

The Challenges In Managing Herbicide Resistance In Corn

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History has shown that emphasizing one group of herbicide chemistry over others can lead to shifts in weed spectrums. In many cases these shifts occur because of selecting for weedy biotypes that are resistant to the herbicide(s) being used.

The Roundup Ready, Liberty Link, and Clearfield technologies offer advantages over methods used in traditional corn. The estimated percentage of Roundup Ready acres in 2006 was 94% for soybeans, 43% for corn, and 67% for cotton. There is concern this trend will lead to more glyphosate-resistant weeds and eventually diminish the use of this important technology. The likelihood of this occurring may be great if growers rely totally on glyphosate for managing weeds in corn, much like they have in soybeans and cotton.

Kentucky's Experiences

Herbicide resistance was first confirmed in Kentucky in 1987 where corn growers used atrazine plus Princep in a continuous corn rotation. In spite of the resistance to this chemistry, atrazine continues to be used on nearly 80% of Kentucky's corn acres. Kentucky growers learned to adapt by including other herbicides in the weed control program to manage the triazine biotypes of smooth pigweed while maintaining the benefits the triazine herbicides offered.

Other types of herbicide resistance have been confirmed in various grain crops in at least 6 other weedy biotypes in Kentucky. With exception of glyphosate-resistant marehail (also known as horseweed) in soybeans, herbicide-resistant problems in Kentucky have generally been confined to local fields where they are often managed. In most cases, herbicide resistant problems in corn are less prevalent where growers produce three crops in a two year rotation (i.e. corn - wheat - double crop soybean).

Controlling Corn as a Weed

Controlling corn as a weed in corn is gradually becoming a problem in Kentucky where it is grown continuously in the same field without rotating to other crops. The fact some corn hybrids also have herbicide-tolerant traits can be good or problematic, depending on the situation. Hybrids with glyphosate tolerance (e.g. Roundup Ready, Agrisure GT, etc.) will not be controlled with glyphosate. Likewise, corn hybrids with the Liberty Link trait will not be controlled with Liberty; and Clearfield or IT hybrids will not be controlled with Lightning herbicide.

Replanting Situations: One scenario where unwanted corn can be a problem in corn fields is replanting corn where initial stands are poor either due to flooding or injury from early frost.

Planting a conventional hybrid that has no herbicide-tolerant traits allows the greatest flexibility for managing the initial stands where replanting is a high risk. Unfortunately some growers did not follow this strategy this past spring where they planted too early and had to replant into a failed Roundup Ready corn stand. The use of Lightning or Liberty has been discussed as an option for controlling the initial Roundup Ready corn stand; however, the number of hybrids having resistance to either of these herbicides is limited.

Two studies were conducted this past spring to compare several herbicide treatments for managing young corn seedlings (See table 1). The environmental conditions were different and did impact control of corn. The favorable conditions at the University of Kentucky Research & Education (UKREC) site allowed for better control compared with the Christian County site where corn was planted early and suffered significant freeze damage. The cool and cloudy weather that often occur in early spring is believed to be one factor that contributes to erratic control of corn with herbicides.

Also control of seedling corn was better when applications were delayed until the 3- to 4- leaf stage. Control of 1- to 2- leaf corn seemed to be better when the Gramoxone was applied at the higher rate and tank mixed with either Sencor or Lorox.

Volunteer Corn Situations: As a general rule, volunteer corn in corn is not a widespread problem in Kentucky where it is harvested early enough for seed to germinate in the fall and for freezing temperatures to kill emerged plants. However, there are occasional seasons where corn lodges, either prematurely due to stalk rot or insect damage, or delayed harvest due to wet weather conditions. These conditions often result in volunteer corn the following spring. University of Illinois research shows that corn yield is reduced 42 to 60 percent due to interference from volunteer corn plants.

Managing volunteer corn can be even more challenging than controlling initial stands in a replant situation. It is difficult to get thorough spray coverage of volunteer corn plants growing in clumps that originate from ears. Also, emergence patterns of volunteer corn may be more erratic than corn that is planted at a uniform depth.

Based on limited research, control of volunteer corn can be erratic; consequently there are more questions than there are solutions. It is going to be important to develop strategies for managing volunteer corn, especially with increasing interest in Roundup Ready technology and growing more corn in a continuous rotation and no-tillage system. Δ

**Burndown Control of Roundup Ready Corn
For A Replant Situation (At UKREC & Christian County 2007) ¹**

Herbicide	Rate/A	% Corn Control		
		UKREC		Christian County
		1-2 Leaf	3-4 Leaf	1-2 Leaf
Gramoxone Inteon	2 pt/A	83	99	40
Gramoxone Inteon	3 pt/A	85	100	60
Gramoxone Inteon	2 pt/A	90	99	77
Lorox	0.67 lb/A			
Gramoxone Inteon	3 pt/A	90	100	78
Lorox	0.67 lb/A			
Gramoxone Inteon	2 pt/A	93	99	65
Lorox	1.0 lb/A			
Gramoxone Inteon	3 pt/A	93	100	72
Lorox	1.0 lb/A			
Gramoxone Inteon	2 pt/A	85	100	52
Sencor	3 oz/A			
Gramoxone Inteon	3 pt/A	90	100	69
Sencor	3 oz/A			
Gramoxone Inteon	2 pt/A	90	99	53
Sencor	4 oz/A			
Gramoxone Inteon	3 pt/A	93	100	57
Sencor	4 oz/A			
Select MAX ²	4 oz/A	98	100	67
Select MAX ²	8 oz/A	100	100	83
Liberty	32 oz/A	77	60	36
Liberty	34 oz/A	80	63	36
Non-treated Check		0	0	22
LSD		6		24

¹ Corn at UKREC was planted after the April freeze whereas the corn at Christian County was planted early and injured by the April freeze.

² Select MAX is not registered for use in corn.