



# Weed Control Recommendations in **Wheat**



**2008**



# Weed Control Recommendations in Wheat

Gaylon D. Morgan, Associate Professor and Extension Small Grains Specialist

Paul A. Baumann, Professor and Extension Weed Specialist

Todd Baughman, Associate Professor and Extension Agronomist, Texas AgriLife Research and Extension Center at Vernon

Brent Bean, Professor and Extension Agronomist, Texas AgriLife Research and Extension Center at Amarillo

The recommendations contained herein are based primarily on herbicide labels researched by the Texas AgriLife Extension Service. The use of product names is not intended as an endorsement 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.

Information given herein is for educational purposes only. References to commercial products or trade names are made with the understanding that no discrimination is intended and no endorsement by the Texas AgriLife Extension Service is implied.

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



# Contents

<b>Cultural and Mechanical Weed Control .....</b>	<b>6</b>
<b>Managing Herbicide-Resistant Weeds .....</b>	<b>6</b>
<b>Tables and Figures</b>	
<b>Figure 1. Feekes scale for the growth and development of cereals .....</b>	<b>7</b>
<b>Table 1. Preplant herbicides .....</b>	<b>8</b>
<b>Table 2. Preemergence herbicides .....</b>	<b>8</b>
<b>Table 3. Postemergence herbicides .....</b>	<b>10</b>
<b>Table 4. Harvest aids .....</b>	<b>14</b>
<b>Table 5. Postharvest herbicides .....</b>	<b>15</b>
<b>Table 6. Herbicide restrictions and mode of action .....</b>	<b>16</b>
<b>Table 7. Herbicide efficacy for grasses and weeds .....</b>	<b>19</b>
<b>Figure 2. Boom sprayer calibration .....</b>	<b>22</b>

## Cultural and Mechanical Weed Control

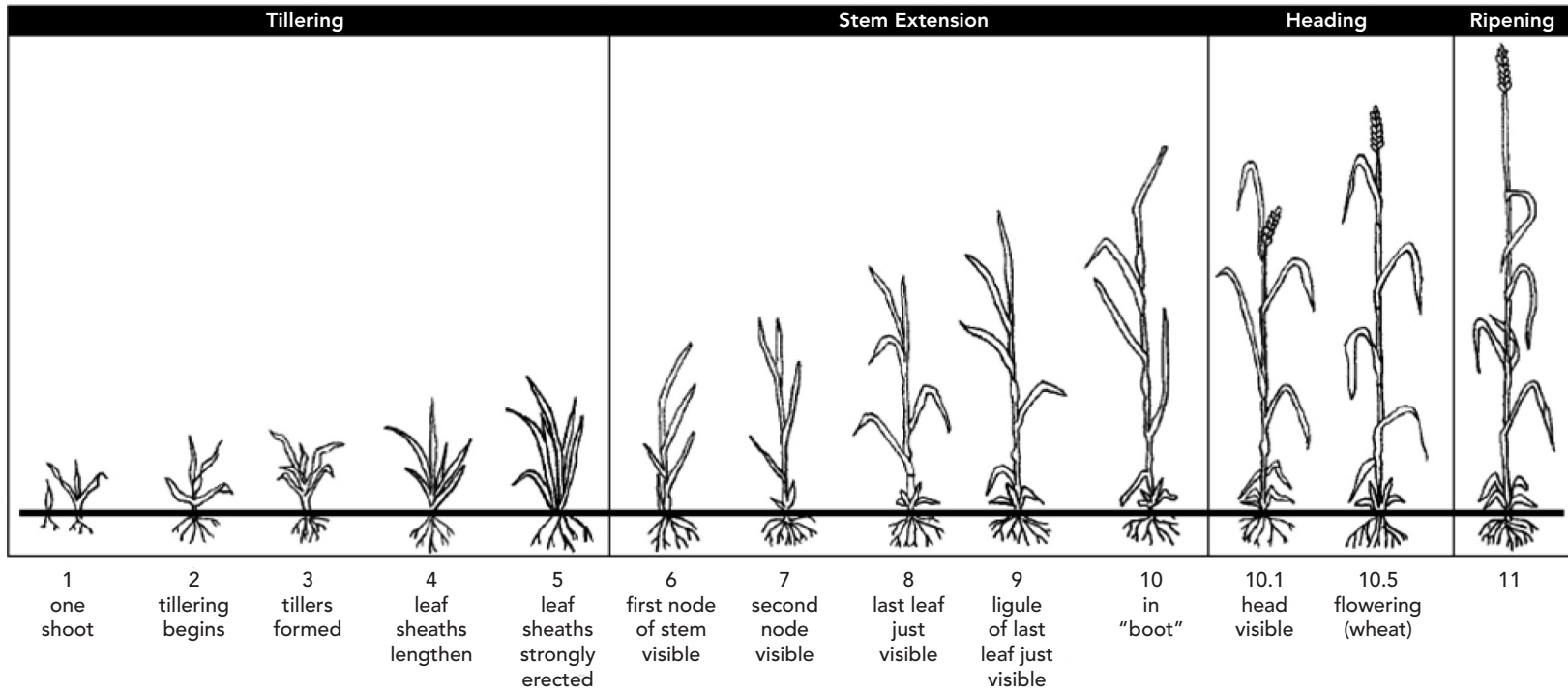
Weeds may be controlled in cropland through cultural, mechanical and chemical means. Judicious use of these methods individually or in combination can effectively manage weeds without causing economic loss or environmental harm. Selecting the proper management strategy depends largely on the target weed(s) and the infestation level. The type of crop will also play a major role in determining the timing of mechanical measures.

