TABLE 3A — Weed Response to Herbicides in Small Grains*

			WINTER ANNUAL GRASSES					WINTER ANNUAL BROADLEAVES									SUMMER ANNUALS					PERENNIALS				
	SITE OF ACTION	CROP TOLERANCE**	BLUEGRASS (ANNUAL)	CHEAT	DOWNY BROME	RYEGRASS (ANNUAL)	WINDGRASS (COMMON)	CHICKWEED (COMMON)	DEADNETTLE (PURPLE)	HENBIT	HOARY ALYSSUM	HORSEWEED (MARESTAIL)[a]	MAYWEED (DOGFENNEL)	MUSTARD SPECIES	PENNYCRESS (FIELD)	SHEPHERDSPURSE	LAMBSQUARTERS (COMMON)	PIGWEED	RAGWEED (COMMON)	RAGWEED (GIANT)	SMARTWEED	BINDWEED (FIELD)	CANADA THISTLE	SOWTHISTLE	WILD GARLIC	WILD ONION
2,4-D AMINE	4	3	N	N	N	N	N	P	F	P	**G**	**G**	P	**E**	**E**	**E**	**G**	**G**	**G**	**G**	P	P	P	P	P	P
2,4-D ESTER	4	3	N	N	N	N	N	P	F	P	**G**	**G**	P	**E**	**E**	**E**	**G**	**G**	**G**	**G**	P	F	F	P	F	F
AFFINITY BROADSPEC	2/2	1	N	N	N	N	N	**E**	**G**	**E**	P	F	**E**	**E**	**E**	**E**	**E**	**E**	F	P	**E**	P	F	F	**G**	F
AXIAL XL	1	1	N	N	N	**E**	**G**	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
BANVEL/CLARITY	4	3	N	N	N	N	N	F	P	P	F	**G**	F	F	P	**G**	**G**	**G**	**G**	**G**	**G**	F	F	F	F	F
BUCTRIL/MOXY	6	1	N	N	N	N	N	P	-	**G**	F	P	F	**E**	**G**	**G**	**E**	P	**G**	**G**	**G**	P	P	N	N	N
CURTAIL	4/4	3	N	N	N	N	N	P	-	-	**G**	**G**	**G**	**E**	**E**	**E**	**G**	**G**	**G**	**G**	F	P	F	P	P	P
EXPRESS	2	1	N	N	N	N	N	**E**	**E**	**E**	P	F	**E**	**E**	**E**	**G**	**E**	F	P	P	F	P	F	F	F	P
HARMONY	2	1	N	N	N	N	N	**G**	-	-	P	N	**E**	**G**	**G**	**G**	**G**	**E**	F	P	**E**	P	P	P	**E**	F
HARMONY EXTRA	2/2	1	N	N	N	N	N	**E**	**G**	**E**	P	F	**E**	**E**	**E**	**E**	**E**	**E**	F	P	**E**	P	F	F	**E**	F
HUSKIE	6/27	1	N	N	N	N	N	**G**	**E**	**E**	F	**E**	F	**E**	**E**	**E**	**E**	**E**	**E**	**G**	F	P	F	F	N	N
MCPA	4	2	N	N	N	N	N	P	-	-	**G**	**G**	P	**G**	**G**	**G**	**G**	**G**	**G**	F	P	P	P	P	P	P
NIMBLE	2/2	1	N	N	N	N	N	**E**	**G**	**E**	P	F	**E**	**E**	**E**	**E**	**E**	**E**	F	P	**E**	P	F	F	**E**	F
OSPREY	2	2	**G**[b]	F	-	**G**	**E**	P	N	N	N	N	N	**G**	**G**	-	N	P	N	N	N	N	N	N	N	N
PEAK	2	2	N	N	N	N	N	**G**	F	F	-	-	P	**E**	**E**	**G**	F	**E**	**E**	F	F	F	F	N	**G**	N
POWERFLEX HL	2	2	**G**[b]	**E**	**G**	**E**	**E**	**G**	F	F	N	P	-	**E**	**E**	**G**	**G**	**G**	N	N	F	N	N	N	F	N
PROWL H_2O	3	2	-	-	-	-	P	N	N	N	N	N	N	-	-	-	F	F	N	N	N	N	N	N	N	N
PUMA	1	2	N	N	-	-	F	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
QUELEX	2/4	2	N	N	N	N	N	**G**	**G**	**G**	-	**G**	**G**	**G**	**G**	**G**	**G**	**G**	N	N	-	P	P	P	N	N
STARANE ULTRA	4	2	N	N	N	N	N	F	-	-	N	-	P	F	-	-	P	P	**E**	**E**	F	F	P	P	N	N
STINGER	4	2	N	N	N	N	N	P	-	-	P	**E**	**G**	-	-	-	P	P	**G**	**G**	F	P	**G**	F	N	N
TALINOR	6/27	1	N	N	N	N	N	**G**	F	F	-	**E**	**E**	**E**	**E**	**E**	**E**	**E**	**E**	**E**	**G**	P	F	**E**	-	-
WIDEMATCH	4/4	2	N	N	N	N	N	P	-	-	P	**E**	**G**	**G**	-	-	P	P	**E**	**G**	F	F	**G**	F	N	N

[a] Group 2 (ALS-inhibiting) herbicides will not control Group 2 resistant horseweed.

[b] Will not control annual bluegrass that has already started to flower.

Herbicide Site of Action: The site of action key is located on pages 15-16.

Herbicide Effectiveness: P = Poor; F = Fair; **G** = Good; **E** = Excellent; N = None; – = Not enough information to rank

* The above ratings are a relative comparison of herbicide effectiveness. Weather conditions greatly influence the herbicide's effectiveness, and weed control may be better under favorable conditions or poorer under unfavorable conditions.

** Crop Tolerance: 1=Minimal risk of crop injury; 2=Crop injury can occur under certain conditions (soil applied—cold, wet: foliar applied—hot, humid); 3=Severe crop injury can occur. Follow precautions under Remarks and Limitations and on the label; 4=Risk of severe crop injury is high. Recommended only in rescue situations.

