

# Effects of AuxiGro® WP and Fertilizers on Upland Cotton in the Palo Verde Valley, 2002

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## Abstract

*A field experiment was conducted to obtain data from upland cotton grown under low desert conditions to document of the effects of AuxiGro® WP and treatments consisting of AuxiGro® WP plus various foliar fertilizers on cotton yield and quality. Treatments were applied the morning of July 6, 2002, to DPL 655BR cotton that had begun bloom approximately June 28. Yields and quality data were obtained and economics calculated. AuxiGro by itself did not result in a yield increase, but did so in combination with various fertilizers. Highest quality resulted in the 8 oz/acre rate of AuxiGro + Foliar Pride fertilizer, but highest yields were documented from the 4 oz./acre rate of AuxiGro + CalMax. All treatments increased harvested value of cotton/acre when compared with the untreated check, with the treatment consisting of 4 oz./acre rate of AuxiGro + CalMax worth almost \$200/acre more than the untreated check.*

## Introduction

In the late 1990s a fairly new product for the agricultural industry called AuxiGro® was introduced, with first registration in 1999 by Auxein Corporation (now Emerald BioAgriculture). The active ingredients in AuxiGro® WP are equal amounts of gamma aminobutyric acid (also referred to as GABA) and L-glutamic acid (each 29.2%). GABA is known to occur in animals, and functions as a neurotransmitter.

In comparison with animals, the role of GABA in plants is not as well documented or understood at this time. Kinnersley (1997) noted that “mineral analysis of treated plants has shown an increase in the content of macronutrients needed for plant growth with the most consistent increase shown in tissue potassium. In treated rye grass and duckweed, levels of potassium increased more than 200%. The correlation between GABA-mediated increases in plant growth and increases in tissue potassium content led to a working hypothesis that GABA bioactivity in plants is similar to its mechanism of action in animals, where it is known to affect transport of calcium and potassium”. Tindall (2001) notes that plants release GABA through the mitochondria when undergoing a period of stress, with GABA then opening nutrient channels within cell walls, allowing a redistribution of nutrients to areas being affected by outside influences. When AuxiGro® (containing GABA) applications are made to onions at bulbing, the GABA redirects nutrients to the growing bulb and carbohydrates can be concentrated in the expanding vegetation.

AuxiGro® is the only product currently containing GABA chemistry for plant growth known to be registered. Applications of AuxiGro® to onions early in the growth cycle apparently result in no apparent response, but those made later in the season have provided consistent and sometimes impressive results. Usage of AuxiGro® at various rates and timings on bulb onions (sizes 1.25-1.5 inch diameter at application) increased mean tonnage by a minimum average of 29 percent (9 tons/acre) to as much as 42.6% (13.2 tons/acre) in Utah State trials during 1998-1999 (Tindall, 2001).

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By early 2001, Auxigro<sup>®</sup> was registered on a diversity of US crops, including fresh market and storage type onions (but not processing/dehydrators), various vegetables, field crops, fruit trees and grapes, and grass seed, although California registrations in 2001 were limited to almonds, grapes (for disease control and to increase soluble solids), onions (fresh market and storage), and processing tomatoes.

As information on how this product affects cotton in the low desert is lacking, this trial was conducted to obtain data from upland cotton grown under low desert conditions (which would also include some expected inherent environmental stress) of the effects of Auxigro<sup>®</sup> WP and treatments consisting of Auxigro<sup>®</sup> WP plus various foliar fertilizers on cotton yield and quality.

## Materials and Methods

A cotton field that was planted with the upland cotton variety DPL 655BR during the latter part of April, 2002, was selected for the experiment. Cotton was planted in single rows with a 40 inch spacing between rows and row length was 1,105 ft.

Treatments were applied the morning of July 6, 2002, approximately one week after first bloom. Applications were made with a tractor mounted three-point hitch sprayer with plots being 8 rows wide x field length. The sprayer was calibrated to deliver 11.1 gallons of solution/ acre. A randomized complete block design with four replications was utilized for the experiment.

