

PIX EFFECTS ON THE GROWTH AND DEVELOPMENT OF DP 555 BG/RR IN CENTRAL TEXAS

Doug Pustejovsky

Delta and Pine Land Company

Elm Mott, TX

Dave Albers

Delta and Pine Land Company

Lubbock, TX

Abstract

A study was performed in the Brazos Bottom cotton growing region of Texas near College Station in 2002. Two cultivars, DP 555 BG/RR and SG 215 BG/RR, were monitored at one site looking at different growth parameters (plant height, total nodes, maximum internode distance (MID) between the 4th and 5th internode, and nodes above white flower (NAWF)). At an additional site DP 458 B/RR was monitored along with DP 555 BG/RR and SG 215 BG/RR looking at the same growth parameters. At both test sites DP 555 BG/RR had a taller final plant height than the other two cultivars. This height difference was modest early in the growing season but became more apparent during the early and late blooming cotton growth stages. DP 555 BG/RR exhibited a strong growth pattern at both locations in comparison to SG 215 BG/RR and DP 458 B/RR as further evidenced by a longer MID and higher NAWF number during the early and late blooming period. DP 555 BG/RR had more total nodes than SG 215 BG/RR and DP 458 B/RR at both locations tested. Each site tested had adequate mepiquat chloride (MC) concentrations in the DP 555 BG/RR plants to suggest full plant responses to the growth regulator.

Introduction

Different cultivars follow different growth curves. Most full season cotton varieties follow a longer growth curve that takes more heat units to develop a full potential crop than an early season variety. This study aims to compare the growth parameters (plant height, total nodes, maximum internode distance (MID) between the 4th and 5th internode, and nodes above white flower (NAWF)) of one early season cotton variety, SG 215 BG/RR, with the growth of one new full season variety, DP 555 BG/RR. One mid to full season cotton variety, DP 458 BG/RR, is also compared to the other two cultivars in this study. From this study one will be better able to understand the growth and maturity of the new cotton cultivar, DP 555 BG/RR, and its response to mepiquat chloride.

Materials and Methods

Data collection was taken from two sites in 2002. Each site was located in the Brazos Bottom cotton growing region of Texas near College Station, TX. Both sites were furrow irrigated and part of D&PL's Agronomic Systems Trials (AST's) that evaluate the agronomic qualities and yield capabilities of new and existing germplasm. At each site the timing and amount of mepiquat chloride (MC) applied was logged. At one location (site 1) DP 555 BG/RR and SG 215 BG/RR were sampled weekly from pre-squaring cotton to approximately three weeks post cutout. Weekly samples consisted of 20 plants (two 10 plant subsamples) for each variety for plant height, total nodes, maximum internode distance (MID) between the 4th and 5th internode, and nodes above white flower (NAWF). Site 1 was planted on April 19, 2002, followed a previous crop of corn in 2001, and had 160 actual units of nitrogen applied in the soil early in the growing season. This site was irrigated 4-5 times during the season and had a total of 56 oz. of MC applied (4 applications). Both test varieties received the same rates and timing of MC. The same sampling procedure was used at an additional location (site 2) except that DP 458 B/RR was sampled along with DP 555 BG/RR and SG 215 BG/RR. Site 2 was planted on April 13, 2002, followed a previous crop of grain sorghum, and had 85 actual units of nitrogen applied in the soil early in the growing season. This site was irrigated 2-3 times and had a total of 14 oz. of MC applied (2 applications). All three test varieties received the same rates and timing of MC.

For each location a graphical representation of plant height, total nodes, NAWF, and MID for each variety sampled was charted over time. The concentration of MC in DP 555 BG/RR was charted throughout the growing season for each site using the Mepiquat Chloride Rate and Timing (MEPRTV1.45) program to calculate MC concentration in cotton (Landivar et al., 1992, Landivar et al., 1995). Each variety at each test site was taken to yield and a loan value and corresponding value per acre was calculated.

Results

Table 1 summarizes the final lint yield, loan value, and value per acre for each variety tested. DP 555 BG/RR had the highest value per acre at both locations. At site 1 total plant height of DP 555 BG/RR was 48.2 inches while SG 215 BG/RR was 41.2 inches with most of the difference in height being accounted for after the plants started blooming (Figure 1). DP 555 BG/RR accumulated more total nodes (27.2) than SG 215 BG/RR (24.0) during the growing season at site 1 with the separa-

tion in total node number beginning prior to first bloom and continuing throughout the growing season (Figure 2). The difference in NAWF between DP 555 BG/RR and SG 215 BG/RR at site 1 was most evident early in the flowering period with DP 555 BG/RR having two more NAWF than SG 215 BG/RR just after the plants started to bloom (Figure 3). The MID for DP 555 BG/RR and SG 215 BG/RR was similar early in the growing season until first bloom when DP 555 BG/RR maintained a longer MID for a period of approximately four weeks (Figure 4).