TABLE 3B – Herbicide Premixes in Small Grains

TRADE NAME	COMPANY	FORMULATION	TYPICAL USE RATE	=	EQUIVALENT RATES
Affinity BroadSpec	DuPont	50WG	0.75 oz/A	=	0.375 oz Harmony SG + 0.375 oz Express
Curtail	BASF	2.38L	2 pt/A	=	0.25 pt Stinger + 1 pt 2,4-D amine
Harmony Extra	DuPont	50WG	0.75 oz/A	=	0.5 oz Harmony SG + 0.25 oz Express
Huskie	Bayer CropSciences	2.06L	13.5 oz/A	=	0.74 pt Buctril + 0.033 lb ai pyrasulfotole
Nimble	Cheminova	75WG	0.5 oz/A	=	0.5 oz Harmony SG + 0.25 oz Express
Quelex	Dow AgroSciences	20WG	0.75 oz/A	=	0.0046 lb ae halauxifen + 0.0046 lb ai florasulam
Talinor	Syngenta	1.77L	13.7 oz/A	=	0.62 pt Buctril + 0.033 lb ai bicyclopyrone
Widematch	Dow AgroSciences	1.5L	1.33 pt/A	=	5.3 oz Stinger + 0.67 pt Starane

TABLE 3C – Small Grain Herbicides – Remarks and Limitations

Direct-Drilled Small Grains (No-Till)

(fall or spring seedings following soybeans, corn or dry edible beans)

In general, complete control of all plants present at the time of planting is required for successful weed control. With direct drilling (no-till), vegetation control is accomplished before planting with burndown herbicides such as paraquat *(Gramoxone)* or glyphosate (Table 10). Other herbicides such as *Sharpen* may be tank-mixed with these products to help improve control of certain weed species (e.g., glyphosate-resistant horseweed). The required application rate varies, depending on weed species and size. Refer to the product labels for details. *Gramoxone* provides faster kill. Glyphosate is preferred if perennial weeds are present, but fields with serious perennial weed problems should not be direct drilled with a small grain until the perennial weeds have been controlled.

The need for a burndown herbicide depends on the species of weeds present. If no weeds are present, a burndown herbicide is not needed. For fall-seeded small grains, fields with small seedlings of species that DO NOT overwinter (summer annuals only) and are present at low densities DO NOT need a burndown herbicide. If the weeds are large, however, or capable of overwintering (winter annuals, biennials or perennials) or if identification of the weeds cannot be confirmed, a burndown herbicide should be used. For spring-seeded small grains, a burndown herbicide should be used if any weeds are present at planting time, regardless of species or size.

Herbicides applied after small grain emergence are not affected by the tillage system used. All of the herbicides listed below can be used in all tillage systems including direct drilling. No weed problems are unique to no-till small grain production. Therefore, no-till small grain production does not present any special weed control concerns.

Wheat Only — All Tillage Systems

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
Annual grasses	mesosulfuron *(Osprey)* + surfactant + ammonium sulfate	0.013	4.75 oz 4.5WG + 0.5% + 3 lb	• Refer to Table 3A for weed control and crop tolerance ratings. • Apply in the fall after wheat emergence, or in the spring before jointing. • *Osprey* will provide control of windgrass, annual bluegrass, annual ryegrass, and cheat. • Methylated seed oil at 1.5 pt/A can be used in place of surfactant + ammonium sulfate. • Red clover can be frost-seeded after fall applications of *Osprey* – some initial injury may occur. DO NOT apply *Osprey* in the spring if red clover is frost-seeded. • DO NOT apply to barley. • *Osprey* should be applied using water as the spray carrier, but up to 15% of the spray solution can be nitrogen fertilizer solution. • DO NOT use spray additives that alter the spray solution below 6.0 pH. • DO NOT apply more than a total of 4.75 oz/A per crop year. • May be tank mixed with other herbicides to control a broader spectrum of broadleaf weeds. See label for tank mix partners. • Refer to Table 3E for harvest restrictions. • **Crop rotation restrictions**: Rotation interval for corn is 12 months. Refer to label and Table 12 for crop rotation restrictions.

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Wheat Only — All Tillage Systems *(continued)*

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
(continued)				
Annual grasses	pyroxsulam *(PowerFlex HL)* + surfactant + ammonium sulfate	0.016	2 oz 13WG + 0.5% + 3 lb	• Refer to Table 3A for weed control and crop tolerance ratings. • Apply to winter wheat in the fall or spring from the 3 leaf stage to jointing, between Feeke's stages 1.3 and 6 (Figure 1). • *PowerFlex HL* may only be applied to wheat. • *PowerFlex HL* is labeled for control of windgrass and cheat. • Most effective when grass weeds are at the 2 leaf stage and broadleaf weeds are less than 2 inches tall. • Red clover can be frost-seeded after fall applications of *PowerFlex HL* – some initial injury may occur. DO NOT apply *PowerFlex HL* in the spring if red clover is frost-seeded. • *PowerFlex HL* may be applied with no more than 50% of the spray carrier as liquid nitrogen (<30 lb actual nitrogen), reduce the rate of surfactant to 0.25% - foliar leaf burn, yellowing, and reduced growth may occur. • *PowerFlex HL* will not control ALS-resistant weed species. • DO NOT apply to barley. • DO NOT tank-mix with dicamba, 2,4-D amine, or MCPA – grass control will be reduced. • Refer to Table 3E for harvest restrictions. • Refer to label and Table 12 for crop rotation restrictions.
	pendimethalin *(Prowl H_2O)*	0.95	2 pt 3.8CS	• Refer to Table 3A for weed control and crop tolerance ratings. • *Prowl H_2O* may only be applied to wheat. • Apply between 1 leaf and flag leaf emergence, between Feeke's stages 1 and 7.9 (Figure 1). • *Prowl H_2O* has limited effectiveness against windgrass. • *Prowl H_2O* will not control emerged weeds. *Prowl H_2O* should be applied before target weed emergence. • Wheat seed must be planted 1/2 to 1 inch deep to avoid crop injury. • Refer to Table 3E for harvest restrictions. • Refer to label and Table 12 for crop rotation restrictions.

