



Weed Control Recommendations in **Wheat**



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Weed Control Recommendations in Wheat

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The recommendations contained herein are based primarily on herbicide labels researched by the Texas A&M AgriLife Extension Service. Information given is for educational purposes only. The use of product names is not intended as an endorsement by the Texas A&M AgriLife Extension Service of the product or of a specific manufacturer, nor is there any implication that other formulations containing the same active ingredient are not equally effective. Product names are included solely to aid readers in locating and identifying the herbicides suggested.

This publication is not a substitute for herbicide product labels! It is only a guide for controlling weeds in wheat. Labeled rates and restrictions change constantly. Please consult a current product label before use.

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Cultural and mechanical weed control

Weeds may be controlled through cultural, mechanical, and chemical means. Judicious use of these methods individually or in combination can manage weeds effectively without causing economic loss or environmental harm.

Choose the proper management strategy according to the target weed(s) and the infestation level. The type of crop will play a major role in determining the timing of mechanical measures.

- Use weed-free seed to protect against weed infestations.
- Thoroughly clean the harvesting equipment before moving from one field to the next, and require custom harvesters to clean their equipment before entering the field.
- In conventional tillage systems, use mechanical tillage or preplant burndown herbicides to remove initial weed flushes before planting. This will reduce or eliminate the potential for continued infestation.
- Rotate crops that physically outcompete certain weeds, resulting in their gradual decline. Remove light or spotty infestations of weeds by hand hoeing or spot cultivation to prevent weed seed production and the spread of rhizomes or roots. When plowing perennial weeds, take care to prevent the transport and spread of plant parts to other areas of the field.

Managing herbicide-resistant weeds

- Use integrated weed management strategies. Apply herbicides only when necessary, and combine their use with mechanical, cultural, or biological methods.
- Rotate or mix herbicides with different modes of action.
- If possible, rotate crops where herbicide rotations are feasible.
- Scout the fields regularly for resistant weed populations, and control the weed escapes—treat them as you would a newly established invasive species.
- Plant weed-free wheat seed.
- Clean the tillage and harvest equipment to prevent the spread of resistant species.

Managing herbicide-resistant ryegrass

Italian ryegrass (*Lolium perenne* ssp *multiflorum*) has long been one of the most troublesome weeds in Texas wheat. In 1989, biotypes of this species in North Texas were identified that were resistant to sulfonylurea herbicides (ALS inhibiting). Because of the widespread use of sulfonylurea herbicides such as Amber, Finesse, Osprey, and others in wheat, ALS-resistant ryegrass has become a difficult problem for wheat producers in this region. Additionally, ryegrass biotypes resistant to the ACC-ase inhibiting herbicides such as Hoelon (diclofop-methyl) and Axial XL (pinoxaden) exist within Texas. To control this weed, growers must take a systems-approach using several tactics.

One of the most effective methods for managing resistant ryegrass populations is crop rotation.

Rotating to a summer crop allows you to use non-selective herbicides and tillage in the winter. Timely control of ryegrass infestations in winter-fallow fields can greatly reduce ryegrass seed in the soil. Rotating to summer crops also allows you to use additional herbicide modes of action to control any ryegrass that survives winter control measures.



Figure 1. Mature ryegrass in Texas.

For fields in wheat production, plant certified seed to avoid spreading ryegrass to non-infested fields. Also, thoroughly clean the tillage and harvesting equipment before moving from ryegrass-infested fields.

Several herbicide products are available to control ALS and ACC-ase resistant ryegrass at different points in the season:

- **Before planting**, a burndown application of Roundup (glyphosate) or Gramoxone (paraquat) can control emerged ryegrass.
- **Between spiking and the 2-leaf stage**, Axiom DF (flufenacet + metribuzin) can be applied to wheat to provide residual control of ryegrass.

- **At delayed preemergence or early postemergence**, Zidua (pyroxasulfone) and Anthem Flex (pyroxasulfone + carfentrazone) provides residual control.

Note: the addition of metribuzin is needed if ryegrass has emerged at the time of application

- **From the first leaf stage of wheat until the flag leaf is visible**, apply Prowl H2O (pendimethalin) for some residual control or suppression of ryegrass.
- **Between the 2-leaf stage and pre-boot**, control with Axial XL* (pinoxaden)

*Note: Axial XL will NOT control ryegrass biotypes resistant to ACC-ase herbicides.

Figure 2. Feekes scale for the growth and development of cereals

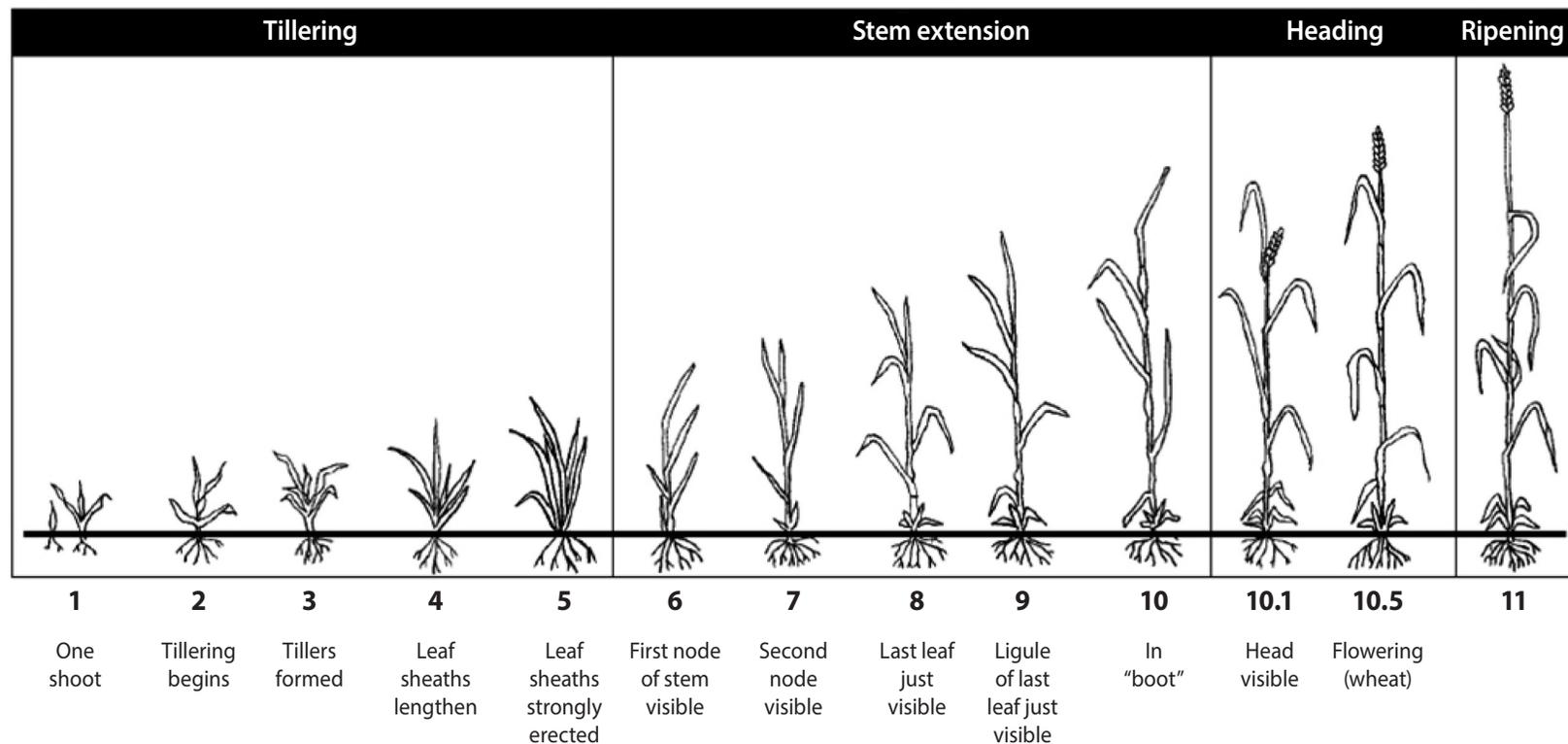
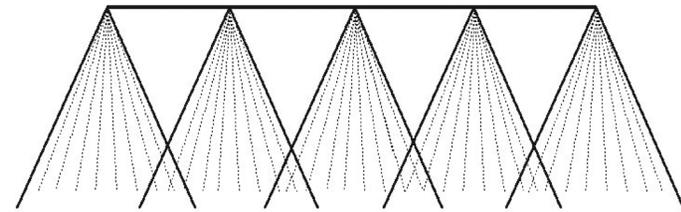


Figure 3. Boom sprayer calibration

1. Determine the nozzle spacing.
2. See the table below for the length of calibration course.
3. Mark off the calibration course on the actual area to be sprayed.
4. Record the amount of time required to drive the calibration course at the desired field gear and rpm to be used while spraying.
5. Park the tractor, maintain the rpm used to drive the course, turn on the sprayer, and set it at the proper pressure for the desired nozzle tips.
6. Catch water from one nozzle for the amount of time required to drive the calibration course.
7. Ounces of water caught = gallons per acre.
8. Divide gallons per acre into the number of gallons in the spray tank to determine how many acres will be sprayed. Add the appropriate amount of herbicide for the number of acres to be sprayed.