At site 2 total plant height of DP 555 BG/RR was 46.4 inches, SG 215 BG/RR was 39.3 inches, and DP 458 B/RR was 39.0 inches (Figure 5). The growth of all three varieties was similar until the early blooming period when DP 555 BG/RR started to become taller than SG 215 BG/RR and DP 458 B/RR and maintained a taller plant height throughout the rest of the growing season. In order, SG 215 had the fewest total nodes (20.6), DP 458 B/RR was second (22.8), and DP 555 BG/RR had the most total nodes (24.8) (Figure 6). The trend was evident throughout the growing season. At site 2 DP 555 BG/RR had the highest NAWF count at early bloom (8.2) compared to DP 458 B/RR (7.1) and SG 215 BG/RR (6.2) with the pattern continuing through post cutout (Figure 7). For the approximate four weeks after first bloom, the MID was slightly longer for DP 555 BG/RR than for SG 215 BG/RR and DP 458 B/RR (Figure 8).

At site 1 the concentration of mepiquat chloride (MC) in DP 555 BG/RR rose to over 90 parts per million (PPM) early in the growing season and was maintained at a level of around 60 PPM for the remainder of the growing season (Figure 9). Site 2 had a MC concentration of around 25 PPM for DP 555 BG/RR early in the growing season and was maintained at a level of around 20 PPM for the remainder of the growing season (Figure 9).

Conclusions

The plant height of DP 555 BG/RR was taller than SG 215 BG/RR at both locations tested in 2002. At both sites the height differential between DP 555 BG/RR and SG 215 BG/RR was modest in pre-squaring cotton. However, during the early and late blooming cotton stages, DP 555 BG/RR maintained a more aggressive growth pattern as evidenced by its taller final plant height. DP 555 BG/RR likewise maintained a taller plant height in comparison to DP 458 B/RR as was evident at site 2 in 2002. Again, DP 555 BG/RR exhibited a strong growth pattern during the blooming period and maintained a taller plant canopy over the DP 458 B/RR for the remainder of the growing season. Although the two sites tested had differences in fertility (site 1 – 160 units of nitrogen; site 2 – 85 units of nitrogen) and irrigation, a similar growth pattern was observed with DP 555 BG/RR with respect to SG 215 BG/RR and DP 458 B/RR as related to its plant height at the end of the growing season. This may partially be explained by DP 555 BG/RR's longer maximum internode distance (MID) during the first three to four weeks of blooming in comparison to SG 215 BG/RR and DP 458 B/RR. This may also be explained by the fact that DP 555 BG/RR accumulated more total nodes of growth than SG 215 BG/RR and DP 458 B/RR during the growing season at both sites.

The concentration of mepiquat chloride (MC) suggested to control cotton growth where growth conditions are adequate is around 10 to 12 parts per million (PPM) (Landivar et al., 1992, Landivar et al., 1995). The concentration of MC was about five to six times the suggested rate for most of the growing season for DP 555 BG/RR at site 1. The elevated rates of MC used may partially be explained by the cotton crop having been rotated with corn from the previous year, having been irrigated 5-6 times, and having a higher rate of nitrogen (160 units) applied in the soil.

The concentration of MC in DP 555 BG/RR at site 2 was around 20 PPM for most of the growing season. This concentration still exceeded the normal suggested rate of 10-12 PPM. Site 2 used around 40 ounces less of MC than site 1 but still maintained an adequate level of MC in the cotton plant as to suggested rates. This is probably partially due to the differences in irrigation and fertility between the two test sites. It appears from this study that DP 555 BG/RR may require more monitoring during the early and late blooming cotton stages than other standard cultivars. The more aggressive growth pattern (taller plant height, longer MID, more total nodes) of DP 555 BG/RR may also require more MC to be applied during the blooming period when compared to other standard cotton varieties.

References

- Landivar, J.A., S. Zypman, D.J. Lawlor, J. Vasek and C. Crenshaw. 1992. The use of an estimated plant pix concentration for the determination of the timing and rate of application. Proc. Beltwide Cotton Conference. pp. 1047-1049.
- Landivar, J.A., D Locke, Z. Cespedes and D. Moseley. 1995. The effect of estimated plant pix concentration on leaf area expansion and main stem elongation rate. Proc. Beltwide Cotton Conference. pp. 1081-1084.

