

COTTON HARVEST AID

Cotton Alliance Research Progress Report 2013



University of California Cooperative

Extension:

Steve Wright, Farm Advisor, Tulare/Kings Co.

Bob Hutmacher, Ext. Cotton Specialist, WSREC

Dan Munk, Farm Advisor, Fresno Co.

Staff Research Associates:

Gerardo Banuelos, Tulare/Kings County

Jon Wroble, Fresno County

Sonia Rios, Tulare/Kings County

Mark Keeley, Shafter Research Extension

Agricultural Technician:

Walter Martinez, Tulare County

Westside Research & Extension Center:

Merf Solorio, Superintendent

Lab Assistants:

Kelly Hutmacher, Tulare/Kings County

Eduardo Padilla, Tulare/Kings County

Isaac Giron, Tulare/Kings County

Bill Taylor, Tulare/Kings County

Cotton Harvest Aid Management 2013

This report summarizes the applied defoliation research studies conducted during 2013. This was another unique season due to warm weather causing rapid progression of the cotton crop. Three research trials were conducted on Pima cotton at the Westside Research Center in Five Points, CA. These fields were planted with Phytogen 802RF on April 16, 2013 with a seed rate of 18 lbs/A. The fields received a pre-irrigation, three in-season irrigations, and pressure bomb readings were taken to better manage plant vigor. In addition, the fields received 140 lbs of nitrogen urea plus 14 lbs sidedress of Temik (*Aldicarb*) on May24, 2013. The fields also received 16 ounces of Mepex (*Mepiquat Chloride*) on June 19th and again on July 1, 2013. The plots were 65' in length and consisted of four rows with 40" spacing. In each trial, each treatment had 4 replications.

The objective of these studies was to define the most appropriate conditions for effective defoliation and crop termination. New harvest aids and several tank mix combinations were evaluated to validate defoliation programs in a manner to insure optimum performance and minimum impact on fiber quality.

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HARVEST AIDS TESTED IN THESE STUDIES

Brand Name	Common Chemical Name/Formulation	Company
Agridex	<i>Crop Oil Concentrate</i>	Helena
CottonQuik	<i>Ethephon</i>	Dupont
Def	<i>Tribufos</i>	Bayer
Defol 7	<i>Sodium Chlorate</i>	Core Agri
Display	<i>Carfentrazone-ethyl</i>	FMC
ET	<i>Pyraflufen-ethyl</i>	Nichino
Finish 6	<i>Ethephon & Cyclanilide</i>	Bayer
Folex	<i>Tributyl phosphorotrithioate</i>	AMVAC
Ginstar	<i>Thidiazuron & Diuron</i>	Bayer
Gramoxone SL	<i>Paraquat</i>	Syngenta
Induce	<i>Nonionic Surfactants</i>	Helena
Prep	<i>Ethephon</i>	Bayer
Shark	<i>Carfentrazone-ethyl</i>	FMC

Summary

Pima Defoliation Ginstar (2-Step Approach) Study:

The objective of this study was to compare early (6 NACB) timing versus standard timing (4 NACB) rates of Ginstar and Finish on percent defoliation, desiccation, open boll, and regrowth. The results indicated that there was no difference between the 6 NACB vs. the 4 NACB timings for open boll and regrowth (Table 2) by 21 DAT. The 6 NACB timing gave a slight advantage in desiccation (Table 1) and lint yield, compared to the 4 NACB timing (Table 2). The 4 NACB timing gave a slight advantage in defoliation (Table 1), compared to the 6 NACB timing.

Pima Early vs. Late for Defoliation/Whitefly Management:

The objective of this study was to compare one treatment with early (6 NACB) timing versus standard timing (4 NACB) rates of Folex plus Finish on percent defoliation, desiccation, open boll, cotton yield and regrowth, plus whitefly management. Comparing second application treatments of ET, Shark, Defol 7, Gramoxone, Ginstar and Finish, following the first application of Folex plus Finish. The results indicated that there was no difference between the 6 NACB vs. the 4 NACB timings for desiccation (Table 1), open boll and regrowth (Table 2) by 21 DAT. The 6 NACB timing gave a slight advantage in lint yield, compared to the 4 NACB timing (Table 2). The 4 NACB timing gave a slight advantage in defoliation, compared to the 6 NACB timing (Table 1) at 21 DAT. The insect counts showed no significant difference between treatments on October 11 for aphids and adult whitefly per leaf (Table 4). The whitefly nymphs ranged from 31 to 85 per leaf and spider mites ranged from 0 to 4 per leaf on October 11 (Table 4).

