# 2011 UGA Cotton Defoliant Evaluation Program
## Midville Location

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### Field Description
This trial was conducted at the University of Georgia Southeast Research and Education Center in Midville, Ga. The site was an irrigated field planted in late May. Crop condition and plant maturity was assessed four days prior to defoliation, on October 3, 2011 (Figure 1). Leaves on the majority of plants were relatively mature, with very few juvenile leaves throughout the field. Most leaves had begun to senesce naturally. Little to no sign of juvenile regrowth in the terminal was present; however, a small percentage of plants had begun to produce juvenile regrowth in the basal region.

Plant growth and maturity information was collected from 30 randomly selected plants in the trial (Figure 1). Cotton height averaged 50 inches, and ranged from 46 to 54 inches. The total number of bolls per plant ranged from eight to 19, and averaged 13. The percentage of bolls that were open averaged 84 percent and ranged from 70 to 93 percent. Nodes above cracked boll ranged from one to four, with an average of 2.3. Examination of unopened bolls indicated significant maturity for defoliation and boll opening (well-developed seed, dark seed coat and mature fiber). As a reference, cotton harvested from research in this 3-acre field averaged more than 1,500 pounds of lint per acre.

Defoliation applications (product selection and rate) were determined by manufacturers and were based on crop condition and weather forecast. The forecast for the week following defoliation indicated daytime temperatures reaching the low 80s and nighttime temperatures falling to the low 50s. The forecast also indicated a 40 to 60 percent chance for precipitation four to six days after application.

### Trial Description
Defoliants were applied on the morning of October 7, 2011. All treatments were applied using a $CO_2$-pressurized backpack sprayer equipped with DG 11002 VS flat fan nozzles, and calibrated to deliver 15 GPA at 3 mph. The trial consisted of 14 different defoliation treatments and a non-treated check. Plots consisted of four cotton rows approximately 30 feet in length (middle two rows of each plot were sprayed). Treatments were arranged in a randomized complete block design with four replications. Visual assessments of percent open bolls, percent defoliation, percent desiccation and percent regrowth were estimated at 7, 14 and 21 days after treatment (DAT). Data were subjected to ANOVA using the PROC MIXED procedure of Statistical Analysis System (SAS). Means were separated with Fisher's Protected LSD at $P \leq 0.10$.

## Weather Prior to and Following Defoliation

Due to crop maturity and weather conditions during this trial, results should represent late-season defoliant performance. Daytime high temperatures reached only the low- to mid-80s and nighttime lows were generally at or below 60º F (Figure 2).

During the first week following defoliation, rainfall events occurred between three to six DAT, totaling approximately 2 inches (Figure 3). Another 0.5 inch of rainfall occurred between 11 and 12 DAT. These rainfall events likely created favorable conditions for regrowth.

**Figure 1.** Images of cotton at trial site taken on October 3, 2011 -- four days prior to defoliation.

Daytime high temperatures fluctuated after defoliation, yet only reached into the 80s between eight and 11 DAT. Low temperatures rose slightly immediately after defoliation (reaching the 60s three to six DAT), yet fell over the rest of the evaluation period (down into the low 50s by eight DAT and into the 40s by nine DAT).

