

# **EVALUATION OF FOUR COMMONLY USED METHODS OF TIMING THE APPLICATION OF HARVEST AID PRODUCTS**

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## **Abstract**

Several methods of timing the application of harvest aid products are used in the industry. The most common methods are sixty-percent open and four nodes above cracked boll. Two less common methods are the Cotman and Lewis methods. These were evaluated for three years. The third year four trials were conducted using irrigated and dryland on both normal and high nitrogen conditions. The general order of application was Cotman followed by the Lewis method. Then the four nodes above cracked boll followed the sixty-percent open method. In 1999 all methods were ready on the same day. In 2000 the high nitrogen irrigated field did not cutout until late August. The Cotman rule is that if cutout is after the date that a flower has a fifty-percent chance of maturing then that date is used for starting the DD60 count. The later defoliantes were applied resulted in increased lint yields and higher micronaire values. The micronaire was 5.0 or greater four times out of six when the four nodes above cracked boll was used. The sixty-percent method resulted in a micronaire value of 5.0 or greater one half of the time. The Cotman and Lewis methods had a micronaire value of 5.0 or greater only one time out of six. Since the Lewis method was later than Cotman, it had the higher lint yield. The reduction in lint production by the Lewis method as compared to sixty-percent open was more than offset by the increased value of the lint due to the elimination of micronaire marketing penalties. The Lewis method protected the micronaire and lint yield better than any of the other methods.

## **Introduction**

Proper timing of the application of harvest aid products is very important. When a crop is defoliated prematurely the yield is reduced. However a late defoliation will expose the crop to unnecessary risk of bad weather, which can reduce grades and interfere with harvest. The most popular method is to defoliate when sixty percent of the harvestable bolls are open. If there is a zone of missing bolls, such as when aphids have been a problem, then the effectiveness of this method is distorted.

When the top open boll is within four nodes of the top harvestable boll method is another common method of timing defoliant application. The top harvestable boll can be difficult to determine. It is easy to count bolls that are immature and one is hoping will mature.

The Cotman computer program, developed by Cotton Incorporated and the University of Arkansas, uses 850 DD60's after the crop has cutout (blooms within five nodes from the top of the plant) as the time to apply harvest aid products. A DD60 is the value obtained by subtracting sixty from the average temperature for the day. If the number is negative then the value is zero. When the total DD60's after cutout reaches 850, it is time to apply harvest aid products. If the crop does not cutout until after the date that a boll has at least a fifty percent chance of opening occurs then the date determines when to start counting DD60's.

The fourth method used to time defoliation is the Lewis method. It is based upon the micronaire of the four bottom first position bolls. If the micronaire of these bolls is high then the crop may need to be defoliated before it is sixty-percent open. This will stop further development of the unopened bolls and the micronaire of the entire crop will be less than 5.0 and thus avoiding a discount for high micronaire. The reduced micronaire of the upper bolls reduces the average for the entire plant. The intent of the method is to maximize yield and protect the micronaire. The method does require a hand gin to prepare the sample and access to a micronaire tester.

## **Materials and Methods**

These methods of defoliation timing were compared for three years at the Delta Center in Portageville, Missouri. Stoneville 474 was the variety used. The experimental design was a randomized complete block with four replications. A Schweiss high clearance sprayer was used to apply the harvest aid products. One application of 1.5 pt. Prep, 12oz. Def, and 8 oz. Harvade was applied. Twenty-two pounds of pressure and fifteen gallons of water were used. The trials were harvested with a Case International two-row picker. The samples were ginned on a twenty saw Continental gin stand preceded by an inclined cleaner and a feeder extractor followed by one stage on lint cleaning. Samples were graded on a high volume instrument. In 1998 and 1999 the fields were both irrigated. In 2000 four fields were tested, two were irrigated and two were

non-irrigated. Normal rates of nitrogen were used except one irrigated and one dryland test were in a field following soybeans and the cotton grows very tall and rank.

### Results and Discussion

In 1999 all of these methods called for defoliation on the same day. In 1998 and 2000 the 850DD60 method was first, followed by the Lewis method, then four nodes above cracked boll, followed the sixty-percent open method as the latest. Other than in 1999 the only exception to this order was the high nitrogen irrigated field where cutout was in late August. Cutout is preferred to be on or before August 10 for this area since this is the date a flower has a fifty-percent chance of making. When cutout is late the calendar rule for Cotman takes over and August 10 is the date that is used for starting the count for the 850 DD60's. Yield averages were ranked in the order of defoliation with the latest defoliation producing the highest yield. Micronaire increased as the defoliation date was delayed. Four nodes above cracked boll gave an average micronaire of 4.91, which appears to be ideal. However four times out of six the micronaire was at least 5.0, thus receiving a price discount. The sixty-percent open method produced a micronaire of at least 5.0 in one half of the trials. The Cotmaand Lewis methods produced a high micronaire reading only one time out of six. The Lewis method had a higher average lint yield than the Cotman method thus generating the most revenue. Considering the yield and protection of micronaire the Lewis method appeared to be superior for achieving the maximum revenue.