Table 1. Lint yield and value per acre of test varieties at site 1 and site 2.

Variety	Lint/Acre	Loan Value	Value/Acre
DP 555 BG/RR	1,715	\$0.5410	\$927.82
SG 215 BG/RR	1,685	\$0.5260	\$886.31
Site 1 Average	1,574	\$0.5439	\$855.60

Variety	Lint/Acre	Loan Value	Value/Acre
DP 555 BG/RR	1,430	\$0.5205	\$744.32
SG 215 BG/RR	1,303	\$0.5220	\$680.17
DP 458 B/RR	1,219	\$0.5420	\$660.70
Site 2 Average	1,265	\$0.5244	\$662.54

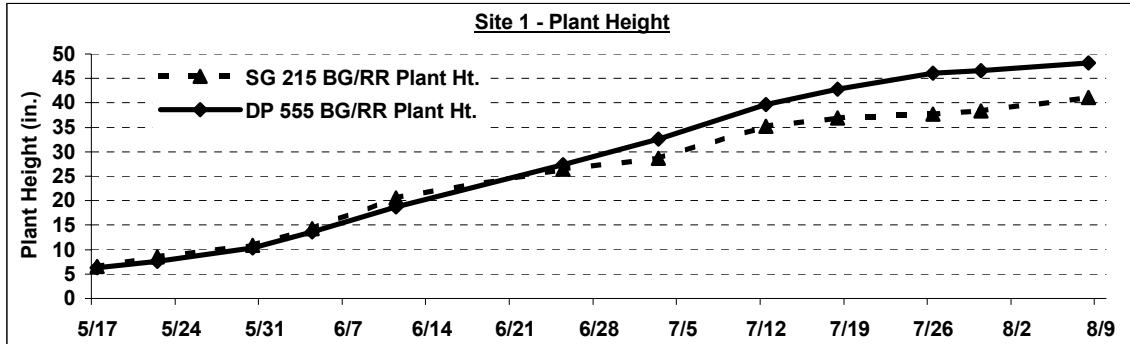


Figure 1. Plant height of DP 555 BG/RR and SG 215 BG/RR at site 1.

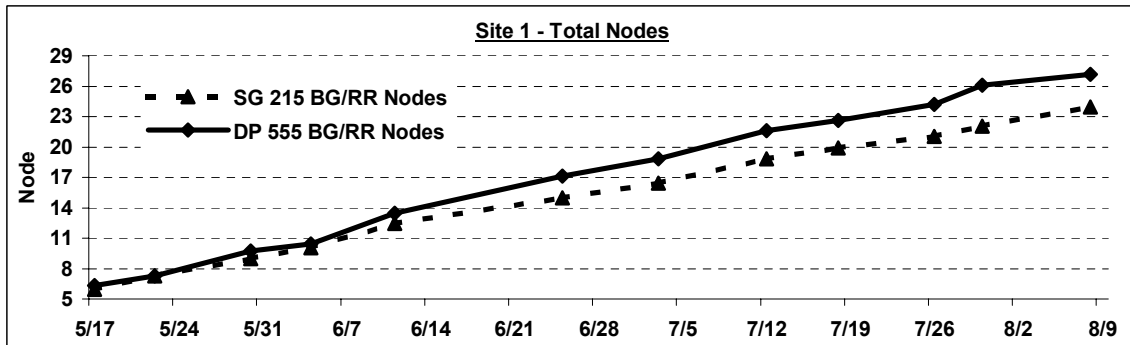


Figure 2. Total nodes of DP 555 BG/RR and SG 215 BG/RR at site 1.

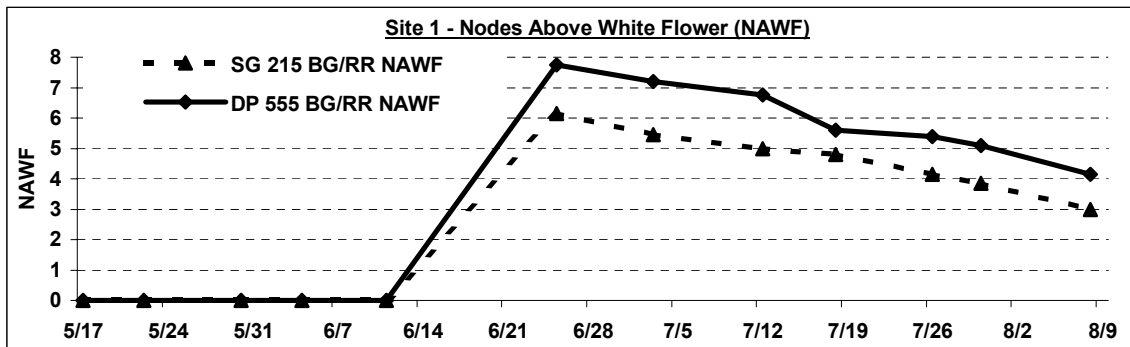


Figure 3. NAWF of DP 555 BG/RR and SG 215 BG/RR at site 1.