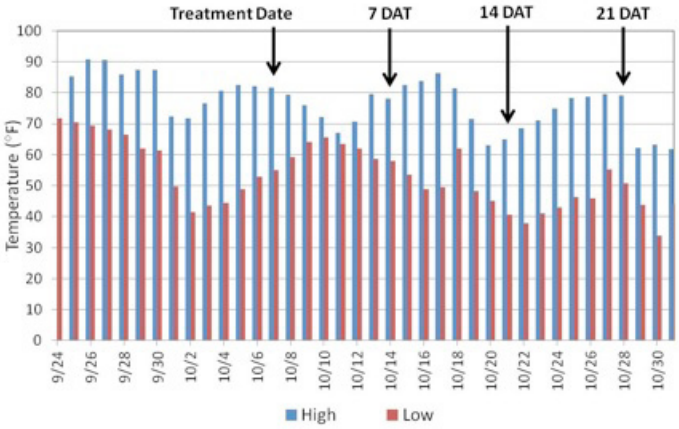


**Figure 2.** High and low temperatures at the Midville site during the experiment in 2011.

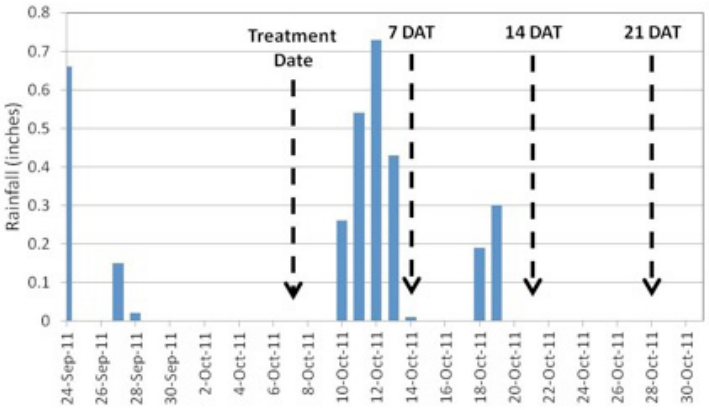


**Figure 3.** Rainfall events and daily amounts at the Midville site during the experiment in 2011.

## Defoliant Performance

**Percent Open Boll** - In this trial, only minor differences in percent open boll were observed between treatments, likely due to the high percentage of open bolls present at time of defoliation and because all defoliant applications contained an ethephon product. Cotton in all treated plots was at least 92 percent open by 7 DAT (compared to 89 percent open in the non-treated check). All treatments had at least 98 and 100 percent open bolls at 14 DAT and 21 DAT, respectively. Although no treatments were included for comparison, ethephon products have demonstrated the ability to aid removal of mature leaves and potentially enhance the effectiveness of other defoliants, even if little to no boll opening activity is needed.

**Defoliation** - As expected, differences between defoliant treatments were largest at seven DAT and defoliation ratings ranged from 17 to 77 percent, and averaged 58 percent across all treatments. Performances among treatments were due to several factors. Treatments containing a tribufos product or ET provided at least 70 percent defoliation. Also, higher rates of tribufos products improved defoliation, whereas treatments containing 8, 12 and 16 ounces of a tribufos product defoliated cotton at 67, 73 and 77 percent, respectively. The inclusion of, or increased rates of, thidiazuron-containing products to mixtures also generally appeared to improve defoliation at seven DAT.

Defoliation improved at varying rates between seven and 14 DAT among treatments and results were less variable. By 14 DAT, all but two treatments were at least 89 percent defoliated (average defoliation across all treatments was 90 percent). Highest defoliation ratings at 14 DAT were generally associated with higher rates of thidiazuron + diuron or thidiazuron products.

Defoliation did not greatly improve between 14 and 21 DAT, and ratings generally didn't vary more than 5 percent between 14 and 21 DAT. Similar to ratings at 14 DAT, cotton in all but two treatments were at least 88 percent defoliated at 21 DAT.

**Desiccation** - In general (averaged across all treatments), desiccation was highest seven DAT and was lower at each subsequent rating. At seven DAT, average desiccation was 6.3 percent and only four treatments had desiccation ratings higher than 6 percent (desiccation was at least 12 percent in treatments containing ET). Treatments with tribufos products also had increased desiccation at seven DAT (4 to 6 percent). By 14 DAT, desiccation in all treatments was below 8 percent, and all but two treatments had desiccation ratings lower than 6 percent. At 21 DAT, desiccation was below 5 percent in all treatments and little difference was observed between any treatments.

**Regrowth** - In this trial, regrowth (both basal and terminal) became evident by seven DAT and became more prevalent with time (2.8, 7.2 and 18.3 percent average regrowth across all treatments at seven, 14 and 21 DAT, respectively). At all rating intervals the presence (or absence) of a thidiazuron product in a specific treatment impacted level of regrowth. At seven DAT, the only treatments that did not specifically contain a thidiazuron product had regrowth rated above 2.5 percent. By 14 DAT, all four treatments without a thidiazuron product were the only applications that had regrowth rated above 8 percent. Regrowth was most noticeable 21 DAT, but again the presence of a thidiazuron product generally related to reduced regrowth. In this specific trial, the rate of a particular thidiazuron product did not relate to improved regrowth suppression (Figure 4 and Figure 5), yet it should be noted that in many cases, higher rates of these products have been associated with additional regrowth suppression.