Barley and Wheat — All Tillage Systems

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
Annual grasses	pinoxaden *(Axial XL)*	0.054	16.4 oz 0.42L	• Refer to Table 3A for weed control and crop tolerance ratings. • Apply from the 2-leaf stage to pre-boot stage (Figure 1). • *Axial XL* is labeled for control of windgrass. • May be tank mixed with most other herbicides. Consult label for tank mix partners. • Weeds should be actively growing, 1- to 5-leaf grasses. • *Axial XL* contains a built-in adjuvant. • Refer to Table 3E for harvest restrictions. • Refer to label and Table 12 for crop rotation restrictions.

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Barley and Wheat — All Tillage Systems *(continued)*

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
(continued)				
Annual grasses	fenoxaprop-p-ethyl *(Puma)*	0.082	0.66 pt 1EC	• Refer to Table 3A for weed control and crop tolerance ratings. • *Puma* can be applied on wheat and barley from crop emergence up to the 5-leaf stage but not after jointing begins, between Feeke's stages 1 and 6 (Figure 1). • *Puma* will provide control of windgrass. • *Puma* will only control emerged grass weeds. Rate of application varies based on weed species present to be controlled. • *Puma* will control susceptible grass weeds in the 1-leaf to 2-tiller stage of growth. • May be tank mixed with other herbicides to improve broadleaf weed control. See label for tank mix partners and details on rates. • May be tank mixed with either *Baythroid XL, Furadan, Sevin*, or *Warrior* insecticides. DO NOT tank mix with malathion. • May be tank mixed with mancozeb, *Tilt* and *Stratego* (without additional adjuvant), or *Topsin M* fungicides. • Refer to Table 3E for harvest restrictions. • Refer to Table 12 for crop rotation restrictions.
Annual broadleaves	2,4-D amine or *2,4-D ester*	0.5 0.5	1 pt 4L 1 pt 4L	• Refer to Table 3A for weed control and crop tolerance ratings. • Apply in the spring to actively growing grain following tillering (usually about 6-8 inches tall) but prior to jointing, between Feeke's stages 3 and 6 (Figure 1). • DO NOT treat in the BOOT to DOUGH stage. • DO NOT apply in the fall. • Most effective when weeds are small (less than 4 inches). • DO NOT frost-seed red clover if *2,4-D* is applied. • *2,4-D ester* will provide suppression of wild garlic and wild onion. • Not effective on smartweed and wild buckwheat. • Liquid nitrogen fertilizer solutions can be used as the carrier in place of water. • *2,4-D ester* mixes easier with 28% liquid nitrogen. • Refer to Table 3E for harvest restrictions. • Refer to Table 12 for crop rotation restrictions.

(Continued on next page)

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
(continued)				
Annual broadleaves	thifensulfuron-methyl + tribenuron-methyl *(Affinity BroadSpec)* + surfactant	0.023	0.75 oz 50WG + 0.25%	• Refer to Table 3A for weed control and crop tolerance ratings. • See Table 3B for individual product rate equivalents for the premix. • Apply to winter wheat and barley after the crop is in the 2-leaf stage but before the flag leaf is visible, between Feeke's stages 1.2 and 7.9 (Figure 1). • Most effective if weeds are small, 4 inches or less. • Red clover can be frost-seeded after fall applications of *Affinity BroadSpec*. DO NOT apply *Affinity BroadSpec* in the spring if red clover is frost-seeded. • *Affinity BroadSpec* may be tank mixed with 2,4-D, MCPA or *Buctril* and improved control of ragweed. • Tank mixes with 2,4-D may improve thistle control but also carry a greater risk of crop injury. To reduce this risk, apply 2,4-D at no more than 0.5 pt/A (0.25 lb ai/A) of 2.4-D and reduce surfactant concentration to 0.125%. • For severe infestation, increase *Affinity BroadSpec* rate to 1.0 oz/A. • **Caution:** If liquid nitrogen fertilizer is used as the herbicide carrier, leaf burn, yellowing, and stunting are likely. Crop injury is greatly reduced if the spray carrier is a 50:50 mixture of liquid nitrogen to water compared with 100% liquid nitrogen as the carrier. With favorable growing conditions the symptoms are temporary, but this practice is not recommended. • **Caution:** DO NOT USE *Affinity BroadSpec* plus malathion, as crop injury will occur. • Refer to Table 3E for harvest restrictions. • See Table 12 for crop rotation restrictions.
	dicamba *(Banvel, Clarity)*	0.125	0.25 pt 4L	• Refer to Table 3A for weed control and crop tolerance ratings. • Apply in spring to actively growing plants with a well established secondary root system or following tillering but prior to jointing, between Feeke's stages 3 and 6 (Figure 1). • Some wheat varieties are sensitive to dicamba. • DO NOT apply dicamba to wheat varieties Wakefield or Madison — severe injury and yield loss will occur. • DO NOT apply to spring-seeded barley. • DO NOT frost-seed red clover if dicamba is applied. • Most effective when weeds are small, less than 4 inches. • Dicamba provides some control of bindweed, thistles, wild garlic and wild onion. • More effective than 2,4-D on smartweed, wild buckwheat, and perennials. • CAUTION should be taken to avoid vapor and particle spray drift. • Refer to Table 3E for harvest restrictions. • Refer to Table 12 for crop rotation restrictions.