1. Use weed-free seed to protect against weed infestations in the row and the introduction of new weed species.
2. Thoroughly clean harvesting equipment before moving from one field to the next, or require custom harvesters to clean their equipment before entering the field.
3. In conventional tillage systems, use mechanical tillage or pre-plant burndown herbicides to remove initial weed flushes before planting. This will reduce or eliminate the potential for continued infestation.
4. 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

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

**Figure 1. Feekes scale for the growth and development of cereals**



**Table 1. Preplant herbicides**

Product name	Application rate per acre	Weeds controlled	Remarks	Labeled in other small grains
Amber DF	0.28–0.47 oz 0.56 oz rate for annual grass suppression	Annual broadleaves: mustards, pennycress, vetch. Annual grass suppression: annual ryegrass, downy brome, cheat, Japanese brome.	Should be used 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
Finesse DF	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/acre.	Do not apply if wheat has germinated and has started to emerge above the soil line or on wheat planted into dry soil. Wheat should be planted at least 1 in. deep. Do not use in soils with a pH above 7.9. Long rotation restrictions.	Barley
Hoelon 3EC	2–2.66 pt	Annual grass: annual ryegrass.	Apply at planting. If no rain occurs within 7 days, expect reduced control. Rate dependent on soil type.	None

**Table 2. Preemergence herbicides**

Product name	Application rate per acre	Weeds controlled	Remarks	Labeled in other small grains
Amber DF	0.28–0.47 oz 0.56 oz rate for annual grass suppression	Annual broadleaves: mustards, pennycress, vetch. Annual grass suppression: annual ryegrass, downy brome, cheat, Japanese brome.	Requires rainfall to activate (enough to wet 2–3 in. deep).	None
Finesse DF	0.2–0.5 oz	Annual broadleaves: mustards, curly dock. Annual grasses: cheat, downy brome, ryegrass, and Japanese brome at 0.5 oz/acre.	Application should occur after planting but before wheat emerges. The 0.5 oz rate is only for suppressing cheat, bromes, and ryegrass.	Barley
Glean FC	0.5 oz 0.33 oz for oats	Annual grasses: ryegrass suppression. Annual broadleaves: mustards, curly dock.	North central Texas and southern Oklahoma only. Wheat seeds should be planted at least 1 in. deep. Crop rotations are dependent on soil pH.	Oat
Hoelon 3EC	2–2.66 pt	Annual grass: Italian ryegrass.	Apply at planting. If no rain occurs within 7 days, expect reduced control. Rate dependent on soil type.	None
Maverick Pro	0.66 oz	Annual grasses: cheat, downy brome. Annual broadleaves: wild mustard.	Preemergence applications are not recommended for no-till systems. Rotational restriction for sorghum and corn is 22 months.	None
Prowl H2O	1.5–3.0 pt	Annual broadleaves: henbit, kochia, shepherdspurse. Annual grass: wild oat, ryegrass, downy brome.	Wheat must be at or beyond the 1-leaf stage at the time of application. Rate is dependent on soil type. Seed should be planted 0.5–1.0 in. deep to avoid crop injury. Seedbed should be firm and free of clods and trash.	None



