PALMER AMARANTH (*AMARANTHUS PALMERI*) AND THRIPS (*THRIPS SP.*) CONTROL WITH VARIOUS DICAMBA + INSECTICIDE TANK-MIXES IN COTTON (*GOSSYPIUM HIRSUTUM*).

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Abstract

A field experiment was conducted to evaluate the effect of carrier volume and spray droplet size on the efficacy of dicamba + insecticide tank mixtures to control Palmer amaranth (*Amaranthus palmeri*) and thrips (*Thrips sp.*) in cotton (*Gossypium hirsutum*). This experiment consisted of two field locations: the Delta Research and Extension Center in Stoneville, Mississippi, and Hood Farms in Dundee, Mississippi. Four row plots were planted with a single cotton variety: DP 1646 B2XF, and plot dimensions were 3.9m x 14.2m (Stoneville, MS) and 3.8m x 9.1m (Dundee, MS). Applications were made on 04 and 07 June 2018 in Stoneville and Dundee, respectively. Applications were initiated when cotton reached the 4-leaf growth stage.

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}. A single formulation of dicamba: (XtendiMAX® with VaporGrip) applied at 1.5 kg ha^{-1}, and two insecticides: acephate (Acephate 97UP) applied at 0.2 kg ha^{-1}, and dimethoate (Dimethoate 4EC) applied at 0.4 kg ha^{-1} were chosen. This experiment utilized two carrier volumes: 140 and 280 L ha^{-1} and two droplet sizes: 200µm and 800µm.

Pesticide - Carrier Volume - Droplet Size treatment combinations included [1] dicamba-141 L ha^{-1}-800 µm, [2] dicamba + acephate-141 L ha^{-1}-800 µm, [3] dicamba + dimethoate-141 L ha^{-1}-800 µm, [4] dicamba + acephate-280 L ha^{-1}-800 µm, [5] dicamba + acephate-280 L ha^{-1}-800 µm, [6] acephate-141 L ha^{-1}-200 µm, [7] acephate-141 L ha^{-1}-800 µm, [8] dimethoate-141 L ha^{-1}-200 µm, [9] dimethoate-141 L ha^{-1}-800 µm. Each replication contained both a weed/pest free check in addition to an untreated control.

Visual thrips damage ratings (1-5) and thrips counts (adults and nymphs) were taken at 1, 3, and 7 days after treatment (DAT). Visual Palmer amaranth control (0-100) was evaluated at 7, 14, 21, and 28 DAT, and visual cotton injury (0-100) was rated at 7, 14, and 21 DAT. Seed cotton yield was collected using a spindle picker modified for plot research. Additionally, 25 boll -samples were collected prior to mechanical harvest and ginned on a laboratory micro-gin to determine lint turnout.

The experimental design was a randomized complete block and data were analyzed using PROC MIXED in SAS v. 9.4. Means were separated using Fisher's Protected LSD at an alpha level of 0.05.

At 1, 3, and 7 DAT, thrips counts varied by location but not due to carrier volume, or droplet size. At 1 DAT, adult counts were 44% less in Stoneville ($p = 0.0068$) relative to Dundee, but nymphs were 63% less in Dundee ($p = 0.001$) relative to Stoneville. At 3 DAT, adult and nymph counts were 62% ($p = 0.0126$) and 56% (p d 0.0001) less in Stoneville relative to Dundee. Finally, at 7 DAT, only nymphs counts varied across location, and were 67% fewer Stoneville ($p = 0.0146$) relative to Dundee.

At 7 DAT, visual Palmer amaranth control varied due to treatment ($p = <0.0001$). All treatments resulted in greater control of Palmer amaranth relative to the untreated control. However, the weed free check resulted in the highest level of control relative to all other treatments.

At 14 DAT visual Palmer amaranth control varied due to treatment (p = < 0.0001). All treatments resulted in greater control of Palmer amaranth relative to the untreated control. However, the weed free check resulted in the highest level of control relative to all other treatments.

Seed cotton yield varied by location (p = d 0.0001) but not due to pesticide, carrier volume, or droplet size. Seed cotton yield was 74% (3240 kg ha^{-1}) and 76% (3293 kg ha^{-1}) higher in Stoneville relative to Dundee in Experiment 1 and 2, respectively.

Our data indicate that thrips counts varied across location, but did not vary due to carrier volume or droplet size and Palmer amaranth control did not vary due to carrier volume or pesticide tank-mix 14 DAT. No treatment resulted in the same level of Palmer amaranth control as the weed free check. Finally, seed cotton yield varied due to location and not due to pesticide, carrier volume, or droplet size. Future research should focus on various dicamba + insecticide tank-mixes for their potential utility in cotton production systems. Furthermore, the potential volatility of dicamba formulations when tank-mixed with an insecticide should be thoroughly investigated.