

Cotton Field Check

Management Updates from UC Cooperative Extension

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Using Plant Based Measurements to Support Lygus Management Decisions PB Goodell, IPM Advisor

Highlights

1. Lygus is a key pest causing fruit loss through their feeding.
2. Cotton plants cannot produce a boll at every fruiting position because the demand by developing cotton bolls outstrips the plant's capacity.
3. Knowing both the current fruit status and the Lygus population are critical to making the best treatment decision.
4. Important data to be collected and recorded include, number of fruiting branches, percent retention of first position fruit on **BOTTOM** five fruiting branches, percent retention of first position fruit on **TOP** five fruiting branches, and number of Lygus per 50 sweeps.
5. Estimate fruit retention weekly and scout for Lygus twice weekly.
6. Details for Lygus management can be found at www.ipm.ucdavis.edu, click agriculture & floriculture (Pest Management Guidelines) and then Cotton.
7. These data help frame our understanding of the overall fruit status of the field and whether the population of Lygus present is actually a threat

Lygus bugs are key pests to cotton's yield. They damage the plant by feeding on developing fruit structures and causing a loss of fruit. While the plant sheds a major portion of its fruit naturally, Lygus can impact yield and require additional time for compensation to occur.

There is a solid understanding of Acala upland cotton fruiting cycle. While the level of knowledge is not available for Pima cotton, enough similarities exist to allow for reasonable decisions to be made, based on the degree and location of fruit retention.

Understanding how a plant sets fruit and what normal retention levels are expected is a valuable tool in assessing Lygus population densities for management. In Acala upland cotton, tools have been developed to assess the fruit retention pattern and determine if it within expectations.

To do this, four pieces of information are required (refer to Figure 1)

1. the number of **fruiting branches**,
2. the retention of fruit on the first position (FP₁) on the **BOTTOM** five fruiting branches (FB),
3. the retention of fruit on the first position (FP₁) on the **TOP** five fruiting branches and
4. the number of **Lygus per 50 sweeps** from which the plant information was taken.

The number of fruiting branches provides an estimate of the plant's age. Fruit retention on the top five branches is variable depending on the age of the plant. It is important to know the percent of FP₁ fruit retained on the bottom five FBs because this indicates the value of upper fruit in compensating for early loss. Knowing the percent retention of FP₁ on the top of the plant provides us with an indication of current fruit set. These data help frame our understanding of the overall fruit status of the field and whether the population of Lygus present is actually a threat.

Table 1 and Figure 2 provide the levels of square retention a plant is expected to have based on its age (number of fruiting branches). These data are based on high yielding Acala upland cotton. Additional details and instructions and an on-line calculator is also available at UC IPM Cotton Pest Management Guideline web site, www.ipm.ucdavis.edu/PMG/C114/m114sccalcretn.html.

The process works like this: cotton fields are scouted weekly for Lygus and square retention and scouted again for Lygus within the same week. The data collected are averaged for sub sections of the fields where Lygus populations were estimated. Using Table 1, locate the row in which the number of fruiting branches you determined for your field. Find the column that represents the bottom retention from your field site and read the number where the row and column intersect. This figure represents the **expected** retention for those conditions. If your estimated top retention is below this number, your crop is not holding the expected level of fruit. If your estimated fruit retention on top is greater than this figure, the plant is exceeding expectations and Lygus should not need to be managed.

For example, use the schematic cotton plant in Figure 1. Count the number of fruiting branches (10), count the bottom retention (4/5 or 80%) and count the number of positions at FP₁ in the top five fruiting branches (3/5 or 60%), and there were 5 Lygus adults per 50 sweeps. The expected retention on top would be 56%. Since we have 60%, the plant is retaining more fruit than it can be expected to mature and therefore the Lygus population is not yet a threat. However, in this scenario, the field should be watched closely.

