

**THE INFLUENCE OF OVER-THE-TOP AND POST-DIRECTED APPLICATIONS OF ROUNDUP®
AGRICULTURAL HERBICIDE ON YIELD AND FRUIT RETENTION IN ROUNDUP READY® COTTON**

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Abstract

Since the launch of Roundup Ready cotton in 1997, producers have recognized the value that the technology provides to their farm enterprise. Estimated adoption levels in excess of two-thirds of the U.S cotton acreage indicate that producers have confidence in the technology and that Roundup herbicide used in combination with Roundup Ready cotton provides safe and reliable weed control when used in accordance with the label.

Monsanto Company has conducted replicated research trials designed to specifically evaluate the tolerance levels of Roundup Ready cotton to various Roundup agricultural herbicide application methods, combinations, rates and timings across a wide representation of environments and geographies. The results of over 100 tolerance trials conducted over a five year period (1993 – 1998) concluded that the current Roundup Ready technology provided Roundup Ready cotton with excellent vegetative tolerance to applications of Roundup Ultra™ at rates well beyond the 0.75 lb ae. / A labeled rate. However, tolerance in the floral portion of Roundup Ready cotton did not consistently provide adequate crop safety in some instances impacting yield when over-the-top applications were made beyond the fifth leaf stage of development. Subsequent research determined that crop safety is increased with applications beyond the fifth true leaf stage if the amount of cotton exposed to the Roundup agricultural herbicide was reduced by post-directing applications. Nevertheless, excellent crop safety could not be consistently achieved unless post-direct applications were made utilizing equipment that directs the spray to the base of the plants avoiding contact of the spray with the cotton leaves.

The current Roundup Ready cotton label allows a maximum of two over-the-top applications from the ground cracking stage through the four leaf stage and two post-directed applications from the fifth leaf stage through layby. Any single application cannot exceed a 0.75 lb ae per acre rate of any labeled Roundup agricultural herbicide and there must be two nodes of incremental growth and at least 10 days between sequential in-crop applications.

Since 1998, Monsanto has continued its Roundup Ready cotton tolerance work in order to validate and/or refine if necessary the current Roundup herbicide label for use in Roundup Ready cotton. A mixed model analysis was performed on both yield and plant mapping data collected from 54 replicated Roundup Ready cotton tolerance trials conducted from 1998-2002. The results of these analyses concluded that there were no differences among the untreated check and various Roundup agricultural herbicide treatment regimes. In addition to the tolerance trial summaries, cotton yield data were collected from studies conducted by Monsanto (Technology Development, Trait Development, Formulation and Regulatory) and a host of trials from either academic or private contract researchers. Roundup treatment regimes, which included single and sequential applications, were differentiated by herbicide rate (0.75, 1.12, and 1.50 lbs ae. /A) and application type (over-the-top and/or post-directed sprays).. Despite a modest sixty pound lint yield difference separating the highest and lowest treatment regimes, significant differences were detected among the fifteen treatments. However, no statistical difference was detected among the top five yielding treatments of which four of the top five yielding treatment regimes utilized the labeled 0.75 lb ae./A rate of Roundup.