

SMALL GRAINS

WEED MANAGEMENT IN NO-TILLAGE SMALL GRAINS

Cool-season annual weeds such as common chickweed, henbit, and annual ryegrass (Italian) have the potential to emerge in late summer or early fall and gain a competitive advantage over no-tillage small grains. If weeds become established in the fall and are allowed to overwinter, the chances of achieving successful weed control in no-tillage small grains is limited.

Scouting no-tillage small grain fields before planting can help determine if a 'burndown' herbicide is needed. No-tillage treatments include foliar applied herbicides such as glyphosate, or paraquat for 'burndown' control of existing vegetation. The recommended timing of application of no-tillage treatments is before, during, or soon after planting but before crop emergence.

Scouting no-till fields 3 to 4 weeks after planting will determine the presence of problem weeds that emerge with the crop and is especially important if no 'burndown' herbicide is applied. A fall application may be warranted if there is a heavy weed population or if weeds have approached the maximum label size during late fall and before winter. Consider a fall postemergence application of herbicides such as Harmony Extra, Metribuzin (to metribuzin tolerant varieties), or Buctril for cool-season annual broadleaf weeds; Axial, Osprey, PowerFlex, or Finesse Grass and Broadleaf for Italian ryegrass.

Preplant Foliar "Burndown" Herbicides for No-Till Wheat

PARAQUAT

PRODUCT	Herbicide Rate Based on Height of Annual Weeds		
	1 to 3 " weeds	3 to 6" weeds	6" weeds
GRAMOXONE SL 2.0 GRAMOXONE SL 2S or FIRESTORM 3 S, PARAZONE 3S or PARAQUAT CONCENTRATE 3S	2 to 2.5 pt/A or 1.3 to 1.7 pt/A	2.5 to 3 pt/A or 1.7 to 2.0 pt/A	3 to 4 pt/A or 2.0 to 2.7 pt/A
(paraquat cation lb / A)	(0.5 to 0.63 lb ai/A)	(0.63 to 0.75 lb ai/A)	0.75 to 1 lb ai/A

Additives: Surfactant at 1 to 2 pt/100 gallons of spray mixture or Crop Oil Conc. at 4 qt/100 gal.

Weeds Controlled: Many small annuals including annual ryegrass (Italian), brome spp., common chickweed, henbit.

Spray Volume: Apply in 10 - 20 gallons of clean water, or complete clear liquid fertilizers per acre. Do not use suspension type fertilizers. A spray volume of more than 20 GPA may be needed if weeds exceed 6" in height. Use a drift control agent if spray volume < 10 GPA.

General Comments: Paraquat containing products are classified as a Restricted Use Pesticide. Apply before, during, or after planting wheat or barley but before crop emergence. Regrowth may occur from perennial grasses and broadleaf weeds, legume sods, or perennial grass sods. Certain annuals such as ryegrass or henbit may not be effectively controlled if plants are well established at the time of application.

Environmental Statements: Drift of spray can desiccate green tissue and result in injury to non-target plants and render them unfit for sale, use, or consumption.

Rain Delay: Rainfastness is and 15-30 minutes for GRAMOXONE INTEON and GRAMOXONE SL and 30 minutes for FIRESTORM, PARAZONE, or PARAQUAT CONCENTRATE.

Rotation Restrictions: All rotational crops may be planted immediately after last application.

Harvest & Forage Restrictions: None.

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GLYPHOSATE

Listed below are examples of glyphosate formulations and approximate rates for most burndown applications in no-tillage small grains. The specific rate of product will vary depending on glyphosate formulation and size and species of weeds.

Glyphosate formulation ¹	Annuals <6" tall	Annuals >6" tall
Roundup Original, etc. (3 lb ae/gal)	1.5 to 2 pt/A (24 to 32 fl oz/A) (0.56 to 0.75 lb ae/A)	2 to 3 pt/A (32 to 48 fl oz/A) (0.75 to 1.13 lb ae/A)
Buccaneer 5 (3.75 lb ae/gal)	1.2 to 2 pt/A (19 to 32 oz/A) (0.56 to 0.94 lb ae/A)	1.75 to 2.5 pt/A (28 to 40 oz/A) (0.82 to 1.17 lb ae/A)
Duramax (4 lb ae/gal)	1.13 to 1.5 pt/A (18 to 24 fl oz/A) (0.56 to 0.75 lb ae/A)	1.5 to 2.25 pt/A (24 to 36 fl oz/A) (0.75 to 1.13 lb ae/A)
Roundup PowerMAX Roundup WeatherMAX (4.5 lb ae/gal)	1 to 1.4 pt/A (16 to 22 fl oz/A) (0.56 to 0.77 lb ae/A)	1.4 to 2 pt/A (22 to 32 fl oz/A) (0.77 to 1.13 lb ae/A)
¹ For a detailed list of glyphosate products see page 21.		