Pima Defoliation Evaluation Comparing Second Application Treatments:

The objective of this study was to compare Ginstar plus ethephon (CottonQuik, Finish and Prep) followed by several (B) treatment combinations that included ET, Shark, Display, Defol 7 and Gramoxone. Each treatment had 4 replications. All treatments gave good defoliation, desiccation, open boll percentages and low regrowth ratings (Table 1 & 2). There were no differences between the secondary applications.

Pima Defoliation Ginstar (2-Step Approach) Study

The objective of this study was to compare differences between combinations of Ginstar plus Finish, applied at 6 nodes above cracked boll (NACB) versus 4 NACB. Each treatment had 4 replications.

The first application at the 6 NACB stage was applied on September 20, 2013; the temperature was 85°F and with winds of 0-4 mph. The first application at the 4 NACB stage was on September 27, 2013; the temperature was 72°F and winds ranged from 4-10 mph. The second follow up application for the 6 NACB stage was on October 4, 2013; the temperature was 80°F and winds ranged from 4-8 mph. The second follow up application for the 4 NACB stage was applied on October 11, 2013; the temperature was 77°F with winds from 2-4 mph.

All treatments were applied using a PDF High Clearance Sprayer with a volume of 15 gpa, pressure of 40 psi, speed of 4 mph and 8002 flat fan nozzles. Defoliation, desiccation, and open boll percentages were visually recorded at 7, 14, and 21 days after treatment (DAT).

The results indicated that there was no difference between the 6 NACB vs. the 4 NACB timings for open boll and regrowth (Table 2) by 21 DAT. The 6 NACB timing gave a slight advantage in desiccation (Table 1) and lint yield, compared to the 4 NACB timing (Table 2). The 4 NACB timing gave a slight advantage in defoliation (Table 1), compared to the 6 NACB timing. Results demonstrated that an application at 6 NACB could bring about an earlier harvest of 2-3 weeks.

Table 1.

			Percent Defoliation				Percent Desiccation			
			27- Sept	4- Oct	11- Oct	18- Oct	27- Sept	4- Oct	11- Oct	18- Oct
Treatments	Rates/A	Timing	7 DAT	14 DAT	21 DAT	28 DAT	7 DAT	14 DAT	21 DAT	28 DAT
1. Ginstar + Finish + Agridex B. Ginstar + Finish + Agridex	4 fl oz + 12 fl oz + 1 pt 8 fl oz + 20 fl oz + 1 pt	6 NACB	40	56	80	91	21	50	78	89
2. Ginstar + Finish + Agridex B. Ginstar + Finish + Agridex	4 fl oz + 12 fl oz + 1 pt 10 fl oz + 20 fl oz + 1 pt		41	55	80	90	21	46	78	89
3. Ginstar + Finish + Agridex B. Ginstar + Finish + Agridex	6 fl oz + 12 fl oz + 1 pt 8 fl oz + 20 fl oz + 1 pt		43	60	80	90	21	54	79	88
4. Ginstar + Finish + Agridex B. Ginstar + Finish + Agridex	6 fl oz + 12 fl oz + 1 pt 10 fl oz + 20 fl oz + 1 pt		40	54	80	90	21	48	78	88
5. Ginstar + Agridex B. Ginstar + Finish + Agridex	6 fl oz + 1 pt 8 fl oz + 20 fl oz + 1 pt		40	59	80	90	20	51	81	88
			4- Oct	11- Oct	18- Oct		4- Oct	11- Oct	18- Oct	
6. Ginstar + Finish + Agridex B. Ginstar + Finish + Agridex	4 fl oz + 12 fl oz + 1 pt 8 fl oz + 20 fl oz + 1 pt	4 NACB	44	64	83		20	45	69	
7. Ginstar + Finish + Agridex B. Ginstar + Finish + Agridex	4 fl oz + 12 fl oz + 1 pt 10 fl oz + 20 fl oz + 1 pt		45	65	85		18	48	73	
8. Ginstar + Finish + Agridex B. Ginstar + Finish + Agridex	6 fl oz + 12 fl oz + 1 pt 8 fl oz + 20 fl oz + 1 pt		45	66	88		23	55	78	
9. Ginstar + Finish + Agridex B. Ginstar + Finish + Agridex	6 fl oz + 12 fl oz + 1 pt 10 fl oz + 20 fl oz + 1 pt		44	60	81		19	41	65	
10. Ginstar + Agridex B. Ginstar + Finish + Agridex	6 fl oz + 1 pt 8 fl oz + 20 fl oz + 1 pt		45	68	85		21	55	78	
11. Untreated	-----			11	19	30	54	9	14	19

