Cotton’s Year for Lygus

The situation and the plan

After years of lesser status as a cotton pest, lygus bugs returned in full force during Arizona’s 1998 cotton season. Weather, crop, and insecticide use factors came together to create an ideal breeding ground for an exploding population of lygus that reduced yields in some areas to as low as three quarters of a bale per acre. Growers in both central and southwestern Arizona have suffered substantial crop losses, plus skyrocketing control costs totaling over $150 per acre.

Managing lygus successfully is a long-term process that involves more than chemical controls, according to Peter Ellsworth, an entomologist at The University of Arizona’s Maricopa Agricultural Center. That process includes a combination of ongoing field sampling for lygus; observing appropriate thresholds recommendations for spraying; careful selection and limited use of insecticides when necessary; and attempting to avoid lygus problems from the start. This takes careful planning and an investment of at least three years to implement a successful cooperative program, according to Ellsworth, who compares the lygus problem to the whitefly dilemma six years ago.

“In 1992 we had a disaster with the whitefly,” Ellsworth says. “By 1996 we had a solid, research-based pest management program in place that relegated the whitefly to minor pest status.” With industry support, the College of Agriculture was able to focus its resources on developing an integrated pest management package that responded to community needs. Ellsworth believes that same kind of cooperation with appropriate funding can result in an effective lygus program in the near future.

What happened in 1998 that gave lygus carte blanche in the cotton fields?

“It was a cascading set of interdependent causes,” Ellsworth maintains. “All of them had to be in place.” First, El Niño’s rains produced a lush spring landscape full of the wide range of desert plant species that lygus prefer for overwintering.

Second, certain strategically placed seed crops at the right stage of growth served as bridging hosts just as the spring desert species died back. The lygus migrated to safflower in the Yuma Valley and to seed alfalfa in central Arizona, where they continued to feed and increase in great numbers.

Lygus feeding doesn’t pose an economic threat to safflower, but lygus damage seriously affected the seed alfalfa in many cases this year. Control this year in seed alfalfa was exceedingly difficult, according to Ellsworth. He says growers do not yet have all the necessary tools and strategies in place to handle heavy lygus infestations in alfalfa.

Third, the wet spring conditions delayed cotton planting by three to four weeks in many areas, or forced fields to be replanted, which displaced the fruiting cycle to coincide with large numbers of lygus coming out of harvested safflower and seed alfalfa fields during peak cotton flowering.

Lygus are flower and seed feeders; they pierced and sucked the cotton squares and young bolls until they dropped. With so much late-maturing food around, the lygus were able to hang on longer than usual.

“This led to an incredible, sustained lygus wave,” Ellsworth says. “We saw areas where growers had to contend with lygus for as many as 12 weeks.”

Jeff Silvertooth, a UA cotton agronomist, says that in one of his own cotton projects in central Arizona he went from 75% retention to 65% over a five-day period, and from 65% to 25% in the next five-day period. Yields dropped to less than two bales per acre. The best he saw in hard-hit areas was about 2.5 bales per acre, compared to 1997 yields of 3.5 bales per acre or more. In these same hard-hit areas, yields of approximately 1.0 bale per acre or less were common.

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“You might think that safflower and seed alfalfa are a bad thing, but that’s not true,” Silverttooth says. “We need to diversify our crop mix, but when we do that it’s a package deal: you have markets to explore, but you also have crop-pest relationships to deal with. You need collaboration, and strategies to deal with a new system. Maybe the cotton and safflower growers need to get together and talk about where they are planting, how fields can be scouted and managed in terms of the crop and insect pests.”

This interlocking system becomes more apparent with Ellsworth’s observation that the whitefly program’s insect growth regulators (IGRs) and transgenic Bt cotton for pink bollworm reduce the need for broad spectrum insecticides in the cotton fields, thus allowing more lygus to flourish. This is why integrated pest management programs should be developed in the context of whole systems, Ellsworth says. “So often we tackle one problem and another pops up in its place. The pests’ ability to resist insecticides is an even greater incentive to develop integrated solutions.”

With funding from the Arizona Cotton Grower’s Association and the Arizona Cotton Research and Protection Council, Ellsworth and a team of cooperating scientists began a program in 1997 to address integrated lygus management in cotton. This program has established the basis for a procedure aimed at reducing insecticide use through adequate field sampling, adherence to threshold guidelines, and using the right compound for the job. Some of these measures still need further testing and refinement as they are incorporated into the larger cotton pest management program. In addition, Ellsworth recommends the following practices to prevent lygus damage in the first place:

1. Plant early, produce the crop early, and terminate early.

2. If possible, avoid planting near known lygus sources, especially safflower and alfalfa. If this is not possible, use these as trap or catch crops, then treat them before lygus “escape” (safflower), or strip-cut and otherwise manage the availability of the host-trap (alfalfa) so that lygus are never forced to leave.

3. Use tolerant or resistant cotton varieties when available.

4. Do not water-stress the cotton.

5. Manage other pests with a minimum of foliar insecticides by using IGRs for whiteflies and Bt cotton for pink bollworm. This will help lower insecticide selection forces in the crop and conserve the natural enemy community.

Ellsworth and Silverttooth will each continue with their work in 1999 dealing with entomological and agronomic aspects of cotton and cropping systems in Arizona. They also recognize the importance of integrating their information (pest management and agronomy) into practical and functional recommendations that can be used in the various cotton-producing areas of Arizona.

In 1999, Ellsworth hopes to see the availability of more tools in the lygus control arsenal. “While still building on the fundamentals of pest avoidance, crop management (including seed alfalfa and safflower), and community involvement,” he says, “these new tools could add to and diversify our chemical control options.”

— Susan McGinley