**Table 3. Postemergence herbicides**

Product name	Application rate per acre	Weeds controlled	Weed height at application	Remarks	Tankmix options	Labeled in other small grains
Achieve SC Achieve Liquid	6.9–9.2 oz	Annual grasses: Italian ryegrass, wild oat.	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.	Buctril, Bronate, Curtail M, Stinger	Barley
Affinity BroadSpec with TotalSol	0.4–1.0 oz	Annual broadleaves: mustards, henbit, filaree, flixweed.	Up to 4 in. tall or across. Refer to 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, MCPA, Clarity, Hoelon, Buctril. Refer to label for additional tankmixes.	Barley
Affinity Tankmix with TotalSol	0.6–1.0 oz	Annual broadleaves: mustards, henbit, flixweed.	Up to 4 in. tall or across. Refer to 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, MCPA, Clarity, Hoelon, Buctril. Refer to label for additional tankmixes.	Barley
Agility SG with TotalSol (Ally Extra+Dicamba)	1.6–3.2 oz	Annual broadleaves: mustards, docks, henbit, kochia, flixweed.	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. Refer to label for additional tankmixes.	Barley, triticale
Aim EW Aim EC	0.5–2.0 oz	Annual broadleaves: field pennycress, tansy mustard, henbit, shepherdspurse, flixweed.	Up to 4 in. tall or up to 3 in. across	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. Refer to label for additional tankmixes.	Barley, oats, rye, triticale
Ally XP	0.1 oz	Annual broadleaves: annual mustards, kochia, wild buckwheat, curly dock.	Up to 4 in. tall or across	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.	Banvel, Bromoxynil, 2,4-D, Express, Harmony Extra, Maverick, MCPA, Starane. Do not tank-mix with Malathion.	Barley, triticale
Ally Extra with TotalSol (Ally+Harmony Extra)	0.3–0.5 oz	Annual broadleaves: annual mustards, kochia, wild buckwheat, curly dock.	Less than 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, MCPA, Bromoxynil	Barley, triticale
Amber 75 DF	0.28–0.47 oz	Annual broadleaves: pennycress, tansy mustard, kochia.	Dependent on weed species, generally 2–6 in. tall. Refer to label for specific weeds.	Do not apply to stressed wheat. Do not apply the <b>enhanced</b> rate to soils above pH 7.5, except in the Texas Blacklands.	Clarity, Banvel, Buctril, 2,4-D, Express, Harmony Extra, Maverick, MCPA, Starane	Barley

(continued on next page)

**Table 3. Postemergence herbicides (continued)**

Product name	Application rate per acre	Weeds controlled	Weed height at application	Remarks	Tankmix options	Labeled in other small grains
Axial XL	8.2 oz	Annual grasses: wild oat, Italian ryegrass.	1–5-leaf stage and before 3 tillers develop	Apply at 2-leaf to boot stage. Adigor adjuvant must be used with this product at 9.6 oz/acre. Do not apply to stressed wheat. Fertilizer solutions should not exceed 50% liquid nitrogen.	Ally, Amber, Finesse, Buctril, 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 ryegrass.	Prior to 1-leaf stage	Certain varieties are sensitive to Axiom; see label for specifics. Rate is dependent on soil type. Apply at spike to the 3-leaf stage. Do not exceed 10 oz/acre/season. Crop oil concentrate, vegetable oil, and petroleum are <b>not</b> recommended as a surfactant.	Numerous herbicides labeled	Triticale
Beyond	4–6 oz	Annual grasses: cheat, jointed goatgrass, wild oat, ryegrass, rescuegrass, feral rye. Annual broadleaves: mustards, henbit, primrose.	Grasses: 1- to 4-leaf stage Broadleaves: 1–3 in. tall; refer to label.	<b>Use only with Clearfield wheat seed.</b> A surfactant and nitrogen-based fertilizer must be added to spray solution. A maximum of 8 oz/acre can be applied each growing season. Seed cannot be saved. Refer to label for rotational restrictions.	Dicamba, 2,4-D, Buctril, Starane, Stinger, MCPA	None
Buctril 4 EC	0.75–1.0 pt	Annual broadleaves: kochia, field pennycress, corn groomwell.	8-leaf stage, 4 in. tall, or rosette up to 2 in. Refer to label.	Apply from crop emergence to boot stage. Good crop tolerance. Do not apply when crop covers weeds or crop is under water stress.	Numerous broadleaf and grass herbicides	Barley, oats, rye, triticale
Bronate 4 EC Buctril + MCPA	1.0–2.0 pt	Annual broadleaves: pepperweed, wild mustard, Russian thistle.	8-leaf, 4 in. tall or rosette up to 2 in. Refer to label.	Apply when wheat is at 3-leaf to boot stage.	Numerous options	Barley, oats, rye
Clopyralid (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 months for sorghum. Avoid drift.	Refer to label	Barley, oats
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: mustards, thistles, dock. Also garlic and onion.	Small weeds	Apply in the spring when wheat is full tiller, but before boot stage. Crop injury may occur at higher rates.	Commonly tank-mixed with ALS herbicides	Barley, rye
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 prior to wheat-jointing stage. Early crop stages have more tolerance.	Commonly tank-mixed with ALS herbicides	Barley, oats

