MANAGING WEED SHIFTS IN ROUNDUP READY (GLYPHOSATE-TOLERANT) COTTON

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Abstract

As the acreage treated with herbicides increased in the 1960s and 1970s, ecological shifts occurred and weeds such as prickly sida (*Sida spinosa*), that had been almost nonexistent in cotton fields became major weed problems. Perennials such as purple and yellow nutsedge (*Cyperus rotundus* and *esculentus*), silverleaf nightshade (*Solanum eleaegnifolium*) and perennial vines became more troublesome because they did not have to compete with other weeds (McWhorter and Abernathy, 1992).

Presently, we are dealing with two simultaneous changes: 1) increasing conservation tillage and 2) rapid adoption of Roundup Ready cotton. With conservation tillage it is known that weed populations change dramatically, and previously latent weeds become problems.

From our experience with Roundup as a burndown in conservation tillage systems, we have documented from lack of control, increases in cutleaf eveningprimrose (*Oenothera lacinata*), Carolina geranium (*Geranium carolinianum*), ryegrass (*Lolium sp.)*, and rough fleabane (*Erigeron strigosus*). It seems logical to conclude that weed shifts will occur as producers rely on Roundup Ready weed control systems in cotton.

The big question is how do we anticipate and manage weed shifts in Roundup Ready cotton?

What are likely to be the species involved? Most would agree that barnyardgrass (*Echinochloa crus-galli*), bermudagrass (*Cynodon dactylon*), nutsedges, hemp sesbania (*Sesbania exaltata*), morninglories (*Ipomoea sp.*), purslane (*Portulaca sp.*) , and prickly sida, spurges (*Euphorbia sp.*), velvetleaf (*Abutilon theophrasti*), spurred anoda (*Anoda cristata*), sicklepod (*Senna obtusifolia*), and Florida pusley (*Richardia scabra*) will increase.

Factors that favor certain weed shifts are 1) tolerance to Roundup, 2) ability to emerge after the four-leaf stage of cotton, 3) shade and drought tolerance, 4) maximum plant height about equal to cotton, 5) prolific seed production, and 6) no-tillage culture. Furthermore, continued use of a particular herbicide often causes a shift in a weed community from susceptible to more tolerant species (Radosevich, Holt, and Gherrsa, 1997)

In 1998, in Tennessee we observed an increase in smooth pigweed (*Amaranthus hybridus*), red sprangletop (*Leptochloa filiformis*), and large crabgrass (*Digitaria sanguinalis*) after two years in the Roundup Ready cotton, Roundup only systems compared with a standard program of Prowl (pendimethalin)+ Cotoran (fluometuron) preemergence, Staple(pyrithiobac) early postemergence, and Bladex (cyanazine) + MSMA post-directed. In 1999, high densities of these species emerged early in the Roundup only plots, but were readily controlled with Roundup and there was no difference in weed densities between the standard and Roundup Ready systems.

Why the difference? In 1998, adequate late-season rainfall and a late fall contribute to weed emergence and seed production, while in 1999 late-season drought prevented weed emergence and consequently seed production.

Finally, weed shifts are inevitable. Some shifts are predictable. Options exist to minimize the impact of most predictable shifts. Among these are to 1) avoid reliance on a single herbicide, or herbicide mode of action and 2) to practice crop rotation with alternative weed control programs. Unexpected weed shifts are also possible and producers and weed scientists should stay on alert.

References

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