COTTON (*GOSSYPIUM HIRSUTUM*) DEFOLIATION AS AFFECTED BY DROPLET SIZE AND CARRIER VOLUME

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A field experiment was conducted to evaluate the effect of carrier volume and spray droplet size on the efficacy of cotton (*Gossypium hirsutum*) harvest aid applications. This experiment was conducted at the R.R. Foil Plant Science and Research Center in Starkville, Mississippi and at the Black Belt Branch and Experiment Station in Brooksville, Mississippi. Four row plots were planted to DP 1646 B2XF. Plot dimensions were 3.9m x 24.4m (Starkville, MS) and 3.9m x 12.2m (Brooksville, MS). Harvest aid applications were made at 60% open boll on 17 September 2018 and 19 September 2018 in Starkville and Brooksville, respectively.

Applications were made with a Capstan® Pinpoint Pulse-Width Modulation (PWM) sprayer on a high-clearance Bowman Mudmaster at a ground speed of 14.5 km hour^{-1}. This experiment utilized two carrier volumes: 47 and 187 L ha^{-1}, three droplet sizes: 200 µm, 500 µm, and 800 µm, and three harvest aid materials: thidiazuron (TakeDown® SC) applied at 0.15 kg ha^{-1}, ethephon (BollBuster ®) applied at 1.5 kg ha^{-1}, and tribufos (Folex® 6EC) applied at 0.37 kg ha^{-1}. Harvest aid applications included: [1] thidiazuron + ethephon and [2] thidiazuron + ethephon + tribufos.

Visual ratings were taken at 3, 7, and 10 days after application (DAA) and included percent open bolls, percent green leaves, percent defoliation, percent desiccation, terminal regrowth and basal regrowth. Seed cotton yield data were also collected. Ratings were taken as a percent (%) relative to the untreated control. Seed cotton for each plot was sent to the University of Tennessee in Jackson, TN for ginning, and fiber quality was determined by the USA classing office in Memphis, TN.

The experimental design was a factorial arrangement of treatments within a randomized complete block design with a single untreated check within each replication. Data were analyzed in PROC MIXED in SAS v. 9.4. Means were separated using Fisher's Protected LSD at an alpha level of 0.05.

Pooled over location at 10 DAA, a carrier volume of 187 L ha^{-1}, a droplet size of 800µm, and a tank-mix of thidiazuron + ethephon reduced green leaves by only 55% ($p = 0.0104$) and increased defoliation by only 51% ($p = 0.0256$). Desiccation varied due to carrier volume x tank-mix ($p = 0.0356$) and droplet size x tank-mix ($p = 0.0035$). However, desiccation levels were all d 3%, and are therefore largely inconsequential. A carrier volume of 187 L ha^{-1}, a droplet size of 200µm, and a tank-mix of thidiazuron + ethephon + tribufos resulted in the most regrowth observed of 12% ($p = 0.0201$).

Consequently, an application volume of 47 L ha^{-1} and a droplet size of 500µm and a tank-mix of thidiazuron + ethephon with or without tribufos reduced green leaves by e 85% (0.0104).

Carrier volume, droplet size, and harvest aid program had no effect on percent open bolls, leaf grade, or fiber quality. Our results indicate lower carrier volumes may have utility in cotton harvest aid programs. In such cases, efficacy may vary due to concentration of active ingredient within the spray droplet.