DETERMINING OPTIMUM PLANT GROWTH REGULATOR STRATEGIES IN RESPONSE TO FRUIT REMOVAL

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Abstract

Regardless of practice utilized to protect cotton fruiting structures, fruiting structures still abscise due to a multitude of physiological stresses or insect feeding. However, limited fruit loss early in the season is acceptable provided it does not exceed the economic injury level. The current economic injury level for cotton as defined by the Mississippi State University Extension Service is 20 percent lost or 80 percent retained. However, cotton with square retention ranging from 70 to 85 percent will often produce higher yields than cotton with a higher rate of square retention. Fruit loss usually results in taller plants as energy devoted to fruit production is re-directed to vegetative growth. However, excessive cotton height can be problematic for pest management, harvest aid application, and harvest efficiency. In addition, it is difficult to manage height of cotton with reduced fruit retention. The use of plant growth regulators (PGR) has become common in cotton production in the United States with mepiquat chloride being the most commonly applied PGR. Increased earliness has been a purported benefit from mepiquat chloride application; however, contradictory data exits with respect to PGR effect on varietal maturity. Several studies concluded that there is no benefit with respect to increased earliness following mepiquat chloride application. However, little to no previous research exists regarding the effect of PGR application on earliness, cotton growth and development, and yield in the presence of substantial early season fruit loss. Given the current situation in Mississippi with tarnished plant bugs and other factors resulting in early season fruit loss, a more defined strategy is needed for proper PGR application**.**

Experiments were conducted in 2012 and 2013 at Starkville, MS and Brooksville, MS. DP 1034 B2RF was planted in mid-May of each year with all insects, weeds, and other agronomic inputs based on Mississippi State University Extension Service recommendations. These experiments were conducted with a two – factor factorial arrangement of treatments within a randomized complete block design. Factor A consisted of level of fruit removal with fruiting structures were hand removed at first bloom. Levels of removal included no removal, 50% removed, and 100% of fruiting structures removed. Factor B consisted of PGR application rate and included 0, 0.051, 0.103, 0.154, and 0.205 lbs ai/acre. All PGR applications were made with a CO_2 – powered backpack sprayer calibrated to apply 15 gallons per acre. All data were subject to analysis of variance using the PROC GLIMMIX procedure in SAS 9.3. Location was considered a random effect. Means separated using Fisher's Protected LSD at $\alpha = 0.05$.

There was no interaction between level of fruit removal and PGR application rate with respect to final height, total nodes, nodes above cracked boll, or yield. End of season plant height and total nodes increased as the level of fruit removal per plant increased. As PGR application rate increased, final height and total nodes decreased. Nodes above cracked boll significantly increased as the rate of fruit removal per plant increased indicating a delay in maturity. Generally nodes above cracked boll decreased as PGR application rate increased, with the exception of the 0.154 lb. ai/ac application rate. PGR application rate did not have a significant effect on yield. There were no significant differences among treatments containing no removal and 50 percent removal with respect to lint yield. Plot receiving 100 percent of the fruiting structures removed at bloom yield significantly less than other treatments in question.