Table 2.

			Percent Open Boll				Regrowth		Lint Yield lbs/A	Mic.
			27- Sept	4- Oct	11- Oct	18- Oct	21 DAT			
Treatments	Rates/A	Timing	7 DAT	14 DAT	21 DAT	28 DAT	Top	Bottom		
1. Ginstar + Finish + Agridex B. Ginstar + Finish + Agridex	4 fl oz + 12 fl oz + 1 pt 8 fl oz + 20 fl oz + 1 pt	6 NACB	78	90	98	99	0	1	1892	3.8
2. Ginstar + Finish + Agridex B. Ginstar + Finish + Agridex	4 fl oz + 12 fl oz + 1 pt 10 fl oz + 20 fl oz + 1 pt		76	86	98	99	0	1	1845	3.8
3. Ginstar + Finish + Agridex B. Ginstar + Finish + Agridex	6 fl oz + 12 fl oz + 1 pt 8 fl oz + 20 fl oz + 1 pt		78	90	98	99	0	1	1818	3.8
4. Ginstar + Finish + Agridex B. Ginstar + Finish + Agridex	6 fl oz + 12 fl oz + 1 pt 10 fl oz + 20 fl oz + 1 pt		78	90	98	99	0	1	1867	3.8
5. Ginstar + Agridex B. Ginstar + Finish + Agridex	6 fl oz + 1 pt 8 fl oz + 20 fl oz + 1 pt		78	91	98	99	0	0	1882	3.8
			24- Oct	1- Nov	8- Nov					
6. Ginstar + Finish + Agridex B. Ginstar + Finish + Agridex	4 fl oz + 12 fl oz + 1 pt 8 fl oz + 20 fl oz + 1 pt	4 NACB	78	93	98		0	1	1777	3.9
7. Ginstar + Finish + Agridex B. Ginstar + Finish + Agridex	4 fl oz + 12 fl oz + 1 pt 10 fl oz + 20 fl oz + 1 pt		77	91	95		0	0	1877	3.9
8. Ginstar + Finish + Agridex B. Ginstar + Finish + Agridex	6 fl oz + 12 fl oz + 1 pt 8 fl oz + 20 fl oz + 1 pt		80	92	98		0	1	1814	3.8
9. Ginstar + Finish + Agridex B. Ginstar + Finish + Agridex	6 fl oz + 12 fl oz + 1 pt 10 fl oz + 20 fl oz + 1 pt		79	91	96		0	1	1779	3.9
10. Ginstar + Agridex B. Ginstar + Finish + Agridex	6 fl oz + 1 pt 8 fl oz + 20 fl oz + 1 pt		81	92	98		0	1	1856	3.9
11. Untreated	-----			77	80	88	93	0	0	1857

Pima Early vs. Late for Defoliation/Whitefly Management

The objective of this study was to compare one treatment with early (6 NACB) timing versus standard timing (4 NACB) rates of Folex plus Finish on percent defoliation, desiccation, open boll, cotton yield and regrowth, plus whitefly management. Comparing second application treatments of ET, Shark, Defol 7, Gramoxone, Ginstar and Finish, following the first application of Folex plus Finish.

The first application at the 6 NACB stage was applied on September 20, 2013; the temperature was 85°F and winds of 0-4 mph. The first application at the 4 NACB stage was on September 27, 2013; the temperature was 72°F and winds ranged from 4-10 mph. The second application for the 6 NACB stage was on October 4, 2013; the temperature was 80°F and winds ranged from 4-8 mph. The second application for the 4 NACB stage was applied on October 11, 2013; the temperature was 77°F and winds from 2-4 mph.

