Herbicide Resistance Management – Human Dimensions to an Evolving Problem

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The evolution of an increasing number of herbicide-resistant weed species and populations has become a major concern across U.S. agriculture, particularly in those crop production systems that depend upon the widespread use of a limited number of weed management practices. The scientific community has expressed concern that the ability to manage weeds in production agriculture will decrease if an integrated system of best management practices (BMPs) is not developed and implemented. In May 2012, a number of organizations, with support from a USDA AFRI conference grant, sponsored a National Herbicide Resistance Summit which was hosted by the National Research Council in Washington, DC. The WSSA used this forum to promote a special report commissioned by USDA Animal and Plant Health Inspection Service (APHIS) on BMPs, their levels of adoption, impediments to adoption, and recommendations to optimize herbicide resistance management (Norsworthy et al. 2012). A summary of results from the Summit can be viewed at http://nas-sites.org/hr-weeds-summit/.

Rather than an end-point, the first Herbicide Resistance Management Summit was viewed as a starting point and call for action. Since the first Herbicide Resistance Management Summit, the WSSA has presented findings from the APHIS report to a number of organizations and has also published a comprehensive suite of herbicide resistant weed management training modules that have been widely disseminated (http://wssa.net/). The WSSA continues to be actively engaged with industry, grower organizations, state and federal agencies, and the science community on how to facilitate the adoption of herbicide resistant weed management practices. However, while some progress is being made as evidenced by increasing grower adoption of more diversified weed management programs, the level of adoption is still far below expectations and acreage infested with herbicide resistant weeds continues to grow at an increasing rate. It should be noted that the effectiveness of BMP adoption on a single farm is at least partly dependent on adoption by neighboring farms, as weeds have the capacity to travel across property lines. Thus, the effectiveness of BMPs is dependent on a wide range of adoption.

The myriad of factors driving the evolution of herbicide resistant weeds in crop production make its management incredibly complex. Weed management is ultimately the responsibility of farmers and farm managers. However, each farm household and farming enterprise are different, facing a variety of sociologic, economic and agronomic conditions. “One-size-fits-all” BMP recommendations cannot account for this variety and thus will have uneven success at best, and may prove costly and ineffective at worst. Moreover, dispersal of weed pollen and seeds, whether natural or human mediated, means that herbicide resistance can spread throughout the farm community. This “common pool” nature of the herbicide resistance problem makes the collective actions of neighboring farmers and the widespread adoption of BMPs necessary to ensure sustainable solutions.
The process of farm management innovation, including the development and dissemination of new technologies, strategies and tactics, has been studied by social scientists. The development and implementation of solutions to the myriad of problems in agriculture is part of a complex process that is influenced by factors such as farmer knowledge, values and objectives, size of operation, specific commodities produced, community social structure and other social networks, market influence, resource costs, governmental regulations and policies, and crop price signals.

What is now widely recognized is the need to engage all stakeholders in a dialog that results in the identification of the most important decision drivers that impact weed management across different crop production settings and ecosystems. The results of this dialog will be an understanding of how best to approach effective weed management planning from all who contribute to these decisions, including growers, land managers, retailers, applicators, agrichemical industry, university research and extension, crop advisors, state and federal agencies, and others.