



The University of Georgia

Cooperative Extension

College of Agricultural and Environmental Sciences

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2011 UGA COTTON DEFOLIANT EVALUATION PROGRAM (Midville Location)

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 8 to 19, and averaged 13. The percentage of bolls which were open averaged 84% and ranged from 70 to 93%. Nodes above cracked boll ranged from 1 to 4, 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 over 1500 lbs. 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 80's and nighttime temperatures falling to the low 50's. The forecast also indicated a 40 to 60% 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 CO₂-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 4 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 $P \leq 0.10$.

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



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 80's and nighttime lows were generally at or below 60° 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" of rainfall occurred between 11 and 12 DAT. These rainfall events likely created favorable conditions for regrowth.

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

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

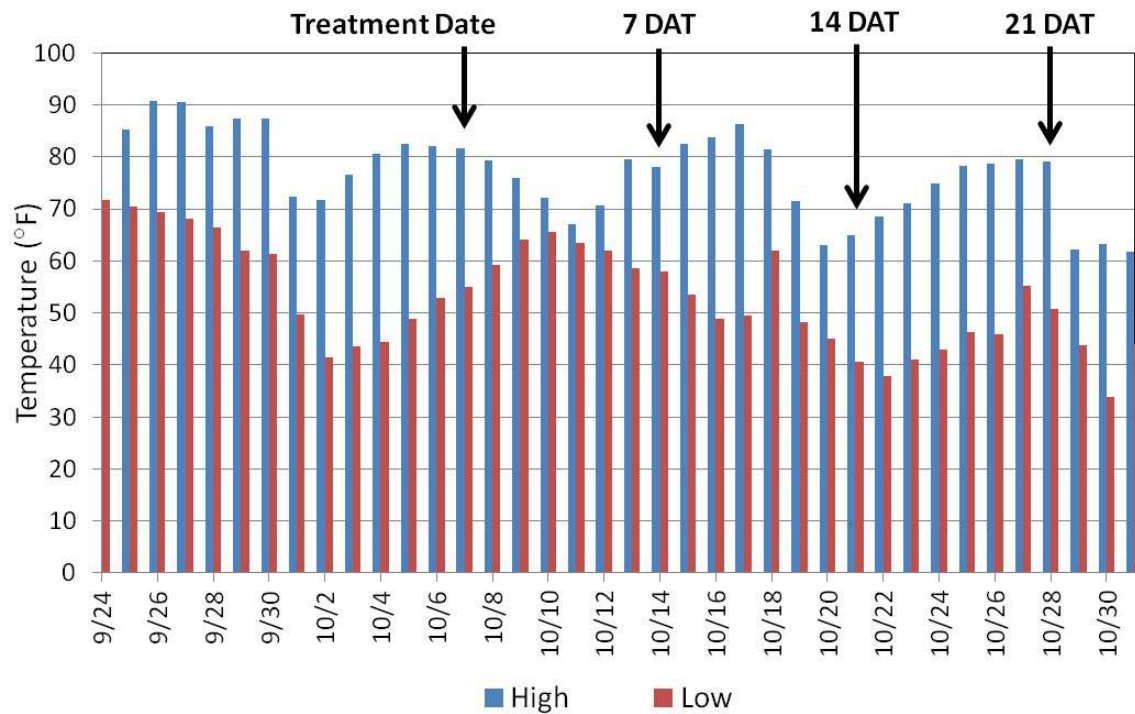
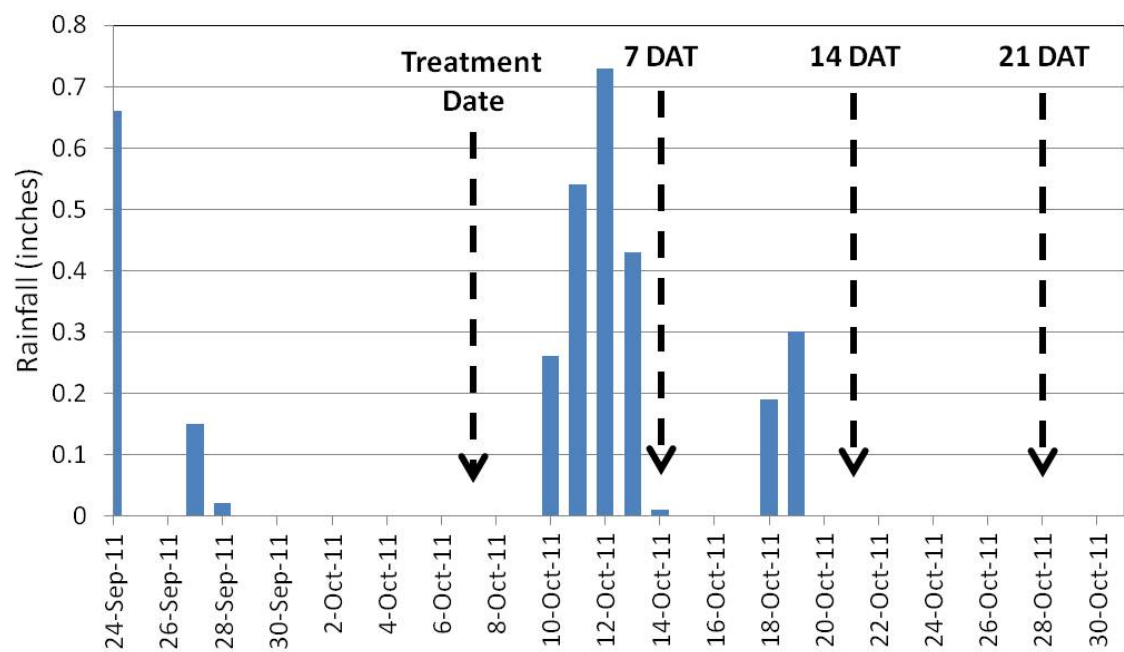


