candle", i.e., a large square that would be an open bloom within 24 hours. Theses bracts often had "windows" or etchings cut in them. The small worms (1/4 inch or less) had black heads making it easier to differentiate them from the Helicoverpa complex.

Trap Lines

During June and July, our trap lines were indicating steady buildups of beet armyworms (BAW's) and corn earworms (CEW's). We began trapping for fall armyworms (FAW's) the third week in July. However, we found that either the FAW lure and/or the traps (both 2X Deltas and buckets) are not as effective as the bucket traps for BAW's or the Harstack traps for Helicoverpa. Tobacco budworm (TBW) trap catches had been very high in June, but had begun to decline by mid July. Early planted, adjacent corn fields were maturing (drying up) by this time and CEW's were pupating. Thus, we predicted a heavy CEW moth flight to coincide with the July full moon.

Materials

Up to this point in the season (July 24) TBW's had been controlled effectively by Bt cotton or by the application of a Bt (CONDOR XL) plus an ovicide (LARVIN or OVASYN) plus an insect growth regulator (IGR){DIMILIN} to the non - Bt cotton. BAW's had been appearing in high numbers (above the threshold of 4 "hits" per 100 feet of row) since early June. Every effort was made to preserve beneficial insects. Cotesia levels were high, averaging about 2 parasitized BAW larvae per 15 worm hits. Cotesia and Low Rate Multiple Applications (LRMA) of CONDOR and DIMILIN, kept the BAW damage levels very low. Aphids were also a problem and supplemental releases of lacewings plus the fungus had obtained control. We try to maintain a 15 to 1 ratio of predators to prey. Not only did the LACEWINGS aid in aphid control, but they also assisted in controlling the moderate (10 to 15 per cent, 3700 to 5550 eggs per acre) TBW egg lays made in late June.

During late July, CEW's moved out of maturing corn fields and 50 to 60 per cent egg lays were common. These egg counts along with 8 to 10 per cent fruit damage necessitated our first synthetic pryrethroid (SP) application of SCOUT - XTRA with an ovicide (LARVIN or OVASYN). This SP worked slowly, taking 5 days to achieve a good kill (80 %). A second SP application of DECIS was made 7 days later on the heaviest infestations. Beneficial counts plummeted, opening the door for the fall armyworm. By early August, FAW's were beginning to be found at threshold levels (4 per 100 blooms) on the lush, rank, later planted/maturing cotton fields. By mid August treatments were begun.

Conclusions

Fall Armyworm Facts

1. FAW's prefer rank, lush over-fertilized, over-watered growth. Fields adjacent to peanuts, pastures, grasslands most susceptible. They prefer later planted or later maturing cotton.

2. Eggs masses almost impossible to find. Moths are difficult to trap, but easily flushed and seen in fields milling around.

3. Small worms (less than 0.25 inch) may be found on bracts of "candles". They can be mistaken for bollworms.

4. FAW's move around, up and down the plant depending on the conditions and the time of day.

5. Medium size FAW's can easily be found in white and pink (red) blooms in afternoons.

6. Small FAW's will etch windows inside bracts.

7. Medium FAW's will etch bolls; although not damaged severely, they will later develop boll rot.

8. Medium to large FAW's will damage large, almost mature bolls. They enter from the bottom; thus are more difficult to spot.

9. Four worms per 100 blooms will cause about a 5 % boll loss.

10. Once they attain medium size and move down into the plant canopy, they're almost impossible to kill with any labeled, existing, conventional insecticides.

Recommendations

1. Practice season long, total plant management. Manage for earliness to mature crop before onslaught. Don't over-fertilize and/or over-water. Use PIX early on to control plant height and maintain an open canopy.

2. Preserve beneficials. Avoid using hard or harsh insecticides.

3. Detect FAW's early. Use Whole Plant Inspection Protocol. Hire experienced consultants.

4. Adjust treatment thresholds according to predator-prey ratio. Treating at 4 FAW's per 100 blooms may be too low in some instances.

5. Thorough coverage is the key if you have to spray. Spray by ground with 3 nozzles (2 on drops) per row. Use plenty of water.

6. Use TRACER if available. Otherwise, PIRATE which is very hard on beneficials.

7. Encourage University and Experiment Station research on fall armyworms.

References

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