Additives: For products that require a surfactant, a non-ionic surfactant at 0.25% v/v is often used. Consult the herbicide product label to verify if a surfactant is needed and the type and rate of surfactant to include. Dry Ammonium Sulfate at 1 to 2% by weight (8.5 to 17 lb/100 gal) may improve glyphosate activity during dry weather, or when mixed in hard water or with certain herbicides, or applied to certain weed species.

Weeds Controlled: Annual fleabane, annual ryegrass, (Italian), brome spp., common chickweed, henbit, johnsongrass, mustards, volunteer small grains.

Perennials: Consult label for glyphosate rate for specific perennial weed species. Best control of perennial weeds is usually achieved when treated at late growth stages (approaching maturity) and when soil moisture is adequate for active plant growth. Control may be reduced if plants are mowed or grazed and not allowed to regrow to recommended growth stage. Perennial weeds may require multiple applications for optimum control.

Spray Volume: A spray volume of 3 to 10 gallons of water/A is often recommended when glyphosate is used alone at reduced labeled rates for certain annual weed species. Consult label when using a volume of 10 to 40 GPA.

General Comments: Apply before, during, or after planting but before crop emergence. Glyphosate is a translocated herbicide. Management programs that rely on repeated use of glyphosate alone without herbicides of other sites of action may lead to the development of populations of glyphosate-resistant biotypes of weeds.

Environmental Statements: Take precautions to avoid spray drift to desirable plants.

Rain Delay: Rain soon after application may reduce effectiveness. Some labels indicate 6 hrs.

Rotation Restrictions: There are no rotational restrictions following normal use of glyphosate. Wait at least 30 days before planting of crops not listed on the label.

Harvest & Forage Restrictions: Do not harvest or feed vegetation for 8 weeks after application.

Guide to the Relative Response of Weeds and Crop to Herbicides¹

	Cheat	Downy Brome	Field Brome	Ryegrass, Annual	Common Chickweed	Curly Dock	Henbit	Horseweed (Marestail)	Mustards spp.	Pennycress, Field	Shepherd's-purse	Vetch spp.	Wild Garlic	Crop Response ²
Axial XL	P	-	-	G	N	N	N	N	N	N	N	N	N	1
2,4-D	N	N	N	N	P	P	P	F	G	G	G	F	F	3
Dicamba (Clarity, Banvel, etc)	N	N	N	N	F	F	P	F	F	F	G	G	F	3
Buctril	N	N	N	N	F	P	F	F	G	G	F	F	P	2
Finesse Grass & Broadleaf	G	P	G	G	G	G	G	-	-	-	-	-	G	2
Harmony Extra SG / Nimble / TNT Broadleaf	N	N	N	N	G	G	G	F	G	G	G	F	G	1
Harmony SG / Harass	N	N	N	N	F	G	F	-	G	G	G	F	G	1
MCPA	N	N	N	N	P	P	P	F	G	G	G	F	F	3
Metribuzin ³	F	-	-	F	G	-	G	G	G	G	G	-	-	3
Osprey	F	P	F	G	F	-	F	P	P	-	-	P	N	3
PowerFlex	-	G	G	G	G	-	F	P	G	G	-	G	F	3
Quelex	N	N	N	N	G	-	G	G	G	G	G	-	N	3

G = Good F = Fair P = Poor N = No Control - = No Information Available

¹ This table should be used only as a guide for comparing the relative effectiveness of herbicides to a particular weed. Under extreme environmental conditions, the herbicides may perform better or worse than indicated in the table. If a farmer is getting satisfactory results under his conditions, he should not necessarily change products as a result of the information in the table.

² Crop Response rating is based on a scale from 0 to 9, with 0 being no injury. A rating of 3 or less will not result in a crop yield loss under normal conditions.

³ Use only wheat or barley varieties recommended on the metribuzin label or CROP INJURY may occur.

Preplant Soil-Residual for No-Till Wheat

VALOR SX 51WDG

VALOR SX 51WDG 2 oz/A

flumioxazin (0.064 lb ai/A)

Weeds Controlled: Marestail (horseweed), common chickweed, henbit

Application Timing: Plant no-till wheat no sooner than 7 days after application.

General Comments: Apply only on no-till or minimum tillage fields where previous crop residue has not been incorporated into the soil. Wheat seed must be planted a minimum of one inch deep. For control of emerged weeds, VALOR SX must be applied with an appropriate burndown tank mix partner. Treated soil that splashes onto newly emerging crop may result in temporary injury. Do not exceed 2 oz of VALOR SX/A in a single application or during the growing season. With conventional tillage wheat a minimum 30 day waiting period and 1" rainfall is required before planting. To enhance removal of herbicide residue from spray system, use a tank cleaner such as Valent Tank Cleaner.

