

Effects of Messenger® Treatments on Upland Cotton in the Palo Verde Valley, 2001

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Abstract

Messenger® was applied at various growth stages of cotton to ascertain effects upon yield and quality. Plant mapping data indicated that treated cotton aborted lowest developing fruits when temperatures caused stress during experiment, untreated cotton did not. Lack of Messenger® after first bloom resulted in lower lint quality. Untreated cotton had highest yields and value/acre from the Nov. 9 harvest date, although Messenger® applied at both first bloom and three weeks after first bloom had highest yields and value/acre when harvested on October 15.

Introduction

Messenger® is a biochemical pesticide used for plant disease management, insect suppression and plant growth enhancement. As this product is very new to agriculture, little data exist for the effect of this chemistry upon local crops and conditions. This trial was conducted to gather data on the effect of Messenger® on cotton production in the low desert.

Methods and Materials

Messenger® applications were applied at four specific times during the cotton season to a upland cotton variety (DPL 655BR) planted in mid April 2001 by the grower cooperator in this study (Desert Cotton). Cotton was planted in rows spaced 40" apart in a field with row 1,250 ft long. Plot sizes were 12 rows wide by field length, with two untreated rows between treated plots.

Treatment timings for the study were scheduled to be applied at the two leaf stage, pin head square, first bloom and 3 weeks after first bloom, although treatments usually were slightly after these events. Treatments consisted of a single to multiple applications, with each application consisting of 2.5 oz/acre of Messenger® as follows:

<u>Treatment</u>	<u>2 leaf stage</u>	<u>Pin head square (PHS)</u>	<u>First bloom</u>	<u>3 weeks post 1st bloom</u>
A	X	X	X	X
B		X	X	X
C			X	
D			X	X
E	<i>Untreated check, no Messenger applied.</i>			

Plant mapping data were attempted to be obtained twice during the season, once at first bloom (June 12), and then again several weeks (July 19) after the final application. Data were obtained from two replicates on June 12th (south and south central replicates) and were to be obtained from all four replicates on July 19. Data were obtained from one full replicate (south) and one additional plot before personnel were forced to leave the field due to initiation of an aerial insecticide application for whiteflies. Plant mapping was completed for five plants per plot; data were obtained for plant height, total nodes, first fruiting node, and fruiting site retention at site 1-3 for each fruiting node as applicable. For each plot the following averages were calculated: height:node ratio; plant height, first fruiting node, nodes, percent average plant retention for positions (fruiting sites) 1, 2, 3; percent retention for positions 1-2, and positions 1-3.

Field was also further treated in a non-uniform manner at the time of defoliation, as the northern 2/3 were defoliated while the southern 1/3 received an additional irrigation and was defoliated at a later date. Cotton plots from the northern 2/3 of the field plots were picked on October 15, using a four row John Deere 9665 cotton picker and a two row John Deere 9920 cotton picker to harvest the 12 rows of each plot. The southern 1/3 of the field was picked in the same manner on Nov. 9. Each plot was picked separately and dumped into trailers so that seed cotton weights for each plot could be obtained. Cotton was then ginned by Modern Gin (Blythe, CA).

Cotton lint yields for each plot were calculated by multiplying entire field average for percentage of turn-out associated with each respective harvest (36.16% lint for Oct. 15 harvest). Quality data for each bale from the respective plots were obtained from Modern Gin and quality factors for each treatment for each harvest date were calculated. Values for cotton lint were also calculated using data from each individual bale.

Results

Plant heights and nodes

Plants treated with Messenger® were slightly shorter (21.26-22.2 inches tall) than the untreated check (23.2 inches) on June 12, but Messenger® treated cotton was slightly taller (28.3-30.6 inches) than the untreated check (27.9%) on July 19. Numbers of nodes per plant were similar in all plots on both sample dates (Table 1), but height:node ratios did reflect changes in plant heights.

Retention

Early cotton fruiting retention percentages were very good at shortly after first bloom (Table 1) with all the Messenger® treated plots having slightly higher retention rates (80.7-84.6%) than the untreated check (77.9%) on June 12. High temperatures of 115°F on July 5 caused percent retention of fruiting structures at positions 1-2 to be almost cut by half by July 19 however, which also resulted in fewer calculated developing reproductive structures than had been present on June 12. This also resulted in reduced yield potential for all plots. Messenger® treated cotton continued to have slightly higher retention rates on July 19 (38.8%-45.7%) than the untreated check (33.6%).

There was a change in location of first fruiting node for Messenger® treated plots (Table 2) from June 12th (~node 5.5) to July 19th (6.6), while the average first fruiting node for the untreated check stayed constant at node 5.0. The shed of these first potential fruits is perhaps due to additional stress in the Messenger® treated plots associated with plant growth acceleration properties of this product. Plant height increases in these plots may also be associated with this change in fruiting nodes.

Lint

Seed cotton lint yields on October 15 indicated variable results from Messenger® applications. Two treatments resulted in decreased yields (first bloom only, four applications beginning at the two leaf stage) while the other two treatment regimens were similar to slightly higher in yield than the untreated check (Table 4). The untreated check had the highest yields on Nov. 9th, and was much higher (105-236 lbs. lint/acre) than cotton treated with Messenger®.