Nozzle spacing and length of calibration course				
Nozzle spacing (inches)	18	20	30	40
Length of calibration course* (linear feet)	227	204	136	102

*To determine the calibration course for a nozzle spacing not listed, divide the spacing expressed in feet into 340 (340 sq ft = 1/128 acre).

Example: Calibration distance for 19-inch nozzle spacing = $340 \div 19/12 = 215$ feet

Source: *Suggestions for Weed Control in Cotton* (B-5039), the Texas A&M AgriLife Extension Service

Table 1. Preplant herbicides

Product name	Application rate per acre	Weeds controlled	Remarks	Labeled in other small grains
Amber Custom-Pak	0.28–0.47 oz 0.56 oz rate for annual grass suppression	Annual broadleaves: mustards, pennycress, vetch Annual grass suppression: downy brome, Japanese brome, cheat, Italian ryegrass	Use only if disk drill is used for planting, not hoe/sweep drills. Incorporate into top 1 in. of soil. Requires rainfall to activate (enough to wet 2–3 in. deep)	None
Anthem Flex	2.5–4.5 oz	Annual broadleaves: amaranth, pigweed, waterhemp Annual grasses: barnyardgrass, crabgrass, foxtail spp., Italian ryegrass	Recommend tank-mixing if some weeds have already germinated Some initial stunting/yellowing can occur under wet conditions, but should not affect grain yield. Do not incorporate. Apply no more than 30 days before planting.	None
Axiom DF	4–10 oz	Annual broadleaves: chickweed, henbit, blue mustard, wild radish Annual grasses: suppression of downy brome, wild oat, Italian ryegrass	Some varieties are sensitive to Axiom; see label for specifics. Rate depends on soil type. Apply at spike until the 3-leaf stage. Do not exceed 10 oz/ac/season. Crop oil concentrate, vegetable oil, and petroleum are not recommended as a surfactant.	Triticale
Axxe	0.8 oz–3 gal	Annual broadleaves: chickweed, lambsquarters, mallow, mares tail, mustard spp., shepherdspurse Annual and perennial grasses: fescue, perennial ryegrass	Do not irrigate within 2 hr after application. Also approved for harvest aid	Barley, oat
Finesse Cereal and Fallow	0.2–0.4 oz	Annual broadleaves: mustards, curly dock, henbit Annual grasses: cheat, downy brome, and Japanese brome at 0.3–0.4 oz/ac	Do not apply if wheat has germinated and started to emerge above the soil line or on wheat planted into dry soil. Plant wheat at least 1 in. deep. Do not use in soils with a pH above 7.9. Long rotation restrictions	Barley
Gramaxone SL 2.0	2.0–4.0 pt	Annual grass and broadleaf weeds: suppression of perennial weeds	Rainfast after 30 minutes. Minimum total spray volume of 10 GPA by ground, 5 GPA aerially	Barley
Facet L	22–43 oz	Annual broadleaves: bedstraw, clover, prickly lettuce, morning glory Perennial broadleaves: field bindweed Annual grasses: barnyardgrass, crabgrass, foxtail spp.	Plant wheat 1 in. deep or deeper after application. Can tank-mix with 2,4-D, Dicamba, or glyphosate	Restricted for use only in the High Plains of Texas. See label for acceptable counties
Treflan TR-10	5.0–7.5 lb	Annual broadleaves: cheat chickweed, henbit, nettle Annual grasses: Italian ryegrass, downy brome	Wet or flooded soil may result in poor weed control.	Barley
Valor SX	1.0-2.0 oz	Annual broadleaves: chickweed, henbit, lambsquarters, marestail, pigweed, mallow	Requires 30 days and 1 in. rainfall/irrigation prior to planting. Use tank mix partner, such as glyphosate.	None

Table 2. Preemergence herbicides

Product name	Application rate per acre	Weeds controlled	Remarks	Labeled in other small grains
Amber Custom-Pak	0.28–0.47 oz 0.56 oz for annual grass suppression	Annual broadleaves: mustards, pennycress, vetch Annual grass suppression: downy brome, cheat, Italian ryegrass	Requires rainfall to activate (enough to wet 2–3 in. deep).	None
Anthem Flex	2.0–4.5 oz	Annual broadleaves: amaranth, pigweed, waterhemp Annual grasses: crabgrass, barnyardgrass, foxtail spp., Italian ryegrass	Apply delayed pre or early post (when wheat is spiking up to 4th tiller). Recommend tank-mixing if some weeds have already germinated. Do not apply to preemerged wheat.	None
Axiom DF	4–10 oz	Annual broadleaves: chickweed, henbit, blue mustard, wild radish Annual grasses: suppression of downy brome, wild oat, Italian ryegrass	Some varieties are sensitive to Axiom; see label for specifics. Rate depends on soil type. Apply at spike to the 3-leaf stage. Do not exceed 10 oz/ac/season. Crop oil concentrate, vegetable oil, and petroleum are not recommended as a surfactant.	Triticale
Finesse Cereal and Fallow	0.2–0.5 oz	Annual broadleaves: mustards, curly dock Annual grasses: cheat, downy brome, Italian ryegrass, and Japanese brome at 0.5 oz/ac	Apply after planting but before wheat emerges. The 0.5 oz rate is only for suppressing cheat, bromes, and ryegrass.	Barley
Glean XP	0.5 oz 0.33 oz (oats)	Annual broadleaves: mustards, curly dock Annual grasses: Italian ryegrass suppression	North central Texas and southern Oklahoma only. Plant wheat seeds at least 1 in. deep. Crop rotations depend on soil pH.	Oats
Gramoxone SL 2.0	2.0–4.0 pt	Annual grass and broadleaf weeds: suppression of perennial weeds	Actively growing weeds 1–6 in. tall. Rainfast after 30 minutes. Minimum total spray volume of 10 GPA by ground, 5 GPA aerially. See label for tank mixes.	Barley
Hoelon 3EC	2–2.66 pt	Annual grass: Italian ryegrass	Apply at planting. Expect reduced control if no rain occurs within 7 days. Rate depends on soil type.	None
Maverick	0.66 oz	Annual broadleaves: wild mustard Annual grasses: downy brome, cheat	Preemergence applications are not recommended for no-till systems. Rotational restriction for sorghum and corn is 22 mo.	None
Prowl H ₂ O	1.5–3.0 pt	Annual broadleaves: henbit, kochia, shepherdspurse Annual grass: downy brome, wild oat, Italian ryegrass	Apply from 1-leaf stage through flag leaf emergence of wheat. Rate depends on soil type. Plant seed 0.5–1.0 in. deep to avoid crop injury. Seedbed should be firm and free of clods and trash.	Triticale
Sharpen	1.0–2.0 oz	Annual broadleaves: kochia, lambsquarters, mares tail, mustard spp., pigweed, Russian thistle, shepherd's purse	Some varieties are more sensitive than others. Tank mixes include Clarity and Roundup. See label for weed size at application.	Barley, oats, rye, triticale
Zidua	0.7–1.25 oz	Annual broadleaves: pigweed, waterhemp Broadleaves suppressed: henbit, kochia, mares tail, morning glory, mustard Annual grasses: Italian ryegrass Grasses suppressed: brome spp., cheat, wild oat	Apply as delayed preemergence. Wait until 80% of wheat seed has germinated and the shoot is at least ½ long. Will not control germinated/emerged weeds. Tank-mix with metribuzin (2 oz) to control emerged weeds. Wheat may be visibly stunted or discolored. Do not apply to preplant or preemerged wheat. Wheat varieties differ in tolerance to Zidua.	None