Environmental Statements: VALOR has the potential to runoff to surface water and adjacent land.

Rain Delay: 1 hour.

Rotation Restrictions: Rotational intervals following VALOR at rates up to 2 oz/A include: 7 days for wheat, 14 days for no-till field corn, and 30 days and one inch of rainfall for conventional till field corn, sorghum, tobacco, and wheat. Soybeans may be planted immediately.

Harvest & Forage Restrictions: Do not graze until wheat reaches 5 inches in height. If VALOR SX is used as a harvest aid do not harvest within 10 days of application.

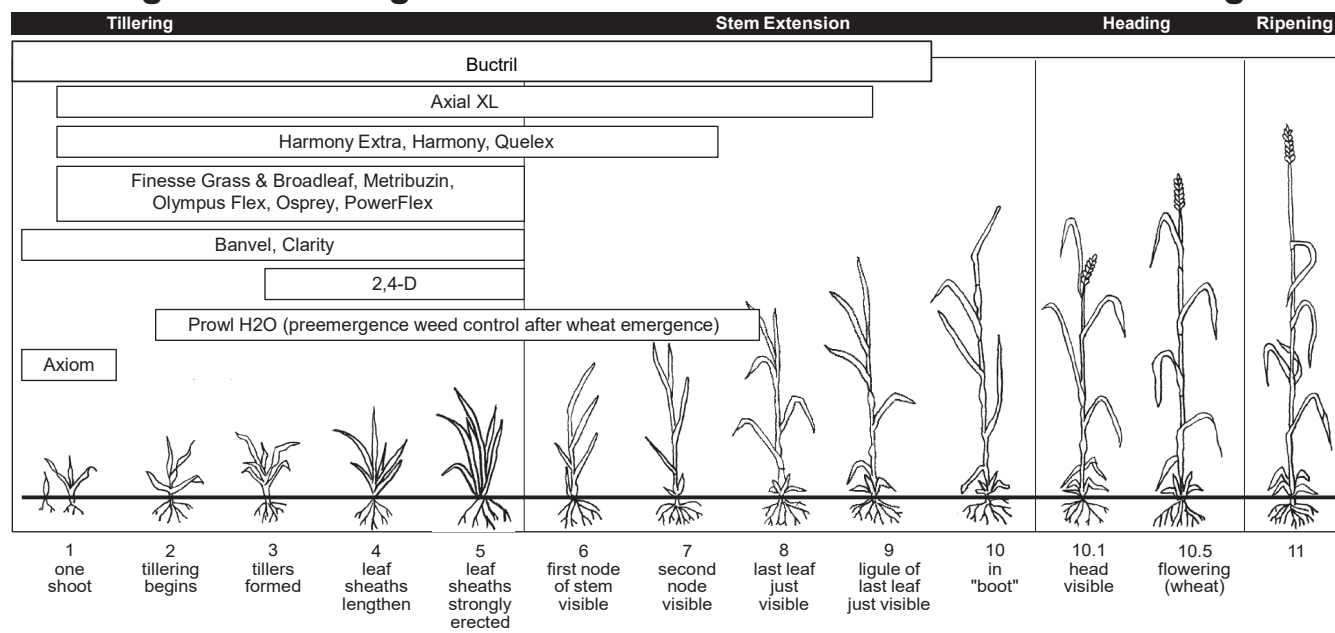
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Preemergence Herbicides for Ryegrass

Axiom, Finesse, Prowl H2O, Zidua, and Anthem Flex provide soil-residual suppression or control of Italian ryegrass. Emerged ryegrass is not affected by Prowl H2O, Zidua, or Anthem Flex; whereas, Axiom and Finesse may have limited foliar activity on emerged ryegrass plants. As a general rule, these products should be used as a sequential or tank mix partner with foliar-applied herbicides to help provide both preemergence and postemergence control of ryegrass. Depending on the situation, they may also provide an alternative herbicide site of action to help limit the development of herbicide resistant biotypes. Excessive residue from previous crop may limit weed control.