**Figure 4.** Images of basal (left) and terminal (right) regrowth at 21 DAT.

**Figure 5.** Images of cotton with little to no regrowth at 21 DAT.

The effectiveness of any particular defoliation strategy is very difficult to predict, even among experienced agronomists. The sheer number of products, rates and potential tank-mixtures also makes specific decisions difficult. This trial demonstrated the effectiveness of 14 defoliation treatments that were tested at this location in these conditions, and although specific differences were noted amongst performances, be aware that each case (crop condition and weather) may result in entirely different results. Therefore, growers should realize that harvest aid performance can be highly variable and unpredictable, and dependent upon crop and environmental conditions at timing of application and thereafter.

Because of the many product, rate and tank-mixture combinations currently available, the ability to identify relative efficacies of products with regard to their ability to remove leaves (mature and/or juvenile) and open bolls and prevent regrowth will greatly help in decision making. Please consult your local UGA county Extension agent for help in making specific defoliant decisions and for more information on specific defoliant performance.

One additional thing to consider, and not included in this report, is cost. Although performance is the primary parameter from which decisions should be made, the costs of a defoliant mixture should be considered to determine the value of specific products vs. their potential benefit. As always, consult the label of any harvest aid product regarding directions for use, rates and safety information.

The photos below the table illustrate defoliant performance in one replication taken at 14 days after treatment. Treatment numbers correspond to treatments listed in the data table.