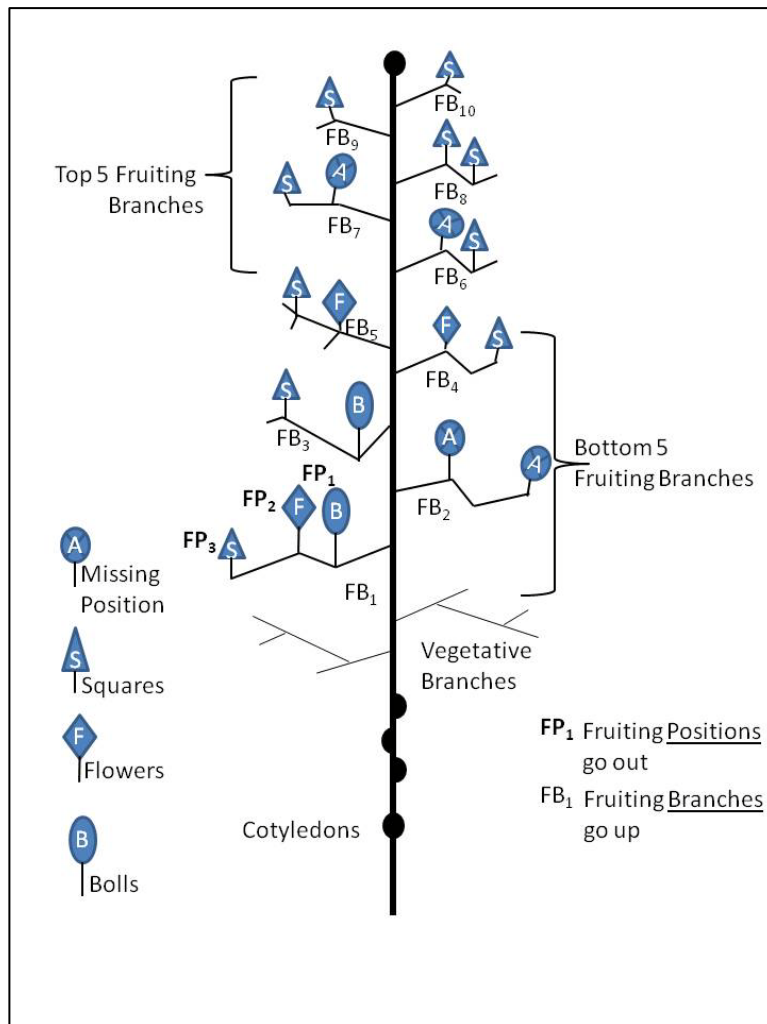


Figure 1. Schematic diagram of cotton plant fruiting structure.

Total Fruiting Branches	Percent retention of the first position fruit on the BOTTOM 5 fruiting branches									
	10	20	30	40	50	60	70	80	90	100
Less than 5	The expected retention of the top 5 first fruiting positions is 73%. The retention on the first fruiting branch is erratic and at least 3 branches should be present before Lygus decisions are made.									
5	73	73	73	73	73	73	73	72	72	71
6	73	73	73	73	73	73	72	72	70	69
7	73	73	73	73	73	72	71	70	68	65
8	73	73	73	73	72	71	69	66	63	60
9	73	73	72	71	70	68	65	62	58	53
10	73	72	71	69	67	65	60	56	51	46
11	71	70	68	66	62	58	54	49	44	39
12	69	67	64	61	56	51	46	41	37	32
13	66	63	59	54	49	44	39	35	30	27
14	61	57	52	47	42	37	33	29	25	22
15	55	50	45	40	35	31	27	24	21	18
16	48	43	38	33	29	25	22	20	18	16
17	40	36	31	28	24	21	19	17	15	14
18	34	29	26	23	20	18	16	14	13	12
19	28	24	21	19	17	15	14	13	12	11
20	23	20	18	16	15	13	12	11	11	10

Table 1. Expected retention (%) of the first position fruit on the TOP five fruiting branches for Acala upland cotton. Source: UC IPM Cotton Pest Management Guidelines

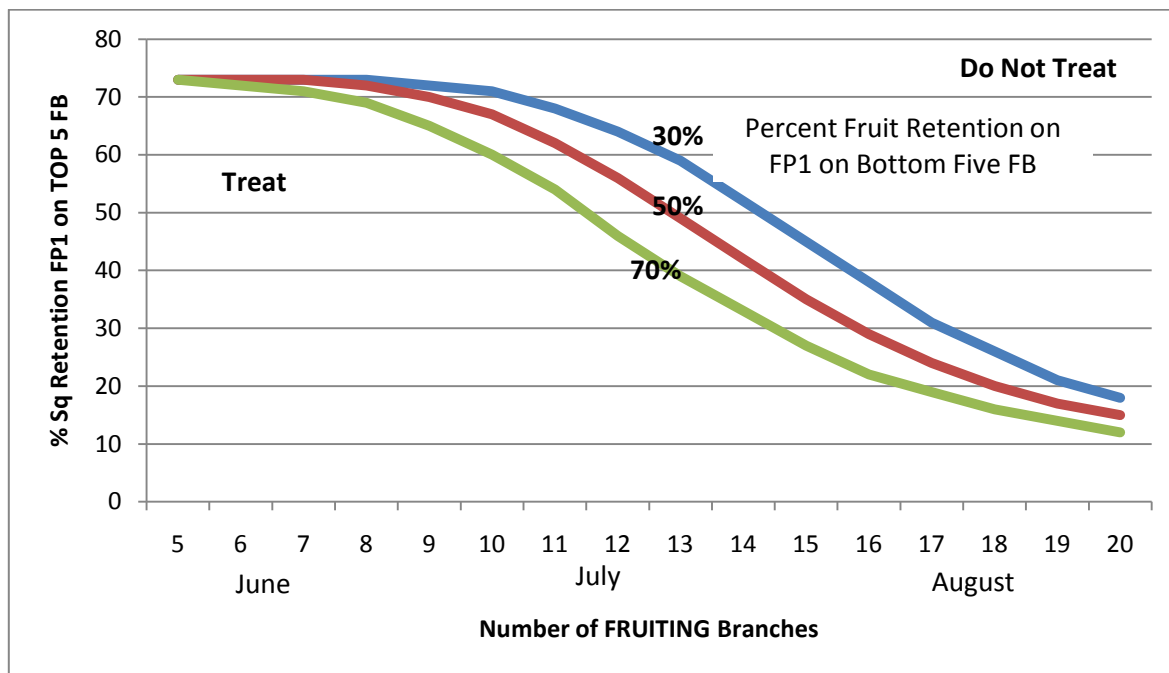


Figure 2 illustrates the same information as Table 1 but displays only three columns of bottom retention, 30%, 50% and 70%.