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Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
(continued)				
Annual broadleaves	bromoxynil (*Buctril, Moxy,* others)	0.35	1.5 pt 2L	• Refer to Table 3A for weed control and crop tolerance ratings. • Apply from emergence to boot stage, between Feeke's stages 1 and 9 (Figure 1). • *Buctril* may be applied to small grains seeded with ALFALFA only. Alfalfa needs to have at least 4 trifoliate leaves prior to application and air temperatures should not exceed 70°F at and 3 days following application. • Good coverage is essential. • Bromoxynil must be applied to small weeds for effective control. • Redroot pigweed and mustard must be controlled when very small (refer to label for details). • Very good crop safety. • Refer to Table 3E for harvest restrictions. • Refer to Table 12 for crop rotation restrictions.
	clopyralid+ 2,4-D amine *(Curtail)*	0.6	2 pt 2.38L	• Refer to Table 3A for weed control and crop tolerance ratings. • See Table 3B for individual product rate equivalents for the premix. • For control of annual broadleaves and suppression of 3 Canada thistle. • Apply to wheat and barley following tillering but prior to jointing, between Feeke's stages 3 and 6 (Figure 1). • DO NOT treat in the BOOT to DOUGH stage. • DO NOT treat a field with *Curtail* that has been treated previously with 2,4-D or dicamba. • Refer to Table 3E for harvest restrictions. • Rotation interval for soybeans and dry beans is extended to 18 months if soils contain less than 2% organic matter and natural precipitation is less than 15 inches during the 10.5 months following treatment. • See Table 12 for crop rotation restrictions.
	tribenuron-methyl *(Express SG)* + surfactant	0.016	0.5 oz 50WG + 0.25%	• Refer to Table 3A for weed control and crop tolerance ratings. • Apply after the crop has reached the 2-leaf stage but 3 before the flag leaf is visible, between Feeke's stages 1.2 and 7.9 (Figure 1). • Provides some suppression of Canada thistle and sowthistle. Apply when thistles are actively growing and 4-8 inches tall with 2-6 inches of new growth. • *Express* may be tank mixed with 2,4-D, MCPA or *Buctril* for improved control of ragweed. • Tank mixes with 2,4-D may improve thistle control but also carry a greater risk of crop injury. To reduce this risk, apply no more than 0.5 pt/A (0.25 lb a.i./A) of 2,4-D and reduce surfactant concentration to 0.125%. • Spectrum of annual weeds controlled is narrower than with *Harmony Extra* or *Affinity Broadspec*. • Very good crop safety. • **Caution:** If liquid nitrogen fertilizer is used as the herbicide carrier, leaf burn, yellowing, and stunting are likely. With favorable growing conditions the symptoms are temporary, but this practice is not recommended. • Refer to Table 3E for harvest restrictions. • Refer to Table 12 for crop rotation restrictions.

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Barley and Wheat — All Tillage Systems *(continued)*

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
(continued)				
Annual broadleaves	thifensulfuron-methyl *(Harmony SG)* + surfactant	0.023	0.75 oz 50WG + 0.25%	• Refer to Table 3A for weed control and crop tolerance ratings. • Apply to winter wheat and barley after the crop is in the 2-leaf stage but before the flag leaf is visible, between Feeke's stages 1.2 and 7.9 (Figure 1). • Most effective if weeds are small, 4 inches or less. • *Harmony* may be tank mixed with 2,4-D, MCPA or *Buctril* for improved control of ragweed. • Tank mixes with 2,4-D may improve thistle control but also carry a greater risk of crop injury. To reduce this risk, apply no more than 0.5 pt/A (0.25 lb ai/A) of 2,4-D and reduce surfactant concentration to 0.125%. • For severe infestation, increase *Harmony SG* rate to 0.9 oz/A. • For mayweed (dogfennel) control, reduce the *Harmony SG* rate to 0.45 oz/A. • Control of common ragweed is inconsistent. • **Caution:** If liquid nitrogen fertilizer is used as the herbicide carrier, leaf burn, yellowing, and stunting are likely. With favorable growing conditions the symptoms are temporary, but this practice is not recommended. • Refer to Table 3E for harvest restrictions. • Refer to Table 12 for crop rotation restrictions.
	thifensulfuron-methyl + tribenuron-methyl *(Harmony Extra SG)* + surfactant	0.023	0.75 50WG + 0.25%	• Refer to Table 3A for weed control and crop tolerance ratings. • See Table 3B for individual product rate equivalents for the premix. • Apply to winter wheat and barley after the crop is in the 2-leaf stage but before the flag leaf is visible, between Feeke's stages 1.2 and 7.9 (Figure 1). • *Harmony Extra* is the best herbicide option for controlling wild garlic — increase the rate to 0.9 oz/A and apply when wild garlic is less than 12 inches tall with 2-4 inches of new growth. • *Harmony Extra* will provide some control of wild onion. • Most effective if weeds are small, 4 inches or less.3 • *Harmony Extra* may be tank mixed with 2,4-D, *MCPA* or *Buctril* for improved control of ragweed. Tank mixes with 2,4-D may improve thistle control but also carry a greater risk of crop injury. To reduce this risk, no more than 0.5 pt/A (0.25 lb ai/A) of 2,4-D and reduce surfactant concentration to 0.125%. • For severe infestations and control of Canada thistle, increase the *Harmony Extra SG* rate to 0.9 oz/A. • For mayweed (dogfennel) control, *Harmony Extra SG* rate may be reduced to 0.45 oz/A. • Control of common ragweed is inconsistent. • **Caution:** If liquid nitrogen fertilizer is used as the herbicide carrier, leaf burn, yellowing, and stunting are likely. With favorable growing conditions the symptoms are temporary, but this practice is not recommended. • Refer to Table 3E for harvest restrictions. • Refer to Table 12 for crop rotation restrictions.

