

**MORPHOLOGICAL EFFECTS OF ROUNDUP  
APPLICATION TIMINGS ON ROUNDUP-  
READY™ COTTON**

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**Abstract**

Field experiments were conducted in 1996 at the Upper Coastal Plain Research Station in Edgecombe County, NC and the Cherry Farm in Wayne County, NC to evaluate the morphological and yield effects of postemergence (POST) applications of Roundup (Glyphosate) in Roundup-Ready™ cotton (*Gossypium hirsutum* L.). Current varieties of Roundup-Ready™ cotton exhibit a negative response to applications of Roundup when applied POST after the 4-leaf stage. The exact morphological response to these applications has not yet been determined.

Square retention and boll development are extremely important for high lint yields in cotton production. Determinations of the location of square abortions and a compensation potential, if any, by the plant may aid in the decision-making process of utilizing Roundup as an over-the-top application after the critical 4-leaf stage.

At the Upper Coastal Plain Research Station in Rocky Mount, Coker 312-1445 RR was planted conventionally on beds at 36" on May 9, 1996. Plots consisted of four rows at twenty-five feet in length and were replicated four times. Treatments included 1.5 pts./acre of Roundup Ultra at the following growth stages: 4-leaf, 8-leaf, 1st Bloom, 1st Bloom + 4 weeks, and Full Fruit. All treatments received trifluralin (Treflan) at 1.5 pts./acre pre-plant incorporated (PPI) and fluometuron (Cotoran) at 2 pts./acre pre-emergence (PRE) for early season weed control. Plots were also maintained weed-free throughout the season to eliminate weed competition.

At the Cherry Farm in Goldsboro, Hartz 1445 RR was planted conventionally at 38" on May 9, 1996. Plots consisted of four rows at thirty feet in length and were replicated three times. Treatments included 2 pts./acre of Roundup Ultra at the following growth stages: 2-4 leaf, 6-leaf, 11-12 leaf, Prebloom, and Mid-to-Peak Bloom. All treatments received pendimethalin (Prowl) at 1.8 pts./acre and norflurazon (Zorial 80 DG) at 0.75 lbs./acre PPI. Cotoran at 1.5 qts./acre and Zorial at 0.75 lbs./acre was also applied PRE. All plots were maintained weed-free throughout the season to eliminate weed competition.

At Rocky Mount, 5 plants/plot were mapped and the two treated rows of each four row plot were harvested on

October 16, 1996. At Goldsboro, 20 plants/plot were mapped and the two treated rows of each four row plot were harvested on November 4, 1996.

Lint cotton yields were significantly affected as Roundup applications were made after the 4-leaf stage. There was a significant decrease in yield when Roundup was applied at the 8-leaf and 1st Bloom stages. Treatments of 1st Bloom + 4 weeks and Full Fruit were not significantly different from the check and 4-leaf application.

Total number of sympodial bolls was calculated from the mapping data on each treatment. At Rocky Mount, the 8-leaf treatment had a statistically greater number of sympodial bolls than did any of the other treatments. This is due to more bolls being set at higher nodes (nodes >11, positions 1,2) on the plant when Roundup was applied at the 8-leaf and 11-12 leaf stages when compared to all other treatments. The number of bolls at lower nodes (nodes 4-7, positions 1,2) on the plant, however, was statistically less than the earlier or later applications.

The 8-leaf and 1st Bloom applications of Roundup resulted in a significant amount of square abortions at positions (1,2) on the lower nodes (4-7) of the plant. This allowed the plant to produce more bolls at positions (1,2) on higher nodes (>11) of the plant. The decrease in lint cotton yield from these treatments is a result of these later set bolls being non-harvestable.

Applications of Roundup to Roundup-Ready™ cotton after the 4-leaf stage results in square abortions at positions on the lower nodes of the plant and will attempt to compensate by producing more squares at positions on higher nodes of the plant. This phenomenon results in delayed maturity which may significantly increase the necessity for prolonged insect and disease management. It may also require an additional application of a boll opener. Regions possessing a longer growing season than North Carolina may experience less of a challenge in managing timely boll maturation as a result of later set bolls at higher nodes. This could possibly result in less of a yield effect in more southern locations.