Six of the seven treatments applied included the surfactant BreakThru (a non-ionic surfactant marketed by Western Farm Service) at the rate of 6.4 oz/100 gallons of water, with the exception of the first treatment applied, which was water only. This was followed in application sequence by the water plus BreakThru treatment. The other treatments applied for comparison to the untreated check included:

- 3) Auxigro at 4 oz./acre
- 4) CalMax at 1 qt./acre. CalMax is a foliar fertilizer marketed by Western Farm Services consisting of 10% nitrogen, 11% calcium, 1.2% magnesium, 0.1% iron, 0.1% manganese, 0.05% boron, 0.05% copper, 0.05% zinc, and 0.001% molybdenum.
- 5) Auxigro at 4 oz./acre + 1 qt./acre CalMax
- 6) Auxigro at 4 oz./acre + 2 qts/acre of Foliar Pride. Foliar Pride is a foliar fertilizer marketed by Western Farm Services containing 7% nitrogen, 14% phosphoric acid, 8% potash, 0.1% iron zinc and 0.05% zinc as well as 0.15% humic acids derived from leonardite.
- 7) Auxigro at 8 oz./acre + 2 qts./acre of Foliar Pride

Plots were first harvested with a four row John Deere 9965 four row cotton picker on Dec. 16, 2002. After each individual plot was harvested, cotton seed weights were obtained using a boll-buggy, and cotton was then transferred to modules. A separate module was made for each treatment. Modules were ginned at Modern Ginning Company (Blythe, CA) and data compiled from all ginned bales of treatment module for quality comparisons. Doing so, however, resulted in losing quality data from individual plots for each replicate.

A second picking of plots was completed on January 3, 2003, utilizing the same cotton picker. Cotton seed weights were obtained by weighing the pickings from each plot after transferring them from the picker to a cotton trailer on scales. As all second picking seed cotton was together in the trailer, further quality analyses were not available by treatment.

Cotton lint yields for each plot were calculated by using overall turn-out percentages for the eight modules. Means were statistically analyzed with Fishers least significant difference (Statgraphics for Windows, Manugistics Inc.). Cotton lint quality factors were averaged using standard commercially derived results from each bale in each treatment (8-9 bales/treatment) available after ginning.

## Results

### Lint Yields

Yields from all treatments were not greatly dissimilar, with only the Auxigro (4 oz) + CalMax treatment yielding significantly more cotton lint at first pick (1,574 lbs/acre) than the untreated check (1,481 lbs/acre). The Auxigro (4 oz) + CalMax treatment combination also had significantly greater cotton lint production per acre than the Auxigro 4 oz/acre treatment by itself (1,464 lbs) and numerically more than the CalMax treatment by itself (1,525 lbs). As cotton yields were numerically increased by water as well as surfactant (BreakThru) treatments which were accompanied by changes in cotton lint quality, the possibility exists that these two particular treatments may have been affected via residual contamination in the grower's sprayer/hoses from a previous chemical application as these were the first treatments applied and shared the initial water placed in the spray tank for this experiment.

### Lint Quality

Differences were noted between treatments for lint quality, particularly that of fiber strength. Highest strength (34.7 g/tex) as well as lowest micronaire (5.1) occurred in cotton treated with the highest rate of Auxigro WP (8 oz./acre) + 2 qts/acre of Foliar Pride. Cotton treated with the 4 oz/acre rate of Auxigro WP + 2 qts/acre of Foliar Pride had much less fiber strength (32.1 g/tex) and slightly higher micronaire (5.2) indicating that differences noted were due to level of Auxigro applied rather than Foliar Pride fertilizer.

These two treatments also differed in fiber length, with the shortest average fiber length being noted in the 4 oz/acre rate of Auxigro WP + 2 qts/acre of Foliar Pride (1.121 inches) while the higher 8 oz rate of Auxigro (and several other treatments) had the longest fibers (1.14 inches). Treatments that had average fiber lengths of 1.14 inches (CalMax, water, Auxigro + CalMax, and 8 oz/acre Auxigro + Foliar Pride) also had the highest fiber strengths (minimum of 33.3 g/tex), while lower strength fibers also had comparatively shorter fiber lengths (1.121-1.139 inches). Weakest fiber strength was noted in the untreated check (31.7 g/tex).