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Barley and Wheat — All Tillage Systems *(continued)*

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
(continued)				
Annual broadleaves	pyrasulfotole + bromoxynil *(Huskie)* + surfactant + ammonium sulfate	0.217	13.5 oz 2.06L + 0.25% + 1 lb/A	• Refer to Table 3A for weed control and crop tolerance ratings. • See Table 3B for individual product rate equivalents for the premix. • Apply between 1 leaf and up to flag leaf emergence, between Feeke's stages 1 and 7.9 (Figure 1). • Apply to actively growing weeds with 1 to 4 leaves. • A nitrogen source — ammonium sulfate (0.5 to 1 lb/A) or 28% nitrogen (1 to 2 qt/A) — is required. • Under cool conditions early in the spring, increase the *Huskie* rate to 15 oz/A. • Red clover can be frost-seeded after fall applications of *Huskie* – some initial leaf margin bleaching may occur. DO NOT apply *Huskie* in the spring if red clover is frost-seeded. • Liquid nitrogen fertilizer solutions can be used as the carrier in place of water (WHEAT ONLY). For fall applications, DO NOT apply more than a 50:50 mixture of liquid nitrogen to water as the spray carrier. In the spring, crop injury is greatly reduced if the spray carrier is a 50:50 mixture of liquid nitrogen to water compared with 100% liquid nitrogen as the carrier. • Refer to Table 3E for harvest restrictions. • Refer to label and Table 12 for crop rotation restrictions.
	MCPA	0.19	0.38 pt 4L	• Refer to Table 3A for weed control and crop tolerance ratings. • Apply in the spring to actively growing grain following tillering (usually about 6-8 inches high) but prior to jointing (Figure 1). DO NOT treat grain in boot to dough stage. The boot stage is when the upper sheath is beginning to swell with the enlarging head. • *MCPA* may be applied to small grains underseeded with legumes (e.g., red clover). • A canopy of grain and weeds over the seeding will reduce the possibility of injury to the legume. • Apply in 5-6 gal of water/A to minimize crop injury. • Sweet clover is very sensitive to *MCPA*. • Refer to Table 3E for harvest restrictions. • Refer to Table 12 for crop rotation restrictions.
	thifensulfuron-methyl + tribenuron-methyl *(Nimble)* + surfactant	0.023	0.5 oz 75WG + 0.25% •	• Refer to Table 3A for weed control and crop tolerance ratings. • See Table 3B for individual product rate equivalents for the premix. • *Nimble* contains the same ratio of active ingredients as *Harmony Extra*, but at a different concentration. • See the Remarks and Limitations section for *Harmony Extra*. • Refer to label and Table 12 for crop rotation restrictions.

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Barley and Wheat — All Tillage Systems *(continued)*

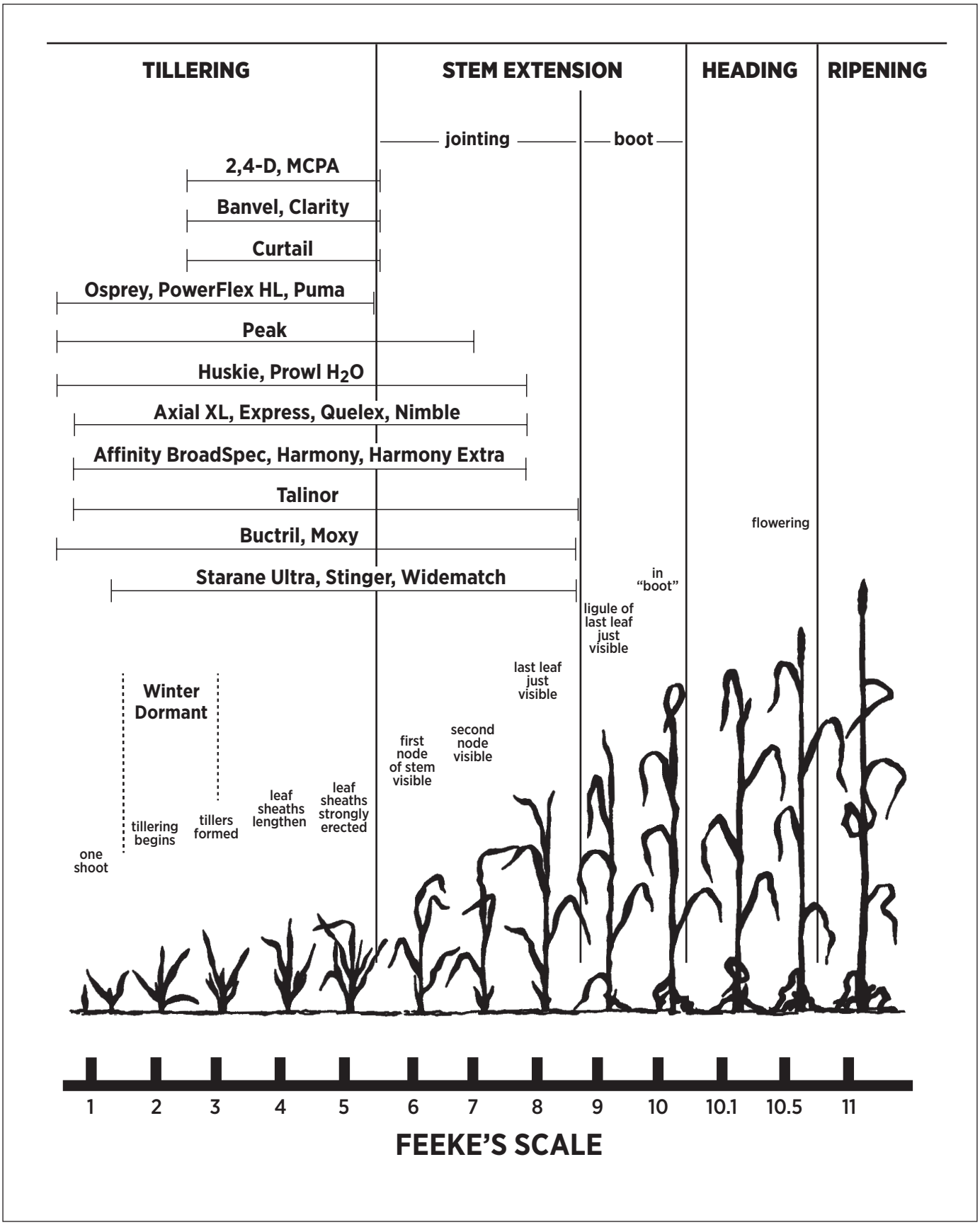
Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
(continued)				
Annual broadleaves	prosulfuron *(Peak)* + crop oil concentrate	0.013	0.38 oz 57DF + 1%	• Refer to Table 3A for weed control and crop tolerance ratings. • Apply from emergence to before the second node is detectable in stem elongation, between Feeke's stages 1 and 7 (Figure 1). • *Peak* provides good control of wild garlic. • May be tank mixed with 2,4-D, dicamba, *Buctril* or *MCPA* to improve control of other broadleaf species. • Weeds should be actively growing, less than 4 inches tall. • Surfactant (0.25% v/v) should replace crop oil concentrate when applied with liquid fertilizer as the carrier. • For severe infestations, increase the *Peak* rate to 0.5 oz/A. • DO NOT apply when the crop is under stress due to drought, cold weather or other factors, or if cold, wet conditions are expected within one week after application. • Refer to Table 3E for harvest restrictions. • Rotation restrictions are 22 months for several crops, including soybeans. • Refer to label and Table 12 for crop rotation restrictions.
	halauxifen + florasulam *(Quelex)* + crop oil concentrate	0.009	0.75 oz 20WG + 1%	• Refer to Table 3A for weed control and crop tolerance ratings. • See Table 3B for individual product rate equivalents for the premix. • Apply between 2 leaf and up to flag leaf emergence, between Feeke's stages 1.2 and 7.9 (Figure 1). • Apply to actively growing weeds less than 4 inches tall. • *Quelex* can be applied with a methylated seed oil at 1% v/v. • DO NOT frost-seed red clover if *Quelex* is applied. • Liquid nitrogen fertilizers can be used as a carrier in place of water. Only a non-ionic surfactant at a maximum rate of 0.25% v/v can be used as the adjuvant if nitrogen fertilizers are the carrier. Temporary crop injury can occur when liquid nitrogen is used as a carrier. • Extreme growing conditions (drought or freezing) prior to, at, or following the time of application may reduce weed control and the risk of crop injury. • Refer to Table 3E for harvest restrictions. • DO NOT compost any plant material from treated areas. • Refer to label and Table 12 for crop rotation restrictions.
	fluroxypyr *(Starane Ultra)*	0.14	0.4 pt 2.8L	• Refer to Table 3A for weed control and crop tolerance ratings. • Apply from 2-leaf stage up to and including flag leaf emergence, between Feeke's stages 1.2 and 9 (Figure 1). • *Starane Ultra* provides excellent control of hemp dogbane. • Apply to actively growing weeds up to 8 inches tall. • Increase the rate to 0.7 pt/A to control volunteer potato. • Refer to Table 3E for harvest restrictions. • Refer to Table 12 for crop rotation restrictions.

