

**EFFECT OF RYZUP PLANT GROWTH
REGULATOR ON LINT YIELD AND
PLANT DEVELOPMENT**

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Abstract

The highly variable production conditions on the Texas High Plains dictate that producers utilize varieties with a high degree of plasticity (intermediate in determinancy), and manage the plant to optimize growth for the ensuing weather and pest complex in each year. Desiccating winds often severely retard early season vegetative growth in this region. The plant growth regulator RyzUp, from Abbott Laboratories was evaluated for any impact on plant growth and yield, following a spring with sustained high winds and stunted plant growth. At two irrigated locations with the most prevalent cotton variety Paymaster HS26 RyzUp was applied to seedling cotton at the 5 and 7 leaf stage at 1, 2 and 3 g a.i. of GA₃ per treated acre (1, 2 and 3 oz of formulated product). RyzUp increase leaf area, plant height and lint yield when compared to the untreated check or the Pix treated check. This product appears to offer a low cost (ca. \$2/acre when band applied) method to stimulate leaf size. Whether larger leaves is a benefit or detriment will depend on the growing conditions and each year. Early applications, at 5 true leaf, offered greater advantage than later, 7 true leaf applications

Introduction

Production conditions on the Texas High Plains are limited by a declining underground water supply, few heat units (1800 to 2500 degree-days 60) and sporadic rainfall (16 median rainfall). Since the optimum plant growth for different yield levels varies, producers utilize varieties with a high degree of plasticity (intermediate in determinancy), to leave open the potential for high yields if rainfall and heat units are favorable that year. Management of irrigation, fertilization and plant growth regulators (PGR's) then provide the tool to adjust plant growth during the growing season.

The PGR Pix, which inhibits gibberellin biosynthesis, has been utilized to adjust plant growth in high rainfall and full irrigation regions since its introduction in 1980. However

in the drought prone South West, growth retardants such as Pix have found limited use. Products that purport to stimulate growth on the hand may have greater utility. The PGR RyzUp is a strong formulation of the gibberellic acid isomer GA₃ (1g a.i./ounce of formulated product). GA₃ has been tested extensively on numerous crops including cotton (Moore, 1979) and is commercially used in the U.S. on grapes and lemons. Its commercial use in cotton has been limited to enhanced fruit set in crossing blocks (V.T. Walhood, personal communication). With low cost formulations and substantially greater producer expertise in the use of PGR's on cotton, novel uses of gibberellin in cotton may be found.

Materials and Methods

A two location evaluation was conducted in commercial pivot-irrigated fields of Paymaster HS26 grown in Dawson County, Texas. Randomized complete block experiments were installed, with plot size of 4 to 8 rows by 100 feet. Both fields suffered stunted early growth, due to slow emergence and high wind, despite being planted into terminated wheat residue for conservation compliance. In addition to various rates and timings of RyzUp, Pix was applied to contrast growth retardation with growth stimulation.

The following RyzUp treatments were applied on June 22, 1995 at locations 1, to cotton in the 5 true leaf stage. All applications were made in 17 gals/acre, with reported rates expressed on a treated acre basis. For ease of application a broadcast sprayer was used, hollow cone nozzles spaced 20 inches apart on the boom, thus rates on a treated acre basis were synonymous with planted acre basis in these trials. In commercial application, producers will most likely utilized a banded applications to reduce cost on a planted acre basis.

1. Untreated control
2. RyzUp 1 oz./acre on June 22
3. RyzUp 2 oz./acre on June 22
4. RyzUp 3 oz./acre on June 22
5. Pix 8 oz./acre, applied on August 8

The following data was collected on July 5 from 10 plants per plot using a belt leaf area meter.

RyzUp (oz.)	--- Leaf Area ---		leaf count	missing leaves
	low 5 lvs (cm2)	total lvs (cm2)		
0	493	746	7	1.25
1	532	771	7	0.75
2	534	801	7	1.25
3	574	806	7	1.5

The following plant monitoring data was collected on July 17 from 10 plants per plot.

RyzUp	height (inches)	node of 1FB	total nodes	# squares per plant	# squares missing
0	10.5	6.1	11.5	6.25	0.25
1	9.1	6.3	11.4	5.95	0.05
2	11	6.2	11.75	6.25	0.25
3	10.8	6.35	11.8	6.35	0.15

The following yield data was collected from hand harvest of 2 rows by 13 feet in the center of each plot. A 1000 g seed cotton subsample was ginned for turnout and HVI quality.

	Lint Yield (lbs/ac)
RyzUp, 0 oz/ac	1072 ab
RyzUp, 1 oz/ac	1142 a
RyzUp, 2 oz/ac	1135 a
RyzUp, 3 oz/ac	1109 ab
Pix, 12 oz/ac	1045 b

a Means followed by the same letter and not significantly different at the P=0.05 level.

At the second location in Dawson County the following treatments were applied

- a. RyzUp 2 oz. @ 3-5 leaf on June 19
- b. RyzUp 2 oz. @ 5-7 leaf on July 6
- c. RyzUp 2 oz. @ 3-5 and 5-7 leaf
- d. RyzUp 2 oz. with 10 lbs of urea @ 5-7 leaf
- e. RyzUp 2 oz. @ Cutout and 10 days later on August 16
- f. Untreated control
- g. Pix 4 oz @ 5-7 leaf

The following data was collected on July 14.

	Height (inches)	Total Nodes	Total Squares	Leaf Area cm ² /10pl	Lint Yield
a.	7.72	7.18	5.16	2130	982 a
b.	8.39	6.10	5.08	2222	825 b
c.	8.51	6.26	4.85	1965	845 b
d.	7.84	6.23	5.15	1982	785 b
e.	7.40	6.20	4.10	1613	771 b
f.	6.75	6.60	3.65	1704	803 b
g.	7.66	6.55	3.35	1711	710 b

a Means followed by the same letter and not significantly different at the P=0.05 level.

Conclusions

RyzUp provided a consistent increase in leaf area at these two locations. A consistent effect on plant height was not observed. With some RyzUp rates, yield was increased over the UTC or Pix treated cotton in fields with early stunting. RyzUp is a tool that appears to offer reliable leaf area stimulation at low cost; whether this results increased yield will most likely depend on the crop condition and ensuing weather.