A BELTWIDE STUDY TO EVALUATE LONG-TERM IMPACT OF INTEGRATED PALMER AMARANTH MANAGEMENT TACTICS IN COTTON

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Abstract

Despite the best efforts to control weeds in crop fields, they manage to persist long-term, due primarily to seed production and seedbank replenishment by uncontrolled weed escapes prior to crop harvest (i.e. late-season escapes), and by individuals that germinate and establish after crop harvest (post-harvest recruits). The late-season escapes can be low in frequency and may not lead to crop yield loss in the current season, but can add substantial amounts of weed seed to the soil seedbank, resulting in future weed problems. Moreover, weeds that emerge after crop harvest, especially in more southern areas with adequate heat units, can produce seed prior to frost or planting the subsequent crop in spring, further adding to soil seedbank. Considering this, seedbank management is a vital aspect of herbicide-resistant weed management. For cotton (*Gossypium hirsutum*), weeds such as Palmer amaranth (*Amaranthus palmeri*) that exhibit a wide emergence window can establish even after a late-post herbicide application, due to fairly open canopies. Similar to the late-season weed escapes, post-harvest weed recruits are also managed rarely since they grow during the off-season. To understand the impact of various integrated management strategies on the occurrence of late-season Palmer amaranth escapes and seedbank addition potential in cotton, a multi-state study is being carried out in four locations (Raleigh, NC; Keiser, AR; Lubbock, TX; and College Station, TX), representing key environments in the US Cotton Belt. XtendFlex® cotton was planted in a Randomized Complete Block Design with four replications, and the crop was managed using standard production practices specific to each location. With respect to weed management, a number of tactics were evaluated, including the use of cover crops, PRE herbicides, POST residuals, layby application, and late-season treatments targeting weed seed viability with the use of a dual-purpose harvest aid. Additionally, a treatment with precision-targeting escapes prior to reproduction was also included. Soil seedbank, seedling emergence pattern, aboveground densities, phenological development, seed production, and cotton yield were documented from each plot. Preliminary results showed that integrated management programs significantly impacted the number of Palmer amaranth escapes, phenology, and seed production, though cotton yields were not influenced within the first year of this study. There were considerable variabilities among the locations for these variables, but the value of a multi-tactic strategy was consistently evident compared to the standard management program. Studies are ongoing to understand the impact of these treatments on weed seed viability and seedling vigor. The experiments will be continued over the next three years to elucidate long-term impact of these treatments on Palmer amaranth population dynamics and cotton yield. Results guide the development of robust integrated management programs for Palmer amaranth in cotton.