HERBICIDE*	RATE	TIMING	REMARKS**
AXIOM flufenacet (15) metribuzin (5)	6–10 oz/A	Spike to 2-leaf wheat and preemergence to 1-leaf ryegrass	Some wheat varieties are sensitive to Axiom. Plant wheat 1 to 2 Inches deep.
FIERCE	3 oz/A	14 days prior to no-till wheat planting	Plant wheat seed at least 1" deep. Fierce has potential to injure wheat, particularly under environmental stress conditions during seed germination thru seedling emergence. Fierce does not control germinated or emerged weed
FINESSE or REPORT EXTRA chlorsulfuron (2) metsulfuron (2)	0.5 oz/A	After planting but before wheat emerges.	Also for control of volunteer corn up to 18" tall. Rotation interval is 6 months for STS soybean and 18 months for field corn, grain sorghum and non-STs soybean. Do not use where soil pH is <5.0 or >7.9.
PROWL H2O pendimethalin (3)	1.5-2.5 pt/A	From 1st-leaf stage of wheat until flag leaf is visible. Emerged ryegrass will not be controlled.	Plant wheat seed at least ½" to 1" deep. Crop injury may occur if applied prior to wheat emergence. Seedbed should be firm and free of clods and trash.
ZIDUA or ZIDUA SC pyroxasulfone (15)	1 - 1.25 oz/A or 1.6 – 2 fl oz/A	<u>Delayed Pre</u> When 80% of germinated wheat seed have at least ½ inch long shoot until wheat spiking	Zidua has potential to injure wheat, particularly under environmental stress conditions during seed germination thru seedling emergence. Zidua does not control germinated or emerged weeds.
	1 - 2 oz/A or 1.6 - 3.25 fl oz/A	<u>Early Post</u> When wheat is spiking until 4'th tiller	
ANTHEM FLEX pyroxasulfone (15) carfentrazone (14)	2.75-3.5 oz/A	<u>Delayed Pre</u> When 80% of germinated wheat seed have at least ½ inch long shoot until wheat spiking	Anthem Flex has potential to injure wheat, particularly under environmental stress conditions during seed germination thru seedling emergence. Anthem Flex has some foliar activity on certain weeds species; however, it will not control germinated or emerged Italian ryegrass.
	2.75-3.6 oz/A	<u>Early Post</u> When wheat is spiking until 4'th tiller	
*Numbers in parenthesis represent groups of different herbicide modes of action. This classification system can aid in the selection of herbicides to limit the development of herbicide resistance.			
**Consult labels to achieve optimum results for managing ryegrass and limiting injury to wheat and rotational crops.			

Timing of Postemergence Herbicides Relative to Wheat Growth Stages



Feekes scale of wheat development.

POSTEMERGENCE HERBICIDES

AXIAL XL

Axial XL 0.42 EC 16.4 oz/A

(pinoxaden 0.053 lb ai/A)

Weeds Controlled: Annual ryegrass (Italian).

Crop Stage: Apply only one treatment per season from 2-leaf stage to pre-boot stage.

General Comments: For winter wheat and barley. Apply to Italian ryegrass from 1 to 5-leaf stage on main stem. For optimum control apply prior to emergence of 3rd tiller. Use a spray volume of 10 gallons of water per acre. Do not exceed 10 gallons of water/A as reduced grass control may occur. AXIAL XL may not effectively control biotypes of ryegrass that are resistant to ACCase inhibitor herbicides.

Environmental Statements: None.

Rain Delay: 30 minutes.

Rotation Restrictions: There is no waiting interval between application and planting wheat or barley. Most other crops require an interval of 120 days between application and planting.

Harvest & Forage Restrictions: Do not graze or harvest forage for hay for a minimum of 30 days following application. Straw may be fed to livestock 60 days after application. Do not harvest grain for 60 days following application.

Tank Mixtures for Wheat: Buctril, Finesse, Harmony Extra, MCPA ester.

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BUCTRIL

BUCTRIL 2EC 1.5 to 2 pt/A

(bromoxynil 0.38 to 0.5 lb ai/A)

Weeds Controlled: Field pennycress, pepperweed, wild mustard, and other broadleaf weeds.

Crop Stage: Apply from emergence to the boot stage of fall-seeded wheat, barley, rye, triticale, or oats

General Comments: **Legumes not seeded. Consult label for small grains underseeded with alfalfa**

Treat emerged weeds up to 4-to 8-leaf stage, or 2 to 4 inches tall or 1 to 2 inches in diameter. Consult label for susceptibility of weed species and rate of herbicide. Do not apply if crop canopy interferes with application as poor control may occur. The cumulative rate should not exceed 2 pt/A.

Environmental Statements: None.

Rain Delay: No information on label.

Rotation Restrictions: Do not plant rotational crops within 30 days after application.

Harvest & Forage Restrictions: Do not graze treated fields for 45 days after treatment.

Tank Mixtures for wheat: 2,4-D, MCPA, Banvel, Express, Harmony Extra. Consult label for approved tank mixes for barley and other small grains.

CLARITY / BANVEL

CLARITY 4 S 4 oz/A or

(dicamba 0.125 lb ai/A)

BANVEL 4S 4 oz/A

Weeds Controlled: Shepherd's-purse, vetch spp., and certain other broadleaf weeds.