*(continued on next page)*

**Table 3. Postemergence herbicides (continued)**

Product name	Application rate per acre	Weeds controlled	Weed height at application	Remarks	Tankmix options	Labeled in other small grains
Express with TotalSol	0.25–0.50 oz	Annual broadleaves: mustards, pennycress, wild garlic.	Less than 4 in. tall or wide	Apply after wheat is at 2-leaf stage but before flag leaf is visible. Short rotational restriction.	Assert, Banvel, Bromoxynil, 2,4-D, MCPA, Starane	Barley, triticale
Finesse DF (Glean + Ally)	0.2–0.4 oz	Annual broadleaves: mustards, curly dock, henbit, prickly lettuce.	Broadleaves: refer to the label.	Apply from 1-leaf to boot stage of wheat. Should not be used in soils with a pH above 7.9. Long rotation restrictions.	2,4-D, Dicamba, MCPA, Diuron, Bromoxynil, Metribuzin	Triticale, barley
Finesse Grass + Broadleaf (Glean + Everest)	Rate I: 1 jug/30 acres Rate II: 1 jug/25 acres Rate III: 1 jug/20 acres	Annual grasses: brome species (except rescuegrass), wild oat, ryegrass. Annual broadleaves: henbit, flixweed, mustards.	Grasses: 2 tillers or less. Broadleaves: varies with weed species; see label.	Apply from 2-leaf stage to jointing. Crop injury may occur if applied at jointing or after. Ryegrass should be less than 1 tiller.	2,4-D, MCPA, Bromoxynil, Aim, Curtail or Stinger, Starane	None
Glean FC DF	0.17–0.33 oz	Annual broadleaves: tansy mustard, henbit. Suppression of annual ryegrass.	Small weeds (2 in. across or 2 ft tall). Refer to label for specific species.	Apply from 2-leaf stage but before boot stage of wheat. Application interval and rate are dependent on location in Texas; see label. Do not apply to soil with a pH above 7.9.	Dicamba, Bromoxynil, MCPA, 2,4-D	Barley, oats, triticale
Harmony Extra with TotalSol	0.45–0.9 oz	Annual broadleaves: tansy mustard, chickweed.	Less than 4 in. tall or wide	Apply from 2-leaf stage but before boot stage.	2,4-D, MCPA, Dicamba, Ally, Bromoxynil, Express, Hoelon	Triticale, barley, oats
Hoelon 3EC	1.33–2.66 pt	Annual grasses: ryegrass, wild oat.	1–4 leaf, depending on rate	Apply to wheat before jointing. Use crop oil concentrate surfactant. Do not apply if temperatures are below 35 degrees 3 days before application. Do not apply to wet fields. Do not apply to wheat within 77 days of harvest.	Amber, Glean, Bromoxynil, Harmony Extra, MCPA	Barley
Huskie	11–15 oz	Annual broadleaves: mustards, henbit, flixweed, thistles.	1–6 in. tall, up to 4 in. in diameter. Refer to label for specific species.	Apply from fully expanded first true leaf up 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 of nitrogen/acre.	Numerous grass and broadleaf herbicides	Barley, triticale