### Summary

Of the four methods of timing harvest aid application, the Lewis method was superior since it produced the maximum income per acre. Usually it was after the Cotman method but earlier than sixty percent open or four nodes above cracked boll.

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### References

Lewis, Hal. 1993. Proc. of the 1993 Research meeting and 1993 Summary of Cotton Research in Progress. Arkansas Agri. Exp. Station Special Report 162. Pp. 39-46.

Table 1. Average lint yield over all years.

| <u>Average</u> | <u>Lint Yield</u> |
|----------------|-------------------|
| Cotman         | 820 lb            |
| Lewis          | 836 lb            |
| 60% open       | 877 lb            |
| 4 NACB         | 880 lb            |

Table 2. Average micronaire over all years.

| <u>Average</u> | <u>Micronaire</u> |
|----------------|-------------------|
| Cotman         | 4.65              |
| Lewis          | 4.77              |
| 60% open       | 4.85              |
| 4 NACB         | 4.91              |

Table 3. 1998 defoliation timing results.

|          | <u>Date</u> | <u>Yield</u> | <u>Mike</u> |
|----------|-------------|--------------|-------------|
| Cotman   | 9-30        | 611          | 4.8         |
| Lewis    | 10-14       | 597          | 5.14        |
| 60% open | 10-14       | 654          | 5.2         |
| 4 NACB   | 10-21       | 722          | 5.17        |

Table 4. 1999 defoliation timing results.

|           | <u>Date</u> | <u>Yield</u> | <u>Mike</u> |
|-----------|-------------|--------------|-------------|
| Cotman    | 9-20        |              |             |
| Lewis 60% | 9-20        | 758          | 4.02        |
| 60% open  | 9-20        |              |             |
| 4 NACB    | 9-20        |              |             |

Table 5. Results of 2000: High nitrogen and irrigated.

|                     | <b>Date</b> | <b>Yield</b> | <b>Mike</b> |
|---------------------|-------------|--------------|-------------|
| Cotman              | 10-18       | 1006         | 5.04        |
| Lewis 60%           | 10-5        | 1015         | 4.95        |
| 60% open            | 10-5        | 993          | 4.97        |
| 4 NACB              | 10-18       | 1040         | 5.15        |
| 849 DD60's on 10-16 |             |              |             |

Table 6. Results of 2000: High nitrogen and dryland.

|           | <b>Date</b> | <b>Yield</b> | <b>Mike</b> |
|-----------|-------------|--------------|-------------|
| Cotman    | 9-14        | 703          | 4.9         |
| Lewis 40% | 9-14        | 705          | 4.85        |
| 60% open  | 9-22        | 778          | 5.13        |
| 4 NACB    | 9-28        | 778          | 5.18        |

Table 7. Results of 2000: Std. Nitrogen and irrigated.

|           | <b>Date</b> | <b>Yield</b> | <b>Mike</b> |
|-----------|-------------|--------------|-------------|
| Cotman    | 9-21        | 914          | 4.7         |
| Lewis 50% | 9-22        | 901          | 4.73        |
| 60% open  | 9-27        | 942          | 4.78        |
| 4 NACB    | 9-29        | 920          | 4.89        |

Table 8. Results of 2000: Std. nitrogen and dryland.

| <b>Std. Nitrogen, Dryland, 10-1</b> |             |              |             |
|-------------------------------------|-------------|--------------|-------------|
|                                     | <b>Date</b> | <b>Yield</b> | <b>Mike</b> |
| Cotman                              | 9-7         | 926          | 4.45        |
| Lewis 40%                           | 9-14        | 1043         | 4.93        |
| 60% open                            | 9-21        | 1135         | 5           |
| 4 NACB                              | 9-22        | 1059         | 5.05        |

Table 9. Number of times lint would receive a penalty in six trials.

| <b>Mike greater than 4.9</b> |              |
|------------------------------|--------------|
| Cotman                       | 1 time over  |
| Lewis                        | 1 time over  |
| 60% Open                     | 3 times over |
| 4 NACB                       | 4 times over |

Table 10. Increase income due to use of Lewis Method.

**Lewis Method**

\*836 lbs/Ac X 52.3 cents=\$437.23/Ac

**60% Open**

\*877 lbs/Ac X (52.3 cents – 4.25 cents/lbs discount)=\$421.40/Ac

**In Conclusion—The 60% open had a 41 lbs per Acre yield increase, but after mike discounts The Lewis Method made \$15.83 more per acre.**