Crop Stage: May be applied before, during, or after planting small grains. The risk of injury may be the least when applied after emergence of fall-seeded wheat, barley, or oats and before jointing stage of growth (apply to spring-seeded oats before plants exceed the 5-leaf stage). Treatments made during periods of rapid growth may temporarily result in crop leaning.

General Comments: **Legumes not seeded.** For best control apply when broadleaf weeds are in the 2- to 3-leaf stage and rosettes are < 2 inches in across.

Environmental Statements: Groundwater and surface water protection statements are included on dicamba labels. Dicamba products should not be mixed, loaded, or applied within 50 feet of any wells, sink holes, perennial or intermittent streams, rivers, and natural or impounded lakes and reservoirs, unless an impervious pad is used. Use caution to limit the risk of drift to nearby sensitive plants.

Rain Delay: 4 hours.

Rotation Restrictions for CLARITY: Corn may be planted anytime. Other crops may be planted after 120 days following application. Sorghum, soybean, and small grains may have a shorter planting interval. Consult restrictions for other dicamba products.

Harvest & Forage Restrictions: The restrictive interval for lactating dairy animals following an application rate ≤ 1 pt/A is 7 days for grazing or 37 days for harvesting hay. There are no grazing restrictions for animals other than lactating dairy animals. Animals cannot be removed for slaughter prior to 30 days after applying Banvel or Sterling.

Tank Mixtures for CLARITY for Wheat & Barley: Buctril, Harmony Extra, MCPA, Sencor, 2,4-D. Consult other dicamba labels for approved tank mixes.

Generic Formulations: Diablo, Rifle, Sterling, Oracle, Vision.

2,4-D

2,4-D (AMINE) 1 to 1.5 pt/A* or

2,4-D 0.5 to 0.75 lb ai/A) or

(2,4-D (ESTER) 0.5 to 1.0 pt/A*

(2,4-D 0.25 to 0.5 lb ai/A)

[* Rates based on 4 lb/gal formulation]

Weeds Controlled: Pennycress, pepperweed, shepherd's-purse, wild mustard and other broadleaf weeds.

Crop Stage: In spring after crop is at full tillered stage (usually 4 to 8" tall) but before it begins to joint. Risk of injury is least when small grains are at fully tillered stage.

General Comments: **Legumes not seeded.** For rate to use, follow directions on label of formulation purchased. Wheat is most tolerant followed by rye, barley, and oats.

Environmental Statements: Drift of 2,4-D spray or vapor can injure nearby susceptible plants.

Rain Delay: No information on label.

Rotation Restrictions: Any crop may be planted after 3 months of above freezing soil temperatures following application or until 2,4-D has disappeared. Consult label for preplant applications to corn and soybean.

Harvest & Forage Restrictions: Do not allow meat animals being finished for slaughter or dairy animals to graze or use for forage within 2 weeks after treatment. Do not feed treated straw if 2,4-D is applied as a preharvest treatment.

Tank Mixtures: Consult specific label.

FINESSE GRASS & BROADLEAF

Finesse Grass & Broadleaf 0.75 to 0.9 oz/A	(chlorsulfuron + flucarbazone)
	(0.012:0.022 to 0.014:0.026 lb ai/A)
+	+
Non-ionic Surfactant (2 qt/100 gal)	Additive

[28% UAN (2 qt/A) or AMS (2 lb/A) may be included with non-ionic surfactant]

Weeds Controlled: Annual ryegrass (Italian), cheat, field brome, henbit.

Crop Stage: After 2-leaf stage, but prior to jointing.

General Comments: For winter wheat. Apply to Italian ryegrass from 1 leaf to 2 tillers. For optimum control apply prior to emergence of 3rd tiller. Crop injury may occur during cool and/or wet conditions. Applications may be made in winter when daytime temperatures reach 40°F. FINESSE GRASS & BROADLEAF will not control ALS-resistant ryegrass

Environmental Statements: None.

Rain Delay: 1 hour.

Rotation Restrictions: The interval between application and planting rotational crops is 4 months for wheat where soil pH is ≤ 7.9 ; 6 months for STS soybean; or 14 months for field corn where soil pH is ≤ 7.5 . Other crops require a field bioassay.

Harvest & Forage Restrictions: Treated wheat may be grazed anytime; however, for best results apply 5 to 7 days before grazing. Do not harvest grain sooner than 60 days after application.

Tank Mixtures for Wheat: Buctril. Tank mixing with 2,4-D may limit control of weedy grasses.

HARMONY EXTRA SG (with TotalSol)

HARMONY EXTRA SG (TotalSol) 50DF 0.45 to 0.9 oz/A	[thifensulfuron:tribenuron]
	(0.009:0.005) to (0.019:0.009) lb ai/A]
+	+
SURFACTANT (NON-IONIC 80%) 1 to 2 qt/100 gal	(additive)

Weeds Controlled: Wild garlic, common chickweed, curly dock, field pennycress, henbit, mustards, shepherd's-purse.

