



## Guidelines for Weed Management When Using Corn and Soybeans with a Glyphosate-Resistance Trait

Glyphosate has provided a revolutionary means for providing broad-spectrum weed control in corn, soybeans and other crops, via insertion of a glyphosate-resistant gene in the seed.

Growers have widely embraced the technology because it provides convenient, effective and economical weed control in corn and soybeans. However, intensive and long-term exclusive use of glyphosate can lead to the development of glyphosate-resistant weeds. Integrated management practices can minimize this risk, at the same time providing growers with a more consistent and effective weed control program.

Until now, most instances of weed resistance to glyphosate have occurred when glyphosate was used continuously and almost exclusively for 10 or more years in orchard and vineyard crops, no-till burndown, and continuous planting of glyphosate-resistant soybean and soybean-cotton rotations. Most corn, soybean and cotton contains a glyphosate-resistance trait. It is expected many farmers will choose to plant continuous glyphosate-resistant corn, soybeans, and cotton in the future. This practice can be effectively and profitably utilized but important guidelines must be observed.

While the odds of developing glyphosate-resistant weeds on your farm are probably less than with most other herbicides, weed resistance is nevertheless developing because of heavy reliance on glyphosate. Widespread popularity and use of corn, soybeans and cotton with glyphosate-resistance makes it important to adhere to the following guidelines for preventing and managing weed resistance to herbicides.

### **Glyphosate Resistance Management Guidelines**

(From Purdue University Extension bulletin *Facts About Glyphosate-Resistant Weeds*, Boerboom and Owen, Dec. 2006.)

- Rotate glyphosate with herbicides that have different modes of action.
- Apply a residual herbicide before glyphosate, or tank mix another herbicide with glyphosate.
- Avoid making more than two glyphosate applications to a field over a two-year period.
- Apply glyphosate at labeled rates and at the recommended stage of weed growth as stated on the label.
- Rotate between Roundup Ready® and conventional crops or crops with other types of herbicide resistance. Use Roundup Ready crops and glyphosate in your crop rotation where they have the greatest economic and management value.
- If glyphosate is used as a burndown treatment and in-crop during the same year, tank mix the glyphosate applied in the burndown treatment with an herbicide that has a different mode of action. The in-crop glyphosate application should still be rotated with other herbicides in other years.
- Use cultivation and other mechanical weed management practices.

Utilizing herbicide programs with multiple modes of action, including glyphosate, results in broader spectrum and more consistent weed control. Using preemergence residual herbicides before glyphosate application reduces early season weed competition and also widens the window for your postemergence glyphosate application in case wind or rain affect herbicide application timing. Using residual herbi-

cides in a postemergence application tank-mix with glyphosate will also help minimize the chances of a second flush of weeds.

Pioneer offers corn and soybean growers one of the widest arrays of weed management options and advice in the industry:

- Most Pioneer® brand corn and soybeans contain a glyphosate-resistance gene to provide growers with effective weed control options.
- All Pioneer® brand corn hybrids containing any Herculex® trait also contain the LibertyLink® gene, making Liberty® herbicide one option for an alternative to glyphosate. There are also numerous conventional herbicides, including products from DuPont Crop Protection, that may be used in combination or rotation with glyphosate. DuPont Crop Protection herbicide recommendations can be found at [http://www2.dupont.com/ProductionAgriculture/en\\_US/products\\_services/herbicides/](http://www2.dupont.com/ProductionAgriculture/en_US/products_services/herbicides/)
- Pioneer conducts extensive screening of all our corn hybrids for tolerance to widely used traditional herbicide alternatives to glyphosate. Updated ratings are published annually in Pioneer product literature.
- Pioneer expects to introduce the Optimum™ GAT™ trait in soybeans (2009) and corn (2010), providing additional weed control options and solutions.
- **The fact the seed you plant has a glyphosate resistance gene does not mean glyphosate is the only herbicide**

**that may be used on the crop.** Weed resistance results from absence of diversity in weed management practices and overuse of a given herbicide, not the herbicide resistance gene inserted in the seed. Pioneer seed provides the industry's widest flexibility for the use of diverse herbicide modes of action, to prevent and manage herbicide-resistant weeds.

- Pioneer sales professionals are trained in agronomics and available to provide you the best localized advice and management options for weed control and other production practices on your farm.

## SUMMARY

**When continuously planting glyphosate-resistant crops, the risk of developing glyphosate-resistant weeds can be significantly reduced by using a diversity of herbicides (mixtures, sequential applications, or rotations) that control each weed species in your field with a different mode-of-action at least once every three years – ideally every other year.**



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To protect the usefulness and availability of these technologies for the future, growers must implement an Insect Resistance Management (IRM) program as specified in product use guides for the following traits available in Pioneer corn hybrids: Herculex® I, Herculex RW, Herculex XTRA and YieldGard® Corn Borer.

For detailed IRM requirements for hybrids with in-plant insect resistance, refer to the appropriate product use guide, available from your Pioneer sales professional or on the web at: [www.pioneer.com/IRM](http://www.pioneer.com/IRM)



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