*(continued on next page)*

**Table 3. Postemergence herbicides (continued)**

Product name	Application rate per acre	Weeds controlled	Weed height at application	Remarks	Tankmix options	Labeled in other small grains
Maverick Pro	0.66 oz	Annual broadleaves: tansy mustard, shepherdspurse, penny cress. Annual grasses: brome species; suppression of rescuegrass and wild oat.	2–3-leaf stage for grasses. Broadleaves less than 2 in. in diameter.	After 2-leaf stage but before jointing. Fertilizer should contain less than 50% liquid nitrogen and not exceed 30 lb nitrogen/acre. Fall applications are typically more effective.	Bronate, Buctril, 2,4-D, 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 0.17–0.33 pt	Annual, biennial, perennial broadleaves: dandelion, yellow rocket, wild radish.	Annual weeds: small. Perennial weeds: at bud stage but before wheat boot stage.	After 4-leaf stage up to boot stage; high rate after tiller to early boot stage. Late-season application for control of perennial weeds must be made before wheat boot stage.	Refer to label	Barley, oats, rye
Olympus 70 WD	0.6–0.9 oz Do not exceed 1.2 oz per crop per crop year.	Annual grasses: brome species, wild oat; suppression of rescuegrass at high rates. Broadleaves: henbit, shepherdspurse, pennycress, pigweed, wild mustards; see label.	Best control on grasses between 2-leaf and 2-tiller stage. Best control on broadleaves less than 2 in. in diameter.	Apply to winter and spring wheat before jointing to avoid crop injury. Fertilizer solutions should not exceed 50% liquid nitrogen.	Amber, Aim, Ally, Banvel, Bronate, Buctril, Clarity, Curtail, Finesse, Harmony, MCP, Peak, Rave, Sencor, Starane, 2,4-D	None
Olympus Flex (Olympus + Osprey)	3.0–3.5 oz	Annual grasses: brome species (except rescuegrass), wild oat, ryegrass. Broadleaves: mustards, chickweed.	Best control on grasses between 1-leaf and 2-tiller stage. Best on broadleaves less than 2 in. in diameter.	Fall-sown wheat only. Fertilizer solutions should not exceed 50% liquid nitrogen and not exceed 30 lb nitrogen/acre.	Amber, Aim, Ally, Buctril, Finesse, Harmony, MCP, Peak, Sencor, Starane	None
Osprey	4.75 oz	Annual grass: Italian ryegrass, wild oat. Broadleaves: henbit, pigweed, mustards.	Annual grasses: 1-leaf to 2-tiller stage. Broadleaves: 1–2 in. in diameter.	Apply to winter wheat before jointing to avoid crop injury. Apply with MSO (methylated seed oil) or other adjuvants mixed with ammonium nitrogen. Fertilizer solutions should not exceed 15% liquid nitrogen. Crop injury may occur if applied with organophosphate insecticides.	Ally, Buctril, Bronate, Curtail, Harmony, MCP, Peak, Starane, Stinger, Finesse	None
Peak WDG	0.38–0.5 oz	Annual broadleaves: prickly lettuce, pennycress, Russian thistle, kochia, tansy mustard, wild mustard.	1–2-leaf stage or 1–6-leaf stage, depending on weed species; refer to label.	Apply to wheat after emergence to before second node is detectable. Consult the product label for crop rotation restrictions.	Dicamba, Bronate, 2,4-D, MCPA. Refer to label.	Barley, oats, rye, triticale

*(continued on next page)*

**Table 3. Postemergence herbicides (continued)**

Product name	Application rate per acre	Weeds controlled	Weed height at application	Remarks	Tankmix options	Labeled in other small grains
PowerFlex	3.5 oz	Annual grass: Italian ryegrass, wild oat, brome species. Broadleaf weeds: flixweed, henbit, mustards, Russian thistle.	Annual grasses: 2-leaf to 2-tiller stage. Broadleaves: prior to 2 in. tall or 2 in. in diameter.	Apply to winter wheat from 3-leaf stage to jointing. Fertilizer solutions should not exceed 50% liquid nitrogen and not exceed 30 lb nitrogen/acre. Crop injury may occur if applied with organophosphate insecticides. <b>Do not mix with Dicamba or amine formulations of 2,4-D or MCPA.</b>	Do not mix with Dicamba or amine formulations of 2,4-D or MCPA. Refer to label for others.	None
Puma 1EC	10.6 oz	Wild oat	2-leaf to 2-tiller stage	Apply to wheat from emergence to the 70 days prior to harvest. Do not exceed 10.6 oz/acre annually.	Ally, Harmony Extra, MCP, Peak	Barley
Rave 59 WDG (Amber + Dicamba)	2.0–4.0 oz	Annual and perennial broadleaves: henbit, mustards, kochia, bindweed, curly dock.	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).	Aim, Ally, Buctril, Bronate, 2,4-D	Barley
Sencor 4L DF	1.5–4.5 oz 1–6 oz	Annual broadleaves: henbit, filaree, shepherdspurse, pennycress. Annual grass suppression: cheat, brome species.	Grasses: less than 2 in. Broadleaves: less than 1 in.	Wheat varietal sensitivity; refer to label. Apply after 2-leaf up to jointing stage. Do not apply when wheat is dormant. Correct timing is necessary to minimize crop injury. Rates vary by wheat stage, soil texture and organic matter. Do not use crop oil adjuvants. Crop injury may occur on high-pH and sandy soils.	Ally, Amber, Finesse, Glean, Harmony Extra, 2,4-D, MCPA, Dicamba, Bronate, Buctril	Barley
Starane	0.33–0.66 pt	Annual and perennial broadleaves: chickweed, prickly lettuce, kochia.	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; refer to label.	Barley, oats
Tiller EC (Puma+2,4-D+MCPA)	1–1.7 pt	Annual broadleaves: pennycress, mustards. Annual grasses: wild oat, volunteer corn.	Grasses: 2-leaf to 2-tiller stage. Broadleaves: less than 4 in.	Apply after 3-tiller to jointing stage.	Buctril, Stinger, Peak, Starane; refer to label.	None
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 injury may occur at higher rates.	Ally, Amber, Finesse, Glean, Harmony Extra and others	None

