

EFFECT OF PLANT GROWTH REGULATOR APPLICATION ON COTTON GROWTH AND DEVELOPMENT

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Abstract

Vegetative growth is necessary to support reproductive growth in a cotton plant. However, excessive vegetative growth can result in increased fruit abortion, delayed crop maturity, and yield reduction. Plant growth regulators (PGR) are used to control excessive growth. Plant growth regulator application to cotton results in a reduction in gibberellic acid in the plant, which reduces internode elongation and plant height. Extensive previous research has been conducted regarding PGR effects on cotton growth and development. However, conflicting reports exist on the effect on PGR application on growth, development, and yield. In addition, the speed of release for new varieties results in little consistent data on management and performance of newly released commercial varieties. Therefore, the objective of this research was to determine the effect of PGR application on growth, development, and yield of newly released Roundup Ready Flex and Liberty Link cotton varieties. This experiment was conducted in 2011. Research on Liberty Link varieties was conducted at the Lon Mann Cotton Research Center located in Marianna, AR. Varieties in this experiment included: Fibermax (FM) 1773 LLB2, FM 1845 LLB2, Stoneville (ST) 4145 LLB2, Bayer CropScience (BCS) 1252 LLB2, ST 5445 LLB2, and Phytogen (PHY) 499 WRF. An additional experiment examining PGR effects on Bayer CropScience (BCS) RR Flex varieties was also conducted at the Lon Mann Cotton Research Center. Varieties in this experiment included: FM 1740 B2RF, ST 5458B2RF, ST 4288B2F, ST 5288B2F, PHY 375 WRF, and PHY 499 WRF. A final study was conducted examining PGR effects on Delta and Pineland RR Flex cotton varieties which included: Delta and Pineland (DP) 1034 B2RF, DP 1137 B2RF, 10R020 B2RF, DP 1252 B2RF, DP 1219 B2RF, DP 1050 B2RF, DP 1133 B2RF, DP 1028 B2RF, DP 1048 B2RF, 10R051 B2RF, DP 1212 B2RF, and DP 1044 B2RF. This experiment was conducted at the Lon Mann Cotton Research Center in Marianna, AR; the West Tennessee Research and Education Center in Jackson, TN; and the R.R. Foil Plant Science Research Center in Starkville, MS. All experiments conducted in Marianna, AR were grown under irrigated conditions while all experiments at the Starkville, MS and Jackson, TN locations were grown under dryland conditions. All Liberty Link and Bayer CropScience Roundup Ready Flex varieties were treated with mepiquat chloride + cyclanilide (Stance Growth Regulator). There were two PGR application regimes for the Liberty Link and the BCS RR Flex varieties. Standard PGR management consisted of 4 oz/ac applied at mid-bloom as well as at full-bloom. Applications were made 12 days apart. Aggressive PGR management consisted of 3 oz/ac at match head square followed by 4 oz/ac at mid-bloom, followed by 4 oz/ac at late bloom. These applications were made at 28 and 10 days apart. Delta and Pineland RR Flex Varieties at all locations were treated with mepiquat chloride (Mepex Growth Regulator). Standard PGR management at all locations was 16 oz/ac applied at bloom. Aggressive PGR management of these varieties in Arkansas consisted of 8 oz/ac applied at match head square, followed by 8 oz/ac at first bloom, and followed by 8 oz /ac at mid-bloom. In Mississippi and Tennessee, aggressive PGR management included 12 oz/ac applied at match head square followed by 16 oz/ac at first bloom. A significant reduction in height following standard and aggressive PGR applications was observed in all Liberty Link varieties. No reduction in plant height was observed in PHY 499 WRF following PGR application. Significant height reduction was also observed in ST 5458B2RF following the aggressive and standard management regimes. In addition, significant reduction in height was observed in ST 4288B2F and 5288B2F following the standard management regime. No reduction in height was observed among all other BCS RR Flex varieties due to PGR application. No difference in height was observed between standard and aggressive management regimes in DP RR Flex varieties. No significant differences in maturity were observed following PGR application with any of the Liberty Link, BCS RR Flex, and DP RR Flex varieties with the exception of FM 1845 LLB2 in which the standard management regime accelerated maturity. However, yield of FM 1845 LLB2 was reduced following PGR application at the standard management regime. With regard to yield, generally no differences were observed in

Liberty Link, BCS RR Flex, and DP RR Flex varieties following PGR application. Overall plant height responses varied based on the variety and PGR management program.