All treatments were applied using a PDF High Clearance Sprayer with a volume of 15 gpa, pressure of 40 psi, speed of 4 mph and 8002 flat fan nozzles. Defoliation, desiccation, and open boll percentages were visually recorded at 7, 14, and 21 days after treatment (DAT).

The results indicated that there was no difference between the 6 NACB vs. the 4 NACB timings for desiccation (Table 1), open boll and regrowth (Table 2) by 21 DAT. The 6 NACB timing gave a slight advantage in lint yield, compared to the 4 NACB timing (Table 2). The 4 NACB timing gave a slight advantage in defoliation, compared to the 6 NACB timing (Table 1) at 21 DAT. The insect counts showed no significant difference between treatments on October 11 for aphids and adult whitefly per leaf (Table 4). The whitefly nymphs ranged from 31 to 85 per leaf and spider mites ranged from 0 to 4 per leaf on October 11 (Table 4).

Table 1.

			Defoliation				Desiccation			
			27-Sep	4-Oct	11-Oct	18-Oct	27-Sep	4-Oct	11-Oct	18-Oct
Treatments	Rate/A	Timing	7 DAT	14 DAT	21 DAT	28 DAT	7 DAT	14 DAT	21 DAT	28 DAT
1. Folex + Finish + Induce	2 pts + 24 floz + 0.25% v/v	6 NACB								
B. Defol 7 + Gramoxone SL + Induce	1.5 qts + 1 pt + 0.25% v/v		15	43	76	85	11	33	65	64
			4-Oct	11-Oct	18-Oct		4-Oct	11-Oct	18-Oct	
2. Folex + Finish + Induce	2 pts + 24 floz + 0.25% v/v	4 NACB								
B. Defol 7 + Gramoxone SL + Induce	1.5 qts + 1 pt + 0.25% v/v		18	73	84		19	61	68	
3. Folex + Finish + Induce	2 pts + 24 floz + 0.25% v/v									
B. ET + Gramoxone SL + Induce	2.75 floz + 1 pt + 0.25% v/v		18	69	81		19	63	69	
4. Folex + Finish + Induce	2 pts + 24 floz + 0.25% v/v									
B. Shark + Gramoxone SL + Induce	1.6 floz + 1 pt + 0.25% v/v		19	69	83		18	56	75	
5. Folex + Finish + Induce	2 pts + 24 floz + 0.25% v/v									
B. Ginstar + Finish + Induce	8 floz + 20 floz + 0.25% v/v		16	69	81		15	56	63	
6. UTC	-----		5	13	40	56	0	5	20	18

Table 2.

			Open Boll				Regrowth		Lint Yield lbs/A	Mic
			27- Sep	4- Oct	11- Oct	18- Oct	21 DAT			
Treatments	Rate/A	Timin g	7 DAT	14 DAT	21 DAT	28 DAT	Top	Bottom		
1. Folex + Finish + Induce	2 pts + 24 floz + 0.25% v/v	6 NACB								
B. Defol 7 + Gramoxone SL + Induce	1.5 qts + 1 pt + 0.25% v/v		78	84	97	99	0	2	1950	4.0
			4- Oct	11- Oct	18- Oct					
2. Folex + Finish + Induce	2 pts + 24 floz + 0.25% v/v	4 NACB								
B. Defol 7 + Gramoxone SL + Induce	1.5 qts + 1 pt + 0.25% v/v		83	95	99		0	2	1921	4.0
3. Folex + Finish + Induce	2 pts + 24 floz + 0.25% v/v									
B. ET + Gramoxone SL + Induce	2.75 floz + 1 pt + 0.25% v/v		80	94	98		0	2		
4. Folex + Finish + Induce	2 pts + 24 floz + 0.25% v/v									
B. Shark + Gramoxone SL + Induce	1.6 floz + 1 pt + 0.25% v/v		80	95	99		0	3		
5. Folex + Finish + Induce	2 pts + 24 floz + 0.25% v/v									
B. Ginstar + Finish + Induce	8 floz + 20 floz + 0.25% v/v		77	94	98		0	2		
6. UTC	-----		69	75	90	94	0	1		

Table 3.

