



Agronomic Spotlight

Best Management Practices for Weed Control in Wheat

- Management practices that improve the competitiveness of wheat stands can aid in weed control efforts.
- Fall and spring burndown applications may be the best time to control some grass weeds in winter and spring wheat, respectively.
- Weed spectrum, crop rotation, type of wheat, and harvest conditions affect weed management.
- Volunteer wheat should be controlled before planting another wheat crop.

Weed control is essential for wheat quality and yield. One Italian ryegrass plant per square foot can compete with wheat and cause a 4 percent loss in yield potential.¹ Quality of harvested grain and harvest efficiency is also affected by weed growth. Some weeds can produce large amounts of green vegetation that hinder harvest equipment, increase moisture and foreign matter, and lead to dockage. Volunteer wheat can also harbor insects between wheat crops and promote diseases.

Cultural Control

Weed heights can be kept short and herbicides more effective if cultural practices are used to make wheat more competitive with weeds. Crop height, later planting dates, and early cultivation can help control some weed species.

- Winter wheat and spring wheat products that are normal height are more competitive compared to semi-dwarf wheat.²
- Cultivation can be used to force germination in some weed species such as wild oat, which typically is dormant and has delayed emergence. Once emerged, weeds can be controlled with tillage or herbicides.²
- Later planting dates allow for early-emerged weeds to be controlled with a burndown application or tillage prior to crop emergence.

Fall and Spring Burndown

The focus of burndown applications prior to seeding spring wheat is to control small, emerged weeds that could reduce early-season yield potential and for which in-crop control options may be limited, less effective, and more costly.³ Downy brome and Japanese brome are grass species that are better controlled with early fall or early spring herbicide applications rather than late fall, late spring, or mid-season applications. Brome species can be controlled with higher rates of propoxycarbazone in-crop. However, this long-residual ALS herbicide could injure growing spring wheat at high rates.²

In-Season

Identifying leaf stages of wheat is important to proper timing of herbicides applications. Some synthetic auxin herbicides, if applied after jointing, can cause malformed heads or twisted flag leaves because of rapid stem extension. Many in-season grass herbicides are packaged with a safener for wheat. Safeners protect crops from herbicide injury by increasing the activity of detoxification enzymes. Labels of these products are more particular in recommendations for crop and weed stages. Other herbicides have

pre-harvest intervals or restrictions on using the seed or hay. Whether applying pre or post, farmers should check local recommendations or with their agronomist.

Rotations

- **Wheat to Wheat**—grass weeds such as wild oat can build up in these rotations. Certain active ingredients such as sulfosulfuron may be an option in continuous wheat as the long residual may restrict options for the following crop.²
- **Wheat to Fallow to Wheat**—large summer annual weeds may need to be controlled to avoid interference with planting equipment and improve seedbed conditions. A fallow period can be used to control a problem weed such as downy brome. Tillage immediately after harvest would stimulate germination. Downy brome seedlings could either be tilled again or controlled with herbicides.
- **Wheat to Corn or Canola**—herbicide tolerant wheat and canola are available as Clearfield® brand products in some regions. Rotations that include both crops could increase selection pressure for resistance to imazamox herbicides. Product stewardship is in place with specific technology rotation restrictions agreed to by the grower in the BASF Clearfield Licensing Agreement. Herbicides with a site of action other than ALS inhibitor should be sought for the third crop in a Clearfield rotation. For example, corn could use a soil-applied option such as a seedling shoot growth inhibitor (acetochlor and metolachlor) along with a post-applied photosynthesis inhibitor (atrazine) or EPSP synthase inhibitor (glyphosate).



Figure 1. Wheat stage is important for timing herbicide applications. The stem extension stages prior to heading are a time of rapid growth in the plant. Growth regulator herbicides are restricted to applications before this growth stage.

Harvest and Post-Harvest

Glyphosate can be applied to wheat that has reached physiological maturity or the hard-dough stage (maximum kernel dry weight). Harvest can be benefited by allowing suppression or control of troublesome weed escapes and late weed

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flushes that may interfere with harvest equipment or result in potential for dockage at the elevator. A seven day pre-harvest interval is required after the application. Do not apply glyphosate to wheat that is grown for seed.

