Cooperative Extension

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Lygus In Cotton: Implementing Action Thresholds

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Lygus bug as a pest has a huge potential for negative economic impact on growers of cotton in Arizona. It attacks the yield component directly by feeding mainly on squares. Gaps in fruiting result in losses in time that force growers to extend the production season. Also, these gaps disrupt carbohydrate balance in the plant resulting in excessive vegetative growth, more difficult and costly defoliation, and poorer fiber characteristics (especially micronaire).

When non-chemical approaches fail to prevent economically damaging numbers of *Lygus*, insecticides become a necessary tactic. Most *Lygus* insecticides tend to be very broad-spectrum in nature giving rise to potential problems with secondary pests and resurgence. Implementing action thresholds carefully will maximize profits while minimizing the negative effects of insecticides.

Several years of research have resulted in a modern system of action thresholds for *Lygus* in Arizona cotton. These thresholds, when properly implemented, will return the cost of the insecticide and more, even under the most depressed economic conditions.

The Strategy

There are several important facts to consider: 1) eggs are deposited within plant tissues, do not hatch for about 1 week, and are relatively protected from insecticides; 2) nymphs are relatively susceptible to insecticides, unable to move large distances, and are responsible for the majority of preventable damage in cotton; and 3) adults readily fly in and out of cotton, do less damage than nymphs, and are relatively unaffected by insecticides. Thus, the strategy really becomes focussed squarely on the stage that can be controlled, *nymphs*. Adults, therefore, are important mainly for signalling the potential for a reproducing population within cotton fields.

The Threshold

Information is needed on both adult and nymphal *Lygus* bugs. ***The threshold is defined by the total number of Lygus (15) and the total number of nymphs (4) found in a 100-sweep sample***. As a notational shorthand, we refer to this as the 15/4 level. Also, because the level contains two parts, both criteria must be satisfied in order to have "reached" threshold. Thus, levels (total *Lygus* / total nymphs) such as 12/6, 17/1, 32/0, and 11/5 are all considered below threshold. On the other hand, 17/4 and 21/7 are above threshold. Fundamentally, this means that there must be at least 4 nymphs present per 100 sweeps along with enough adults to total at least 15 *Lygus* per 100 sweeps.

Research was conducted on a series of thresholds in comparison to a *Lygus*-untreated check (Table 1). Sprays were made only once both parts of the threshold were satisfied. In our tests, total numbers of *Lygus* exceeded the '15' level many times. Thus, merely finding 30 or 40 total *Lygus* per 100 sweeps (and no nymphs) should not lead to an overreactive spray decision. Postcounts from this study

Table 1: Pre- and Post-count (~7 DAT) levels of Lygus *bugs for 5 possible thresholds (total* Lygus*/nymphs per 100 sweeps); no. of sprays = 5, 4, 3, 3, 2, & 0; Maricopa, 2000; Ellsworth & Barkley, 2001.*

Target Threshold	Precount Total Lygus / Nymphs per 100		Postcount Total Lygus / Nymphs per 100	
15/0	21.0 / 7.4	a	12.2 / 4.2	ab
15/1	20.0 / 4.5	a	15.0 / 3.3	ab
15/4	**24.3 / 14.3**	**a**	**10.0 / 1.7**	**a**
15/8	24.0 / 12.7	a	9.0 / 1.7	a
15/16	30.5 / 19.5	a	21.0 / 2.5	b
UTC	41.5 / 18.0	a	41.5 / 18.0	c

Means within same column sharing the same letter are not significantly different (P > 0.05; Tukey's).

(Table 1) show that the 15/4 and 15/8 timing reduced *Lygus* numbers the most. Two years' worth of results have been combined to obtain regression relationships between the threshold levels (expressed in nymphs per 100 sweeps) and yield or economics (Fig. 1). Not surprisingly, higher yields occurred when sprays were made for *Lygus*. However, excessive spraying (i.e., lower thresholds) can actually reduce yields! Maximum yields were obtained at the '15/1.7' level. Every producer knows, however, that high yields are a target, but making money is the goal. Placed on an economic scale, maximum net return occurred at the '15/5.7' level. In fact, 99% of the maximum net return was found for a range of 1.9–8.5 nymphs per 100 sweeps. Thus, '15/4' protects yields, moderates sprays, and significantly improves net returns.