**Table 4. Harvest aids**

Product name	Application rate per acre	Weeds controlled	Preharvest interval	Crop application timing	Remarks	Tankmix options	Mode of action
Ally	0.1 oz	Annual broadleaf weeds.	A waiting interval of 10 days is required before harvest.	Apply when wheat is in the hard dough stage.	Do not use in soils with a pH exceeding 7.9. Weeds growing under limited moisture may not be controlled. Do not use straw for livestock feed.	2,4-D, Roundup	ALS inhibitor
Clarity	0.5 pt	Annual and some perennial broadleaf weeds.	A waiting interval of 10–14 days is required before harvest.	Apply when wheat is in the 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.	Ally, 2,4-D, 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.	Apply after hard dough stage of grain (less than 30% moisture).	Do not exceed 1 quart/acre. Not recommended for wheat being harvested for seed. Do not feed treated straw or permit dairy or meat animals being finished for slaughter to graze treated grain fields within 7 days after treatment.	2,4-D, Clarity	ALS inhibitor
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.	Apply after wheat is in the hard dough stage.	Do not use treated straw for livestock.	Ally, Clarity, Roundup	Growth regulator
Weedmaster	Up to 2.0 pt	Annual and some perennial broadleaf weeds.	A waiting interval of 7 days is required before harvest.	Apply 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	Apply during the bloom to bud stage while weeds are actively growing.	Allow 2 weeks following 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.
Paramount DF (quinclorac)	5.3–8.0 oz	Annual grass and annual broadleaf weeds, field bindweed.	Plants should be actively growing and at least 4 in. long. Apply in fall just prior to first freeze. Following tillage, allow 30 days for regrowth prior to herbicide application.	Restricted for use only in the High Plains of Texas. Refer to label for acceptable counties.
Roundup	4–5 qt	Annual and perennial grass and broadleaf weeds.	Apply during the bloom to bud stage while weeds are actively growing.	No plant-back restrictions.
Tordon 22K	0.5–1.0 pt	Annual and perennial broadleaf weeds, bindweed.	Apply 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.	Apply after wheat harvest and before killing frost.	Allow 40 days between application and planting to prevent wheat injury. Do not exceed 4 qt/acre per year.

**Table 6. Herbicide restrictions and mode of action**

Product name (common name, active ingredient)	Grazing and forage restrictions	Crop rotation restrictions	Mode of action <sup>1</sup>
Achieve SC Achieve Liquid (tralkoxydim)	Do not graze or hay for 30 days.	Cereals: 30 days. Other crops: 106 days.	ACCCase
Affinity Broadspec (thifensulfuron-methyl + tribenuron-methyl); 1:1 ratio	Do not graze, feed forage, or hay.	Wheat and barley: anytime. Cotton: 14 days. Canola and sugarbeets: 60 days. Other crops: 45 days.	ALS inhibitor
Affinity Tankmix (thifensulfuron+tribenuron); 4:1 ratio	Do not graze, feed forage, or hay.	Wheat and barley: anytime. Canola and sugarbeets: 60 days. Other crops: 45 days.	ALS inhibitor
Agility (Dicamba+thifensulfuron+tribenuron+metsulfuron)	Do not graze, feed forage, or hay.	Wheat: 1 mo. Corn: 12 mo. Cotton: 14–22 mo. Sorghum: 4 mo.	Growth regulator + ALS inhibitor
Aim EW Aim EC (carfentrazone-ethyl)	Do not graze for 7 days.	Corn, cotton, sorghum, soybeans, wheat: anytime. Root and leafy vegetables: 30 days. Other crops: 12 mo. after application.	Photosynthetic inhibitor
Ally XP (metsulfuron-methyl)	No restrictions.	Corn: 12 mo. Cotton: 14–22 mo. Sorghum: 10 mo. Soybeans: 34 mo. Sunflowers: 22 mo.	ALS inhibitor
Ally Extra (Ally+Harmony Extra) (thifensulfuron-methyl, tribenuron-methyl, metsulfuron-methyl)	Do not graze, feed forage, or hay.	Corn: 4–12 mo. Cotton: 14–22 mo. Soybeans: 4 mo. Sorghum: 4 mo.	ALS inhibitor
Amber 75 DF (triasulfuron)	No restrictions.	<b>Soil pH 7.9 or lower:</b> Corn: 22 mo. IR corn: 4 mo. Sorghum: 14 mo. Soybeans: 36 mo. STS soybeans: 11 mo. Other crops: field bioassay.	ALS inhibitor
Axial XL (penoxaden)	Do not graze or hay for 50 days.	Wheat: immediately. Root and leafy crops: 30 days. Other crops: 120 days.	ACCCase
Axiom DF (flufenacet + metribuzin)	Do not graze for 30 days.	Corn, soybeans, wheat, triticale: immediately. Cotton: 8 mo. Oats, sorghum, rye: 12 mo. after application.	Photosynthetic inhibitor
Beyond (imazamox)	No restrictions for grazing or hay.	Clearfield wheat: anytime. Wheat: 3 mo. Corn: 8.5 mo. Cotton: 9 mo. Sorghum: 9 mo. Sunflowers: 9 mo.	ALS inhibitor
Buctril 4 EC (Bromoxynil)	Do not graze for 45 days.	Corn, sorghum: immediately. Most others: 1 mo.	Photosynthetic inhibitor
Bronate 4 EC (Buctril + MCPA)	Do not graze for 45 days.	Do not plant rotational crops within 30 days.	Photosynthetic inhibitor + growth regulator
Stinger (clopyralid)	Do not graze for 7 days. Do not harvest hay.	Cereals and corn: immediately. Sorghum, alfalfa, sunflower: 10.5 mo.	Growth regulator

