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Weed management for 2012

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Introduction

While there have not been many new things in weed control/management for 2012, some that have occurred are not necessarily good. Herbicide resistance, particularly in common waterhemp has escalated significantly for populations with evolved resistance to glyphosate and resistance to HPPD herbicides has predictably has been identified in a number of locations across Iowa. Unfortunately, again as predicted, no new "silver bullets" have surfaced and in fact, it is unlikely that new herbicide mechanisms of action will be introduced in the foreseeable future. Thus it comes that much more important to recognize the tactics that are available and establish a diverse long-term approach to using the tools in a sustainable manner.

"New" products and changes

While there have not been any new products introduced for 2012 (at this time), there are several products pending registration, "new" generic herbicides and changes in herbicide labels. The following is a partial list of these changes; the inclusion of products should not be construed as an endorsement by Iowa State University or exclusion considered a lack of support.

Ignite (Bayer Crop Science)

The Ignite label now describes a single application dose of up to 36 fluid ounces per acre. This application can be followed by one additional application of a maximum 29 fluid ounces per acre for a seasonal maximum Ignite application of 65 fluid ounces per acre. The Ignite applications to corn have not changed; the maximum amount of Ignite in any single application is 22 fluid ounces per acre with a seasonal total of 44 fluid ounces per acre.

Vida (Gowan)

Vida (pyraflufen-ethyl) is an inhibitor of the PPO enzyme and a potent contact herbicide that can be applied to soybean and corn as a preplant burndown, at planting burndown and after planting burndown but prior to crop emergence for the control of many broadleaf weeds. Vida is now registered as a postemergence directed application in corn (conventional, glyphosate-tolerant, Liberty Link, popcorn, seed corn, corn silage, and corn stover). Sweet corn is not registered for a postemergence directed application. Refer to the label for specific restrictions and directions.

Flexstar GT 3.5 (Syngenta)

Flexstar GT 3.5 is a different premixture formulation of fomesafen and glyphosate. This premixture contains 5.88% fomesafen and 22.4% glyphosate for a total of 0.56 pounds of fomesafen and 2.26 pounds (acid equivalent) of glyphosate per gallon product. The use rate in Iowa (Region 4) is 2.8 pints per acre.

Medal herbicides (Syngenta)

Medal herbicides are a new S-metolachlor series of products with 7.62 pounds of active ingredient per acre (Medal and Medal EC), 7.64 pounds of active ingredient (Medal II and Medal II EC) and a premixture Medal II AT which is atrazine and S-metolachlor at 3.1 and 2.4 pounds active ingredient respectively.

Warrant (Monsanto)

Warrant is an encapsulated formulation of acetochlor that is now labeled for application to field corn as a postemergence application. Applications can be made until the corn is 30 inches in height either broadcast or as a directed treatment (e.g. drop nozzles) to minimize interference of the crop with spray coverage. Warrant should be applied prior to weed emergence and will provide residual control of annual grasses and some small-seeded annual broadleaf weeds.

Roundup Ready Plus weed management solutions (Monsanto)

Monsanto has partnered with a number of companies to improve weed management in glyphosate-resistant corn and soybean and has incentivized the addition of products other than their proprietary herbicides to provide stewardship

to glyphosate and the trait. Additions to the previously listed products are Cobra/Phoenix in soybean and Impact in corn.

Basis Blend (DuPont)

Basis Blend is a premixture of rimsulfuron (20%) and thifensulfuron (10%) which is suggested to be a better formulation that is easier to handle, mix and clean out of the sprayers than Basis 75% DF. Basis Blend can be applied any time after harvest but prior to ground freeze-up. It can be applied with other herbicides (e.g. 2,4-D) and is registered for application to fields that wil be planted to corn or soybean.

Valor (Valent)

Valor has a modification of the label that describes planting corn seven days after application in no tillage and minimum tillage production systems.

Pyroxasulfone (several)

Pyroxasulfone is a "new" product that has been included in the ISU herbicide research program for many years under the KIH-485 description. Considerable research was conducted on corn and soybean and a variety of application timings (e.g. early preplant) and rates were included in this extensive evaluation series (www.weeds.iastate.edu/research/default.htm). Pyroxasulfone was first included in the ISU research program in 2003 as a 3.57 SC formulation and was a Kumiai experimental product. This herbicide is an inhibitor of very long chain fatty acids similar to the mechanism of action demonstrated by S-metolachlor and acetochlor (Group 15). Agreements have been made with BASF, FMC and Valent to market pyroxasulfone in different proprietary products, either alone or in combination with other herbicides. These registrations are pending.

New genetically engineered traits (several)

The development of new genetically engineered (GE) crop traits continues with regard to dicamba-tolerant soybean (Monsanto) and the DHT soybean and corn (Dow AgroSciences). According to these companies, these new crop traits are on track for commercialization mid-decade. There has been considerable discussion about the utility of these traits and labeled herbicides as tools to better manage weeds, particularly those weeds (e.g. common waterhemp) that have evolved resistance to glyphosate. Currently, there are concerns about the movement of the herbicides used in these GE crops to sensitive crops (e.g. grapes) and also whether or not the use of the systems will result in new resistant weed biotypes. The companies are expending considerable time and money developing robust stewardship programs and use guidelines in an attempt to proactively mitigate these concerns. However, it is critically important for growers and applicators to recognize that the adoption of crop systems based on these technologies have concomitant risks and limitations; they do not represent the new "silver bullet" as some uninformed people have been suggesting.

The development of Optimum GAT crops has been delayed indefinitely according to DuPont.

