UTILIZING CROP ROTATION AS A RESISTANCE MANAGEMENT TOOL

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Abstract

Most growers in areas severely affected by glyphosate-resistant (GR) weeds have realized the severity of this problem and that GR weeds will be present for the foreseeable future. Control measures, such as hand-weeding, which seemed extreme a few years ago are now routinely utilized to manage GR Palmer amaranth. Growers are also becoming more educated on the importance of soil seedbanks and how these impact their weed management programs.

One area that offers opportunities to manage GR weeds, especially GR Palmer amaranth, is crop rotation. Major row crops in the area of Mississippi most severely impacted by GR Palmer amaranth include corn, cotton, rice, and soybean. Most populations of GR Palmer amaranth in this area of Mississippi are also resistant to acetolactate synthase-inhibiting (ALS) herbicides. The prevalence of glyphosate and ALS herbicide use in cotton and soybean limits growers' ability to manage GR and ALS-resistant Palmer amaranth in these crops. Because of fertile soils and abundant water, Mississippi growers have the opportunity to rotate cotton or soybean to corn or rice and exploit the herbicide mode of action options and cultural weed control tactics available in those crops for control of GR Palmer amaranth.

Crop rotation is a benefit to weed management because it the breaks cycle of continuous association of a weed species with a single crop. Crop rotation is effective for weed management when crops with contrasting growth habits and/or cultural requirements are used in the rotation. For example, a broadleaf crop could be rotated to a grass crop or an upland crop could be rotated to an aquatic crop. In addition to rotating the crop, weed management tools should also be modified during the rotation. Rotating weed management tools might include rotating herbicide modes of action or using planting date as an avoidance mechanism for problem weeds.

In Mississippi, corn is a good rotational crop for cotton or soybean to manage GR Palmer amaranth. Synthetic auxin and HPPD-inhibiting herbicides can be effective for GR Palmer amaranth control in corn if these herbicides are used correctly. Additionally, these herbicides are not labeled for in-season application to cotton or soybean. A key to exploiting corn as a rotational crop to manage GR Palmer amaranth is to avoid weed seed production after harvest. On clay soils infested with GR Palmer amaranth, rice can be an effective rotational crop for soybean. A mixture of propanil and Grandstand has provided the most consistent Palmer amaranth control in rice. Palmer amaranth will not survive flooding, but plants on levees should be controlled to prevent seed production.