

EFFECTS OF ROUNDUP ULTRA® ON ROUNDUP READY™ COTTON

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Abstract

Postemergence weed control is a challenge for cotton producers. Cotton has been developed that is tolerant to the broad spectrum herbicide Roundup Ultra®. The advantages of Roundup Ready™ cotton include control of a wide range of weed species and favorable environmental profile. The growth stage of cotton determines the application window. Over-the-top treatment is permitted before the fifth true-leaf stage and after 20% open. From the fifth true-leaf stage through 20% open, Roundup Ultra® can be applied only with directed application equipment. Little research has been conducted to determine the extent of injury to the plant from over-the-top and post-directed applications during this interval. Thus, our objective was to investigate the effect of application of Roundup Ultra® during this period.

Research plots were established at the West Tennessee Experiment Station to determine the effects of Roundup Ultra® on cotton fruiting, lint yield and earliness. Treatments included a single Roundup Ultra® application over-the-top to cotton at the four-, six-, eight-, ten-, or twelve-leaf stage. Sequential applications included single applications over-the-top at the 6-, 8-, or 10-leaf stage and post-directed at the 6-, 8-, or 10-leaf stage both following an initial application over-the-top at the 4-leaf stage. All plots were maintained weed free and an untreated hoed check was included for comparison. Coker 312 by 1445RR was planted in 1996 and Paymaster 1215RR was planted in 1997. Roundup Ultra® was applied at 0.75 lb. ai/ac (1.5 pt. product/ac) in 10 GPA at every application timing. University of Tennessee recommended practices for cotton production, excluding weed control, were followed. Eight plants selected at random were mapped to determine fruiting patterns and plant heights. Maps began at node four for consistency. The first fruiting node was recorded and the presence or absence of a boll at the first three fruiting positions on each node was recorded. Plots were spindle-picked twice to determine lint yields.

Fruiting occurred higher on the plant in 1997 than in 1996. However, fruiting patterns were comparable. Analysis of total boll retention by Fisher's protected LSD produced no difference among treatments. Interactions among treatment by node and position were significant. Percent retention at position one was consistently higher in the untreated check

compared with single applications. Fewer position differences were observed when cotton was treated once at the 4-, 10-, or 12-leaf stage both years. Retention at position one was less in the 6- and 8-leaf stage single applications than the untreated check. Effects were greater in 1997. Over-the-top application at the 4-leaf stage was prior to fruit set, and treatment at the 10-leaf and 12-leaf stage did not affect fruit already set on lower nodes. Favorable growing conditions in 1996 compared to 1997 helped counteract Roundup Ultra® injury. In all sequential applications, percent retention was less at the first position compared to the untreated check. When a sequential application was made over-the-top at the 10-leaf stage, retention at the first position was less than the untreated check from node five through ten. Cotton retained more fruit through node nine with Roundup Ultra® post-directed than over-the-top application. Percent first harvest was not reduced by single 4-leaf and 6-leaf stage or sequential 4-leaf + 6-leaf applications with Roundup Ultra® in 1996 and there were no differences in final lint yield. In 1997, a single application at the 10-leaf stage reduced percent first harvest, but the sequential 4-leaf + 10-leaf stage applications did not decrease percent first harvest. Single applications at the 10- and 12-leaf stage reduced lint yield.

Treatment yields for sequential over-the-top applications were similar at all leaf stage combinations, but were less than the check. Cotton yield with post-directed treatments were similar to the untreated check and consistently higher than over-the-top sequential applications.

In conclusion, label applications do not injure cotton and single applications up to the 8-leaf stage do not reduce yields. Earliness may be delayed with single applications of Roundup Ultra after the 8-leaf stage. Small changes in fruit retention can mean less yield in certain years. Post-directing Roundup Ultra offers the advantage of reducing the risk of yield reduction but may not control weeds in cotton rows. Consideration should be given to the amount of damage to cotton from in-row weeds versus injury from Roundup Ultra® applied outside of label guidelines.