			20-Sep (Pre-counts)				27-Sep (7 DAT & Pre-Counts)			
Treatments	Rate/A	Timing	Aphids /Leaf	WF nymphs/ Leaf	Adult WF/ Leaf	Spider Mites/ Leaf	Aphids /Leaf	WF nymphs/ Leaf	Adult WF/ Leaf	Spider Mites/ Leaf
1. Folex + Finish + Induce B. Defol 7+ Gramoxone SL + Induce	2 pts + 24 floz + 0.25% 1.5 qts + 1 pt + 0.25%	6 NACB	7.4	15.4	5.8	1.7	0.1	82.2	0.2	3.5
2. Folex + Finish + Induce B. Defol 7+ Gramoxone SL + Induce	2 pts + 24 floz + 0.25% 1.5 qts + 1 pt + 0.25%	4 NACB	9.0	39.4	7.6	2.1	0.1	47.2	0.2	13.1
3. Folex + Finish + Induce B. ET+ Gramoxone SL + Induce	2 pts + 24 floz + 0.25% 2.75 floz + 1 pt + 0.25%		6.3	18.6	9.1	1.4	0.1	51.2	0.3	9.0
4. Folex + Finish + Induce B. Shark+ Gramoxone SL + Induce	2 pts + 24 floz + 0.25% 1.6 floz + 1 pt + 0.25%		3.9	26.2	6.9	0.4	0.0	35.4	0.1	17.0
5. Folex + Finish + Induce B. Ginstar + Finish + Induce	2 pts + 24 floz + 0.25% 8 floz + 20 floz + 0.25%		7.7	19.6	5.9	0.8	0.2	94.0	0.4	6.3
6. UTC	-----		9.4	31.6	9.8	1.8	0.0	62.8	0.3	15.4

Table 4.

			4-Oct (14 DAT & 7 DAT)				11-Oct (21 DAT & 14 DAT)			
Treatments	Rate/A	Timing	Aphids /Leaf	WF nymphs/ Leaf	Adult WF/ Leaf	Spider Mites/ Leaf	Aphids /Leaf	WF nymphs/ Leaf	Adult WF/ Leaf	Spider Mites/ Leaf
1. Folex + Finish + Induce B. Defol 7+ Gramoxone SL + Induce	2 pts + 24 floz + 0.25% 1.5 qts + 1 pt + 0.25%	6 NACB	0.1	29.6	0.0	4.1	0.1	67.5	0.1	3.5
2. Folex + Finish + Induce B. Defol 7+ Gramoxone SL + Induce	2 pts + 24 floz + 0.25% 1.5 qts + 1 pt + 0.25%	4 NACB	0.2	48.5	0.0	3.0	0.1	31.3	0.4	0.4
3. Folex + Finish + Induce B. ET+ Gramoxone SL + Induce	2 pts + 24 floz + 0.25% 2.75 floz + 1 pt + 0.25%		0.2	55.7	0.0	3.0	0.1	57.9	0.2	2.7
4. Folex + Finish + Induce B. Shark+ Gramoxone SL + Induce	2 pts + 24 floz + 0.25% 1.6 floz + 1 pt + 0.25%		0.2	39.4	0.1	3.3	0.1	85.1	0.1	3.4
5. Folex + Finish + Induce B. Ginstar + Finish + Induce	2 pts + 24 floz + 0.25% 8 floz + 20 floz + 0.25%		0.3	95.1	0.1	1.0	0.2	68.3	0.2	1.7
6. UTC	-----		0.2	43.0	0.0	3.5	0.2	38.1	0.4	1.2

Pima Defoliation Evaluation Comparing Second Application Treatments

The objective of this study was to compare Ginstar plus ethephon (CottonQuik, Finish and Prep) followed by several (B) treatment combinations that included ET, Shark, Display, Defol 7 and Gramoxone. Each treatment had 4 replications.

Harvest Aids were applied on October 2, 2012 when cotton was at 6 NACB, using a PDF High Clearance Sprayer with a volume of 15 gpa, pressure of 40 psi, speed of 4 mph, and 8002 flat fan nozzles. The temperature was 90°F and wind of 1- 3 mph. Defoliation, desiccation, and open boll percentages were visually recorded at 7 and 14 days after treatment (DAT).