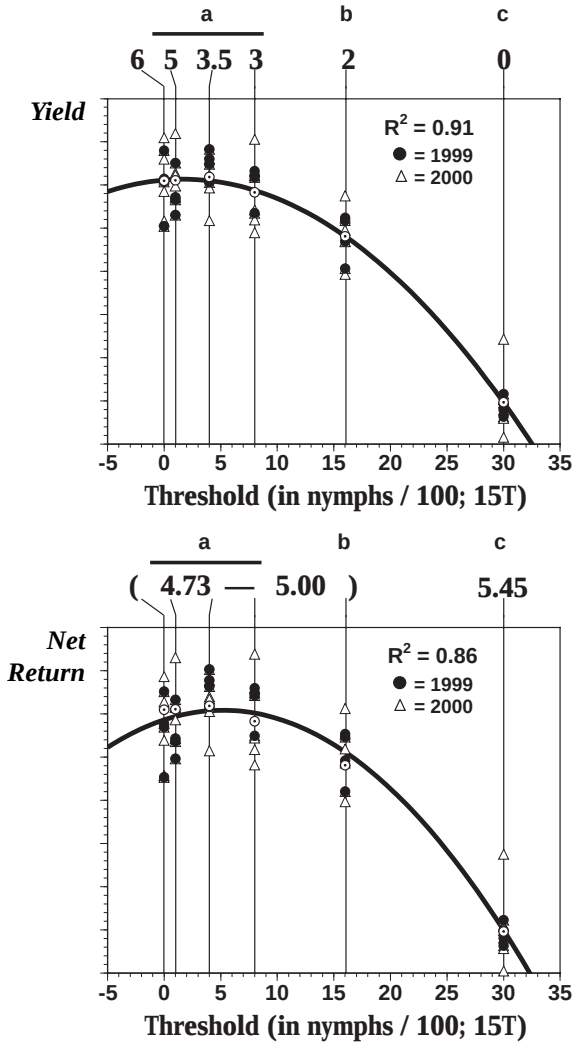

Figure 1: Relationships of normalized yields (top) and net return after Lygus *control costs (bottom) to* Lygus *thresholds (expressed in nymphs per 100 sweeps). Average number of sprays required (top) and micronaire (bottom) appear above each graph.*

Implementing Thresholds

The results are definitive for the conditions under which these tests were conducted. Adjustments will be needed for very early populations (e.g., pre-squaring) and very late populations (e.g., at cut-out). Thus, crop phenology and fruit retention should also be considered when making decisions. Other unknown factors or complications include: natural enemy densities, pest complex, irrigations/rain, and plant populations, to name a few.

To implement this system of action thresholds, follow these steps:

1) Start sweeping cotton as soon as possible, at least weekly;
2) Take 25-sweep samples from no fewer than 4 locations per management unit (shortcuts will lead to errors!);
3) Record the number of nymphs and total *Lygus* per 100 sweeps;
4) Compare your findings to the '15/4' threshold and treat only once there are at least 15 total *Lygus* and 4 nymphs per 100 sweeps. Even then, however, consider your natural enemies, the current pest complex, and fruit retention and damage levels;
5) When addressing *Lygus* as the principal pest, use only recommended materials alone—mixtures are unnecessary—and at higher labelled rates. Under the majority of cases in Arizona, no more than 2 sprays are generally needed;
6) Never ignore the principles of resistance management. Rotate chemistries where possible, and attempt to limit the use of all active ingredients and pyrethroids as a class to no more than 2 uses per season against all pests.

References

Ellsworth, P.C. & V. Barkley. 2001. Cost-Effective *Lygus* Management in Arizona Cotton. *In* J.C. Silvertooth [ed.], Cotton, A CALS Report. Publ. No. AZ1224. University of Arizona, Tucson, AZ. pp. 299–307. *http://ag.arizona.edu/pubs/crops/az1224/az12247j.pdf*

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