WEED SPECIES DENSITY AND DIVERSITY IN ROUNDUP READY COTTON: PERCEPTIONS VERSUS REALITY

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Abstract

In 2006, a 4-year study was established to evaluate the temporal aspects of weed populations in Roundup Ready production systems in 6 states. During the initial year of the study, we identified producer fields currently in continuous Roundup Ready cotton systems, split them into producer and researcher halves, and established sampling points. The producer half of the field is managed the same as it was prior to study initiation while the researcher side of the field is managed with additional residual herbicide inputs as needed. At each sampling point, weed counts were taken before preplant weed control, before the first postemergence (POST) application, 2 weeks after the last POST (LAYBY postemergence directed) application, and before cotton defoliation. Weed populations were recorded at each sampling point and totals on the two sides were compared to determine if the additional modes of action impacted weed species and numbers. Mississippi researchers observed 36 weed species at the different sampling times during the season, while in North Carolina, 55 species were observed.

Growers perceptions were that weed pressure had decreased with the use of Roundup Ready cotton systems when compared to pressure before using Roundup Ready cotton. Morningglory and pigweed species were cited as the most common and troublesome weeds by producers in the same survey. Weed counts before the first POST application in Mississippi and North Carolina showed the greatest differences in weed numbers. In North Carolina, 4 times as many weeds were observed on the producer managed side of the field and are likely due to several producers opting to apply no preemergence residual herbicide. In Mississippi, there was virtually no difference in weed count numbers for the majority of weed species. We observed 3 times more hemp sesbania (*Sesbania exaltata*) and prickly sida (*Sida spinosa*) on the producer side of the field, while there was 8 times more large crabgrass (*Digitaria sanguinalis*) on the researcher side of the field before the first POST weed management input. In North Carolina on the producer side of the field, we observed 67, 54, 23, 8, 8, and 7 times more common lambsquarters (*Chenopodium album*), redroot pigweed (*Amaranthus retroflexus*), Palmer amaranth (*Amaranthus palmeri*), goosegrass (*Eleusine indica*), eclipta (*Eclipta prostrata*), and large crabgrass, respectively, with dayflower (*Commelina* spp.), Texas panicum (*Panicum dichotomiflorum*), and common purslane (*Portulaca oleracea*) observed only on the producer side. There were no differences observed in populations of common ragweed (*Ambrosia artemisiifolia*), sicklepod (*Senna obtusifolia*), yellow nutsedge (*Cyperus esculentus*), or fall panicum. Prickly sida, tropic croton (*Crotalaria glandulosus*), and common cocklebur (*Xanthium strumarium*) populations were 3, 3, and 2 times greater, respectively on the researcher side.

Two weeks after the last POST application there were 8 and 24 weed species observed in Mississippi and North Carolina, respectively. Barnyardgrass (*Echinochloa crus-galli*) was 4 times greater on the researcher side of the field

in Mississippi, with all other weeds having similar numbers. In North Carolina on the producer side of the field there were 23, 12, 7, 6, 4, 3, 3, and 2 times more goosegrass, redroot pigweed, Palmer amaranth, common cocklebur, ivyleaf morningglory (*Ipomoea hederacea*), eclipta, entireleaf morningglory (*Ipomoea hederacea* var. integriuscula), and sicklepod respectively than on the researcher side. No differences were observed in yellow nutsedge, large crabgrass, pitted morningglory (*Ipomoea lacunosa*), and tall morningglory (*Ipomoea purpurea*) numbers. On the researcher side of the field after the last POST we observed 6, 3, and 3 times more common purslane, prickly sida, and dayflower, respectively.

Prior to defoliation 15 and 39 weed species were observed in Mississippi and North Carolina, respectively. In North Carolina cotton does not grow as tall or canopy as thickly as in Mississippi, leading to winter annual weeds germination after the LAYBY application, which increased the number of weeds observed. In Mississippi, there were 5 and 1.5 times more prickly sida and redvine (*Brunnichia ovata*), respectively on the producer side of the field, with 1.5 times more barnyardgrass on the researcher side. In North Carolina there were 30, 26, 7, and 4 times more Palmer amaranth, redroot pigweed, crowfootgrass (*Dactyloctenium aegyptium*), and pitted morningglory on the producer side of the field, while 3 and 2 times more goosegrass and sicklepod, respectively, were observed on the researcher side of the fields.

Weed diversity and numbers were affected by herbicide selection on the producer and researcher halves of the fields, with fewer weeds observed where residual herbicides were used, with greatest differences observed in North Carolina. Cotton yields were not greatly affected by herbicide selection and subsequent weed control due to the overall excellent control of weeds on both the producer and researcher sides of the fields.

In all, greater weed numbers were observed on the grower side of the field than on the researcher side of the field, showing a reduction in weed numbers due to residual herbicide use. Grower perceptions of troublesome weed species, morningglory and pigweed, were accurate as these species were the most common on the producer side of the field when compared to the researcher side.