ECONOMIC AND ECOLOGICAL IMPACT OF INTEGRATED WEED MANAGEMENT STRATEGIES ON PALMER AMARANTH IN COTTON

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The rise of herbicide-resistant weeds, such as Palmer amaranth (*Amaranthus palmeri* S. Wats.), has resulted in a need to adopt a multifaceted approach to weed control that reduces selection for herbicide resistance. Previous research has suggested that non-chemical practices such as cover crops, establishing a zero-tolerance threshold for weeds, and deep tillage along with use of effective residual and postemergence herbicides can disrupt the emergence of weeds and reduce weed seedbank populations. To study how these tactics impact weed populations in cotton (*Gossypium hirsutum* L.) production systems over time, a long-term study was initiated near Marianna, AR during the fall of 2018. This study was arranged as a split, split, split-plot in a randomized complete block design with zero-tolerance being the whole-plot factor, deep tillage the sub-plot factor, cover crops the sub-sub-plot factor, and herbicide programs the sub-sub-sub-plot factor. Weed densities and emergence were measured in four, one-meter squares per plot at 21, 42, 63, and 70 days after the initial herbicide application. An economic analysis was conducted on each program utilizing crop input costs, labor, and cotton lint yield to determine overall profitability for each program. The use of effective management strategies helped reduce overall Palmer amaranth emergence from the first year to the second year. Plots that utilized zero-tolerance strategies showed a 63% reduction in Palmer amaranth in the second year while the use of a moldboard plow reduced populations by 73% after two years. Net profits were impacted by the use of added integrated weed management inputs. In the second year, the use of cover crops increased profitability while a dicamba-based, in-crop herbicide program generated higher profits than those without dicamba most likely because of residual control from the dicamba in the absence of rainfall after planting. Results from the first two years of the long-term study have yielded insights into how successful the use of integrated weed management strategies are at reducing Palmer amaranth populations while also portraying some of the economic impacts of these strategies.