Leaf matter average scores ranged from a high of 3.0 (untreated check) to 2.125 (BreakThru) with averages from other treatments ranging from 2.75 (Auxigro 4 oz + CalMax) to 2.375 (Auxigro 8 oz + Foliar Pride).

### Calculated Economics

Deductions in value of lint were noted for the untreated check (\$0.09) and the CalMax (\$0.074) due primarily to low fiber strength (31.7 g/tex) and high micronaire (5.3) respectively. Calculated economic values for cotton lint from other treatments reflected little change (+/- \$0.01).

When projected lint values and lint yields/acre for the various treatments were combined, all treatments resulted in increase economic values when compared with the untreated check, with all but the CalMax treated cotton valued at \$100+/acre more. Highest valued cotton on a per acre basis was produced using the Auxigro (8 oz./acre) + Foliar Pride treatment, valued at almost \$200/acre more than the untreated check.

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## Literature Cited

Kinnersley, A. M. 1997. The role of gamma aminobutyric acid (GABA) in plant growth and productivity. (Abstract) National Center for Environmental Research, Office of Research and Development, United States Environmental Protection Agency, Science to Achieve Results (STAR) Program. [http://us.epa.gov/ncer\\_abstracts/sbir/other/pp/kinnersl.html](http://us.epa.gov/ncer_abstracts/sbir/other/pp/kinnersl.html)

Tindall, T. A. 2001. Utah studies show Auxigro beneficial. *Onion World*. 17(5):16-17.

**Table 1. Effects of treatments on DPL 655 BR cotton quality**

<b>Treatment</b>	<b>Rate/acre</b>	<b>Leaf</b>	<b>Strength</b>		<b>Length</b>	
			<b>Mic<sup>1</sup></b>	<b>g/tex</b>	<b>Unif<sup>2</sup></b>	<b>(1/100")</b>
AuxiGro WP + Foliar Pride	8 oz/acre 2 qts/acre	2.375	5.1	34.7	82	114.0
AuxiGro WP + CalMax	4 oz/acre 1 qt/acre	2.75	5.2	33.7	82	114.0
Water only	-----	2.5	5.2	33.6	82	114.0
CalMax	1 qt/acre	2.55	5.3	33.3	81	114.0
AuxiGro WP	4 oz/acre	2.25	5.2	32.31	82	113.875
AuxiGro WP + Foliar Pride	4 oz/acre 2 qts/acre	2.55	5.2	32.1	81	112.11
Untreated Check	-----	3.0	5.275	32.0	82	113.0
BreakThru	-----	2.125	5.2	31.7	82	113.0

<sup>1</sup> Mic = micronaire

<sup>2</sup> Unif = uniformity

**Table 2. Effects of treatments on DPL 655 BR cotton lint yields and economics**

<b>Treatment</b>	<b>Rate/acre</b>	<b>lbs of lint/acre</b>			<b>Value (¢ +/- per lb)</b>	<b>\$ / Acre @ \$0.60/lb base</b>	<b>\$/acre vs.check</b>
		<b>1st pick</b>	<b>2nd</b>	<b>Total</b>			
AuxiGro WP + CalMax	4 oz/acre 1 qt/acre	1,574a	86	1,660	+0.30875	\$1,000.86	\$195.90
Water	-----	1,515ab	85	1,600	+0.37625	\$ 965.70	\$160.74
BreakThru	-----	1,531ab	97	1,628	-0.82375	\$ 963.74	\$158.78
AuxiGro WP @ + Foliar Pride	4 oz/acre 2 qts/acre	1,541ab	90	1,630	-1.00667	\$ 963.38	\$158.42
AuxiGro WP + Foliar Pride	8 oz/acre 2 qts/acre	1,500ab	90	1,590	+0.41	\$ 960.30	\$155.34
AuxiGro WP	4 oz/acre	1,464 b	87	1,551	-0.36625	\$ 925.39	\$120.43
CalMax	1 qt/acre	1,525ab	96	1,621	-7.44222	\$ 858.97	\$ 54.01
Untreated Check	-----	1,481 b	83	1,564	-9.0275	\$ 804.96	\$ 0.00

Means in columns followed by the same letter are not significantly different at the  $p \leq 0.05$  level (Fishers LSD test)