EARLY SEASON WEED COMPETITION IN ROUNDUP FLEX COTTON

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Abstract

Field studies were conducted to examine the impact of weed competition on cotton from delaying the first glyphosate application in Roundup Ready Flex® cotton. Studies were established at the Attapulgus Research Farm near Attapulgus, GA and the Plant Sciences Farm near Athens, GA in 2003. Cotton was exposed to 2, 3, 4, 5, and 6 weeks of weed competition after emergence with and without pendimethalin applied preemergence. At the Athens location, cotton mapping and yield data indicated no impact of weed competition. This is possibly due to lower than anticipated weed populations at this site. At the Attapulgus location, first and second position boll counts declined from 25 to 5 at nodes 11-15 in cotton exposed to 3 to 5 weeks of weed competition. Third position boll numbers declined at nodes 5-10, 11-15, and at all nodes >15. Seed cotton data were regressed against weeks of competition with associated weeds. When pendimethalin was applied PRE at 0.84 kg ai/ha, 80 kg seed cotton yield were lost for each week cotton was exposed to weed competition beyond three weeks after emergence. When pendimethalin was not applied, 107 kg seed cotton yield was lost for each week cotton was exposed to competition. These data indicate the need for growers to control weeds during early season cotton growth.

Introduction

Glyphosate-resistant cotton (Roundup Ready®) accounts for approximately 93% of all cotton acres in Georgia. Glyphosate-resistant cotton can receive foliar applications of glyphosate through the fourth true leaf stage. Following the fourth true leaf stage, all glyphosate applications must be directed to decrease spray coverage of the foliage. The small window of timing for foliar applications is not always followed by growers and problems can arise from off-label applications. Off-label applications can lead to a wide array of yield problems. The next generation of goyphosate-resistant cotton (Roundup Ready Flex) will have a much wider window of glyphosate application to the 14- leaf stage. However, with the introduction of this new technology, growers may be tempted to prolong their first glyphosate applications thereby increasing the duration of early season weed competition. Buchanan and Burns (1970) found cotton yield was negatively affected by weed competition in as little as four weeks after emergence. The objective of this study was to determine the effect of delaying first glyphosate applications in Roundup Ready Flex cotton would have on yield.

Materials And Methods

Field experiments were conducted at the Attapulgus Research and Education Center in Attapulgus on a Lucy loamy sand (thermic, Arenic, Kandiudults) with a pH of 5.9 and 84% sand, 14% silt, and 2% clay with 0.9% organic matter as well as the Plant Science Farm near Athens on a Cecil sandy loam (clayey, kaolinitic, thermic, Typic Hapludults) with 76% sand, 16% silt, 8% clay, and 0.9% organic matter and a pH of 5.9. A Roundup Ready Flex variety (GH_S9910) was planted at both locations in 2003. Treatments consisted of cotton exposed to weed competition for 2, 3, 4, 5, and 6 weeks after emergence without any preemergence herbicide or with pendimethalin applied preemergence at 0.84 kg ai/ha. Plots were kept weed free for the remainder of the growing season following glyphosate application.

The experimental design was a factorial with four replications. Individual plots in Attapulgus consisted of four rows, spaced 91-cm apart, 7.5m long. Weeds present in Attapulgus consisted of bristly starbur (*Acanthospermum hispidum*), Florida pusley (*Richardia scabra*), and yellow nutsedge (*Cyperus esculentus*). Plots in Athens consisted of two rows, spaced 76 cm apart, 7.5 m long. In Athens, sicklepod (*Senna obtusifolia*), prickly sida (*Sida spinosa*), and morningglory spp (*Ipomoea spp*). were present in the plots.

All herbicide treatments were were applied with a backpack CO_2 – pressurized sprayer, calibrated to deliver 170 L/ha at 220 kPa. Seed cotton yields were taken in Attapulgus by machine harvest of the middle two rows of each plot. In Athens, seed cotton yields were taken by hand harvesting 3 m of one row in each plot. Boll mapping was conducted in both Athens and Attapulgus. All yield data were analyzed using linear regression. Mapping data was analyzed using a Proc Mixed model in SAS.

Results And Discussion

Mapping and yield data from Athens revealed no significant differences between treatments. This is probably due to lower than expected weed populations. However, mapping data form Attapulgus showed that from nodes 15 -20, first position boll numbers declined from 25 to 5 when weeds were allowed to compete from three to five weeks. Likewise nodes 11-15 experienced a decline from 25 to 5 second position bolls from three to five weeks competition. Finally, third position boll numbers were reduced from 9 to 5 on nodes 5-10 and from 6-0 on nodes 11-15. Yield data from Attapulgus revealed that with the use of pendimethalin yields were reduced 80 kg of seed cotton for each week that the glyphosate application was postponed (Figure 1). When pendimethalin was not used, this loss increased to 107 kg for each week of additional competition. The yield data from Attapulgus are similar to Buchanan and Burns (1970) indicating a need for early-season control of weeds.

References

Buchanan, G.A. and E.R. Burns. 1970. Influence of weed competition on cotton. Weed Sci. 18:149-154.

Figure 1. Weed competition with Roundup Ready Flex at Attapulgus, GA.