(Continued on next page)

Barley and Wheat — All Tillage Systems *(continued)*

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
(continued)				
Annual broadleaves	clopyralid *(Stinger)*	0.094	0.25 pt 3L	• Refer to Table 3A for weed control and crop tolerance ratings. • Apply to wheat or barley from the 3-leaf stage to boot stage, between Feeke's stages 1.3 and 9 (Figure 1). • May be tank mixed with 2,4-D, dicamba, *Buctril, Harmony Extra* or *Express* for control of additional weeds. See label for details on rates. • *Stinger* provides good control of Canada thistle and sow-thistle. For best results increase the rate to 0.33 pt/A and treat thistle plants between the rosette stage and bud stage. • Refer to Table 3E for harvest restrictions. • See Table 12 for crop rotation restrictions.
	bromoxynil + bicyclopyrone *(Talinor)* + *CoAct+* + crop oil concentrate	0.19	13.7 oz 1.77L + 2.75 oz + 1%	• Refer to Table 3A for weed control and crop tolerance ratings. • See Table 3B for individual product rate equivalents for the premix. • Apply between 2 leaf and up to the pre-boot stage, Feekes stage 1.2 and 8 (Figure 1). • Apply to actively growing weeds with 1 to 4 leaves. • *CoAct+* must be applied with *Talinor* and either a crop oil concentrate or surfactant, depending on tank mix partner. • DO NOT add ammonium sulfate or nitrogen products or severe crop injury can occur. • DO NOT apply *Talinor* in the spring if red clover is under-seeded. • DO NOT apply to a crop that is stressed by frost, drought, flooding, or other conditions. • *Talinor* maybe tank mixed with certain fungicides, consult label. • DO NOT tank mix with any organophosphate or cambamate insecticide. • Refer to Table 3E for harvest restrictions. • Refer to label and Table 12 for crop rotation restrictions.
	clopyralid + fluroxypyr *(WideMatch)*	0.25	1.33 pt 1.5L	• Refer to Table 3A for weed control and crop tolerance ratings. • See Table 3B for individual product rate equivalents for the premix. • Apply to wheat, barley and oats from the 3-leaf stage to the boot stage, between Feeke's stages 1.3 and 9 (Figure 1). • DO NOT frost-seed red clover if *WideMatch* is applied. • May be tank mixed with 2,4-D, dicamba, *Buctril, Harmony Extra, Affinity BroadSpec* or *Express* for control of additional weeds. See label for details on rates. • *WideMatch* provides some control of thistles and hemp dogbane. • Refer to Table 3E for harvest restrictions. • Refer to label and Table 12 for crop rotation restrictions.

FIGURE 1 — Wheat growth stages according to the Feeke's scale. Management inputs are indicated.



