INTRODUCTION OF SYNTHETIC AUXIN HERBICIDE RESISTANCE IN SOYBEAN: IMPLICATIONS FOR VEGETABLE PROCESSORS

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Soybeans with resistance to synthetic auxin herbicides, such as 2,4-D and dicamba, are currently in development and may be considered for commercial release in some areas in the near future. While these traits may improve the weed control spectrum and options in soybean, concern has been expressed by specialty crop producers that expanded use of synthetic auxin herbicides may increase risk of off-target herbicide movement. The intent of this paper is to review specialty crop production, with a focus on Wisconsin, and to pose potential components of an "ideal" herbicide stewardship program for discussion.

A Review of Specialty Crop Production, with a Focus on Wisconsin

In general, the number of Wisconsin specialty crop producers has increased in recent years, while the number of grain growers has decreased over a similar time period (Table 1). There are a few common threads among these farms that increase risk when considering off-target pesticide movement. The average specialty crop farm is small, ranging from an average size of 0.9 acres in floriculture to 90 acres for vegetables. Given the small acreage, these farms are not often "on the radar." These farms are also interspersed among agronomic crops throughout the state. There is no consolidated specialty crop production area. Finally, specialty crops tend to be tremendously high in value. Cranberries, for example, cost about $35,000 per acre to establish, and production may exceed $24,000 per acre in gross value.

Table 1. Grain and specialty crop production in Wisconsin in 2002 and 2007 according to the 2007 USDA Census of Agriculture.

	2002		2007		
Crop	Farms (#)	Production (A)	Farms (#)	Production (A)	Avg. farm (A)
GRAINS					
Corn	29,021	2.9 million	27,505	3.3 million	120
Soybean	15,245	1.5 million	14,513	1.4 million	96
SPECIALTY CROPS					
Vegetables	2,850	252,693	3,319	297,238	90
Orchards	1,009	9,683	1,135	9,730	9
Floriculture	814	644	953	864	0.9
Nursery	624	14,334	637	12,177	19
Fruit	--	--	1,132	9,719	9
Grape	--	--	253	479	2
Berry	--	--	1,019	20,485	20

The number and acreage of organic farms is also increasing rapidly in Wisconsin. The number of organic farms in Wisconsin increased from 712 in 2005 to 1,099 in 2009. Wisconsin ranks second, behind California, in the number of organic farms. The acreage has similarly increased, from 41,245 acres in 1997 to 147,120 acres in 2007. Herbicide use near certified organic production can be particularly challenging. Herbicide movement to any non-target crop, grown "conventionally" or organically, is illegal. However, organic production can be particularly at risk given that farm certification, and subsequently the ability to sell the crop as organic, can be compromised by synthetic pesticides.

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Landscapes and ornamental production are also sensitive to off-target pesticide movement. The Association of American Pesticide Control Officials (AAPCO) conducted a national survey of suspected pesticide drift cases in 2005 (AAPCO, 2005). Nationally, agricultural crops were the intended target of 70% of confirmed drift cases, and lawns and landscapes were the most frequent recipient (43%) of drift. Fifty-three percent of cases involved commercial applicators for hire, and 22% involved certified private applicators. In Wisconsin, it is worth noting that more confirmed drift cases occurred from applications to non-agricultural land (51%) than agricultural crops (42%). The 5 most common active ingredients involved in 2004 drift cases in Wisconsin were 2,4-D, glyphosate, dicamba, atrazine and mesotrione.

Components of an "Ideal" Herbicide Stewardship Program

Given the breadth and value of specialty crop production in Wisconsin, it seems that all parties involved would desire reasonable steps to mitigate any potential risk of off-target herbicide movement. Off-target herbicide movement could include particle drift at the time of application, herbicide volatilization, or tank-contamination. The following is a list of potential herbicide stewardship program components for consideration and discussion during the presentation:

- Herbicide characteristics:
  - Non-volatile formulations that would reduce risk of off-target movement and allow use at higher air temperature (when weed control is needed in soybean) without increased risk.
  - Pesticide residue tolerances established for specialty crops grown in close proximity to soybeans and field corn.
  - Traceable marker included in the herbicide formulation to discourage use of other more volatile formulations of the same active ingredient or "anonymous" drift. Investigation of potential off-target movement would include a marker test of the suspected target field to ensure that the reduced-risk, labeled formulation was applied.
- Herbicide application requirements
  - Appropriate drift reduction nozzles and drift reduction tank additives.
  - Allow applications by ground only.
  - Specific tank-cleaning instructions included on and required by the label to reduce risk of misapplication through tank contamination.
  - Specific training and educational requirements prior to use of the herbicide. This could possibly be accomplished by making the potential herbicide a restricted-use pesticide, thus requiring purchase and application by a trained and licensed applicator.
- Weather-related and geographic restrictions
  - Include appropriate air temperature, wind speed and direction, and relative humidity restrictions based on the limitations of the herbicide formulation.
  - Possibly restrict temporally during times of nearby sensitive crop growth, or require permits for application during potentially higher-risk time periods.
  - Include appropriate application buffer requirements near sensitive sites.
  - Possibly restrict geographically in consolidated areas of sensitive sites or specialty crops.
  - Increase knowledge of neighboring sensitive sites through participation in awareness programs such as the Driftwatch program in development by Purdue University.

References

Association of American Pesticide Control Officials. 2005. Pesticide drift survey. Accessed online (November 28, 2010): http://aapco.ceris.purdue.edu/htm/survey.htm.