Quality

Cotton quality was similar from treated and untreated cotton was similar, with the exception of the Messenger applied at first bloom only. This treatment had the highest micronaire at the Oct. 15th harvest, and the shortest but strongest fibers of cotton harvested on Nov. 9th (Table 3). This treatment had the lowest valued lint (\$0.03-0.07/lb. less than other treatments) on both harvest dates, perhaps because there was not a later Messenger application as in all other treated cotton that may have helped increase cotton quality.

Value

Cotton in the untreated plots had the highest value/acre from the Nov. 9 harvest, thus indicating that usage of Messenger[®] in this experiment was not economical when utilized by itself in the manners previously described. Data from the Oct. 15 harvest indicate that only one treatment (1st bloom + 3 weeks later) was valued higher than the untreated check when costs of application and materials are included.

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Table 1. Average plant heights, nodes, and percent retention on June 12 and July 19.

<u>Treatment</u>	<u>Plant height (in)</u>		<u>Nodes/plant</u>		<u>Height:node ratio</u>		<u>% retention</u> <u>positions 1-2</u>	
	<u>June 12</u>	<u>July 19</u>	<u>June 12</u>	<u>July 19</u>	<u>June 12</u>	<u>July 19</u>	<u>June 12</u>	<u>July 19</u>
	2 leaf + PHS + 1st bloom + 3 weeks later	21.6	29.5	16.1	23.8	1.34	1.24	80.8
PHS + 1st bloom + 3 weeks later	22.2	30.6	16.0	24.4	1.39	1.26	84.6	45.7
First bloom only	21.26	28.34	16.6	22.8	1.28	1.24	82.1	38.6
1st bloom + 3 weeks later	22.2	29.6	16.1	24.2	1.38	1.22	80.7	38.8
Untreated	23.23	27.9	16.0	23.2	1.45	1.20	77.9	33.6

Table 2. First fruiting node, nodes with reproductive structures and calculated reproductive structures on June 12 and July 19.

<u>Treatment</u>	<u>First fruiting node</u>		<u>Nodes with fruiting structures (positions 1-2)/plant</u>		<u>Calculated flower/fruiting structures/plant (pos. 1-2)</u>	
	<u>June 12</u>	<u>July 19</u>	<u>June 12</u>	<u>July 19</u>	<u>June 12</u>	<u>July 19</u>
2 leaf + PHS + 1st bloom + 3 weeks later	5.3	7.0	10.8	16.8	17.54	13.57
PHS + 1st bloom + 3 weeks later	6.1	6.9	9.9	17.5	16.75	16.00
First bloom only	5.0	6.2	11.6	16.6	19.05	12.81
1st bloom + 3 weeks later	5.5	6.2	10.6	17.8	17.11	13.81
Untreated	5.0	5.0	11.0	18.2	17.14	12.23

Table 3. Quality factors of cotton lint as affected by treatment and harvest date

<u>Treatment</u>	<u>Leaf matter</u>		<u>Micronaire</u>		<u>Strength (g/tex)</u>		<u>Length (1/100th)</u>	
	<u>Oct.</u>	<u>Nov.</u>	<u>Oct.</u>	<u>Nov.</u>	<u>Oct.</u>	<u>Nov.</u>	<u>Oct.</u>	<u>Nov.</u>
	<u>15th</u>	<u>9th</u>	<u>15th</u>	<u>9th</u>	<u>15th</u>	<u>9th</u>	<u>15th</u>	<u>9th</u>
2 leaf + pin head square 1st bloom + 3 weeks later	2.0	2.0	5.1	5.2	29.2	30.4	109.0	109.0
PHS + 1st bloom + 3 weeks later	2.0	2.0	5.0	5.2	28.2	29.6	108.0	110.0
First bloom only	1.75	2.0	5.2	5.2	28.3	30.1	108.3	107.0
1st bloom + 3 weeks later	1.83	1.75	5.08	5.1	30.0	29.6	109.3	108.0
Untreated	1.75	2.0	5.05	5.2	29.1	29.4	108.5	109.0

Table 4. Cotton lint yields and values per acre

<u>Treatment</u>	<u>October 15 harvest</u>			<u>November 9 harvest</u>		
	<u>Lbs.</u>	<u>+/-</u>	<u>Value^{1/}</u>	<u>Lbs.</u>	<u>+/-</u>	<u>Value^{1/}</u>
	<u>lint</u>	<u>¢/lb</u>	<u>acre</u>	<u>lint</u>	<u>¢/lb</u>	<u>acre</u>
2 leaf + pin head square (PHS) 1st bloom + 3 weeks later	1,254	- 5.64	\$ 681.46	1,589	- 5.31	\$ 868.88
PHS + 1st bloom + 3 weeks later	1,352	- 5.94	\$ 731.16	1,458	- 5.06	\$ 801.25
First bloom only	1,240	- 8.97	\$ 632.72	1,579	-12.66	\$ 747.67
1st bloom + 3 weeks later	1,390	- 5.02	\$ 764.06	1,517	- 5.10	\$ 832.80
Untreated	1,347	- 5.85	\$ 729.13	1,694	- 6.74	\$ 902.51

¹Value per acre calculated using a \$0.60/lb of lint base.