*(continued on next page)*



**Table 6. Herbicide restrictions and mode of action (continued)**

Product name (common name, active ingredient)	Grazing and forage restrictions	Crop rotation restrictions	Mode of action <sup>1</sup>
2,4-D 2,4-D 4 Amine 2,4-D 4 Low V Ester 2,4-D 6 Low V Ester	Do not graze for 14 days.	Corn: immediately. Cotton: refer to label. Sorghum, wheat: 0.5 mo. Soybeans: check label.	Growth regulator
Dicamba Banvel 4L Clarity 4L	Do not graze for 7 days for lactating dairy cattle. No haying for 37 days.	Corn: immediately. Sorghum: 15 days. Others: after harvest.	Growth regulator
Express 75 XP (tribenuron-methyl)	Do not graze or feed hay of treated area.	Wheat: anytime. Most other crops: 45 days (see label for exceptions).	ALS inhibitor
Finesse DF (Glean + Ally) (chlorsulfuron + metsulfuron-methyl)	No grazing restrictions.	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
Finesse Broadleaf + Grass (Glean + Everest) (chlorosulfuron + flucarbazone-sodium)	Do not harvest grain for 60 days.	<b>Soil pH 7.9 or lower:</b> Wheat: 4 mo. Barley: 10 mo. Soybeans (STS): 9 mo. Soybeans: 14 mo. Other crops: perform a field bioassay before planting.	ALS inhibitor
Glean FC DF (chlorsulfuron)	No grazing restrictions.	Sorghum: 14–25 mo. Cotton: 14–26 mo. or field bioassay, dependent on area, pH and rainfall. Other crops: perform a field bioassay before planting.	ALS inhibitor
Harmony Extra DF (thifensulfuron-methyl + tribenuron-methyl)	Do not graze, feed forage, or hay.	Wheat: anytime. Most other crops: 45 days after application (see label for exceptions).	ALS inhibitor
Hoelon 3EC (diclofop-methyl)	Do not graze for 28 days. Do not harvest forage or hay prior to grain harvest.	All crops may be planted after harvest.	ACCase
Huskie (pyrasulfotole + bromoxynil)	Do not graze or harvest forage for 25 days. Do not harvest grain or straw for 60 days.	Wheat, barley, oats, triticale: 7 days. Sorghum and soybeans: 4 mo. Corn, canola, sunflowers: 9 mo. Cotton: conduct field bioassay.	Carotenoid biosynthesis inhibitor + photosynthetic inhibitor
Maverick Pro (sulfosulfuron)	No grazing restrictions. Do not cut hay for 30 days.	<b>Soil pH 7.5 or lower:</b> Wheat: anytime. Corn, sorghum, sunflower: 22 mo. Cotton, soybeans: 12 mo.	ALS inhibitor
MCPA (chlorophenoxyacetic acid)	Do not graze for 7 days.	Corn: immediately. Cotton: refer to label. Sorghum, wheat: 0.5 mo. Soybeans: check label.	Growth regulator