Oats — All Tillage Systems

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
Annual broadleaves	2,4-D amine	0.38	0.75 pt 4L	• Refer to Table 3A for weed control and crop tolerance ratings. • Apply in the spring to actively growing grain following tillering (usually about 6-8 inches high) but prior to jointing. DO NOT treat grain in boot to dough stage. The boot stage is when the upper sheath is beginning to swell with the enlarging head. • Most effective when weeds are small (less than 4 inches). • Some yield reduction may occur but generally less than that caused by weeds. • Refer to Table 3E for harvest restrictions. • Refer to Table 12 for crop rotation restrictions.
	bromoxynil *(Buctril, Moxy)*	0.38	1.5 pt 2L	• Refer to Table 3A for weed control and crop tolerance ratings. • May be applied from emergence up to boot stage. • Good coverage essential. • *Bromoxynil* must be applied to small weeds for effective control (see label). • Redroot pigweed and mustard must be controlled when very small (refer to label for details). • Very good crop safety. • Refer to Table 3E for harvest restrictions. • Refer to Table 12 for crop rotation restrictions.
	thifensulfuron-methyl *(Harmony SG)* + surfactant	0.018	0.6 oz 50SG + 0.25%	• Refer to Table 3A for weed control and crop tolerance ratings. • Apply to oats in the 3- to 5-leaf stage but before jointing. • DO NOT apply to Ogle, Porter, or Premier varieties. • Most effective if weeds are small (4 inches or less). • Addition of surfactant is essential for adequate results. • Control of common ragweed is inconsistent. • Refer to Table 3E for harvest restrictions. • Refer to Table 12 for crop rotation restrictions.
	thifensulfuron-methyl + tribenuron-methyl *(Harmony Extra SG)* + surfactant	0.018	0.6 oz 50SG + 0.25%	• Refer to Table 3A for weed control and crop tolerance ratings. • See Table 3B for individual product rate equivalents for the premix. • Apply to oats in the 3- to 5-leaf stage but before jointing. • DO NOT apply to Ogle, Porter, or Premier varieties. • Most effective if weeds are small (4 inches or less). • Addition of surfactant is essential for adequate results. • Control of common ragweed is inconsistent. • DO NOT graze or feed forage or hay from treated areas to livestock. (Dry-harvested straw may be used for bedding and/or feed.) • Injury symptoms will appear on weeds in 1-3 weeks after application. • Refer to Table 3E for harvest restrictions. • Refer to Table 12 for crop rotation restrictions.
	MCPA	0.38	0.75 pt 4L	• Refer to Table 3A for weed control and crop tolerance ratings. • Less injurious and less effective than 2,4-D. • Most effective when weeds are small (less than 4 inches). • Apply at or after full tillering but before the boot stage (the first node is detectable and the grain is usually 6-8 inches tall at full tillering; the boot stage is when the upper sheath is beginning to swell with the enlarging head). • Refer to Table 3E for harvest restrictions. • Refer to Table 12 for crop rotation restrictions.

(Continued on next page)

Oats — All Tillage Systems *(continued)*

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
(continued)				
Annual broadleaves	thifensulfuron-methyl + tribenuron-methyl *(Nimble)* + surfactant	0.018	0.38 oz 75WG + 0.25%	• Refer to Table 3A for weed control and crop tolerance ratings. • See Table 3B for individual product rate equivalents for the premix. • *Nimble* contains the same ratio of active ingredients as *Harmony Extra*, but at a different concentration. • See the Remarks and Limitations section for *Harmony Extra*. • Refer to label and Table 12 for crop rotation restrictions.
	fluroxypyr *(Starane Ultra)*	0.14	0.4 pt 2.8L	• Refer to Table 3A for weed control and crop tolerance ratings. • Apply from 2-leaf stage up to and including flag leaf emergence (between 1.2 and 9 on Feeke's scale). • Apply to actively growing weeds up to 8 inches tall. • Narrow spectrum of weeds controlled. • DO NOT apply to small grains underseeded with a legume. • Refer to Table 3E for harvest restrictions. • Refer to Table 12 for crop rotation restrictions.
	clopyralid *(Stinger)*	0.094	0.25 pt 3L	• Refer to Table 3A for weed control and crop tolerance ratings. • Apply to oats from the 3-leaf stage to boot stage. See label for details. • May be tank mixed with *Buctril* for control of additional weeds. • Refer to Table 3E for harvest restrictions. • See Table 12 for crop rotation restrictions.
	clopyralid+ fluroxypyr *(WideMatch)*	0.25	1.33 pt 1.5L	• Refer to Table 3A for weed control and crop tolerance ratings. • See Table 3B for individual product rate equivalents for the premix. • Apply to wheat, barley and oats from the 3-leaf stage to boot stage (between 1.3 and 9 on Feeke's scale). See label for details. • May be tank mixed with 2,4-D, dicamba, *Buctril, Harmony Extra, Affinity BroadSpec* or *Express* for control of additional weeds. See label for details on rates. • Refer to Table 3E for harvest restrictions. • Refer to Table 12 for crop rotation restrictions.