Table 3. Postemergence herbicides

Product name	Application rate per acre	Weeds controlled	Weed height at application	Remarks	Tank-mix options	Labeled in other small grains
2,4-D 2,4-D 4 Amine 2,4-D 4 Low V Ester 2,4-D 6 Low V Ester	0.5–1.3 pt 0.5–1.3 pt 0.3–0.66 pt	Annual and perennial broadleaves: dock, mustards, thistles. Also garlic and onion	Small weeds	Apply in the spring when wheat is full tiller but before boot stage. Crop may be injured at higher rates.	Commonly tank-mixed with ALS herbicides	Barley, rye
Achieve SC Achieve Liquid	6.9–9.2 oz	Annual grasses: wild oat, Italian ryegrass	1–4 in. ryegrass 1–6 in. wild oat	Supercharge adjuvant is required at 0.5%v/v. Crop rotation for cereal grains, 30 days. All other crops, 106 days	Bronate, Buctril, Curtail M, Stinger	Barley
Affinity BroadSpec with TotalSol	0.4–1.0 oz	Annual broadleaves: filaree, flixweed, henbit, mustards	Up to 4 in. tall or across. See label for specific weeds	Apply after 2-leaf stage but before flagleaf is visible; must be thoroughly mixed with water before adding to liquid nitrogen fertilizer.	2,4-D, Buctril, Clarity, Hoelon, MCPA. See label for more tank mixes	Barley, oats, triticale
Affinity Tankmix with TotalSol	0.6–1.0 oz	Annual broadleaves: flixweed, henbit, mustards	Up to 4 in. tall or wide. See label for specific weeds	Apply after 2-leaf stage but before flagleaf is visible; must be thoroughly mixed with water before adding to liquid nitrogen fertilizer.	2,4-D, Buctril, Clarity, Hoelon, MCPA. See label for more tank mixes	Barley, oats, triticale
Agility SG with TotalSol (Ally Extra+Dicamba)	1.6–3.2 oz	Annual broadleaves: docks, flixweed, henbit, kochia, mustards	Up to 6 in. tall or across; kochia and Russian thistle at 2 in. tall	Apply after 2-leaf stage but before jointing stage.	2,4-D, MCPA, Clarity, Hoelon, Buctril. See label for more tank mixes	Barley, triticale
Aim EW Aim EC	0.5–2.0 oz	Annual broadleaves: field flixweed, henbit, tansy mustard, pennycress, shepherdspurse	Up to 4 in. tall or up to 3 in. wide	Apply up to wheat jointing stage. Add non-ionic surfactant. Coverage is essential for good control. A minimum of 10 GPA carrier volume is required.	2,4-D, MCPA. See label for more tank mixes	Barley, oats, rye, triticale
Ally XP	0.1 oz	Annual broadleaves: wild buckwheat, curly dock, kochia, annual mustards	Up to 4 in. tall or wide	Dryland wheat: apply at 2-leaf to boot stage. Irrigated wheat: apply after tillering to boot stage, and delay irrigation for 3 days after treatment. Do not apply to soils above pH 7.9.	2,4-D, Banvel, Bromoxynil, Express, Harmony Extra, Maverick, MCPA, Starane Ultra. Do not tank-mix with Malathion.	Barley, triticale
Ally Extra SG with TotalSol (Ally+Harmony Extra)	0.3–0.5 oz	Annual broadleaves: wild buckwheat, curly dock, kochia, annual mustards	<4 in. tall or wide	Apply at 2-leaf to boot stage. Delay irrigation for 6 hours after treatment, and irrigation should not exceed 1 in. Long crop-rotation interval. Do not apply to soils above pH 7.9.	2,4-D, Bromoxynil, MCPA	Barley, triticale
Amber Custom-Pak	0.28–0.47 oz	Annual broadleaves: kochia, mustard, pennycress, tansy	Depends on weed species. Generally 2–6 in. tall. See label for specific weeds	Do not apply to stressed wheat. Do not apply the enhanced rate to soils above pH 7.5, except in the Texas Blacklands.	2,4-D, Banvel, Buctril, Clarity, Express, Harmony Extra, Maverick, MCPA, Starane Ultra	Barley

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Table 3 continued

Product name	Application rate per acre	Weeds controlled	Weed height at application	Remarks	Tank-mix options	Labeled in other small grains
Anthem Flex	2.0–4.5 oz	Annual broadleaves: amaranth, pigweed, waterhemp Annual grasses: barnyardgrass, crabgrass, foxtail spp., Italian ryegrass	Generally 2–4 in. tall for some broadleaves	Apply delayed pre or early post (when wheat is spiking up to 4th tiller). Recommend tank-mixing if some weeds have already germinated.	2,4-D, Aim, Dicamba	None
Axial Star	16.4 oz	Annual broadleaves: kochia, prickly lettuce Annual grasses: canarygrass, foxtails, wild oat, Italian ryegrass	1–5-leaf stage and before 3 tillers develop; broadleaves up to pre-bolt	Apply at 2-leaf to boot stage in wheat. May be mixed with Tilt or Quilt fungicides or Warrior II insecticide. Fertilizer solutions should not exceed 50% liquid nitrogen.	Affinity, Ally, Amber, Buctril, Curtail, Express, Finesse, Harmony Extra, Huskie, MCPA, Orion, Peak, Pulsar	Barley
Axial TBC	8.85 oz	Annual broadleaves: flixweed, mustards Annual grasses: canarygrass, foxtails, wild oat, Italian ryegrass	1–5-leaf stage and before 3 tillers develop; broadleaves under 4 in. tall	Apply at 3-leaf to pre-boot stage. Adigor adjuvant must be used with this product at 9.6 oz/ac. Do not apply to stressed wheat. Fertilizer solutions should not exceed 50% liquid nitrogen.	Bronate, Buctril, Colt, Starane Ultra, Widematch	Barley
Axial XL	16.4 oz	Annual grasses: wild oat, Italian ryegrass	1–5-leaf stage and before 3 tillers develop	Apply at 2-leaf to boot stage. Do not apply to stressed wheat. Fertilizer solutions should not exceed 50% liquid nitrogen.	Ally, Amber, Buctril, Finesse, Harmony Extra, MCPA	Barley
Axiom DF	4–10 oz	Annual broadleaves: chickweed, henbit, blue mustard, wild radish Annual grasses: suppression of downy brome, wild oat, annual Italian ryegrass	Before 1-leaf stage	Certain varieties are sensitive to Axiom; see label for specifics. Rate depends on soil type. Apply at spike to the 3-leaf stage. Do not exceed 10 oz/ac/season. Crop oil concentrate, vegetable oil, and petroleum are not recommended as a surfactant.	Many herbicides labeled	Triticale
Beyond	4–6 oz	Annual broadleaves: henbit, mustards, primrose Annual grasses: cheat, jointed goatgrass, wild oat, rescuegrass, feral rye, Italian ryegrass	Grasses: 1–4-leaf stage Broadleaves: 1–3 in. tall; see label	Use only with Clearfield wheat seed. A surfactant and nitrogen-based fertilizer must be added to spray solution. A maximum of 8 oz/ac can be applied each growing season. Seed cannot be saved. See label for rotational restrictions.	2,4-D, Buctril, Dicamba, MCPA, Starane Ultra, Stinger	None
Bronate Advanced (Buctril + MCPA)	12.8–25.6 oz	Annual broadleaves: wild mustard, pepperweed, Russian thistle	8-leaf, 4 in. tall or rosette–2 in. See label	Apply when wheat is at 3-leaf to boot stage.	Many options	Barley, oats, rye
Buctril 4 EC	0.75–1.0 pt	Annual broadleaves: corn groomwell, kochia, field pennycress	8-leaf stage, 4 in. tall, or rosette up to 2 in. See label	Apply from crop emergence to boot stage. Good crop tolerance. Do not apply when crop covers weeds or crop is under water stress.	Many broadleaf and grass herbicides	Barley, oats, rye, triticale