Crop Stage: Apply after the 2-leaf stage of wheat, barley, or winter oats but before the flag leaf is visible. Apply to tolerant varieties of spring-seeded oats after the crop is in the 3-leaf stage and before jointing.

General Comments: **Legumes not seeded.** For winter or spring oats do not exceed 0.6 oz/A for Harmony Extra TotalSol and do not apply more than one treatment per season. For wild garlic control, apply to actively growing plants that are less than 12 inches tall with 2 to 4 inches of new growth. Apply to annual broadleaf weeds when plants are past the cotyledon stage and are less than 4 inches tall or across. Injury may occur when crop plants are stressed from adverse environmental conditions.

Environmental Statements: None.

Rain Delay: Several hours of dry weather are needed for absorption into weeds.

Rotation Restrictions: Wheat, barley, and oat may be replanted any time. The minimum interval between application and planting is 7 days for soybean; 14 days for field corn and grain sorghum; and 45 days for other crops.

Harvest & Forage Restrictions for HARMONY EXTRA: Allow at least 45 days between application and harvesting grain. Allow at least 7 days between application and grazing and at least 7 days between application and feeding of forage from treated areas. Allow at least 30 days between application and feeding hay. Harvested straw may be used for bedding and/or feed.

Tank Mixtures for Wheat & Barley: 2,4-D, Express, MCPA, dicamba, bromoxynil. Reduced weed control or increased crop injury may occur with some tank mixes. Consult the label for tank mixtures with liquid nitrogen.

Generic Formulations: AUDIT, NIMBLE, TREATY EXTRA. Consult label for recommended rates and other information.

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HARMONY SG (with TotalSol)

HARMONY SG 50DF 0.45 to 0.9 oz/A	thifensulfuron (0.014 to 0.028 lb ai/A)
+	+
SURFACTANT (NON-IONIC 80%) 1 to 2 qt/100 gal	(additive)

Weeds Controlled: Wild garlic, curly dock, field pennycress, mustards, shepherd's-purse.

Crop Stage: Apply after the 2-leaf stage of wheat, barley, or winter oats but before the flag leaf is visible. Apply to tolerant varieties of spring-seeded oats after the crop is in the 3-leaf stage and before jointing.

General Comments: **Legumes not seeded.** For winter or spring oats do not exceed 0.6 oz/A and do not apply more than one treatment per season. For wild garlic control, apply to actively growing plants that are less than 12 inches tall with 2 to 4 inches of new growth. Injury may occur when crop plants are stressed from adverse environmental conditions.

Environmental Statements: None.

Rain Delay: Several hours of dry weather are needed to absorption.

Rotation Restrictions: Wheat, barley, oat, soybeans, grain sorghum, and field corn may be replanted any time, however, do not plant other crops within 45 days after application.

Harvest & Forage Restrictions for HARMONY SG: Allow at least 7 days between application and grazing and at least 7 days between application and feeding of forage from treated areas. Allow at least 30 days between application and feeding hay. Harvested straw may be used for bedding and/or feed.

Tank Mixtures for Wheat & Barley: 2,4-D, MCPA, dicamba, bromoxynil. Reduced weed control or increased crop injury may occur with some tank mixes. Consult the label for use of adjuvants with tank mixtures and when used with liquid nitrogen.

Generic Formulations: HARASS, THIEF, TREATY. Consult label for recommended rates and other pertinent information.

METRIBUZIN DF

METRIBUZIN 75DF 2 to 8 oz/A	metribuzin (0.094 to 0.38 lb ai/A)
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Weeds Controlled: Common chickweed, henbit, mustards, field pennycress, shepherd's-purse.

Crop Stage: Apply METRIBUZIN DF after crop plants have at least 2 leaves but before jointing. METRIBUZIN DF may be applied to wheat or barley at 2 to 3 oz/A when crop plants have 2 leaves to 2 tillers; or at 4 to 6 oz/A when crop plants have at least 3 to 4 tillers; or at 4 to 8 oz/A when crop plants have more than four tillers but before jointing. When METRIBUZIN DF rate \geq 4 oz/A, secondary roots should be developed and greater than 1 inch long; treatments should not be applied before 75 days after planting; and allow at least 2 weeks for crop to recover from winter dormancy before treatment. Crop injury may occur if METRIBUZIN DF is mixed with fertilizer, applied before specified time, seed are planted less than 1 inch deep, or if the crop is stressed by frost or other factors.

General Comments: **Legumes not seeded. Consult label for information on recommended WHEAT or BARLEY VARIETIES.** For optimum control, apply before broadleaf weeds exceed 1 inch in height, or grasses have more than 2 leaves.

