EFFICACY AND AGRONOMIC IMPACTS OF COMMERCIALLY AVAILABLE PLANT GROWTH REGULATORS ACROSS THE COTTON BELT

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Abstract

Cotton is a subtropical, perennial plant with an indeterminate growth habit. Vegetative and reproduction growth occur simultaneously; however, excessive vegetative growth can have detrimental effects on cotton. Excessive vegetative growth can lead to problems such as increased fruit abortion, delayed crop maturity, and yield reductions. Excessive vegetative growth in cotton is controlled through applications of plant growth regulators (PGR). Agricultural research with PGRs began in the 1930s; however, the introduction of Pix® in 1980 brought PGRs into cotton production. Extensive research exists on the effects of PGR application on cotton. Previous research regarding PGR effects on fiber quality indicate that no differences in fiber quality were observed after application of several commercially PGR products. Yield responses have been very inconsistent. Research is available showing increased, decreased, and no yield effects due to PGR applications. Generally speaking, PGR applications are likely to be beneficial when fruit retention is reduced and excessive vegetative growth is present. However, PGR applications can be detrimental when applied in excess amounts or when applied to stressed cotton. This study was initiated to quantify the effect of PGR application on cotton plant height, lint yield, and fiber quality in eleven states across the Cotton Belt.

Experiments were conducted in Alabama, Arkansas, Arizona, Georgia, Louisiana, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas (2 locations), and Virginia in 2007 and 2008. Data from 19 locations in 2007 and 2008 were analyzed to determine if PGR application affected lint yield or fiber quality. Small plot research techniques were utilized in these experiments. The following PGRs were evaluated: Mepex®, Mepex Gin Out®, Pentia™ and Stance™. Application rates and timings are shown in Table 1. The following varieties were planted in 2007 and 2008 at various locations depending on their geographical location: 'Delta and Pineland 555 BR', 'Delta and Pineland 117 B2RF', 'Delta and Pineland 143 B2RF', 'Fibermax 9063 B2RF', 'Stoneville 5458 B2RF', and 'Phytogen 485 WRF'. Seeding rates, planting date, fertility, insect management, weed management, and harvest-aid applications were state-specific and were based on extension recommendations for each state. Data collected included: plant height prior to PGR application, plant height two weeks after initial application and prior to second PGR application, plant height two weeks after second PGR application, and plant height at the end of the growing season. Total mainstem nodes, nodes above cracked boll, lint yield, and fiber quality data were also collected. Data from each state were grouped into regions: the southeast region included Alabama, Georgia, South Carolina, North Carolina, and Virginia; the mid-south region included Arkansas, Louisiana, and Mississippi, and the southwest region included Oklahoma and two locations in Texas. Data were analyzed using analysis of variance and means were separated using Fishers Protected LSD at P=0.05. A significant treatment by location interaction was present for most variables. Therefore, data were not pooled over all locations; however, when data were analyzed by region, no treatment by location interactions were present, therefore data were pooled over locations within each region.

Application of Mepex®, Mepex Gin Out®, Stance™, and Pentia™ resulted in significant plant height reductions two weeks after the matchhead square (MHS) application. Plants treated with PGRs were 1 to 16% shorter than untreated plants or those treated with Induce® only. A 10 to 21% reduction in plant height was observed two weeks after the second application as well as at the end of the season when plants were treated with a PGR compared to those that received no application or were treated with Induce®. In the Southeast and Southwest regions, a significant reduction in the total number of mainstem nodes was observed due to PGR application. However, no differences among specific PGR products were observed. No significant differences in lint yield were observed due to application of a PGR compared to untreated plants of those treated with Induce®. Micronaire and uniformity were similar for all PGR treatments as well as Induce treatments and the untreated check. Minor differences in length and strength were observed within various regions. In conclusion, PGR application provided no benefit in terms of lint yield, micronaire, or uniformity; however, minor differences were observed in length and strength. Based on this research, selection of a specific PGR should be based upon characteristics that are considered important by the person purchasing the PGR, not due to perceived benefits in yield and/or fiber quality.

Table 1. Application rates and timings of plant growth regulators (PGR).

Product[a]	Rate	Application Timing
Mepex fb[b]	8 oz/A	MHS[c]
Mepex	10 oz/A	2 WAIT[d]
Mepex Gin Out fb	8 oz/A	MHS
Mepex Gin Out	10 oz/A	2 WAIT
Stance fb	1.5 oz/A	MHS
Stance	2 oz/A	2 WAIT
Stance fb	2 oz/A	MHS
Stance	3 oz/A	2 WAIT
Pentia fb	8 oz/A	MHS
Pentia	10 oz/A	2 WAIT
Stance fb	2 oz/A	MHS
Stance fb	3 oz/A	2 WAIT
Stance	3 oz/A	NAWF = 5[e]
Induce fb	0.25 % v/v	MHS
Induce	0.25 % v/v	2 WAIT
Untreated		

[a] All PGR treatments included Induce at 0.25% v/v
[b] fb: followed by
[c] MHS: Matchhead square
[d] 2 WAIT: 2 Weeks after initial treatment
[e] NAWF = 5: Nodes above white flower equals five