

**FRUIT ABSCISSION AND YIELD RESPONSE OF
ROUNDUP-READY™ COTTON TO TOPICAL
APPLICATIONS OF GLYPHOSATE**

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Abstract

Field experiments were conducted at two locations in North Carolina during 1996 and 1997 to evaluate yield effects and location of fruit abscission from topical applications of glyphosate after the four-leaf stage in Roundup-Ready™ cotton (*Gossypium hirsutum* L.).

Fruit retention and boll development are important in maximizing cotton yields. Previous research has indicated that labeled applications of Roundup® in Roundup-Ready™ cotton are non-phytotoxic and do not lead to reduction in yield. The ability to apply glyphosate postemergence over-the-top (POT) after the four-leaf stage could benefit cotton growers by eliminating one or more mechanical cultivation and the need for post-directed (PDIR) herbicide applications.

Roundup Ultra® was applied POT at 1.5 pts/acre at the following growth stages: 4-leaf, 8-leaf, 1st white bloom (fwb), 4 weeks after fwb, and cutout. Seven to 14 days after application of a boll opener and defoliant, five plants per plot were randomly selected for plant mapping. Analysis for location of fruit abscission was performed by individual fruiting position and by fruiting region. For fruiting region analysis, the lower fruiting region consisted of fruiting positions one and two on fruiting branches one through four. The medial fruiting region consisted of fruiting positions one and two on fruiting branches five through eight. The upper fruiting region consisted of fruiting positions one and two on fruiting branches greater than eight.

Lint cotton yields were significantly less than the non-treated weed-free check when glyphosate was applied at the 8-leaf and fwb stages at Rocky Mount in 1996. These application timings, however, did not result in significant decreases in seed cotton yield at Rocky Mount or Clayton in 1997 when compared with the check. At Rocky Mount in 1997, the 8-leaf application yielded less than the application at cutout. At Clayton in 1997, the 8-leaf application yielded less than the 4-leaf application.

Fruit abortion occurred more often at fruiting position one than at position two when glyphosate was applied after the 4-leaf stage. When applied at the 8-leaf stage, there were a

greater percentage of plants which had an abort at position one at fruiting branches 1, 3, and 4. A greater percentage of plants had an abort at position one on fruiting branches 6 and 7 when glyphosate was applied at the fwb stage. Glyphosate applied four weeks after fwb resulted in a greater percentage of plants which had an abort at position one at fruiting branch 10. When applied at cutout, glyphosate resulted in a greater percentage of plants which had an abort at position one at fruiting branches 3 and 11. These results indicate there may be a correlation of timing of glyphosate application with specific node affected.

The total number of sympodial bolls increased with an application of glyphosate at the 8-leaf stage at Rocky Mount in 1996. Likewise, the total number of closed sympodial bolls increased. The number of harvestable bolls, however, decreased when glyphosate was applied at 8-leaf and fwb stages at Rocky Mount in 1996, thereby leading to decreases in yield. When glyphosate was applied at the 8-leaf and fwb stages at Rocky Mount in 1996, there was a greater number of fruit abortions in the lower and medial fruiting regions, respectively. When glyphosate was applied at the 8-leaf stage, there were more bolls produced in the upper fruiting region when compared with all other treatment timings. These results indicate that applications of glyphosate at the 8-leaf and fwb stages of cotton development may cause fruit abortion at lower nodes on the plant. The cotton plant may attempt to compensate for these losses by setting more fruit at higher nodes on the plant, which, in turn, may cause a delay of maturity.