

## **RESPONSE OF PGR'S ON DP 555 BG/RR BY SOIL TYPE**

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### **Abstract**

A trial was conducted near Rolling Fork, Mississippi to evaluate the benefits of Pentia and mepiquat chloride as plant regulators on cotton. Pentia (common name, mepiquat pentaborate) is a new plant regulator, which includes boron on the molecule instead of chloride. Boron provides faster plant uptake and promotes earliness in cotton.

Treatments were applied to DP 555BR/RR, a full season cotton variety with aggressive growth potential to compare affects when cotton was planted on two soil types, silt clay loam and heavy clay. Data was collected to evaluate: (1) the timing of the first application beginning at 8<sup>th</sup> node versus application at first bloom; (2) cotton growth response; (3) earliness and (4) the affect on cotton yield. Cotton treated with Pentia and mepiquat chloride was 31.2% and 27.8% shorter, respectively, than the untreated check. Treatments that began at 14<sup>th</sup> node provided more vegetative growth control than the treatments that began at 7-8<sup>th</sup> node. Pentia treated cotton that began at the 7-8<sup>th</sup> node and 14<sup>th</sup> node provided 23.1% and 39.9% more vegetative growth control, respectively, than the untreated check. All plant regulator treatment programs provided earlier boll opening than the untreated check. All Pentia treatment programs provided a higher percent of open bolls than mepiquat chloride treated cotton. A summary of the treatments showed that Pentia treated cotton was 66.4% open compared to 54.5% and 51.3% open in the mepiquat chloride and untreated cotton, respectively, at 136 days after planting. Cotton grown on mixed soil with plant regulator treatments beginning at bloom followed by a second application in two weeks provided the greatest yield. Pentia and mepiquat chloride treatment programs of 40 oz/A yielded 253 and 230 lb lint/acre, respectively, more than the untreated check. In this study, when plant regulators were applied beginning early (node 7-8) or to cotton planted on heavy clay soil, there were no positive yield increases.

### **Introduction**

DP 555 BG/RR is a slightly fuller season cotton variety with aggressive growth potential. Consequently, producers are interested in the use of plant growth regulators (PGR's) to control this variety's vegetative growth, enhance its earliness, and possibly increase yields. Mepiquat Chloride (MC) compounds have been reported as the most widely used PGR in US cotton production (Zhao et al., 1999), and Pentia (mepiquat pentaborate) has also shown to effectively reduce plant height and earliness (Livingston et al, 1999). Pentia is a relatively new compound formerly tested as BAS130W. Pentia differs from MC in that it has boron on the molecule instead of chloride.

### **Materials and Methods**

A cotton trial was conducted near Rolling Fork, Mississippi to evaluate the growth affects of cotton plant regulators and two soil types on a full season cotton variety. DP 555 BR/RR was planted on April 27, 2003 across two soil types, mixed soil (silt loam) and heavy clay. The strip trial consisted of an untreated check and eight plant regulator treatments in 6-row strips of 1.34 acres per strip. The first plant regulator application was made on June 2, 2003 at node 7-8 with all plant growth regulators being applied at 8 oz/A. A second application was applied 18 days later at node 14 (near first bloom) with all plant growth regulators being applied at 20 oz/A. A second set of treatments started at node 14 (near first bloom). Two further applications at 20 oz/A were applied to some treatments to evaluate variations in affect on the cotton variety. Four different PGR rate programs were applied. All applications included a 80% non-ionic surfactant at 0.25% v/v. Treatments were applied with a John Deere 6000 Hi-Cycle with water volume of 13.1 GPA. Frequent rains throughout the summer provided fast cotton growth, although this cotton variety appeared to grow slowly until about node 10. Data collected included plant height, bolls counts, boll opening and lint yield. Treatments were mechanically harvested.

## **Results and Discussion**

Plant regulators benefit cotton by diverting carbohydrates from vegetative to reproductive growth, thereby shortening plant internodes. These products are excellent management tools for a tall cotton variety, like DP 555BR/RR. The untreated cotton plants in this study average 56 inches in height. Cotton plants treated with Pentia were found to be 31.2% shorter than the untreated check. Whereas, treatments of mepiquat chloride were 27.8% shorter than the untreated check plants. However, treatments that began at 14<sup>th</sup> node provided more vegetative growth control than the treatments that began at 7-8<sup>th</sup> node. Pentia treated cotton that began with applications at the 7-8<sup>th</sup> node and 14<sup>th</sup> node provided 23.1% and 39.9% more vegetative growth control, respectively, than the untreated check. Mepiquat chloride treated cotton that began with applications at the 7-8<sup>th</sup> node and 14<sup>th</sup> node provided 23.1% and 39.9% more vegetative growth control, respectively, than the untreated check. Although this cotton variety, DP 555BR/RR, produces more than the average amount of vegetative growth, it grew very slowly until about the 9-10<sup>th</sup> node. In this study, the cotton appears to be in a slow growth phase and the plant regulator treatment at 7-8<sup>th</sup> node was less effective as compared to treatments that initiated applications near first bloom. At 136 days after planting, counts of first and second position bolls were collected to evaluate the number of bolls per plant and determine plant regulator affect on earliness. Bolls counts indicated that Pentia treatment programs of 48 and 40 oz/A had the greatest amount of bolls per plant with 13.4 and 12 bolls, respectively, at the first and second positions. All plant regulator treatments provided earlier boll opening than the untreated check at 136 days after planting. All Pentia treatment programs provided a higher percent of open bolls than mepiquat chloride treated cotton. A summary of the treatments showed that Pentia treated cotton was 66.4% open compared to 54.5% and 51.3% open in the mepiquat chloride and untreated cotton, respectively. This indicated that Pentia treated cotton provided earlier maturity. A trend was observed that the higher the total treatment rate, the greater the percent of boll opening for both Pentia and mepiquat chloride treatment programs. In this study, cotton grown on mixed soil with plant regulator treatments beginning at early bloom followed by a second application in two weeks provided in the greatest yields. Pentia and mepiquat chloride treatment programs of 40 oz/A yielded 253 and 230 lb lint/acre, respectively, more than the untreated check. In this study, there were no positive yield increases when plant regulators applications were initiated at node 7 to 8 or when cotton was grown on heavy clay soil. The 60-ounce per acre treatment program began with the first application at early bloom and was followed with two additional 20 oz/acre treatments. This program trailed closely behind the “best” treatment and was also better than the check. Both of the late treatment programs yielded more than any of the programs that were initiated at 7-8<sup>th</sup> node. Although the initial applications of 8 oz/A was applied at cotton growth stage of 7-8<sup>th</sup> node, this cotton variety appeared to be growing slowly which may have lessened the positive affects of plant regulators.

## **Conclusion**

Good growing conditions throughout the summer provided optimal cotton growth and development. However, this trial indicated that Pentia was the superior cotton plant growth regulator. Although there was little difference in vegetative growth suppression, but both plant regulators provided significant growth suppression when compared to the untreated check. Suppression of cotton vegetative growth is a valued plant management tool for a tall full season cotton variety like DP 555BR/RR. Early maturity is also an excellent benefit for cotton production systems. Pentia treated cotton provided earlier maturity than mepiquat chloride as indicated by having the greatest percent open bolls at 136 days after planting. This is a valuable benefit to provide opportunity of early harvest. Soil types affect cotton grown and development. Cotton grown on mixed or silt loam soils has the greatest opportunity for higher yields. Cotton grown on heavy clay soils usually has less vegetative growth and requires less plant regulator to suppress growth. Future trials should be conducted to further examine the benefits of Pentia for cotton plant height management, earliness and affect of soil types.

## **References**

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