

Weed Management Systems in Soybeans

Economical, effective, and sustainable weed control is paramount in soybean production. With different weed management options available, such as the Genuity® Roundup Ready 2 Yield® system and the LibertyLink® soybean system, it is important to understand the differences between them and how they should be implemented properly.

Factors for All Weed Management Systems

Timely Weed Removal. Controlling weeds when they are small can help protect soybean yield potential. For every inch of weed height greater than 4 inches, a 2 to 3% yield loss has been observed⁴. Weeds can often grow 1 inch in 3 to 4 days⁴.

Residual herbicides should be used PRE and/or POST to help manage weed resistance and protect yield potential.

Germlasm. Varieties should be chosen based on yield potential, disease tolerances and other characteristics, not solely on their tolerance to herbicides.

Basics of the Systems

Genuity® Roundup Ready 2 Yield® Soybeans. Roundup® brand agricultural herbicides, with the active ingredient glyphosate, are the key herbicides used in the Genuity® Roundup Ready 2 Yield® soybean system. Once glyphosate is absorbed by the plant, it is generally readily translocated to the growing points in the plant¹. After glyphosate absorption and translocation, amino acid production is inhibited, which usually results in plant death. A residual herbicide is recommended PRE and/or POST, especially if glyphosate-resistant weeds are suspected. Additionally, a POST application of a contact herbicide such as Flexstar® or Cobra® is recommended to

Glyphosate and Glufosinate are NOT the Same. Important Differences to Consider Include:

- Mode of Action
- Uptake and Translocation
- Labeled Weed Heights
- Control of Perennial Weeds
- Carrier Volume
- In-Crop Application Window
- Effects of Environmental Conditions
- Rainfastness

Soybean **variety selection** is also a critical component to consider when selecting a weed management system.

control emerged glyphosate-resistant weeds.

LibertyLink® Soybeans. Ignite®, with the active ingredient glufosinate, is the key herbicide in the LibertyLink® system. Translocation of glufosinate is limited, which makes good coverage critical for weed control. Glufosinate inhibits the activity of an enzyme critical for the conversion of ammonia to other nitrogen compounds¹. A build up of ammonia and other effects of amino acid inhibition are often the cause(s) of plant injury.

Weed Control

Weed Size. For both herbicide trait systems, it is recommended to control weeds when they are small to help optimize weed control and limit weed competition with the crop; however, at times weeds can get larger than preferred. With Roundup® agricultural herbicides, if weeds become tough to control, there is the flexibility to increase the rate to increase control. If a POST tank mix partner is required for control of glyphosate-resistant weeds, the labeled weed heights are often shorter than those on the Roundup®

agricultural herbicide label, but taller than those on the Ignite® label (Figure 1). If environmental conditions prevent a timely application of Ignite®, a single application of 36 oz./acre of Ignite® can be applied to LibertyLink® soybeans, followed by a sequential application of a maximum of 29 oz./acre.

Species. Translocated herbicides, such as Roundup® agricultural herbicides, can often provide better control of grasses (fall panicum and foxtail) and perennial weed species (quackgrass and Canada thistle), when compared to herbicides that have limited translocation, like Ignite®⁵.

Figure 1. Labeled weed heights for potential in-crop applications of various herbicide systems in geographies with glyphosate-resistance.

	Roundup PowerMAX® Herbicide (32 oz./a) +		Ignite® (oz./a)	
	Flexstar® (1.25 pt./a)	Cobra® (12.5 oz./a)	22	29
Fall panicum	4-12"	4-12"	3"	5"
Velvetleaf	4-12"	4-12"	3"	4"
Kochia	4-12"	4-12"	4"	6"
Glyphosate-resistant Biotypes				
Palmer amaranth	6 leaf	6 leaf	3"	4"
Waterhemp	4 leaf	6 leaf	4"	5"

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Regardless of Weed Management System:
Residual herbicides should be used PRE and/or POST to help manage weed resistance and protect yield potential.