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Table 3 continued

Product name	Application rate per acre	Weeds controlled	Weed height at application	Remarks	Tank-mix options	Labeled in other small grains
Carnivore	1.0–1.5 pt	Annual broadleaves: bedstraw, chickweed, henbit, kochia, mares tail, Russian thistle	Broadleaves <8 in. tall	Apply when crop is 2-leaf through flag leaf emergence stage.	Axial Star	Barley, oats
Dicamba Banvel 4L Clarity 4L	2–4 oz 2–4 oz	Annual and perennial broadleaves: wild buckwheat, kochia. Less effective on winter annual mustards	Up to 2–3-leaf stage and/or rosettes up to 2 in. across	Apply before wheat-jointing stage. Early crop stages have more tolerance.	Commonly tank-mixed with ALS herbicides	Barley, oats
ETX	0.3–0.6 oz	Annual broadleaves: chickweed, dandelion, henbit, kochia, mallow, lambsquarters, pigweed, Russian thistle	<4 in. tall or rosettes 3 in wide	Apply from crop emergence through appearance of flag leaf. 2 applications allowed per season, minimum 30 days apart. Leaf speckling may occur on crop.	See label	Triticale
Everest 2.0	0.5–1.0 oz	Annual broadleaves: wild mustard, pigweed, shepherd's purse Annual grasses: brome spp., foxtail, wild oat, Italian ryegrass	Broadleaves: <4 in. Grasses: 1–4 leaf stage	Apply from 1-leaf to jointing stage in wheat.	Affinity BroadSpec 2,4-D, Aim, Ally Extra, Amber, Finesse, Harmony Extra, Huskie, Maverick, Peak, Starane Ultra, Stinger	None
Express with TotalSol	0.25–0.50 oz	Annual broadleaves: wild garlic, mustards, pennycress	<4 in. tall or wide	Apply after wheat is at 2-leaf stage but before flag leaf is visible. Short rotational restriction. Exceptions apply if applying to oats.	2,4-D, Assert, Banvel, Bromoxynil, MCPA, Starane Ultra	Barley, oats, triticale
Finesse Cereal and Fallow (Glean + Ally)	0.2–0.4 oz	Annual broadleaves: curly dock, henbit, prickly lettuce, mustards	Broadleaves: see label	Apply from 1-leaf to boot stage of wheat. Do not use in soils with a pH above 7.9. Long rotation restrictions.	2,4-D, Bromoxynil, Dicamba, Diuron, MCPA, Metribuzin	Barley, triticale
Full Deck	1.0–1.5 oz	Annual broadleaves: bindweed, chickweed, dandelion, lambsquarters, kochia, mustard spp., pigweed, thistle, vetch	Broadleaves: <8 in. tall	Apply before flag leaf emergence.	See label	Barley, oats
Glean XP	0.17–0.33 oz	Annual broadleaves: henbit, tansy mustard Grasses suppressed: Italian ryegrass	Small weeds (2 in. across or 2 ft tall). See label for specific species	Apply from 2-leaf stage but before boot stage of wheat. Application interval and rate depend on location in Texas; see label. Do not apply to soil with a pH above 7.9.	2,4-D, Bromoxynil, Dicamba, MCPA	Barley, oats, triticale
Harmony Extra with TotalSol	0.45–0.90 oz	Annual broadleaves: chickweed, tansy mustard	<4 in. tall or wide	Apply from 2-leaf stage but before flag leaf is visible.	2,4-D, Ally, Bromoxynil, Dicamba, Express, Hoelon, MCPA	Barley, oats, triticale

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Table 3 continued

Product name	Application rate per acre	Weeds controlled	Weed height at application	Remarks	Tank-mix options	Labeled in other small grains
Hoelon 3EC	1.33–2.66 pt	Annual grasses: downy brome, wild oat, Italian ryegrass	1–4 leaf, depending on rate	Apply to wheat before jointing. Use crop oil concentrate surfactant. Do not apply if temperatures are below 35° F 3 days before application. Do not apply to wet fields or to wheat within 77 days of harvest.	Amber, Bromoxynil, Glean, Harmony Extra, MCPA	Barley
Huskie	11–15 oz	Annual broadleaves: flixweed, henbit, mustards, thistles	1–6 in. tall, up to 4 in. diameter. See label for specific species	Apply from fully expanded first true leaf to flag leaf emergence. Use AMS or ammonium nitrogen source for more consistent control. May be applied with up to 50% liquid nitrogen; not to exceed 30 lb nitrogen/ac.	Many grass and broadleaf herbicides	Barley, triticale
Huskie Complete	13.7 oz	Annual broadleaves: henbit, lambsquarter, mustards, pigweed, waterhemp Annual grasses: barnyardgrass, canaryseed, foxtail, wild oat	1 leaf–2 tiller for grasses 1–6 in. tall, up to 4 in. diameter. See label for specific broadleaves	Apply to winter wheat before jointing to avoid crop injury.	Express, MCP Ester, Olympus	None
Maverick	0.66 oz	Annual broadleaves: tansy mustard, pennycress, shepherdspurse Annual grasses: brome spp.; suppression of wild oat and rescuegrass	2–3-leaf stage for grasses. Broadleaves <2 in. diameter	After 2-leaf stage but before jointing. Fertilizer should contain <50% liquid nitrogen and no more than 30 lb nitrogen/ac. Fall applications are typically more effective.	2,4-D, Bronate, Buctril, MCPA, Sencor	None
MCPA 2 lb/gal sodium salt 4 lb/gal amine and ester formulations 6 lb/gal	1.5–3.0 pt 0.5–1.0 pt 0.17–.33 pt	Annual, biennial, perennial broadleaves: dandelion, wild radish, yellow rocket	Annual weeds: small. Perennial weeds: at bud stage but before wheat boot stage	After 4-leaf to boot stage; high rate after tiller to early boot stage. Late-season application to control perennial weeds must be made before wheat boot stage.	See label	Barley, oats, rye
Metribuzin 75DF	1–10.67 oz	Annual broadleaves: chickweed, henbit, lambsquarters, wild mustard, pennycress, pigweed, sheperdspurse Annual grasses: cheatgrass	See label and tank mix for best timing	Apply 2-leaf stage up to jointing; crop tolerance varies by variety.	2,4-D, Ally, Amber, Banvel, Bronate, Buctril, Finesse, Glean FC, Harmony Extra, MCPA	Barley
Olympus 70 WDG	0.6–0.9 oz Do not exceed 1.2 oz per crop per crop year.	Annual broadleaves: henbit, wild mustards; pennycress, pigweed, shepherdspurse, see label Annual grasses: brome spp., wild oat; suppression of rescuegrass at high rates	Best control on grasses between 2-leaf and 2-tiller stage. Best control on broadleaves <2 in. diameter	Apply to winter and spring wheat before jointing to avoid crop injury. Fertilizer solutions should not exceed 50% liquid nitrogen.	2,4-D, Aim, Ally, Amber, Banvel, Bronate, Buctril, Clarity, Curtail, Finesse, Harmony Extra, MCP, Peak, Rave, Sencor, Starane Ultra	None

