

Palmer Amaranth Control Is Influenced by the Time of Day in Which Liberty is Applied. A. S. Culpepper¹, A. C. York², L. Steckel³, D. Stephenson⁴, and J. Bond⁵; ¹The University of Georgia, Tifton, GA; ²N. C. State University, Raleigh, NC; ³University of Tennessee, Jackson, TN; ⁴Louisiana State University, Alexandria, LA; ⁵Mississippi State University, Stoneville, MS.

ABSTRACT

Liberty-based weed management programs have been adopted throughout the Southeast and MidSouth to combat glyphosate-resistant Palmer amaranth. Numerous growers have voiced concern that early morning Liberty applications were not controlling Palmer amaranth. Thus two experiments were conducted in five states (GA, LA, MS, NC, TN) to determine the impact that application time of day has on Palmer amaranth response to Liberty. The morning experiment included Liberty applied at 1 and ½ hr before sunrise (-1 and -½ hr after sunrise), at sunrise, and ½, 1, 2, 4, and 6 hr after sunrise. For the evening experiment, Liberty was applied at 6, 4, 2, 1, and ½ hr before sunset, at sunset, and ½ and 1 hr after sunset. Liberty applications were triggered when Palmer amaranth reached 5- to 8-inches in height. A sequential Liberty application was made 15 d after the first application at the exact same time of day as previously described followed 15 to 18 days later by a lay-by application of diuron + MSMA.

Late-season Palmer amaranth control was combined over all locations for the morning experiment. The Liberty system was more effective when application was delayed until at least 2 hours after sunrise. Liberty applied -1, -½, 0, ½, 1, 2, 4, and 6 hr after sunrise controlled Palmer amaranth 34, 39, 48, 66, 82, 90, 93, and 93%, respectively. In LA and MS, GlyTol LibertyLink cotton was planted and no cotton injury was observed. PHY 499 WRF or PHY 375 WRF cotton was planted in GA, NC, and TN with Liberty applied topically to 1- to 2- and 5- to 7-leaf cotton. The greatest level of injury was noted at each location between 4 to 7 d after the second Liberty application. At this time, cotton injury ranged from 4 to 8% with applications made at sunrise or earlier, 12 to 16% injury with applications made at ½ or 1 hr after sunrise, and 23 to 27% injury with applications made at 2 to 6 hr after sunrise. No cotton injury was detectable visually at 2 wk after a Liberty application. Cotton yield was not obtained in MS and no yield differences were noted in LA due to light Palmer populations. Combined over GA, NC, and TN, seed cotton yields of 2725 to 2844 lb/A were noted when Liberty was applied at 1 to 6 hr after sunrise; lower yields were noted with Liberty applications applied earlier in the morning.

Fewer differences were noted with evening applications. In TN and LA, Palmer amaranth control was complete regardless of Liberty application timing. In GA and NC, Palmer amaranth was controlled at least 97% by Liberty systems applied from 6 hr before sunset through ½ hr before sunset. The weed was controlled 91% by Liberty applied at sunset and less than 70% by Liberty applied at ½ or 1 hr after sunset. In MS, Palmer amaranth control ranged from 79 to 83% with Liberty applied between 6 hr before sunset and 1 hr before sunset but control was less than 54% with applications made at ½ hr before sunset through 1 hr after sunset. PHY 375 WRF or PHY 499 WRF cotton was injured at most 24 to 26% by Liberty applied from 6 hr before sunset through 1 hr before sunset, but injury less than 15% was observed at ½ hr before sunset or later in the evening. No differences in yield were noted in TN or LA; pooling over GA and NC results, cotton yields were maximized when Liberty was applied at sunset or earlier in the afternoon.

Presence of dew, herbicide spray drip from leaves, leaf orientation, cloudiness, humidity, soil and air temperatures, and moon stage were documented at each location. Dew present during morning applications prior to 2 hr after sunrise likely played a role in the results observed; however, dew was not present with any evening application suggesting that there may also be a physiological process, impacted by sunlight, occurring within the Palmer amaranth plant allowing the plant more tolerance to Liberty when applied during early mornings or late in the evening. Therefore, Liberty should be applied in the Southeast and Midsouth from 2 hr after sunrise through 1 hr before sunset for the control of Palmer amaranth.