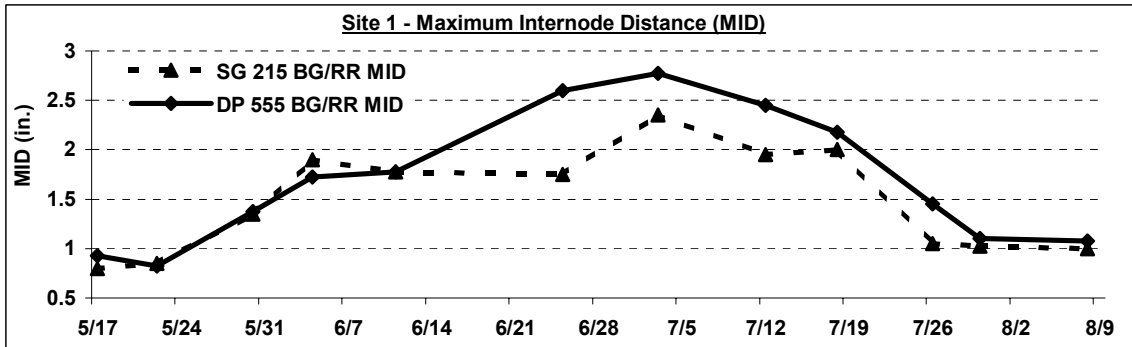


Figure 4. MID of DP 555 BG/RR and SG 215 BG/RR at site 1.

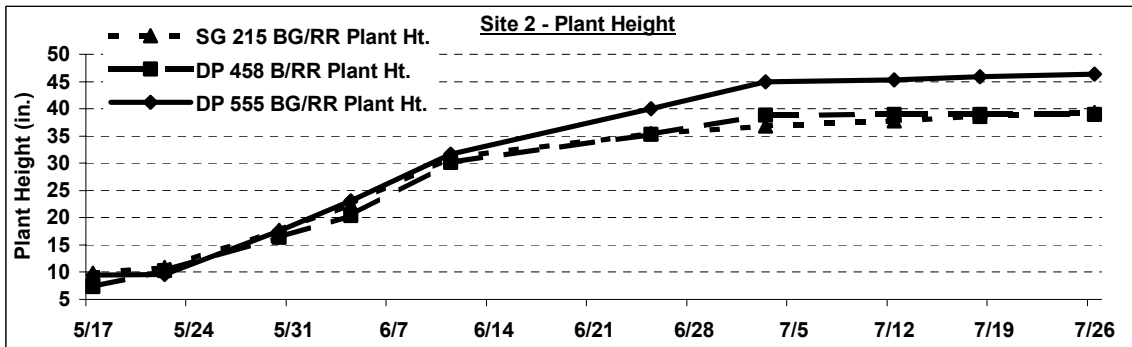


Figure 5. Plant height of DP 555 BG/RR, DP 458 B/RR and SG 215 BG/RR at site 2.

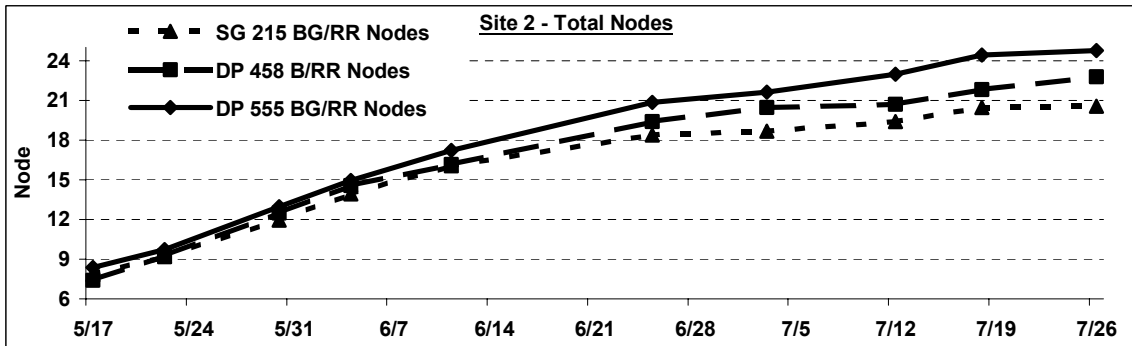


Figure 6. Total nodes of DP 555 BG/RR, DP 458 B/RR and SG 215 BG/RR at site 2.