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Table 3 continued

Product name	Application rate per acre	Weeds controlled	Weed height at application	Remarks	Tank-mix options	Labeled in other small grains
Olympus Flex (Olympus + Osprey)	3.0–3.5 oz	Annual broadleaves: chickweed, mustards Annual grasses: brome spp. (except rescuegrass), wild oat, Italian ryegrass	Best control on grasses between 1-leaf and 2-tiller stage. Best on broadleaves <2 in. diameter	Fall-sown wheat only. Fertilizer solutions should not exceed 50% liquid nitrogen and 30 lb nitrogen/ac.	Aim, Ally, Amber, Buctril, Finesse, Harmony Extra, MCP, Peak, Sencor, Starane Ultra	None
Osprey	4.75 oz	Annual broadleaves: henbit, pigweed, mustards Annual grasses: wild oat, Italian ryegrass	Annual grasses: 1-leaf to 2-tiller stage Broadleaves: 1–2 in. diameter	To avoid crop injury, apply to winter wheat before jointing. Apply with MSO (methylated seed oil) or other adjuvants mixed with ammonium nitrogen. Fertilizer solutions should not exceed 15% liquid nitrogen. Crop may be injured if is applied with organophosphate insecticides.	Ally, Buctril, Bronate, Curtail, Finesse, Harmony Extra, MCP, Peak, Starane Ultra, Stinger	None
Peak WDG	0.38–0.5 oz	Annual broadleaves: prickly lettuce, kochia, tansy mustard, wild mustard, pennycress, Russian thistle	1–2-leaf stage or 1–6-leaf stage, depending on weed species; see label	Apply to wheat after emergence to before second node is detectable. Consult the product label for crop rotation restrictions.	2,4-D, Bronate, Dicamba, MCPA. See label	Barley, oats, rye, triticale
PowerFlex HL	2.0 oz	Annual broadleaves: flixweed, henbit, mustards, Russian thistle Annual grasses: brome spp., wild oat, Italian ryegrass	Annual grasses: 2-leaf to 2-tiller stage Broadleaves: before 2 in. tall or 2 in. diameter	Apply to winter wheat from 3-leaf stage to jointing. Fertilizer solutions should not exceed 50% liquid nitrogen and 30 lb nitrogen/ac. Crop may be injured if applied with organophosphate insecticides.	Do not mix with Dicamba or amine formulations of 2,4-D or MCPA. See label for others	None
Prowl H ₂ O	1.5–3.0 pt	Annual broadleaves: henbit, kochia, shepherdspurse Annual grasses: downy brome, wild oat, Italian ryegrass	Before germination	Apply when wheat is between the 1st leaf stage and flag leaf emergence.	Many postemergence herbicides. See label	Triticale
Puma 1EC	10.6 oz	Annual grasses: Wild oat	2-leaf to 2-tiller stage	Apply to wheat from emergence to 70 days before harvest. Do not exceed 10.6 oz/ac annually.	Ally, Extra, Harmony MCP, Peak	Barley
Rave (Amber + Dicamba)	2.0–4.0 oz	Annual and perennial broadleaves: bindweed, curly dock, henbit, kochia, mustards	1–4 in. for most weeds; 1–12 in. for mustard species	Apply after wheat emergence up to jointing. Consult label for early-developing varieties (TAM 107 and Jagger).	2,4-D, Aim, Ally, Bronate, Buctril	Barley
Starane NXT	14–27.4 oz	Annual broadleaves: kochia, lambsquarters, mallow, mustard spp., pigweed, Russian thistle	4–8 in tall, depending on weed	Apply from 3-leaf stage up to flag leaf emergence.	See label	Barley, oats, triticale
Starane Ultra	0.3–0.7 oz	Annual and perennial broadleaves: chickweed, kochia, prickly lettuce	Before 8 in. tall or vining	Apply from 2-leaf stage up to flag leaf emergence. One application per season.	May be tank-mixed with other registered products; see label	Barley, oats

continued on next page

Table 3 continued

Product name	Application rate per acre	Weeds controlled	Weed height at application	Remarks	Tank-mix options	Labeled in other small grains
Stinger	0.25–0.33 pt	Annual and perennial broadleaves: dandelion, sow thistle	Up to 5-leaf stage. Thistles: rosette to bud stage	Apply when wheat is from 3-leaf to early boot stage. Rotation restriction of 10–18 mo. for sorghum. Avoid drift.	See label	Barley, oats
Weedmaster (Dicamba + 2,4-D)	1.0–1.33 pt	Annual and perennial broadleaves: wild buckwheat, kochia, winter annual mustards	Up to 2–3-leaf stage and/or rosettes up to 2 in. across	Apply in the spring when wheat is full tiller but before jointing stage. Crop may be injured at higher rates.	Ally, Amber, Finesse, Glean, Harmony Extra, and others	None
Widematch	1.0–1.33 pt	Annual broadleaves: chickweed, dandelion, kochia, mares tail, thistle, vetch	Apply before 4 in. tall or vining.	Apply from 3-leaf up to and including flag leaf emergence.	See label	Barley, oats
Zidua	1.0–2.0 oz	Broadleaves suppressed: henbit, mares tail, morning glory, mustard Grass controlled: Italian ryegrass Grasses suppressed: downy brome, Japanese brome, cheat, wild oat	Pre-germination of weeds	Apply as early postemergence. Apply from spike to 4-tiller stage. Tank-mix with other herbicide to control germinated/emerged weeds. Wheat may be visibly stunted or discolored.	Axial XL, Beyond, Clarity, metribuzin, Prowl H ₂ O	None

Table 4. Harvest aids

Product name	Application rate per acre	Weeds controlled	Preharvest interval	Crop application timing	Remarks	Tank-mix options	Mode of action
2,4-D 2,4-D 4 Low V Ester	1.0–2.0 pt	Annual and some perennial broadleaf weeds	Do not allow dairy cattle or slaughter animals to graze for 2 weeks after treatment.	After wheat is in the hard dough stage	Do not use treated straw for livestock.	Ally, Clarity, Roundup	Growth regulator
Ally XP	0.1 oz	Annual broadleaf weeds	A waiting interval of 10 days is required before harvest.	When wheat is in the hard dough stage	Do not use in soils with a pH of over 7.9. Weeds growing under limited moisture may not be controlled. Do not use straw for livestock feed.	2,4-D, Roundup	ALS inhibitor
Axxe	8 oz–3 gal	Annual and perennial broadleaf and grass weeds	—	After full maturity is reached	N/A	N/A	Non-specific
Clarity (Dicamba)	0.5 pt	Annual and some perennial broadleaf weeds	A waiting interval of 10–14 days is required before harvest.	When wheat is in hard dough stage and the joints of the stem are no longer green	Do not use preharvest treated wheat for seed unless a germination test is conducted. Do not allow grazing or use of feed from treated area.	2,4-D, Ally, Roundup	Growth regulator
Glyphosate Roundup Touchdown	1.0–2.0 pt 1.0–2.0 pt	Annual and some perennial broadleaf and grass weeds	A waiting interval of 7 days is required before harvest.	After hard dough stage of grain (<30% moisture)	Do not exceed 1 qt/ac. Not recommended for wheat harvested for seed. Do not feed treated straw or permit dairy/meat animals being finished for slaughter to graze treated fields within 7 days after treatment.	2,4-D, Clarity	EPSP synthase inhibitor
Weedmaster	Up to 2.0 pt	Annual and some perennial broadleaf weeds	A waiting interval of 7 days is required before harvest.	After wheat is in the hard dough stage	Do not use preharvest treated wheat for seed unless a germination test is conducted.	Karmex, Sencor	Growth regulator

Table 5. Postharvest herbicides

Product name	Application rate per acre	Weeds controlled	Crop application timing	Plant-back restrictions
2,4-D	1–3 qt	Annual and perennial broadleaf weeds, field bindweed	During the bloom to bud stage while weeds are actively growing	Allow 2 weeks after a 0.5 in. rainfall for 2,4-D to degrade before planting wheat.
Clarity (Dicamba)	1–2 qt	Perennial broadleaf weeds, field bindweed	Apply to 6–10-in. plants in September to October.	Plant-back restrictions of 45 days per qt applied
Distinct	2–4 oz	Perennial broadleaf weeds, field bindweed	After wheat harvest when weeds are < 6-in. tall	Plant-back restrictions of 30 days after 1 in. rainfall or irrigation
Roundup	4–5 qt	Annual and perennial grass and broadleaf weeds	During the bloom to bud stage while weeds are actively growing	No plant-back restrictions
Sharpen	1–2 oz	Annual broadleaf weeds	After wheat harvest when weeds are < 6-in. tall. Tank mixes include Clarity and Roundup. See label for weed size at application.	No plant-back restrictions
Tordon 22K	0.5–1.0 pt	Annual and perennial broadleaf weeds, bindweed	During the bloom to bud stage while weeds are actively growing	For use on noncropland only or land to be planted to a small grain the following year
Weedmaster (Premix) 2,4-D + Dicamba	1–2 qt	Annual and perennial broadleaf weeds	After wheat harvest and before killing frost	Allow 40 days between application and planting to prevent wheat injury. Do not exceed 4 qt/ac per year.