| | Treatment | Application Rate | % Open Boll | | | % Defoliation | | | % Dessication | | | % Regrowth | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 7 DAT | 14 DAT | 21 DAT | 7 DAT | 14 DAT | 21 DAT | 7 DAT | 14 DAT | 21 DAT | 7 DAT | 14 DAT | 21 DAT |
| 1 | Non-Treated Control | ----- | 89 g | 96 e | 100 a | 0 h | 0 i | 0 h | 0.0 e | 0.0 e | 0.0 f | 9.0 a | 20.8 a | 41.3 a |
| 2 | CutOut | 6.4 fl oz/a | 92 fg | 99 ab | 100 a | 45 e | 91 def | 95 abc | 2.8 b-e | 4.3 bc | 3.8 ab | 1.5 cd | 2.3 fg | 3.8 g |
| | SuperBoll | 32 fl oz/a | | | | | | | | | | | | |
| 3 | CutOut | 8 fl oz/a | 95 abc | 100 a | 100 a | 56 d | 95 a-d | 96 ab | 1.0 de | 2.0 de | 1.8 c-f | 1.8 cd | 3.5 efg | 11.3 ef |
| | SuperBoll | 32 fl oz/a | | | | | | | | | | | | |
| 4 | Aim | 1 fl oz/a | 93 c-f | 98 cd | 100 a | 17 g | 58 h | 39 g | 0.5 e | 2.0 de | 2.3 b-e | 4.8 b | 14.5 b | 33.8 b |
| | ethephon (6 lb ai/gal) | 24 fl oz/a | | | | | | | | | | | | |
| | NIS | 0.25 % v/v | | | | | | | | | | | | |
| 5 | tribufos (6 lb ai / gal) | 16 fl oz/a | 93 c-f | 99 bcd | 100 a | 77 a | 92 c-f | 88 e | 5.3 bc | 4.3 bc | 2.5 b-e | 5.0 b | 17.0 b | 32.5 bc |
| | ethephon (6 lb ai/gal) | 24 fl oz/a | | | | | | | | | | | | |
| | NIS | 0.25 % v/v | | | | | | | | | | | | |
| 6 | Aim | 0.5 fl oz/a | 94 b-f | 99 ab | 100 a | 30 f | 78 g | 73 f | 1.8 cde | 7.8 a | 3.8 ab | 2.5 c | 4.0 efg | 13.8 e |
| | thidiazuron (4 lb ai/gal) | 1.6 fl oz/a | | | | | | | | | | | | |
| | ethephon (6 lb ai/gal) | 24 fl oz/a | | | | | | | | | | | | |
| | NIS | 0.25 % v/v | | | | | | | | | | | | |
| 7 | tribufos (6 lb ai / gal) | 8 fl oz/a | 93 def | 98 cd | 100 a | 66 bc | 90 ef | 91 cde | 5.8 b | 3.3 cd | 2.3 b-e | 0.8 d | 5.3 def | 12.5 e |
| | thidiazuron (4 lb ai/gal) | 1.6 fl oz/a | | | | | | | | | | | | |
| | ethephon (6 lb ai/gal) | 24 fl oz/a | | | | | | | | | | | | |
| | NIS | 0.25 % v/v | | | | | | | | | | | | |
| 8 | Adios | 6.4 fl oz/a | 93 c-f | 99 abc | 100 a | 37 f | 89 f | 92 b-e | 0.0 e | 6.3 ab | 2.5 b-e | 1.3 cd | 2.5 fg | 5.8 g |
| | Ethephon 6 | 32 fl oz/a | | | | | | | | | | | | |
| 9 | Adios | 8 fl oz/a | 94 a-e | 99 ab | 100 a | 63 cd | 96 ab | 95 abc | 4.3 bcd | 1.3 de | 1.3 def | 1.8 cd | 2.3 fg | 4.8 g |
| | Ethephon 6 | 32 fl oz/a | | | | | | | | | | | | |
| 10 | Folex | 8 fl oz/a | 96 a | 100 a | 100 a | 67 bc | 95 a-d | 95 abc | 4.8 bc | 3.0 cd | 3.3 abc | 1.5 cd | 1.8 g | 13.0 e |
| | ethephon (6 lb ai/gal) | 21 fl oz/a | | | | | | | | | | | | |
| | thidiazuron (4 lb ai/gal) | 2 fl oz/a | | | | | | | | | | | | |
| 11 | Folex | 12 fl oz/a | 95 abc | 99 ab | 100 a | 73 ab | 96 a | 98 a | 6.3 b | 4.3 bc | 1.0 ef | 2.0 cd | 2.0 g | 7.5 fg |
| | ethephon (6 lb ai/gal) | 24 fl oz/a | | | | | | | | | | | | |
| | thidiazuron (4 lb ai/gal) | 2 fl oz/a | | | | | | | | | | | | |
| 12 | ET | 1.5 fl oz/a | 92 ef | 98 d | 100 a | 68 bc | 92 def | 95 abc | 16.0 a | 4.5 bc | 3.3 abc | 2.3 cd | 8.3 cd | 25.0 d |
| | ethephon (6 lb ai/gal) | 32 fl oz/a | | | | | | | | | | | | |
| | COC | 0.5 % v/v | | | | | | | | | | | | |
| 13 | ET | 1.36 fl oz/a | 95 a-d | 100 a | 100 a | 70 abc | 94 a-e | 95 abc | 14.5 a | 4.3 bc | 4.5 a | 2.3 cd | 8.3 cd | 15.5 e |
| | Private | 1.21 fl oz/a | | | | | | | | | | | | |
| | ethephon (6 lb ai/gal) | 32 fl oz/a | | | | | | | | | | | | |
| | COC | 0.5 % v/v | | | | | | | | | | | | |
| 14 | Private | 1.6 fl oz/a | 95 abc | 99 bcd | 100 a | 73 ab | 92 b-f | 89 de | 12.5 a | 5.0 bc | 3.0 a-d | 2.5 c | 9.5 c | 28.8 cd |
| | ethephon (6 lb ai/gal) | 32 fl oz/a | | | | | | | | | | | | |
| | COC | 0.5 % v/v | | | | | | | | | | | | |
| 15 | Private | 1.5 fl oz/a | 96 ab | 99 ab | 100 a | 76 a | 96 abc | 93 bcd | 12.5 a | 3.0 cd | 3.3 abc | 2.3 cd | 5.8 de | 25.5 d |
| | ethephon (6 lb ai/gal) | 32 fl oz/a | | | | | | | | | | | | |
| | COC | 0.5 % v/v | | | | | | | | | | | | |
| | LSD (P=.10) | | 2.3 | 0.9 | 0 | 7.3 | 3.9 | 5.2 | 3.69 | 2.19 | 1.98 | 1.69 | 3.22 | 4.42 |

The following photographs were taken 14 days after treatment. Treatment number represents the particular defoliation applications made in the table on the previous page.







Treatment 7


Treatment 8


Treatment 9


Treatment 10


Treatment 11


Treatment 12




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