All treatments gave good defoliation, desiccation, open boll percentages and low regrowth ratings (Table 1 & 2). There were no differences between the secondary applications.

Table 1.

		Percent Defoliation			Percent Desiccation		
		9-Oct	16-Oct	23-Oct	9-Oct	16-Oct	23-Oct
Treatments	Rates/A	7DAT	14DAT	21DAT	7DAT	14DAT	21DAT
1. Ginstar + CottonQuik + Induce B. ET + Agridex	6 floz + 3 pts + 0.25% 2.75 floz + 1%	45	75	88	28	64	79
2. Ginstar + CottonQuik + Induce B. ET + Gramoxone SL + Induce	6 floz + 3 pts + 0.25% 2.75 floz + 20 floz + 0.25%	39	75	83	18	60	68
3. Ginstar + Finish + Agridex B. ET + Gramoxone SL + Induce	6 floz + 20 floz + 1% 2.75 floz + 24 floz + 0.25%	44	75	88	20	64	74
4. Ginstar + Finish + Agridex B. Display + Gramoxone SL + Induce	6 floz + 20 floz + 1% 0.6 floz + 20 floz + 0.25%	40	74	83	19	51	64
5. Ginstar + Finish + Agridex B. Display + Gramoxone SL + Induce	6 floz + 20 floz + 1% 0.8 floz + 24 floz + 0.25%	41	75	85	16	53	70
6. Ginstar + Finish + Agridex B. Shark + Gramoxone SL + Induce	6 floz + 20 floz + 1% 1 floz + 24 floz + 0.25%	43	70	85	16	55	60
7. Ginstar + Finish + Agridex B. Shark + Gramoxone SL + Induce	6 floz + 20 floz + 1% 1.6 floz + 24 floz + 0.25%	41	73	86	16	55	71
8. Ginstar + Finish + Agridex B. Defol 7 + Gramoxone SL + Induce	6 floz + 20 floz + 1% 3 qts + 24 floz + 0.25%	45	73	85	21	58	66
9. Prep + Def + Agridex B. Defol 7 + Gramoxone SL + Induce	2 pts + 2 pts + 1% 3 qts + 24 floz + 0.25%	44	66	83	15	46	58
10. Untreated	-----	33	40	51	7	6	11

Table 2.

		Percent Open Boll			Regrowth	
		9-Oct	16-Oct	23-Oct	21 DAT	
		7DAT	14DAT	21DAT	Top	Bottom
Treatments	Rates/A					
1. Ginstar + CottonQuik + Induce B. ET + Agridex	6 floz + 3 pts + 0.25% 2.75 floz + 1%	94	97	99	0	0
2. Ginstar + CottonQuik + Induce B. ET + Gramoxone SL + Induce	6 floz + 3 pts + 0.25% 2.75 floz + 20 floz + 0.25%	90	96	98	0	0
3. Ginstar + Finish + Agridex B. ET + Gramoxone SL + Induce	6 floz + 20 floz + 1% 2.75 floz + 24 floz + 0.25%	91	96	99	0	0
4. Ginstar + Finish + Agridex B. Display + Gramoxone SL + Induce	6 floz + 20 floz + 1% 0.6 floz + 20 floz + 0.25%	89	93	97	0	1
5. Ginstar + Finish + Agridex B. Display + Gramoxone SL + Induce	6 floz + 20 floz + 1% 0.8 floz + 24 floz + 0.25%	87	93	97	0	0
6. Ginstar + Finish + Agridex B. Shark + Gramoxone SL + Induce	6 floz + 20 floz + 1% 1 floz + 24 floz + 0.25%	90	95	97	0	0
7. Ginstar + Finish + Agridex B. Shark + Gramoxone SL + Induce	6 floz + 20 floz + 1% 1.6 floz + 24 floz + 0.25%	87	93	98	0	0
8. Ginstar + Finish + Agridex B. Defol 7 + Gramoxone SL + Induce	6 floz + 20 floz + 1% 3 qts + 24 floz + 0.25%	91	96	98	0	1
9. Prep + Def + Agridex B. Defol 7 + Gramoxone SL + Induce	2 pts + 2 pts + 1% 3 qts + 24 floz + 0.25%	90	96	98	0	0
10. Untreated	-----	81	87	92	0	0