Table 6. Herbicide restrictions and mode of action

Product name (common name, active ingredient)	Forage restrictions (in days)		Crop rotation restrictions	Mode of action ¹	Herbicide group number
	Graze	Hay			
2,4-D 2,4-D 4 Amine 2,4-D 4 Low V Ester 2,4-D 6 Low V Ester	See label		Corn: 0 days; sorghum, wheat: 0.5 mo.; cotton, soybeans: see label	Growth regulator	4
Achieve SC Achieve Liquid (tralkoxydim)	30	30	Cereals: 30 days; other crops: 106 days	ACCcase inhibitor	1
Affinity BroadSpec (thifensulfuron-methyl+ tribenuron-methyl); 1:1 ratio	7	30	Wheat and barley: 0 days; cotton: 14 days; canola and sugarbeets: 60 days; other crops: 45 days	ALS inhibitor	2
Affinity Tankmix (thifensulfuron+tribenuron); 4:1 ratio	7	30	Wheat and barley: 0 days; canola and sugarbeets: 60 days; other crops: 45 days	ALS inhibitor	2
Agility SG with TotalSol (Dicamba+thifensulfuron+ tribenuron+metsulfuron)	7	30	Wheat: 1 mo.; sorghum: 4 mo.; corn: 12 mo.; cotton: 14–22 mo.	Growth regulator + ALS inhibitor	4, 2
Aim EW Aim EC (carfentrazone-ethyl)	7	7	Corn, cotton, sorghum, soybean, wheat: 0 days; root and leafy vegetables: 30 days; other crops: 12 mo. after application	Photosynthetic inhibitor	14
Ally Extra (Ally+Harmony Extra) (thifensulfuron-methyl, tribenuron-methyl, metsulfuron-methyl)	7	30	Soybeans, sorghum: 4 mo.; corn: 4–12 mo.; cotton: 14–22 mo.	ALS inhibitor	2
Ally XP (metsulfuron-methyl)	0	0	Sorghum: 10 mo.; corn: 12 mo.; cotton: 14–22 mo.; sunflowers: 22 mo.; soybeans: 34 mo.	ALS inhibitor	2
Amber Custom-Pak (triasulfuron)	0	See label	Soil pH 7.9 or lower: IR corn: 4 mo.; STS soybeans: 11 mo.; sorghum: 14 mo.; corn: 22 mo.; soybeans: 36 mo.; other crops: field bioassay	ALS inhibitor	2
Anthem Flex (pyroxasulfone + carfentrazone)	7	7	Corn: 0 mo.; cotton, soybean: 0–4 mo.; wheat: 0–6 mo.; sunflower: 4 mo.; rice: 10–24 mo.; barley, oat, rye: 11–18 mo.	VLCA inhibitor + photosynthetic inhibitor	15, 14
Axial Star (fluroxypyr + pinoxaden)	30	30	Wheat and barley: 0 days; other crops: 4 mos.	ACCcase inhibitor + Growth regulator	1, 4
Axial TBC (florasulam + pinoxaden)	30	30	Barley, oats, wheat: 0.5 mo.; corn/sorghum: 4 mos.; alfalfa, canola, soybean, pea, flax, potato, safflower, sunflower: 9 mo.; other crops: 12 mo.	ALS inhibitor + ACCcase inhibitor	2, 1
Axial XL (pinoxaden)	30	30	Wheat: 0 days; root and leafy crops: 30 days; other crops: 120 days	ACCcase inhibitor	1
Axiom DF (flufenacet + metribuzin)	30	See label	Corn, soybean, wheat, triticale: 0 days; cotton: 8 mo.; oats, sorghum, rye: 12 mo. after application	LCFA synthesis inhibitor + Photosynthetic inhibitor	15, 5

continued on next page

Table 6 continued

Product name (common name, active ingredient)	Forage restrictions (in days)		Crop rotation restrictions	Mode of action ¹	Herbicide group number
	Graze	Hay			
Axex (ammonium nonanoate)	Do not hay or graze		None	Non-specific	—
Beyond (imazamox)	0	0	Clearfield wheat: 0 days; wheat: 3 mo.; corn: 8.5 mo.; cotton, sorghum; sunflowers: 9 mo.	ALS inhibitor	2
Bronate Advanced (Buctril + MCPA)	45	See label	Do not plant rotational crops within 30 days.	Photosynthetic inhibitor + Growth regulator	6, 4
Buctril 4 EC (bromoxynil)	45	See label	Corn, sorghum: 0 days; most others: 1 mo.	Photosynthetic inhibitor	6
Carnivore (bromoxynil + fluroxypyr + MCPA)	45	45	See label	Photosynthetic inhibitor + Growth regulator + Growth regulator	6, 4, 4
Dicamba Banvel 4L Clarity 4L	See label	37	Corn: 0 days; sorghum: 15 days; others: after harvest	Growth regulator	4
Distinct (Dicamba + diflufenzapyr)	0	7	Corn: 7 days; alfalfa, small grains, cotton, grain sorghum, soybeans with >1 in. rain after application: 30 days; all crops with <1 in. rainfall after application: 120 days	Growth regulator + Auxin transport inhibitor	4, 19
ETX (pyraflufen)	See label	21	Corn, cotton, soybean, triticale, wheat: 0 days; barley, oat, legumes, oilseed crops: 1 day	Photosynthetic inhibitor	14
Everest 2.0 (flucarbazone)	30	30	Soybeans (STS): 6 mo.; barley, canola, flax, safflower, soybean, sunflower: 9 mo.; corn: 11 mo.	ALS inhibitor	2
Express with TotalSol (tribenuron-methyl)	7	30	Wheat, barley, triticale: 0 days; oats: 1 day; soybeans: 7 days; cotton, corn, grain sorghum: 14 days; canola: 60 days; other crops: 45 days (see label for exceptions)	ALS inhibitor	2
Facet L (quinclorac)	0	7	Wheat, sorghum, rice: 0 days; alfalfa, beans, clover, peas, safflower: 24 mo.; other crops: 10 mo.	Growth regulator	4
Finesse Cereal and Fallow (Glean + Ally) (chlorsulfuron + metsulfuron-methyl)	0	0	Corn: 11 mo.; sorghum: 14–26 mo.; cotton: 14–26 mo. or field bioassay, depending on area, pH, and rainfall; other crops: perform a field bioassay before planting	ALS inhibitor	2
Full Deck (clopyralid + fluroxypyr + MCPA)	7	7	Barley, corn, oats, wheat: 0 days; flax: 120 days; canola, safflower, grain sorghum: 12 mo.; soybean, sunflower: 18 mo.	Growth regulator	4, 4, 4
Glean XP (chlorsulfuron)	0	0	Sorghum: 14–25 mo.; cotton: 14–26 mo. or field bioassay, depends on area, pH, and rainfall; other crops: perform a field bioassay before planting	ALS inhibitor	2
Gramoxone SL 2.0 (paraquat)	0	0	None	Photosynthetic inhibitor	22