Environmental Statements: Metribuzin containing products have a GROUNDWATER ADVISORY statement on the label.

Rain Delay: No information on label.

Rotation Restrictions: Consult label.

Harvest & Forage Restrictions: Do not graze wheat within 14 days or harvest grain within 21 days after last application. Do not graze or harvest barley before crop maturity.

Tank Mixtures for Wheat & Barley: Consult specific metribuzin product label.

Generic Formulations: DIMETRIC, GLORY, METRI DF, METRIBUZIN 75, and TRICOR DF are examples of products containing the active ingredient metribuzin and are similar to SENCOR (a former brand name product.)

OSPREY

OSPREY 4.5% WDG 4.75 oz/A	mesosulfuron 0.0134 lb ai/A
+	+
Non-Ionic Surfactant (2 qt/100 gal)	Additive
+	+
28% UAN (1 to 2 qt/A) or AMS (1.5 to 3 lb/A)	Additive
(Consult label for using methylated seed oil or basic blend adjuvants)	

Weeds Controlled: Annual ryegrass (Italian) and annual bluegrass

Crop Stage: Apply only one treatment per season from emergence up to the jointing stage of wheat

General Comments: For wheat only. Apply when annual ryegrass and annual bluegrass plants have 1-leaf to 2 tillers. Osprey may not effectively control biotypes of ryegrass that are resistant to ALS-inhibitor herbicides. Crop injury may occur when topdressing liquid ammonium nitrogen fertilizer within 14 days of OSPREY application.

Environmental Statements: None.

Rain Delay: Do not apply if rainfall is expected less than 4 hours after treatment.

Rotation Restrictions: The interval between application and planting rotational crops is 7 days for wheat, 30 days for barley, 90 days for soybean, 12 months for corn, and 10 months for other crops.

Harvest & Forage Restrictions: Do not apply within 30 days of harvesting wheat forage and 60 days for hay, grain, and straw.

Tank Mixtures: OSPREY may be tank mixed with Buctril, Harmony Extra, or Harmony. When using other herbicides not listed on the OSPREY label, apply sequentially 5 days prior to or 5 days after OSPREY.

POWERFLEX

POWERFLEX HL 13% WDG 2 oz/A	pyroxsulam 0.016 lb ai/A
+	+
Non-Ionic Surfactant (1 to 2 qt/100 gal)	Additive
+	+
28% UAN (1 to 2 qt/A) or AMS (1.5 to 3 lb/A)	Additive
(Consult label for using crop oil concentrate)	

Weeds Controlled: Annual ryegrass (Italian), Carolina geranium, cheat, downy brome, field pennycress, hairy chess, hairy vetch.

Crop Stage: Apply in the fall or spring from 3-leaf to jointing stage of wheat or triticale.

General Comments: For wheat and triticale only. Apply when grassy weeds are 2-leaf to 2-tiller stage and before broadleaf weeds exceed 2 inches tall or 2 inches in diameter. POWERFLEX will not effectively control biotypes of ryegrass that are resistant to ALS-inhibitor herbicides. Crop injury may occur when topdressing liquid ammonium nitrogen fertilizer within 7 days of POWERFLEX application.

Environmental Statements: May contaminate surface water due to runoff from rain water.

Rain Delay: Do not apply if rainfall is expected less than 4 hours after treatment.

Rotation Restrictions: The interval between application and planting rotational crops is 1 month for wheat; 3 months for soybean or grain sorghum when applied in February or later. However, when applied before February, do not plant grain sorghum or soybean before April 30. Allow 9 months for alfalfa, barley, field corn, popcorn, grasses, and 12 months for certain other crops not listed.

Harvest & Forage Restrictions: Do not harvest within 60 days after application. Do not graze treated crop within 7 days or cut for hay within 28 days following application.

Tank Mixtures: Consult label when tank mixing with other herbicides. Do not mix with dicamba or amine formulations of 2,4-D or MCPA as these may limit grass control.

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QUELEX

QUELEX 20.4WDG	0.75 oz/A	halauxifen-methyl:florasulam 0.005:0.005 lb ai/A)
	+	+
Non-ionic Surfactant [0.2-.5% v/v]	1.4 to 6 pt/100 gal or	
Crop Oil Concentrate [0.5-1% v/v]	4 to 8 pt/100 gal or	additive
Methylated Seed Oil [0.5-1% v/v]	4 to 8 pt/100 gal	

Weeds Controlled: Common chickweed, henbit, lambsquarters, marestalk (horseweed), Carolina geranium, mustard spp., field pennycress, sheperdspurse,

Crop Stage: Apply in the fall or spring from 2-leaf stage to flag leaf emergence of wheat, barley or triticale.