Figure 3. Rainfall events and daily amounts at the Midville site during the experiment in 2011.



DEFOLIANT PERFORMANCE - Table of Results on Page 7

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 were at least 92% open by 7 DAT (compared to 89% open in the non-treated check). All treatments had at least 98 and 100% 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 7 DAT and defoliation ratings ranged from 17 to 77%, and averaged 58% across all treatments. Performances among treatments were due to several factors. Treatments containing a tribufos product or ET provided at least 70% defoliation. Also, higher rates of tribufos products improved defoliation, whereas treatments containing 8, 12, and 16 oz of a tribufos product defoliated cotton at 67, 73, and 77%, respectively. The inclusion of, or increased rates of, thidiazuron containing products to mixtures also generally appeared to improve defoliation at 7 DAT.

Defoliation improved at varying rates between 7 and 14 DAT among treatments and results were less variable. By 14 DAT, all but two treatments were at least 89% defoliated (average defoliation across all treatments was 90%). 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% between 14 and 21 DAT. Similar to ratings at 14 DAT, cotton in all but two treatments were at least 88% defoliated at 21 DAT.

Desiccation - In general (averaged across all treatments), desiccation was highest 7 DAT and was lower at each subsequent rating. At 7 DAT, average desiccation was 6.3% and only four treatments had desiccation ratings higher than 6% (desiccation was at least 12% in treatments containing ET). Treatments with tribufos products also had increased desiccation at 7 DAT (4 to 6%). By 14 DAT, desiccation in all treatments was below 8%, and all but two treatments had desiccation ratings lower than 6%. At 21 DAT, desiccation was below 5% in all treatments and little difference was observed between any treatments.

Regrowth - In this trial regrowth (both basal and terminal) became evident by 7 DAT and became more prevalent with time (2.8, 7.2, and 18.3% average regrowth across all treatments at 7, 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 7 DAT, the only treatments which did not specifically contain a thidiazuron product had regrowth rated above 2.5%. By 14 DAT, all four treatments without a thidiazuron product were the only applications which had regrowth rated above 8%. 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 which 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, unpredictable, and dependent upon crop and environmental conditions at timing of application and thereafter.

Because of the many product, rate, tank-mixture combinations currently available, the ability to identify relative efficacies of products with regards to their ability to remove leaves (mature and/or juvenile), 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, was 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 on page 7.

1 7 8 5

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 SuperBoll	6.4 fl oz/a 32 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
3 CutOut SuperBoll	8 fl oz/a 32 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
4 Aim ethephon (6 lb ai/gal) NIS	1 fl oz/a 24 fl oz/a 0.25 % v/v	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
5 tribufos (6 lb ai / gal) ethephon (6 lb ai/gal) NIS	16 fl oz/a 24 fl oz/a 0.25 % v/v	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
6 Aim thidiazuron (4 lb ai/gal) ethephon (6 lb ai/gal) NIS	0.5 fl oz/a 1.6 fl oz/a 24 fl oz/a 0.25 % v/v	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
7 tribufos (6 lb ai / gal) thidiazuron (4 lb ai/gal) ethephon (6 lb ai/gal) NIS	8 fl oz/a 1.6 fl oz/a 24 fl oz/a 0.25 % v/v	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
8 Adios Ethephon 6	6.4 fl oz/a 32 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
9 Adios Ethephon 6	8 fl oz/a 32 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
10 Folex ethephon (6 lb ai/gal) thidiazuron (4 lb ai/gal)	8 fl oz/a 21 fl oz/a 2 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
11 Folex ethephon (6 lb ai/gal) thidiazuron (4 lb ai/gal)	12 fl oz/a 24 fl oz/a 2 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
12 ET ethephon (6 lb ai/gal) COC	1.5 fl oz/a 32 fl oz/a 0.5 % v/v	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
13 ET Private ethephon (6 lb ai/gal) COC	1.36 fl oz/a 1.21 fl oz/a 32 fl oz/a 0.5 % v/v	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
14 Private ethephon (6 lb ai/gal) COC	1.6 fl oz/a 32 fl oz/a 0.5 % v/v	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
15 Private ethephon (6 lb ai/gal) COC	1.5 fl oz/a 32 fl oz/a 0.5 % v/v	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
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



Treatment 13



Treatment 14



Treatment 15

1 7 8 5

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