HERBICIDE RESISTANT WEEDS – WHO CARES/WHY WORRY?

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Weed scientists from the North Central Weed Science Society have generated considerable and definitive information about the potential evolution of herbicide resistant weed biotypes. The evolution of ALS-resistant weeds, glyphosate-resistant weeds, and other changes in weed communities have been predicted with relative accuracy. Importantly, extension weed scientists made information about these impending problems available to growers. It is questionable if these efforts alerting growers about the impending weed problems have been successful. Given that the evolution of herbicide resistant weeds has been widespread and pervasive, the evidence indicates that these efforts were largely ineffective. Growers may understand the implications of evolved herbicide resistance, but they do not appreciate the economic implications of herbicide resistant weed biotypes, specifically glyphosate-resistant weed biotypes (Johnson and Gibson 2006).

The result of intense selection pressure imposed by current weed management programs is the evolution of herbicide resistant weed biotypes (Hilgenfeld et al. 2004). These changes are inevitable unless due consideration is given to developing diverse weed management programs and reducing the selection pressure imparted by the weed management practices used. In a recent survey, 66% of the responding growers expressed only a moderate or low level of concern about weeds developing resistance to glyphosate (Johnson and Gibson 2006). One telling fact was that while a majority of the respondents understood that the repeated use of a herbicide results in the selection of herbicide resistant weeds, only 38% of the respondents, irrespective of farm size, understood the implications of using a herbicide(s) with the same mode of action repeatedly. Given the trend to greater adoption of glyphosate-resistant crops, selection pressure resulting in the evolution of glyphosate-resistant weeds will increase at an increasing rate.

Given the importance of glyphosate-based crop systems, there is a need to apply tactics to manage weeds effectively and economically and thus decrease the selection pressure that results in the evolution of herbicide resistant weeds. It is interesting that larger farm size and higher percentage of income attributable to grain is associated with the acceptance of alternative weed management strategies and integrated weed management programs (Hammond et al. 2006). Currently, more than 90% of the soybeans grown in Corn Belt are glyphosate-resistant varieties and it is projected that that 53% of the US corn acres in 2007 will be glyphosate-resistant hybrids. Unless growers proactively initiate integrated weed management programs that dilute the selection pressure imposed by the repeated use of glyphosate, weeds that are poorly controlled by glyphosate, regardless of the physiological or biochemical basis, will become a greater problem in the Corn Belt. The list of glyphosate-resistant weeds reported on the International Survey of Herbicide Resistant Weeds (www.weedscience.org) now includes a total of 11 weed species, six of which have evolved resistance to glyphosate in the United States. Nine glyphosate-resistant weed species have been reported since 2000. What is misleading about the list of herbicide-resistant weeds included on the International Survey of Herbicide Resistant Weeds is that weed scientists must document the resistance and then report the information to the survey. Thus, many species are likely glyphosate-resistant but have not yet been reported to the survey.

The gravity of the evolved resistance to glyphosate is well-understood by the industry. Many companies are advocating diverse weed management tactics and have implemented glyphosate "stewardship" programs. For example, Monsanto recommends the use of soil-applied herbicides in

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glyphosate-resistant corn and soybean (Anonymous 2005). However, it does not appear that growers understand the implications of the selection pressure they are imposing on the agroecosystem and thus far, are not implementing appropriate tactics to delay the changes in the weed communities brought forth by the glyphosate-based weed management programs. Growers may see glyphosate stewardship programs as an additional production expense and do not appreciate the positive economic implications of proactive glyphosate-resistant weed management (Mueller et al. 2005). It is also likely that growers anticipate that the agricultural chemical industry will once again come to the rescue with a new herbicide. While the agricultural chemical industry has historically been remarkably successful with developing herbicide solutions to new problems, it is not likely that new chemistry can be developed to easily and cheaply resolve the weed problems that have been documented, or are anticipated in future glyphosate-based crop production systems. Weed scientists and agronomists must continue to seek an effective means of influencing grower practices to minimize the impending economic problems attributable to the evolution of new herbicide resistant weed problems.

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