General Comments: For use on wheat, barley and triticale. QUELEX is a premixture containing halauxifen-methyl (10.4%) + florasulam (10%) + cloquintocet (safener) Do not allow Quelex to come in direct contact with sensitive broadleaf plants growing nearby. For best results apply when weeds are actively growing in the 2 to 4 leaf stage, or less than 4 inches. Only weeds emerged at time of treatment will be controlled. Quelex may be applied in a spray solution with liquid nitrogen fertilizers; however, use a non-ionic surfactant instead of crop oil concentrate or methylated seed oil (consult label). Do not apply a product containing halauxifen methyl to the crop field more than two times a growing season per year. Do not compost any plant material from treated area.

Environmental Statements: Quelex has groundwater and surface water advisory statements..

Rain Delay: Applications are rainfast within 4 hours after application.

Rotation Restrictions: Barley, wheat, and triticale can be planted anytime; for corn (all types), oats, rye, sorghum, grasses, and soybeans wait 3 months; for fall-seeded canola wait 5 months; and alfalfa wait 9 months following application. Other crops not listed may require a 15 month rotation interval.

Harvest & Forage Restrictions: Do not apply within 60 days of crop harvest. Do not apply closer than 21 days before cutting of hay. Do not allow livestock to graze on treated crops within 7 days following application.

Tank Mixtures: QUELEX may be tank mixed with herbicides labeled for specific crop use (consult product labels when tank mixing).

2,4-D or MCPA

(For Wheat Interseeded with Legumes)

2,4-D (AMINE) 0.5 pt/A* or	(2,4-D 0.25 lb ai/A) or
MCPA (AMINE) 1 pt/A**	(MCPA 0.25 lb ai/A)

[* 2,4-D rate based on 4 lb/gal formulation]

[** MCPA rate based on 2 lb/gal formulation]

Weeds Controlled: Field pennycress, pepperweed, shepherd's-purse, wild mustard, and other broadleaf weeds.

Crop Stage: In spring just before jointing.

General Comments: Legumes seeded. Use low spray volume to minimize injury to legumes. Small grain and weeds form a canopy to protect legumes from spray. Injury to legumes will likely occur, therefore do not spray unless fields are extremely weedy. Red clover, ladino and lespedeza are injured less than alfalfa, sweet clover, or vetch. MCPA Amine (e.g. MCPA Amine 4 from Tenkoz) may be used if small grains are underseeded with alfalfa, lespedeza, red and white clovers. Do not apply MCPA to small grains underseeded with vetch or sweetclover. Do not apply 2,4-D Amine to small grains underseeded to alfalfa or sweetclover.

Environmental Statements: Drift of 2,4-D spray or vapor can injure nearby susceptible plants.

Rain Delay: No information on label.

Rotation Restrictions: Any crop may be planted after 3 months of above freezing soil temperatures following application of 2,4-D or until 2,4-D has disappeared. Consult label for preplant applications of 2,4-D to corn and soybean. No information on MCPA label/

Harvest & Forage Restrictions: Do not allow dairy animals or meat animals being finished for slaughter to graze or use forage 7 to 14 days after treatment depending on herbicide product. Some labels prohibit feeding treated straw.

Tank Mixtures: None.

PREHARVEST

GLYPHOSATE

The following are glyphosate formulations for preharvest applications in wheat (consult label for barley). Glyphosate rate may vary depending on specific product.

Glyphosate Formulation ¹	Rate/A	Remarks
Roundup, etc... (3 lb ae/gal)	1 qt/A (0.75 lb ae/A)	Dry Ammonium Sulfate at 1 to 2% by weight (8.5 to 17 lb/100 gal) may be included with glyphosate to improve weed control. Recommendations for use of surfactants will vary depending on product. ALWAYS CONSULT THE PRODUCT LABEL FOR SPECIFIC DIRECTIONS. Apply to wheat after the hard-dough stage of grain (30% or less grain moisture) and at least 7 days before harvest or grazing. Do not treat wheat grown for seed due to possible reduction in germination or vigor. Wheat stubble may be grazed immediately after harvest.
Extra Credit 5 (3.75 lb ae/gal)	0.8 qt/A (0.75 lb ae/A)	
Duramax(4 lb ae/gal)	24 fl oz/A (0.75 lb ae/A)	
Roundup WeatherMAX Roundup PowerMAX (4.5 lb ae/gal)	22 fl oz/A (0.77 lb ae/A)	
<p>Weeds Controlled: Annual fleabane, barnyardgrass, brome spp., chickweed, common ragweed, crabgrass, fall panicum, giant foxtail, giant ragweed, johnsongrass (seedling), lambsquarters, marestalk, mustards, prickly lettuce, smartweed, and other weed species.</p>		
<p>¹ For a detailed list of glyphosate products see page 21.</p>		