Good season-long control often reduces weed populations and vigor of weeds after harvest. In winter wheat especially, post-harvest weed control should be timed to limit moisture loss to weeds and also prevent deposit of more weed seeds in the soil. Weeds that have been cut at harvest should have active regrowth before applying herbicide.⁴

Volunteer wheat that emerges after harvest can serve as a 'green bridge' to the next wheat crop by hosting insect pests such as the wheat curl mite and Hessian fly along with numerous wheat diseases. If volunteer wheat has emerged, it should be killed at least two weeks before seeding a new crop

of wheat.⁵ This is to allow enough space and time for insects to leave the area or die before the next wheat crop emerges.

Sources: ¹ Martin, J.R. and Green, J.D. 2009. A comprehensive guide to weed control in wheat. University of Kentucky. ² Zollinger, R. Howatt, K., Jenks, B. et al. 2015. 2015 North Dakota Weed Control Guide. North Dakota State University. W-253. ³ Burndown herbicides in no-till wheat. The Ohio State University. C.O.R.N. Newsletter. <http://corn.osu.edu>. ⁴ Klein, R. 2014. Controlling weeds post-harvest in winter wheat. University of Nebraska—Lincoln. ⁵ Watson, S., Shroyer, J., and Whitworth, J. 2011. Volunteer wheat control can help protect yields. Kansas State University. Web sites verified 8/12/15



Figure 2. Glyphosate can be used to control late flushes of weeds that may interfere with harvest equipment.

Table 1. Herbicide active ingredients options for PRE and POST timing in winter and spring wheat.

Wheat Type	Pre-Plant or Pre-Emerge Options			In-Season			Pre-Harvest ³
	Broadleaves	Grasses	Both Grasses and Broadleaves	Broadleaves	Grasses ⁴	Both Grasses and Broadleaves	
Spring Wheat	carfentrazone tribenuron thifensulfuron saflufenacil	triallate	propoxycarbazone flucarbazone glyphosate paraquat trifluralin pendimethalin pyroxasulfone	MCPA dicamba fluroxypyr bromoxynil carfentrazone thifensulfuron ³ tribenuron ³ metsulfuron prosulfuron triasulfuron	fenoxaprop pinoxaden clodinafop	pendimethalin ¹ pyroxasulfone chlorsulfuron fluroxypyr flucarbazone thiencarbazone propoxycarbazone	glyphosate 2,4-D ester dicamba + 2,4-D saflufenacil
Winter Wheat	carfentrazone tribenuron thifensulfuron saflufenacil	triallate chlorsulfuron	propoxycarbazone glyphosate paraquat pendimethalin pyroxasulfone	MCPA ² dicamba fluroxypyr bromoxynil carfentrazone thifensulfuron ³ tribenuron ³ metsulfuron prosulfuron triasulfuron	fenoxaprop pinoxaden clodinafop	pendimethalin ¹ pyroxasulfone chlorsulfuron fluroxypyr flucarbazone thiencarbazone mesosulfuron propoxycarbazone pyroxulam	

¹ Does not control emerged weeds.

² May not be recommended for applications to winter wheat in fall.

³ See label for pre-harvest interval.

⁴ Many in-season grass herbicides are packaged with a safener for wheat, follow labeled recommendations for wheat and weed size at application.

For additional agronomic information, please contact your local seed representative. Developed in partnership with Technology, Development, & Agronomy by Monsanto.

Individual results may vary, and performance may vary from location to location and from year to year. This result may not be an indicator of results you may obtain as local growing, soil and weather conditions may vary. Growers should evaluate data from multiple locations and years whenever possible.

ALWAYS READ AND FOLLOW PESTICIDE LABEL DIRECTIONS. Tank mixtures: The applicable labeling for each product must be in the possession of the user at the time of application. Follow applicable use instructions, including application rates, precautions and restrictions of each product used in the tank mixture. Monsanto has not tested all tank mix product formulations for compatibility or performance other than specifically listed by brand name. Always predetermine the compatibility of tank mixtures by mixing small proportional quantities in advance. Some of the product(s) discussed herein are restricted use pesticide(s) and may not be registered in all states. The distribution, sale, or use of an unregistered pesticide is a violation of federal and/or state law and is strictly prohibited. Check with your local dealer or product representative for the product registration status in your state. All other trademarks are the property of their respective owners.