TABLE 3D — Wheat – Preharvest Applications

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
Annual grasses **Annual broadleaves**	glyphosate + ammonium sulfate	0.75 lb a.e.	See Table 10 + 17 lb/100 gal	• See Table 10 for a list of glyphosate products, formulations and rates. • Apply to wheat after the hard-dough stage when grain contains 30% moisture or less. • Apply up to 7 days before harvest. • DO NOT apply to wheat grown for seed. • Wheat stubble can be grazed immediately after harvest.
Annual broadleaves	2,4-D ester or 2,4-D amine	0.5 0.5	1 pt 4L 1 pt 4L	• Apply to wheat after the hard-dough stage when grain contains 30% moisture or less. • Apply up to 14 days before harvest. • Caution should be taken to avoid vapor and particle spray drift. • DO NOT double crop soybean unless 7 days have occurred between 2,4-D ester application and planting or 15 days between 2,4-D amine application and planting. • Refer to Table 3E for harvest restrictions.
	carfentazone *(Aim)* + methylated seed oil	0.02	1.5 oz 2EC + 1% v/v	• Apply when wheat is in the hard-dough stage and the green color is gone from the nodes of the stem. • *Aim* can be used to defoliate velvetleaf. • Apply up to 3 days before harvest. • *Aim* is not as effective as glyphosate on most species. • *Aim* can be tank-mixed with other preharvest herbicides. • Use a minimum of 10 gallons of water. Higher spray volumes will provide better coverage. • DO NOT harvest for forage within 7 days of application.
	dicamba *(Clarity)*	0.25	8 oz 4L	• Apply when wheat is in the hard-dough stage and the green color is gone from the nodes of the stem. • *Clarity* can be used to suppress annual broadleaf weeds. • Apply up to 7 days before harvest. • DO NOT apply to wheat grown for seed. • Caution should be taken to avoid vapor and particle spray drift. • DO NOT double crop soybean unless 1-inch of rainfall and 14 days have occurred between *Clarity* application and planting. • Refer to Table 3E for harvest restrictions.
	suflufenacil *(Sharpen)* + methylated seed oil + ●ammonium sulfate	0.046	2 oz 2.85L + 1% + 17 lb/100 gal	• Apply when wheat is in the hard-dough stage when grain contains 30% moisture or less. • *Sharpen* desiccation rates range between 1 to 2 oz/A. • Apply up to 3 days before harvest. However, it generally takes 7 days to reach maximum activity. • *Sharpen* is an effective desiccant on common ragweed and horseweed. Glyphosate should be added for common lambsquarters desiccation. • If double cropping to soybean use *Sharpen* at 1 oz/A. • DO NOT apply to wheat or barley grown for seed or malting. • Desiccation treated straw can be grazed or fed to livestock. • Refer to label and Table 12 for crop rotation restrictions.

TABLE 3E — Harvest Restrictions for Small Grain Herbicides

Herbicide	Restrictions
2,4-D	DO NOT permit dairy animals or meat animals being finished for slaughter to forage treated grain fields within 2 weeks after treatment. DO NOT feed treated straw to livestock if a preharvest or emergency treatment is used. See label.
Affinity BroadSpec	Allow 7 days between application and grazing of treated forage or feeding of forage from treated areas to livestock. Allow 30 days between application and feeding of hay from treated areas to livestock. Harvested straw may be used for bedding and/or feed. DO NOT apply closer than 45 days before harvesting grain.
Axial XL	DO NOT graze livestock or harvest forage for hay for a minimum of 50 days following application. DO NOT harvest grain for 60 days following application.
Banvel/Clarity	A waiting interval of 7 days is required before harvest. DO NOT use preharvest-treated wheat for seed unless a germination test is performed on the seed with an acceptable result of 95% germination or better. If small grains are used for pasture or hay, consult the label for harvesting restrictions.
Buctril	DO NOT graze treated fields for 45 days following application.
Curtail/Stinger	DO NOT cut treated grass for hay within 30 days after application. Remove meat animals from freshly treated areas 7 days before slaughter. Withdrawal is not needed if 2 weeks have elapsed since application. DO NOT graze dairy animals in treated areas for 14 days after application. DO NOT use hay or straw from treated areas or manure from animals grazed in treated areas for composting or mulching on susceptible broadleaf crops. DO NOT transfer livestock from treated grazing areas onto sensitive broadleaf crop areas without first allowing 7 days of grazing on an untreated pasture. Otherwise, urine may contain enough clopyralid to cause injury to sensitive broadleaf plants. DO NOT permit dairy animals or meat animals being finished for slaughter to forage or graze treated grain fields within 1 week after treatment. DO NOT harvest hay from treated fields.
Express	Allow 7 days between application and grazing of treated forage or feeding of forage from treated areas to livestock. Allow 30 days between application and feeding of hay from treated areas to livestock. Harvested straw may be used for bedding and/or feed. DO NOT apply closer than 45 days before harvesting grain.
Harmony	Allow 7 days between application and grazing of treated forage or feeding of forage from treated areas to livestock. Allow 30 days between application and feeding of hay from treated areas to livestock. Harvested straw may be used for bedding and/or feed. DO NOT apply closer than 45 days before harvesting grain.
Harmony Extra	Allow 7 days between application and grazing of treated forage or feeding of forage from treated areas to livestock. Allow 30 days between application and feeding of hay from treated areas to livestock. Harvested straw may be used for bedding and/or feed. DO NOT apply closer than 45 days before harvesting grain.
Huskie	DO NOT graze or harvest forage within 25 days or harvest grain and straw within 60 days after application.
MCPA	DO NOT allow livestock to forage or graze treated areas within 7 days of slaughter.
Nimble	Allow 7 days between application and grazing of treated forage or feeding of forage from treated areas to livestock. Allow 30 days between application and feeding of hay from treated areas to livestock. Harvested straw may be used for bedding and/or feed. DO NOT apply closer than 45 days before harvesting grain.
Osprey	DO NOT apply *Osprey* herbicide within 30 days of harvesting wheat forage, and 60 days for hay, grain and straw.
Peak	DO NOT graze or feed treated crops to livestock until 30 days after application.
PowerFlex HL	DO NOT graze within 7 days or harvest the treated crop for hay within 28 days of application. DO NOT apply within 60 days of grain harvest.
Prowl H_2O	DO NOT harvest wheat forage within 11 days, wheat hay within 28 days, or wheat grain and straw within 60 days after application.
Puma	DO NOT apply within 57 and 70 days of harvesting barley and wheat, respectively.
Quelex	DO NOT apply within 60 days of harvest, 21 days before cutting hay, or graze within 7 days of treating the crop.
Starane Ultra	DO NOT allow livestock to graze treated areas or harvest treated forage within 7 days of application. DO NOT apply closer than 40 days before harvesting of grain or straw.
Talinor	DO NOT apply within 60 days of harvest, graze livestock or harvest forage for hay within 30 days, or feed treated straw to livestock within 60 days of treating the crop.
WideMatch	DO NOT apply closer than 14 days before cutting of hay or 40 days before harvesting of grain and straw. DO NOT allow livestock to graze treated areas or harvest treated forage within 7 days of application.