# THE EFFECTS OF DEFOLIATION TIMING AND ETHEPHON RATE ON HARVEST DATE, LINT YIELD, AND FIBER QUALITY OF COTTON

**Guy D. Collins**
**Keith L. Edmisten**
**James E. Lanier**
**Gary S. Hamm**
**Andrew D. Hunt**
**Ranjit S. Riar**
**Matt C. Schmidt**
**North Carolina State University**
**Raleigh, NC**

## Abstract

Preliminary data has suggested that compact-fruiting cotton may be defoliated earlier (30-40 % open bolls) than normal (approximately 60 % open bolls), although optimal yields were only recognized when harvest was delayed until 28 days after defoliation. Experiments were conducted during 2006 and 2007 at Upper Coastal Plains Research Station near Rocky Mount, N.C., investigating yield and harvest date responses to ethephon rates in defoliation mixtures. The objective of this experiment was to determine if optimal yields could be achieved at an earlier harvest date through increasing ethephon rate, if cotton is defoliated early. An early harvest may enhance yield or quality by avoiding problems with re-growth (lint contamination), and weathering (lint and fiber quality reductions). Cotton (DP 454 BG/RR) was planted in a 38-inch row configuration on May 3, 2006 and May 14, 2007. Compact-fruiting cotton was achieved through applications of mepiquat chloride according to the N.C. Cotton Extension recommendations. Targeted defoliation timings included 40 and 80 % open bolls, and harvest timings were targeted at 14 and 28 days after defoliation. Ethephon rates included none, 1.5 lbs a.i./A (1x rate), and 3 lbs a.i./A (2x rate) in mixtures of standard rates of Tribufos and Thidiazuron. A split block / split plot arrangement containing four replications was used as the experimental design. Data were subjected to ANOVA and the mixed procedure using SAS version 9.1.3. Means were separated using Fisher's Protected LSD at $P \leq 0.05$.

Ethephon applied at 1x rates increased lint yield 6 % for cotton harvested early, however the high rate did not result in any additional yield advantage. Ethephon rate did not affect yields for late-harvested cotton. Ethephon applied at 1x rates increased lint yield 7 % for compact fruiting cotton, with no advantage in using 2x rates. Ethephon rate did not affect lint yield of extended fruiting cotton. Compact fruiting cotton yielded 14 % higher than extended fruiting cotton when 2x rates of ethephon were used. Lint yield increased 11 % in early-harvested compact fruiting cotton, when 1x rates of ethephon were used, and 7 % in late-harvested compact fruiting cotton when 2x rates were used. When no ethephon was used, lint yield increased 8 % as harvest was delayed in compact fruiting cotton, however yield was not affected by harvest date when either ethephon rate was used. Ethephon rate did not affect lint yields of extended fruiting cotton that was harvested early, however, as harvest was delayed, the 2x rate decreased lint yield 8 %. In 2007, the 1x rate of ethephon decreased micronaire values 4 % for cotton defoliated early, however there was no effect of ethephon rate on micronaire when cotton was defoliated late. Micronaire decreased 4 % as defoliation was delayed when no ethephon was used, whereas this effect was not realized when either ethephon rate was applied. Percent defoliation increased as ethephon rate increased at 7 days after treatment, while only the 2x rate improved defoliation at 14 days after treatment. Plant mapping data suggests that substantial differences were realized between the compact and extended fruiting patterns, achieved by mepiquat applications, in terms of plant height, height-to-node ration, number of sympodia, node of 1$^{st}$ sympodia, and sympodial retention, however there were few differences between fruiting patterns in terms of boll distribution over several node zones. In 2006, mepiquat treatment increased the number of bolls on nodes 4-7 by 28 %, however there was no other effect of mepiquat on boll distribution in either year.

These data suggests that ethephon may promote an earlier harvest, however high rates (> 1x) are not necessary. Ethephon may promote higher yields for compact fruiting cotton, more-so than extended fruiting cotton, especially when higher rates are used. High ethephon rates may also increase yields for compact fruiting cotton when harvest

is delayed, however these rates may decrease yields as harvest is delayed for extended fruiting cotton. Ethephon may decrease micronaire when cotton is defoliated early, and may also slightly improve defoliation efficacy. To substantiate these results, similar experiments should be conducted in environments where responses to mepiquat are more profound, or in environments with cooler fall temperatures.