

## HERBICIDE PROGRAMS IN ENLIST COTTON FOR LONG-TERM GLYPHOSATE-RESISTANT PALMER AMARANTH CONTROL

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### Abstract

Cotton (*Gossypium hirsutum*) is a major crop in Mississippi. Widespread glyphosate-resistant Palmer amaranth (*Amaranthus palmeri*), the most troublesome weed in Mississippi row crop production, has led to a heavy reliance on PRE herbicides in addition to POST residual herbicides in cotton. 2,4-D tolerant crops are called “Enlist”. A field study was conducted in 2021 at the Delta Research and Extension Center, in Stoneville, Mississippi, to evaluate herbicide programs in Enlist cotton technology for: 1) long-term glyphosate-resistant Palmer amaranth control; 2) reducing weed seed deposition to the soil seedbank; and 3) best alternative treatment for Enlist Duo. Enlist (PHY 390 W3FE) cotton was planted (four rows plot) on April 27, 2021, and emerged on May 03. The experiment was designed as a randomized complete block with four replications. Herbicide treatments were as follows (rate in oz/a): 1) Cotoran (fluometuron) at 32 PRE (A) followed by (fb) Roundup (glyphosate) at 4- to 5-leaf cotton/2- to 4-inch weed (B) fb Roundup at 2- to 3-weeks after B (C); 2) Cotoran (A) fb Roundup (B) fb Liberty (glufosinate) at 29 (C); 3) Cotoran (A) fb Liberty (B) fb Roundup (C); 4) Cotoran (A) fb Dual Magnum (*S-metolachlor*) at 16 + Liberty (B); 5) Cotoran (A) fb Dual Magnum + Liberty (B) fb Liberty at weed flowering (D); 6) Cotoran + Caparol (prometryn) at 32 (A) fb Liberty + Dual Magnum (B); 7) Brake (fluridone) at 16 (A) fb Liberty + Dual Magnum (B); 8) Brake + Direx (diuron) at 16 (A) fb Liberty + Dual Magnum (B); 9) Brake + Cotoran at 16 (A) fb Liberty + Dual Magnum + Assure II (quizalofop) at 8 (B); 10) Brake + Cotoran at 24 (A) fb Liberty + Dual Magnum + Select (clethodim) at 12 + Agri-Dex (B); 11) Brake + Flexstar (fomesafen) at 12 (A) fb Liberty + Dual Magnum (B); 12) Brake + Cotoran at 16 (A) fb Liberty + Select + Agri-Dex (B) fb Liberty + Dual Magnum (D); 13) Brake + Warrant (acetochlor) at 36 (A) fb Liberty + Dual Magnum (B); 14) Cotoran (A) fb Enlist Duo (2,4-D + glyphosate) at 75 (B) fb Liberty + Enlist one (2,4-D) at 32 (C); 15) Cotoran (A) fb Enlist one + Liberty (B) fb Enlist one + Liberty (C); 16) Weed-free check; and 17) Weedy check. Time of herbicide applications were as follows: A) preemergence (PRE) on April 28; B) 4- to 5-leaf cotton / 2- to 4-inch weeds on June 1; C) 2- to 3-weeks after B on June 14; and D) weed flowering on July 7.

There was no cotton injury from any treatment. Treatment 1 provided 30% control of Palmer amaranth by 13 weeks after emergence (WAE). This result indicates that Palmer amaranth populations in the test area were glyphosate-resistant. Treatments 11 and 12 were as good as treatments 14 and 15. Treatment 11 and 12 stopped glyphosate-resistant Palmer amaranth seed production (0 to 1%) as treatment 14 and 15 did. Plot that received the application of treatment 12 provided the highest (numerically) seedcotton yield. Weed-free check plot and plots that received the application of treatments 14 and 15 provided seedcotton yield as comparable to treatment 12. Weed interference (weedy check) reduced seedcotton yield 96%. Palmer amaranth seed deposition to the soil seedbank must be stopped/reduced for long-term weed management and delaying/stopping the evolution of herbicide-resistant weed.