

To people who use herbicides, the term 'resistance' is not new. Like bacteria to antibiotics and insects to insecticides, plants can develop the ability to tolerate herbicide applications that at one time could control them. The process of developing resistance is based on natural selection. Variation in a plant's physiology or morphology can make it possible for the plant to survive a herbicide application. The plant that can survive the herbicide application is allowed to produce the next generation with the same ability to survive the application of that specific family of herbicides. Continued use of this herbicide or herbicides that are similar in their activity, will suppress the non-resistant (or sensitive) plants and allow the resistant plants to survive. This will build up a seed bank in the soil of the resistant plants waiting to emerge when the conditions are suitable. Common ragweed is no exception to this.

Common ragweed (*Ambrosia artemisiifolia* L.) is no stranger to Indiana's production fields. In surveys conducted by the Purdue University's extension weed science team in 1996 and 2000, common ragweed earned a spot in the top ten most common and problematic weeds. This member of the composite family can grow up to 6 ft tall. Its leaves are highly lobed sort of reminding me of a carrot leaf (figure 1). On older plants the lower leaves can be arranged opposite and the upper leaves can be alternately arranged on the stem. There are two types of flowers, one pollen producing found in clusters at the tip of the branches, and another seed producing flower found in the axils of the leaves.

There are reports of common ragweed being resistant a few families of herbicides. In Michigan and New York populations of common ragweed have been found to be resistant to photosystem II inhibitors (atrazine, Sencor, Velpar). Resistance to another family of herbicides, the ALS inhibitors, has been found in Indiana and Ohio. It is suspected that this could be found through out the state of Indiana, but is more common in the Southeastern and central counties. In this situation the use of herbicides that would normally control common

ragweed such as Canopy XL, Firstrate, and Scepter in soybean and Beacon, Permit, and Spirit in corn are no longer effective.



Figure 1. Small common ragweed plant showing the typical leaf shape.

This is a situation that can easily sneak up on a person leaving a person with a field of uncontrolled common ragweed (figure 2). Possibly difficult to detect in a large field, it may look like few late season escapes. Then depending on the environmental conditions a seed bank with a large percentage of seed from resistant plants can spring a surprise, if ALS herbicides are regularly used alone.



Figure 2. ALS resistant giant ragweed in a soybean field.

The best solution for this is prevention. Utilize herbicides that have different modes of action. The ALS herbicides are effective tools for weed control; however, it is not a good idea to become dependent on one herbicide group. A breakdown of different herbicide families can be found at this web address, <http://www.btny.purdue.edu/weedscience/inj/MOAINjury.html>. Rotate crops to allow for the use of different herbicide groups. Utilize the tools available to you, including tillage in bad cases if the site is not conducive to soil erosion. Consider using PRE and POST applications of herbicides with activity on this weed. Consult weed response tables in the Weed Control Guide for Ohio and Indiana (<http://www.btny.purdue.edu/Pubs/WS/WS-16/>) to determine the spectrum of weed control by commonly used herbicides in corn and soybean.

In soybean with ALS resistant common ragweed use Boundary, Command, Gangster, Sencor, or Valor for soil applied suppression. None of these offer great control, but they will suppress emerging ALS resistant common ragweed. If there is common ragweed up before planting in no-till fields use a glyphosate product as a burndown and add 1 pt of 2,4-D at least 7 days before planting (if more than 1 pt is used you must wait to at least 30 days before planting) to help provide a fresh start. In a conventional soybean planting system, POST options are limited to the use of diphenylethers such as Cobra, Flexstar, Reflex, or Ultra Blazer. These may require more than one application to control consecutive flushes that may occur during the growing season. The diphenylethers can cause slight injury, such as leaf spackling or bronzing, but if applied at labeled times before blooming, research suggests that yields are not effected. Another option in soybean is to use Roundup Ready soybeans. Glyphosate products will control common ragweed from good to excellent. Keep in mind that more than one application may be required due to multiple flushes of weeds.

In corn, there are a few more options available. Although trizine resistance common ragweed has been found in Michigan, we have not found it yet in Indiana. PRE applications of atrazine, Balance Pro, Bicep II Magnum, Epic, Guardsman Max, Lariate, Bullet, or Lumax effectively control emerging ALS resistant common ragweed. POST options include growth regulators (2,4-D or dicamba, Stinger), atrazine + oil, or Buctril alone or with atrazine, Liberty in Liberty Link corn or glyphosate in Roundup Ready corn.

ALS resistant common ragweed can be effectively controlled, however, it is just one more thing we have to keep on our minds while trying to make a living in production agriculture. Please read specific herbicide labels for rates and restrictions.

For more information on herbicide resistance and a list of weeds that have developed resistant visit the following web sites.

<http://www.weedscience.org/in.asp>

<http://www.btny.purdue.edu/weedscience/>

http://ipcm.wisc.edu/uw_weeds/research/resistance.htm

<http://www.ag.uiuc.edu/cespubs/pest/articles/v973i.html>

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Information listed here is based on research and outreach/extension programming at Purdue University and elsewhere. The use of trade names is for clarity to readers of this site, does not imply endorsement of a particular brand nor does exclusion imply non-approval. Always consult the herbicide label for the most current and update precautions and restrictions. Copies, reproductions, or transcriptions of this document or its information must bear the statement 'Produced and prepared by Purdue University Extension Weed Science' unless approval is given by the author.