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# Research and Demonstration of Conservation Tillage Practices Combined with Weed Control Options for Controlling ALS[1] Resistant Palmer Amaranth and Other Problem Weeds in Oklahoma Peanut Production Areas

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- OSU researchers have confirmed acetolactate synthase (ALS) resistant Palmer amaranth in Caddo, Tipton, and Beckham counties and suspect the problem to be much more widespread across western Oklahoma.
- Reformulation of pendimethalin from Prowl® EC to Prowl® $H_2O$ did not significantly alter the herbicidal performance.
- Altering current strip tillage systems to include Lilliston rolling baskets for incorporation of pendimethalin (Prowl®) did not significantly improve the herbicide's performance for controlling ALS resistant pigweed.
- Currently, the most successful herbicide programs for controlling ALS resistant Palmer amaranth in peanuts incorporates metolachlor (Dual®), dimethenamid (Outlook®), or flumioxazin (Valor®) applied as a preemergent treatment, followed by acifluorfen (Blazer®), lactofen (Cobra®), or paraquat (Gramoxone® Max) tank mixed with dimethenamid (Outlook®) once the preemergent application breaks and pigweeds begin to emerge during the growing season.
- Fields with significant ALS resistant Palmer amaranth infestations in 2005 at harvest time (such that seed were produced) should benefit by rotating to alternative crops such as *herbicide tolerant* cotton, wheat, or winter canola for at least one production year. Every action for controlling this weed during these cropping seasons should be used to lower the soil seed bank of this problem weed.

[1] ALS = Acetolactate Synthase

Palmer amaranth (*Amaranthus palmeri*) populations across western Oklahoma are developing resistance to acetolactate synthase (ALS) inhibiting herbicides. Palmer amaranth is one of the most troublesome weeds in Oklahoma peanut production today due to its rapid growth rate, high competitiveness, long germination period, and high seed production potential. Prior to it developing resistance to the ALS inhibiting herbicides and the adaptation of no-till production systems, imazapic (Cadre®) [applied postemergent] and/or pendimethalin (Prowl®) [applied preplant incorporated (PPI)] were commonly used for its control. With these issues in mind, we established on-farm and research station based trials near Tipton, Erick, and Ft. Cobb to evaluate ALS resistant pigweed control in no-till and strip-till systems with various levels of herbicides imposed. Herbicide incorporation was accomplished through irrigation in the no-till plots and with Lillisten units mounted on the strip-till unit. Herbicide treatments included pendimethalin (Prowl® EC and Prowl® $H_2O$) applied PPI within the tilled zone of the strip-till unit or preemergent (PRE) and applied alone or with metolachlor (Dual® II Magnum), flumioxazin (Valor®), diclosulam (Strongarm®), and dimethenamid (Outlook®). Postemergence herbicides included paraquat (Gramoxone® Max), lactofen (Cobra®), bentazon (Basagran®), and aciflourfen (Blazer®). Metolachlor and dimethenamid controlled at least 94% of the weeds until seven weeks after application and then at least 90% in strip-till and no-till plots after this period. Split applications of metolachlor, (PRE followed by early postemergent to the crop) controlled 88% of the Palmer amaranth season long. Applying metolachlor tank mixed with paraquat after weed emergence controlled at least 93% of the Palmer amaranth season long. Tank mixing bentazon with metolachlor plus paraquat, increased crop safety over metolachlor plus paraquat alone, but also reduced pigweed control. Lactofen controlled at least 93% of the small (less than 10-cm tall) pigweeds, provided inadequate control of larger weeds, and caused minimal injury to the crop.