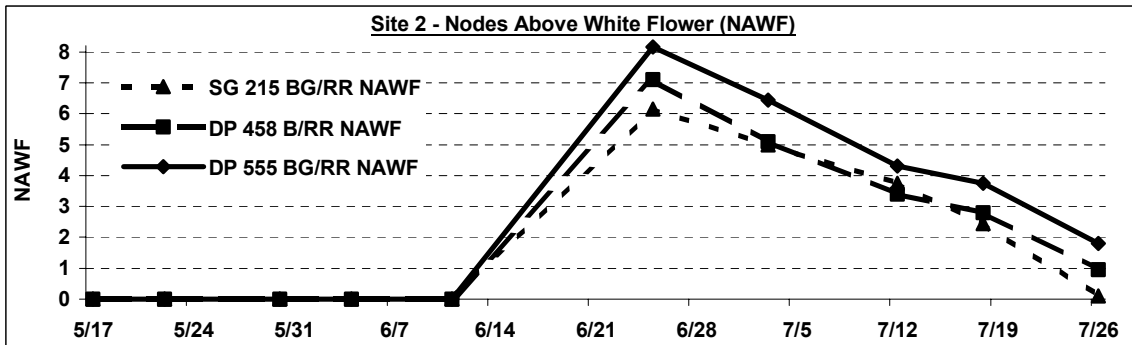


Figure 7. NAWF of DP 555 BG/RR, DP 458 B/RR and SG 215 BG/RR at site 2.

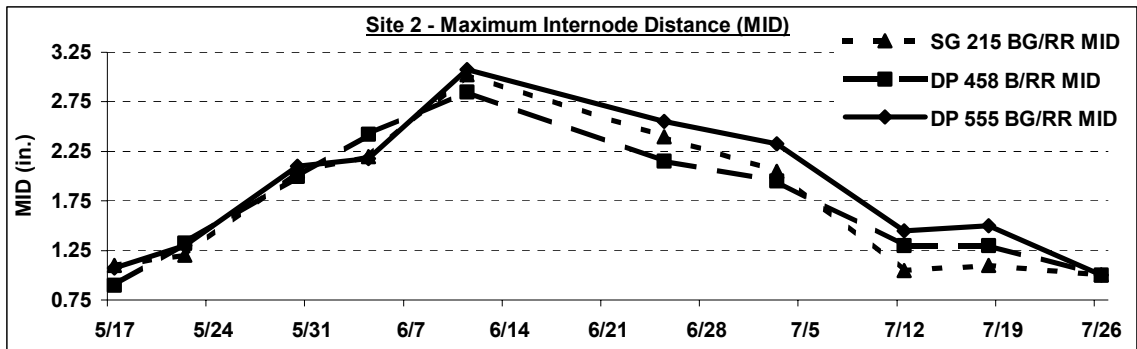


Figure 8. MID of DP 555 BG/RR, DP 458 B/RR and SG 215 BG/RR at site 2.

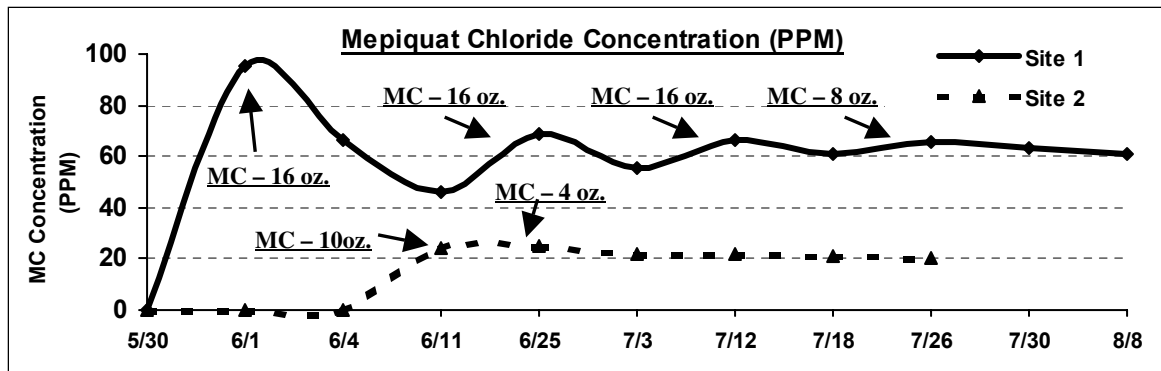


Figure 9. MC concentration of DP 555 BG/RR at site 1 and 2.