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Flexibility of Application

Carrier Volume. Roundup® agricultural herbicides can be ground applied using 3 to 40 gallons per acre (gpa). Volumes of 7 to 10 gpa can help glyphosate absorption, however, higher volumes of 15 to 22 gpa are often recommended when trying to penetrate a crop or weed canopy. Ignite® should be applied using a minimum of 15 gpa, with 20 to 40 gpa recommended for dense weed or crop canopies. The higher volume for Ignite® is due to glufosinate needing good coverage due to minimal translocation. If glyphosate-resistant weeds are present, and the addition of a POST herbicide tank mix partner such as Flexstar® or Cobra® is needed, then carrier volumes should be 15 to 20 gpa and 20 to 30 gpa, respectively.

In-crop Application Window. Roundup® agricultural herbicides can be applied to Genuity® Roundup Ready 2 Yield® Soybeans from emergence through flowering (the R2 stage). R2 stage soybean ends when a pod 5 mm (3/16 inch) long appears at one of the four uppermost nodes on the main stem with a fully developed leaf (R3)³. Ignite® can be applied from emergence to bloom, but not including bloom. Cobra® and Flexstar® have less restrictive in-crop application timing requirements than Roundup® agricultural herbicides or Ignite®.

Environmental Conditions. Making applications to actively growing weeds is beneficial for the efficacy of glyphosate and glufosinate. Application of Ignite® to soybeans showing injury from prior herbicide applications or environmental conditions is not allowed per label.

Rain Fast. Roundup WeatherMAX® Herbicide is rainfast in 30 minutes. Ignite® is rainfast after 4 hours. Flexstar® has a 1 hour and Cobra® has a 30 minute rainfastness, respectively.

Tank Cleaning. If switching between herbicide trait systems, proper cleaning of the tank is critical to help minimize crop injury.

Sources: ¹ Peterson, D.E. et. al. 2010. Herbicide mode of action. Kansas State University Extension. C-715.

² Summary of herbicide mechanism of action according to the Weed Science Society of America (WSSA). (revised June 10, 2011) <http://www.wssa.net> (verified 9/13/2011).

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	Roundup® Brand Agricultural Herbicides in a Genuity® Roundup Ready 2 Yield® System	Roundup® Agricultural Herbicides + POST tank mix of Flexstar® or Cobra® in a Genuity® Roundup Ready 2 Yield® System	Ignite® Herbicide in LibertyLink® Soybean System
Active Ingredient	glyphosate	Flexstar®: fomesafen Cobra®: lactofen	glufosinate
Amount of Translocation ¹	Readily translocated	Glyphosate is translocated. Flexstar® and Cobra® are contact herbicides.	Limited translocation
Weed Spectrum	~240	~240 + glyphosate-resistant broadleaves	~140
Carrier Volume (gal./a)	3 to 40	Flexstar®: 15 to 20 Cobra®: 20 to 30	Minimum: 15 Dense Canopies: 20 to 40
In-crop Application	Cracking through R2	Cracking through R2	Emergence to (not through) bloom.
Maximum Rate/ In-crop Application	44 oz./a	Flexstar®: see label Cobra®: see label	36 oz./a
Maximum Rate/ Year	<ul style="list-style-type: none"> 64 oz./a In-crop 5.3 qt./a Total for burndown, in-crop, preharvest 	Flexstar®: see label Cobra®: 25 oz./a	65 oz./a from burndown to bloom
Pre-harvest Interval	14 days	Flexstar®: 45 days Cobra®: 45 days	70 days
Rainfast	Roundup WeatherMAX® Herbicide: 30 minutes	Flexstar®: 1 hour Cobra®: 30 minutes	4 hours

³ Pedersen, P. 2004. Soybean growth and development. Iowa State University Extension. PM 1945.

⁴ Kamienski, C. 2003. Masters thesis: Effect of postemergence glyphosate application timing on weed control and grain yield in glyphosate-resistant soybean. University of Illinois.

⁵ Owen, M.D.K. 2011. 2011 herbicide guide for Iowa corn and soybean production. Iowa State University Extension. WC-94.