

## EFFECT OF ETHEPHON AND ADJUVANTS ON COTTON DEFOLIANTS

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### Abstract

Field studies were conducted during 1996 to determine the effect of various harvest aid chemicals on the cotton varieties, 'Suregrow 501' and 'Suregrow 125'. Applications were applied in water at 10 gallons per acre (gpa) to cotton in plots of four rows each spaced 40 inches apart and 40 feet long. Visual ratings were made of percent defoliation and percent boll opening at 7 and 14 days after treatment (DAT) and of percent shoot regrowth at 21 DAT whereby 0 = no effect and 100% = complete effect. The least significant difference (LSD) between means as determined by Fisher's Protected LSD test at the 5% level. The harvest aid chemicals with their descriptions and manufacturers are listed in Table 1.

Results with treatments conducted on cotton 'Suregrow 501' are shown in Table 2. The harvest aid chemical, Boll'd<sup>®</sup>, applied alone at 1 to 2 lb/A resulted in less than 85% defoliation at 7 and 14 DAT. Combinations of different levels of Boll'd and DEF 6<sup>®</sup> showed that with Boll'd applied at 1.5 lb/A, an increase in DEF 6 from 0.375 to 0.75 lb/A increased defoliation from 84 to 91% and with Boll'd at 2 lb/A, an increase in DEF 6 from 0.375 to 0.75 lb/A increased defoliation from 88 to 95% at 7 DAT. The chemical Finish<sup>®</sup> applied at 1.0 and 1.25 qt/A resulted in 83 and 85% defoliation, respectively, and the chemical Cotton Quick<sup>®</sup> applied at 3.5 qt/A resulted in 91% defoliation at 7 DAT. With each treatment, there was less than 5% increase in defoliation from 7 to 14 DAT. Boll opening at 7 DAT increased from 71% in the untreated control plots to greater than 85% in all treated plots except with the application of Boll'd at 1 lb/A plus DEF 6 at 0.75 lb/A (83%). At 14 DAT, boll opening was 89% in the untreated control and greater than 95% in all treated plots. Shoot regrowth at 21 DAT was 30% or greater in all treatments except for 23% using Cotton Quick.

Results with cotton 'Suregrow 125' showed the effects of Dropp<sup>®</sup> defoliant applied with various adjuvant combinations on the percent defoliation and boll opening at 7 and 14 DAT and shoot regrowth at 21 DAT (Table 3). Treatments with different oil-based surfactants resulted in enhanced defoliation with the addition of the nitrogen-salt compounds, ammonium sulfate and Uran 28<sup>®</sup>. Both

ammonium sulfate applied with Agri-Dex<sup>®</sup> and Uran 28 applied with Dyne-Amic<sup>®</sup>, Aero Dyne-Amic<sup>®</sup>, and HM 9127 increased the percent defoliation between 5 and 11% over that with the surfactant alone. Preliminary trials in the greenhouse indicated that the addition of ethephon to surfactant-nitrogen-salt compounds could further enhance defoliation with Dropp. However, in this study any favorable effect by the addition of ethephon was masked by the high level of 95% or greater defoliation resulting from the combination of surfactant and nitrogen-salt. The combinations of each Kinetic HV<sup>®</sup> and OSi Oil Blend with Uran 28 and ethephon reached the maximum of 98% or greater defoliation. The percent of open bolls at 7 DAT was 80% in the untreated control plots and 85% both with the addition of Agri-Dex and with the combination of Agri-Dex and ammonium sulfate. Dyne-Amic showed no effect; however, boll opening increased to 93% with the combination of Dyne-Amic and Uran 28 with no additional effect when adding ethephon. Aero Dyne-Amic alone resulted in 88% boll opening with an increase to 92 and 93% with the addition of Uran 28 and Uran 28 plus ethephon, respectively. HM 9127 resulted in 82% boll opening with no effect by the addition of Uran 28, but with an increase to 90% with Uran 28 plus ethephon. Each Kinetic HV and OSi Oil blend in combination with Uran 28 and ethephon resulted in 93% boll opening. Boll opening at 14 DAT increased from 80 to 90% in the untreated control plots with boll opening in the treated plots increasing proportionally to that in the untreated plots. Percent of shoot regrowth at 21 DAT was 10% or less in each plot which was treated with Dropp defoliant.