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Table 6 continued

Product name (common name, active ingredient)	Forage restrictions (in days)		Crop rotation restrictions	Mode of action ¹	Herbicide group number
	Graze	Hay			
Harmony Extra w/TotalSol (thifensulfuron-methyl + tribenuron-methyl)	7	30	Wheat: 0 days; most other crops: 45 days after application (see label for exceptions)	ALS inhibitor	2
Hoelon 3EC (diclofop-methyl)	28	Do not hay	All crops may be planted after harvest.	ACCCase inhibitor	1
Huskie (bromoxynil)	25	25	Barley, oats, triticale, wheat: 7 days; sorghum, soybeans: 4 mo.; canola, corn, sunflowers: 9 mo.; cotton: conduct field bioassay	Photosynthetic inhibitor	6
Huskie Complete (thiencarbazone-methyl + bromoxynil + pyrasulfotole)	25	30	Wheat: 3 mo.; barley, corn, (spring): 9 mo.; alfalfa, canola, dry beans, flax, oats (spring), peas (field), soybean, sunflower: 10 mo.; lentils, potatoes: 18 mo.	ALS inhibitor + Photosynthetic inhibitor + Pigment inhibitor	2, 6, 27
Maverick (sulfosulfuron)	0	30	Soil pH 7.5 or lower: wheat: 0 days; corn, sorghum, sunflower: 22 mo.; cotton, soybean: 12 mo.	ALS inhibitor	2
MCPA (chlorophenoxyacetic acid)	See label		Corn: 0 days; sorghum, wheat: 0.5 mo.; cotton, soybeans: see label	Growth regulator	4
Metribuzin 75DF (metribuzin)	21	28	Soybeans, corn, alfalfa: 4 mo.; wheat, barley, peas: 8 mo.; potatoes, rice: 12 mo.; root crops: 18 mo.	Photosynthetic inhibitor	5
Olympus 70 WDG (propoxycarbazone- sodium)	0	71	Wheat: 0 days; cotton, sorghum, soybean, sunflower: 12 mo.; corn: 18 mo.	ALS inhibitor	2
Olympus Flex (Olympus + Osprey) (propoxycarbazone-sodium + mesosulfuron-methyl)	See label	30	Wheat: 0 days; soybean: 5 mo.; sorghum: 9 mo.; cotton: 10 mo.; corn: 12 mo.	ALS inhibitor	2
Osprey (mesosulfuron-methyl)	See label	60	Wheat: 7 days; barley, sunflower: 1 mo.; cotton, soybean, peanuts: 3 mo.; corn: 12 mo.; other crops: 10 mo.	ALS inhibitor	2
Peak WDG (prosulfuron)	30	See label	Soil pH below 7.8: IR corn, wheat: 0 days; corn, sorghum: 1 mo.; cotton, soybeans, STS soybeans: 10 mo.; see label for specifics	ALS inhibitor	2
PowerFlex HL (pyroxulam)	7	28	Wheat: 1 mo.; barley, canola, corn, oats, sorghum, soybean, sunflower: 9 mo.; other crops: see label	ALS inhibitor	2
Prowl H ₂ O (pendimethalin)	11	28	Corn, cotton, soybeans: 0 days; wheat: 4 mo.; sorghum: 10 mo.	Mitotic disruptor	3
Puma 1EC (fenoxaprop-p-ethyl + safener)	See label		See label	ACCCase inhibitor	1
Rave (triasulfuron + Dicamba)	See label		Soil pH 7.9 or lower: IR corn: 4 mo.; STS soybeans: 11 mo.; sorghum: 14 mo.; corn: 22 mo.; soybeans: 36 mo.; other crops: see label	ALS inhibitor + Growth regulator	2, 4

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Table 6 continued

Product name (common name, active ingredient)	Forage restrictions (in days)		Crop rotation restrictions	Mode of action ¹	Herbicide group number
	Graze	Hay			
Roundup (glyphosate)	7	7	None	EPSP synthase inhibitor	9
Sharpen (saflufenacil)	30	30	Crop rotation intervals depend on application rate; see label	Photosynthetic inhibitor	14
Starane NXT (fluroxypyr + bromoxynil)	45	45	If replanting is required, only barley, oats, or wheat may be planted within 120 days after application.	Growth regulator + Photosynthetic inhibitor	4, 6
Starane Ultra (fluroxypyr)	7	See label	If replanting is required, only barley, oats, or wheat may be planted within 120 days after application.	Growth regulator	4
Stinger (Clopyralid)	7	Do not hay.	Cereals and corn: 0 days; alfalfa, sorghum, sunflower: 10.5 mo.	Growth regulator	4
Tordon 22K (picloram)	See label		Grain sorghum: 8 mo.; barley, oats, wheat: 45 days (<½ pt) or 60 days (½–1 pt); broadleaf crops: 36 mo. or bioassay	Growth regulator	4
Treflan TR-10 (trifluralin)	Do not graze or hay.		Sorghum, oats: 12–14 mo. (>20 in. water), 18 mo. (<20 in. water); other crops: 5 mo.	Mitotic disruptor	3
Valor SX (flumioxazin)	Do not hay or graze.		Cotton, corn, sorghum, sunflower, wheat (conventional till): 30 days; peanut, soybean: immediately; barley, dry beans, flax, lentils, peas, rye, safflower: 3 mo.; alfalfa, canola, oats, other crops (conventional till): 4 mo. (restrictions assuming 2 oz maximum rate)	Photosynthetic inhibitor	14
Weedmaster (2,4-D + Dicamba)	Do not graze or hay before crop maturity.		Wheat: 10 days/pt applied; other crops: 120 days	Growth regulator	4
Widematch (clopyralid + fluroxypyr)	7	14	Barley, corn, oats, wheat: 0 days; canola, flax: 120 days; safflower, grain sorghum, soybean, sunflower: 10.5 mo.; other broadleaf crops: 18 mo.	Growth regulator	4, 4
Zidua (pyroxosulfone)	7	7	Corn: none; cotton, soybean: 0–4 mo.; wheat: 0–6 mo., sunflower: 4 mo.; peanut, field peas, potato: 4–8 mo.; grain sorghum: 6–12 mo.; alfalfa: 10 mo.; barley, oat: 11–18 mo.; canola: 12–18 mo.; other crops: 18 mo.	Lipid synthesis inhibitor	15

¹ **Mode of action** is the primary biochemical or biophysical event that an herbicide directly affects, killing the plant.
ACCase herbicides inhibit the enzyme acetyl-CoenzymeA carboxylase in the pathway leading to lipid synthesis in plants.
ALS inhibitor herbicides disrupt the pathways leading to amino acid production in plants. Herbicides include sulfonylurea and imadazolinone.
EPSP synthase inhibitor herbicides prevent the formation of amino acids used to form plant pigments.
Growth regulator herbicides disrupt hormone balance and protein synthesis in the plant. This leads to weak cell walls and rapid cell proliferations.
Lipid synthesis inhibitor herbicides stop the production of plant lipids and thus stop the formation of cell membranes, which halts new plant growth.
Mitotic disruptor herbicides inhibit cell division and prevent shoot and root elongation.
Photosynthetic inhibitor herbicides inhibit electron transport in the photosynthetic reaction of plants.
Pigment inhibitor herbicides prevent the production of compounds that protect the plant from chlorophyll destruction.

Table 7. Herbicide efficacy for grasses and weeds. Blanks indicate that no data is available.

Herbicides	Grasses							Broadleaf weeds																						
	Japanese/downy brome	Cheat	Feral rye	Italian ryegrass	Jointed goatgrass	Rescuegrass	Wild oat	Bushy wallflower (W)	Carolina geranium (W)	Chickweed (W)	Corn gromwell (W)	Curly dock (S)	Cutleaf primrose (W)	Field bindweed (S)	Field pennycress	Flixweed/tansy mustard (W)	Henbit (W)	Horseweed (S)	Kochia (S)	Pepperweed (W)	Pigweed (S)	Prickly lettuce (W)	Red horned poppy (S)	Russian thistle (S)	Shepherdspurse (W)	Smallseed falseflax (S)	Sow thistle	Sunflower (S)	Mustard	Blue mustard
Preplant																														
Amber Custom-Pak	F	F	P	F	P	P	P	E	E	E		G	E	P		E	E	G	FG	P	E	G		G	E	G		E		E
Anthem Flex																														
Axiom DF	E	E		E ¹					E	E		F					G	E		E					F		G		G	
Axxe																														
Facet L																														
Finesse Cereal and Fallow	P	P	P	G ²	P	P	P	E	E	E	E	G	E	P		E	E	G ²	FG ²	P	E ²	E	E	F	E	E		E		E
Gramoxone SL 2.0																														
Treflan TR-10																						E ⁵								
Amber Custom-Pak	F	F		G ²								G	E	P	E	E	G	G ²	FG ²	P	G ²	G		G	E	G		E		E
Anthem Flex																														
Axiom DF																	E													
Finesse Cereal and Fallow	F	F		F ²								G	E	P	E	E	E	G ²	FG ²	P	G ²	F		F	E	E		E		E
Glean XP				F ²								G	E	P		E		G ²	FG ²	P	G ²				E	E		E		E
Gramoxone SL 2.0																														
Hoelon 3EC				E ¹				P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
Maverick	G	GE		F ²										P	E		F	²	²		²									E
Prowl H ₂ O				F			F													G		E ⁵		G						
Sharpen	P	P	P	P	P	P	P			E			G	G		G	FG	E	G		G	G		E	GE			E	E	
Valor SX																														
Zidua				E																		E								
Postemergence																														
Achieve SC/Achieve Liquid				F ¹			P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
Affinity BroadSpec w/ TotalSol				²														p ²	²		²									
Affinity Tankmix w/ TotalSol				²														²	²		²									