New herbicide resistant weed concerns

New herbicide resistant weed biotypes have been identified in Iowa and the Midwest and weed biotypes with multiple resistances are increasing. HPPD-resistant waterhemp was identified in 2010 in Southeast Iowa in a seed corn production field. Since then, numerous seed corn production fields with putative HPPD resistant common waterhemp have come to the attention of ISU. Extensive infield research was established in 2011 and research efforts are escalating for 2012. The evolution of HPPD resistance in seed corn production fields can be attributable to the intensity of HPPD use in these fields and the identified problems ascribed to the level of observation and management in the seed production fields. Importantly, given the strategies used in seed corn production, multiple resistances to glyphosate have also been identified in the weed populations under investigation.

It is assumed that the extent of HPPD resistance in Iowa, given the likely movement of the resistance trait via pollen, is greater than in just seed corn production fields but masked in commercial production fields. The occurrence of HPPD resistance in seed corn fields is not unlike the canaries in the mines which were used to detect problems for the miners. ISU will continue to monitor HPPD resistance in Iowa common waterhemp populations is conduct research to describe solutions to the problem.

Glyphosate resistance in Iowa common waterhemp, as predicted, has increased dramatically in 2011 and is widely distributed across the state. Through collaboration and support from the Iowa Soybean Association, an extensive

collection of field weed populations has been cataloged and these populations will be evaluated for evolved resistance to glyphosate and the other herbicide mechanisms of action commonly used in Iowa. A previous collection of approximately 200 common waterhemp populations selected arbitrarily three years ago was evaluated in the greenhouse for response to glyphosate; approximately 1/3 of those populations were not effectively controlled by glyphosate. It is anticipated that the percentage of Iowa common waterhemp populations with evolved resistance to glyphosate has increased considerably. Furthermore, populations with resistance to PPO inhibitors are also becoming more common. Note that Nebraska recently announced the identification of a population of common waterhemp with resistance to 2,4-D.

While common waterhemp is the weed about which most Iowa growers and applicators are concerned, issues with herbicide resistant giant ragweed and horseweed/marestail are also escalating. It is clear that the systems currently used for the production of corn and soybean in Iowa, specifically for weeds, is problematic and inevitably will fail unless changes (other than different herbicides) are included soon.

Weed management tactics: Knowledge and diversity

The need for better information is paramount for effective weed management; simplicity and convenience as experienced during the last 16 years of glyphosate-resistant crop systems has run the course and integrated weed management is necessary for the protection of crop yields, the mitigation of existing herbicide resistant weed issues and the proactive tactics needed to keep additional herbicide resistant weed populations from evolving. Unfortunately, while many (and possibly a majority) growers understand that herbicide resistant weeds are an increasing problem, they seem to still be in denial; they fail to recognize that the problem likely exists “close to home” and that action to manage the problem is needed immediately. Recall that typically a weed population must have about 30% of the individuals with evolved resistance to a herbicide before a grower recognizes that the issue exists.

The information that must be acquired includes a cursory understanding about weed biology and ecology, the herbicide resistance(s) that are likely to evolve or have evolved, and what tactics are effective to manage these weeds. Part of the problem is the marketing of herbicides; many companies are now describing premixtures of products that include more than one herbicide mechanism of action. The concept of multiple mechanisms of herbicide action effectively helping control herbicide resistant weeds and delay the evolution of future herbicide resistances has gained some traction with growers. However, without better knowledge of the mechanisms of action that are in the premixtures, the marketing of these products is misleading at best. Consider that most of the premixtures available for soybeans includes a PPO herbicide and the other product is an ALS inhibitor herbicide; given that common waterhemp in Iowa already evolved ALS resistance, these products have only one effective mechanism of action and thus do not represent an effective resistance management program. While redundancy of tactics (multiple herbicide mechanisms of action in each application) is an important strategy, the herbicides included must have activity on the target weeds.

Another strategy that has gained acceptance for herbicide resistant weed management is the rotation of herbicide mechanism of action. Indeed, this can be the start of a herbicide resistant weed management program, but if that is the only tactic used, herbicide resistance will be delayed one year for every year of herbicide mechanism of action rotation but resistance will inevitably evolve. Another common strategy that is marketed is the need for multiple herbicide mechanisms of action in a weed management program. This typically is established by using different herbicides for sequential applications. Unfortunately, the use of this strategy is diminished as it is the last herbicide applied that imparts the selection for resistance. Again, the most effective way to resolve this problem is to use multiple mechanisms for every herbicide application timing.

The most important consideration for weed management in crop production, whether herbicide resistant weed populations exist or not, is the need for diversity in weed management strategies. If diverse strategies beyond simply adding different herbicides are not included, the crop system may not be sustainable. History has proven time and again that herbicide-based weed management will inevitably fail. Mechanical and cultural strategies need to be included in a crop production system. The greater the diversity, the more ecologically sound and economically profitable the crop production system will be. Herbicides will continue to be a key feature of Iowa corn and soybean production, but without other integrated weed management (IWM) strategies, weed management will soon become increasing difficult and crop yields will dramatically decline.

Conclusions

The future of weed management in the relatively near future is better utilization of existing technologies and the inclusion of older herbicide chemistries (when and where appropriate) and mechanical and cultural tactics. The key to profitable and sustainable weed management is diversity. If a diverse suite of weed management tactics is not used, economic losses attributable to weeds will escalate and herbicide resistant weed populations will become more widely distributed. No new herbicide mechanisms of action have been identified for the short and longer term future. While new herbicide-resistant crop traits may possibly become available in the three to five year future, these traits are not the answers to existing weed management concerns; they are good tools for weed control but must be used in an appropriate fashion to maximize the benefits and minimize the risks.