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Cotton—Fruit Retention and Lygus Monitoring

Supplement to UC IPM Pest Management Guidelines: Cotton

To determine if treatment is needed for lygus, sample both fruit/square retention and lygus populations in the field. If fruit/square retention is lower than expected and lygus are above treatment thresholds, treatment is needed.

Directions:

Lygus Monitoring

Always use a standard sweep net with a diameter of 15 inches (37.5 cm). One sample consists of 50 sweeps across a single row of cotton. Take one sample in each quadrant of the field in fields that are up to 8 acres (32 ha). Take more samples in larger fields.

1. Walk briskly down the row and swing the net in front of you so that the lower edge of the rim strikes the plants about 10 inches (25 cm) from the top.
 - Keep the lower tilted edge slightly ahead of the upper edge.
 - Keep the sweeps far enough apart that you do not sweep plants that have already been jostled by the net.
 - Sweeps that are too closely spaced may cause lygus to fly or drop from the plants and thus be missed.
 - Keep the net moving to prevent adults from flying out.
2. After each set of 50 sweeps, count all the lygus bugs in the net, including nymphs, and record the total number below. Average the samples to follow the lygus population over the course of the season.
 - Be sure not to confuse aphids or bigeyed bug nymphs with small lygus bugs.
3. Stop monitoring lygus when:
 - Acala has 5 nodes above white flower (NAWF)
 - Pima has 3.5 NAWF

Fruit Retention Monitoring

1. Randomly select 5 plants from each quadrant of your field.
2. Count the number of first position squares on the **top 5** mainstem nodes and record.
3. Count the number of retained fruit in the first position on the **bottom 5** fruiting branches and record. (Until 10 fruiting branches are available, there will be an overlap between the top 5 and the bottom 5 nodes).
4. Count the number of fruiting branches and record. Total all columns.
5. After the plant has developed more than 10 fruiting branches, you can stop counting fruit on the bottom fruiting branches if the average boll retention remains constant for two weeks in a row. You can use this retention level for the rest of the season.
6. Calculate average percent retention and compare to the expected value derived from the table (p. 2).

Field _____ Date _____

Quadrant	Number of lygus per 50 sweeps		Plant	Number of first position fruit (Top 5 nodes)	Number of first position fruit (Bottom 5 nodes)	Number of fruiting branches
	Adults	Nymphs				
1			1			
			2			
			3			
			4			
			5			
2			6			
			7			
			8			
			9			
			10			
3			11			
			12			
			13			
			14			
			15			
4			16			
			17			
			18			
			19			
			20			
Total						
Average						

Cotton—Fruit Retention and Lygus Monitoring Calculations and Thresholds

Field _____ Date _____

1. Calculations:

Fruit retention monitoring:

a. Determine the average percent of fruit retained in the top 5 nodes:

Total 1st position fruit retained
 _____ on the **top 5** nodes X 100% = _____
 20 plants X 5 nodes

Example:
 Average percent of fruit retained in the **top 5** nodes, if the total first position fruit obtained for the **top 5** nodes is 60:
 _____ 60 total fruit = 0.6 X 100% = 60% average fruit retention
 20 plants X 5 nodes

b. Determine the average percent of fruit retained in the bottom 5 nodes:

Total 1st position fruit retained
 _____ on the **bottom 5** nodes X 100% = _____
 20 plants X 5 nodes

2. Determine if the percent fruit retention in the **top 5** fruiting branches is at, above, or below the expected value. In the table (or using the Web calculator), find the intersection of your sampled number of fruiting branches (from p. 1) and percent fruit retention on the first position of **bottom 5** fruiting branches (b above). This is the expected fruit retention of the **top 5** fruiting branches.

Expected retention (%) of the first position on the top 5 fruiting branches, from data for Acala cotton.

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17	40	36	31	28	24	21	19	17	15	14
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20	23	20	18	16	15	13	12	11	11	10

Treatment thresholds and how to interpret monitoring results:

Treatment may be warranted if:

- square/fruit retention is **lower** than expected AND
- the average number of lygus per sample is:
 - Early squaring: 2 to 4 lygus per 50 sweeps
 - Midsquaring (bloom): 7 to 10 lygus (with at least 1 nymph) per 50 sweeps
 - Late squaring (boll filling): more than 10 lygus (including at least one nymph) per 50 sweeps