continued on next page

Table 7 continued

Herbicides	Grasses							Broadleaf weeds																												
	Japanese/downy brome	Cheat	Feral rye	Italian ryegrass	Jointed goatgrass	Rescuegrass	Wild oat	Bushy wallflower (W)	Carolina geranium (W)	Chickweed (W)	Corn gromwell (W)	Curly dock (S)	Cutleaf primrose (W)	Field bindweed (S)	Field pennycress	Flixweed/tansy mustard (W)	Henbit (W)	Horseweed (S)	Kochia (S)	Pepperweed (W)	Pigweed (S)	Prickly lettuce (W)	Red horned poppy (S)	Russian thistle (S)	Shepherdspurse (W)	Smallseed falseflax (S)	Sow thistle	Sunflower (S)	Mustard	Blue mustard						
Postemergence (continued)																																				
2,4-D	P	P	P	P	P	P	P	E	E	P	P	G	G	G	E	E	P	P	G	E	G	G		E	G	G		G	E	G						
Achieve SC/Achieve Liquid																																				
Affinity BroadSpec w/ TotalSol	P	P	P	P ²	P	P	P	E	F	E	G	E	F	P	G		G	FG ²	G ²	E	G ²	G		G	E					G	E	GE				
Affinity Tankmix w/TotalSol																																				
Agility SG w/ TotalSol																																				
Aim EW / Aim EC	P	P	P	P	P	P	P	G		P			F	F	E	GE	G	F ²	G	G	G	F		G	G					G		GE				
Ally Extra w/ TotalSol				²													²	²		²																
Ally XP	P	P	P	P ²	P	P	P	G						P	E	GE	E	G ²	F		G ²	G		F	G					F		E				
Amber Custom-Pak	P	P	P	P ²	P	P	P	G					G	P	E	GE	F	G ²	FG ²		G ²	E		FG	G	G					E		E			
Anthem Flex																																				
Axial Star				^{1,2}																																
Axial TBC				^{1,2}																																
Axial XL				E ¹			E	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P		
Axiom DF				G																																
Beyond on Clearfield wheat	E	E	G	G ²	E	G	E	G						G		G	P	P ²	P ²		P ²	P			G					P						
Bronate Advanced	P	P	P	P	P	P	P											GE		G					E						G					
Buctril 4 EC	P	P	P	P	P	P	P	G	F	F	G	G	P	P	GE	G	F	E	GE	G	G	G		G	F					G	E	G				
Carnivore																																				
Dicamba (Banvel 4L,Clarity 4L)	P	P	P	P	P	P	P	E						G	FG	E	E	PF	GE		E	G		E	E					E		FG				
ETX																																				
Everest 2.0		E		²													²	²		²																
Express w/ TotalSol	P	P	P	P ²	P	P	P	G						P		GE		F ²	G ²		G ²	G		G	G					F		GE				
Finesse Cereal and Fallow	P	P	P	F ²	P	P	P	E	E	E	E	E	E	P	E	GE	E	E ²	F ²	P	²	E	E	E	F	E	E		F			E		E		

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Table 7 continued

Herbicides	Grasses							Broadleaf weeds																						
	Japanese/downy brome	Cheat	Feral rye	Italian ryegrass	Jointed goatgrass	Rescuegrass	Wild oat	Bushy wallflower (W)	Carolina geranium (W)	Chickweed (W)	Corn gromwell (W)	Curly dock (S)	Cutleaf primrose (W)	Field bindweed (S)	Field pennycress	Flixweed/tansy mustard (W)	Henbit (W)	Horseweed (S)	Kochia (S)	Pepperweed (W)	Pigweed (S)	Prickly lettuce (W)	Red horned poppy (S)	Russian thistle (S)	Shepherdspurse (W)	Smallseed falseflax (S)	Sow thistle	Sunflower (S)	Mustard	Blue mustard
Postemergence (continued)																														
Full Deck																			³											
Glean XP	P	P	P	F ²	P	P	P	E	E	E	E		E		E	E	E	²	G ²	P	²	E	E	G	E	E		F		
Harmony Extra with TotalSol*	P	P	P	P ²	P	P	P	E	F	E	G	E	F	P	G		G	FG ²	G ²	E	G ²	G		G	E			G	E	GE
Hoelon 3EC	P	P	P	E ¹	P	P	E	P	P	P	P	P	P	P		P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
Huskie				P													P	GE			E									
Huskie Complete																														
Maverick	F	E	P	F ²	P	P	F	G						E	G	P	F ²	P ²		P ²	F		P	G				P	F	
MCPA	P	P	P	P	P	P	P						F	G		F	P	P		F	F	F	F	F	G			F	P	
Metribuzin 75DF**	F	E		F					E	E		P		F		G	E		E					F				G		
Olympus 70 WDG	G	E	P	P ²	P	P	G	G	P	G	P		P	P	E	E	F	²	P ²		F ²	F		P	E	E		F	G	
Olympus Flex		E		G ²			G											²	²		²									
Osprey	F	P	P	FG ²	P	P	E		P	P		P	F		F		P	P ²	²	P	F ²				P			P		
Peak WDG	P	P	P	P ²	P	P	P	G		G			G	P	E	E	P	F ²	F ²		G ²	G		G		G		G		
PowerFlex HL	GE	GE		FG ²		G	GE		F	F	G	P				G	F	F		P	²							G		
Puma 1EC	P	P	P	¹	P	P		P	P	P	P	P	P	P		P	P	P	P	P	P	P	P	P	P	P	P	P	P	
Rave	P	P	P	P	P	P	P	E		G		G	G	FG		E	G	G	E	G	E	E		E	E	G		E		G
Starane NXT																														
Starane Ultra	P	P	P	P	P	P	P						G	G				GE	GE		F									
Stinger	P	P	P	P	P	P	P										P		³											
Weedmaster									G	FG		FG					FG	E			E	E						E		
Widematch																			²											
Zidua				GE																	E									

continued on next page

Table 7 continued

Herbicides	Grasses							Broadleaf weeds																								
	Japanese/downy brome	Cheat	Feral rye	Italian ryegrass	Jointed goatgrass	Rescuegrass	Wild oat	Bushy wallflower (W)	Carolina geranium (W)	Chickweed (W)	Corn gromwell (W)	Curly dock (S)	Cutleaf primrose (W)	Field bindweed (S)	Field pennycress	Flixweed/tansy mustard (W)	Henbit (W)	Horseweed (S)	Kochia (S)	Pepperweed (W)	Pigweed (S)	Prickly lettuce (W)	Red horned poppy (S)	Russian thistle (S)	Shepherdspurse (W)	Smallseed falseflax (S)	Sow thistle	Sunflower (S)	Mustard	Blue mustard		
Harvest aids																																
2,4-D	P	P	P	P	P	P	P																									
Ally XP				2														2	2													
Axxe																																
Clarity (Dicamba)	P	P	P	P	P	P	P																									
Glyphosate	E	E	E	E ⁴	E	E	E	E	E	E	E	E	G	G		E	E	FG ⁴	E	E	E ⁴	E		G	E				G			
Weedmaster																																
Postharvest herbicides																																
2,4-D	P	P	P	P	P	P	P					F		F				F	G		G											
Clarity (Dicamba)	P	P	P	P	P	P	P																									
Distinct																																
Roundup	E	E	E	E ⁴	E	E	E	E	E	E	E	E	G	G		E	E	FG ⁴	E	E	E ⁴	E		G	E				G			
Tordon 22K	P	P	P	P	P	P	P						G						G		G											
Weedmaster																																
¹ ACCase-resistant biotypes occur. ² ALS-resistant biotypes occur. ³ Synthetic auxin-resistant biotypes occur. ⁴ EPSP synthase inhibitor-resistant biotypes occur. ⁵ Microtubule assembly inhibitor-resistant biotypes occur. * Harmony GT ratings ** Sencor ratings P=Poor F=Fair G=Good E=Excellent S=Summer W=Winter																																

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