Table 1. Harvest Aid Chemicals

Name	Description	Manufacturer
<i>Defoliant</i>		
Cotton Quick	1-Aminomethanamide dihydrogen tetraoxosulfate and Ethephon	Griffin Corporation
DEF 6	SSS-Tributyl phosphorotrithioate	Bayer Corporation
Dropp	Thidiazuron	AgrEvo USA Company
Finish	Cyclanilide and Ethephon	Rhone-Poulenc Ag Co.
<i>Adjuvants</i>		
Aero Dyne-Amic	A proprietary blend of organosilicone surfactants, methylated vegetable oils, emulsifiers, and buffering agents	Helena Chem. Co.
Agri-Dex	A non-phytotoxic oil/nonionic surfactant; 83/17, v/v	Helena Chem. Co.
Dyne-Amic	An organosilicone based surfactant mixed with a methylated vegetable oil in undisclosed proportions	Helena Chem. Co.
Boll'd (Ethephon)	Two-chloroethyl phosphonic acid	Riverside/Terra International, Inc.
HM 9127	A proprietary product	Helena Chem. Co.
Kinetic HV	A proprietary blend of polyalkyleneoxide modified polydimethylsiloxane and nonionic surfactants	Helena Chem. Co.
OSi Oil Blend 1	A blend of methyl soyate 90%, Triton N-57 5% and Silwet 560 5%	OSi Specialities, Inc.
Uran 28	Liquid nitrogen compound	Helena Chem. Co.

Table 2. Effect of various combinations of defoliant and adjuvants applied to cotton 'Suregrow 501' at 40 to 50% boll opening (average of 4 replications).

Chem	Rate in 10 gpa	% Defol.		% Boll Open		% Shoot Regrowth
		7 DAT	14 DAT	7 DAT	14 DAT	DAT
Boll'd	1 lb	45	45	89	97	88
Boll'd	1.5 lb	78	81	90	97	38
Boll'd	2 lb	76	79	94	98	43
Boll'd	1 lb	89	91	83	98	58
+ DEF 6	0.75 lb					
Boll'd	1.5 lb	84	86	88	97	68
+ DEF 6	0.375 lb					
Boll'd	1.5 lb	91	96	90	98	30
+ DEF 6	0.75 lb					
Boll'd	2 lb	88	91	91	98	35
+ DEF 6	0.375 lb					
Boll'd	2 lb	95	97	93	96	35
+ DEF 6	0.75 lb					
Finish	1 qt	83	85	91	98	45
Finish	1.25 qt	85	85	94	98	43
Cotton Quick	3.5 qt	91	93	95	98	23
Untreated Control	---	0	0	71	89	0
LSD (0.05)		4	3	4	3	4

Table 3. Effect of Dropp® defoliant with various adjuvants applied to cotton 'Suregrow 125' at 60 to 70% boll opening (average of 3 replications).

Dropp 50WP @ 0.1 lb/A	Rate in 10 gpa	% Defol.		% Boll Open.		% Shoot Regro.
		7 DAT	14 DAT	7 DAT	14 DAT	21 DAT
Am. sulfate	1 lb	88	92	82	88	5
Agri-Dex	1%	90	95	85	90	2
Agri-Dex	1%	95	97	85	93	7
+ Am. sulfate	1 lb					
Dyne-Amic	0.5%	85	90	80	95	5
Dyne-Amic	0.5%	96	98	93	96	7
+ Uran 28	1 qt					
Dyne-Amic	0.5%	93	96	90	95	7
+ Uran 28	1 qt					
+ Ethephon	0.25 lb					
Aero	0.5%	92	93	88	93	5
Dyne-Amic						
Aero	0.5%	97	98	92	96	7
Dyne-Amic						
+ Uran 28	1 qt					
Aero	0.5%	97	98	93	97	5
Dyne-Amic						
+ Uran 28	1 qt					
+ Ethephon	0.25 lb					
HM 9127	0.3 pt	82	90	82	90	5
HM 9127	0.3 pt	93	95	83	95	10
+ Uran 28	1 qt					
HM 9127	0.3 pt	93	95	90	93	7
+ Uran 28	1 qt					
+ Ethephon	0.25 lb					
Kinetic HV	0.25%	98	99	93	95	3
+ Uran 28	1 qt					
+ Ethephon	0.25 lb					
OSi Oil	0.5%	99	99	93	96	2
Blend						
+ Uran 28	1 qt					
+ Ethephon	0.25 lb					
Untreated Control	---	0	0	80	90	0
LSD (0.05)		4	4	4	4	5