*(continued on next page)*

**Table 6. Herbicide restrictions and mode of action (continued)**

Product name (common name, active ingredient)	Grazing and forage restrictions	Crop rotation restrictions	Mode of action <sup>1</sup>
Olympus (propoxycarbazone- sodium)	No grazing restrictions.	Wheat: anytime. Cotton, sorghum, soybeans, sunflower: 12 mo. Corn: 18 mo.	ALS inhibitor
Olympus Flex (Olympus + Osprey) (propoxycarbazone-sodium + mesosulfuron-methyl)	No grazing restrictions.	Wheat: anytime. Soybeans: 5 mo. Sorghum: 9 mo. Cotton: 10 mo. Corn: 12 mo.	ALS inhibitor
Osprey (mesosulfuron-methyl)	Do not apply 30 days before harvesting for forage. Hay and silage: 60 days.	Wheat: 7 days. Barley, sunflower: 1 mo. Cotton, soybeans, peanuts: 3 mo. Corn: 12 mo. Other crops: 10 mo.	ALS inhibitor
Peak WDG (prosulfuron)	Do not graze for 30 days. Silage: 40 days. Grain: 60 days.	<b>Soil pH below 7.8:</b> Wheat, IR corn: immediately. Corn, sorghum: 1 mo. STS soybeans, soybeans, cotton: 10 mo. <b>Refer to label for specifics.</b>	ALS inhibitor
PowerFlex (pyroxsulam)	Do not graze for 7 days. Do not cut hay for 28 days.	Wheat: 1 mo. Barley, canola, corn, oats, sorghum, soybeans, sunflower: 9 mo. Other crops: refer to label.	ALS inhibitor
Prowl H2O	Do not feed forage or graze for 75 days.	Sorghum: 10 mo. Wheat: 4 mo. Cotton, corn, soybeans: immediately.	Meristematic inhibitor
Puma 1EC (fenoxaprop-p-ethyl + safener)	No grazing restrictions.	Refer to label.	ACCase
Rave 59 WDG (triasulfuron + Dicamba)	Do not graze for 7 days for dairy cattle or 30 days before slaughter.	<b>Soil pH 7.9 or lower:</b> Corn: 22 mo. IR corn: 4 mo. Sorghum: 14 mo. Soybeans: 36 mo. STS soybeans: 11 mo. Other crops: refer to label.	ALS + growth regulator
Sencor (metribuzin) 4L DF	Do not graze for 14 days.	Soybeans, alfalfa: 4 mo. Wheat, cotton, barley: 8 mo. Other crops: 12 mo.	Photosynthetic inhibitor
Starane (fluroxypyr)	Do not graze for 7 days.	If replanting is required, only wheat, barley or oats may be planted within 120 days following application.	Growth regulator
Tiller EC (Puma+2,4-D+MCPA)	Do not graze.	Refer to label.	ACCCase + growth regulator
Weedmaster (2,4-D + Dicamba)	Do not graze or harvest prior to crop maturity.	Wheat: 10 days/pt applied. Other crops: 120 days.	Growth regulator

<sup>1</sup>Mode of Action is the primary biochemical or biophysical event that an herbicide directly affects, resulting in the death of the plant.

ACCCase 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 herbicides.

Growth regulator herbicides disrupt hormone balance and protein synthesis in the plant. This leads to weak cell walls and rapid cell proliferations.

Mitotic disruptor herbicides inhibit cell division and prevent shoot and root elongation.

Photosynthetic inhibitor herbicides inhibit electron transport in the photosynthetic reaction of plants.

**Table 7. Herbicide efficacy for grasses and weeds**

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
<b>Preplant</b>																														
Amber DF	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
Axiom DF				E													E											G		
Finesse DF	P	P	P	G	P	P	P	E	E	E	E	G	E	P		E	E	G	FG	P	E	E	E	F	E	E		E		E
<b>Preemergence</b>																														
Amber DF	F	F		G								G	E	P	E	E	G	G	FG	P	G	G		G	E	G		E		E
Axiom DF																														
Finesse	F	F		F								G	E	P	E	E	E	G	FG	P	G	F		F	E	E		E		E
Glean FC				F								G	E	P		E		G	FG	P	G				E	E		E		E
Hoelon 3EC				E				P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
Maverick Pro	G	GE		F										P	E		F													E
Prowl H <sub>2</sub> O				F			F												G		E			G						
<b>Postemergence</b>																														
Achieve 40DG				F			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																														
Affinity Tankmix																														
Agility																														
Aim WDG	P	P	P	P	P	P	P	G		P			F	F	E	GE	G	F	G	G	G	F		G	G			G		GE
Ally DF	P	P	P	P	P	P	P	G					P	E	GE	E	G	F			G	G		F	G			F		E
Amber 75 DF	P	P	P	P	P	P	P	G					G	P	E	GE	F	G	FG		G	E		FG	G	G		E		E
Assert 2.5LC																														
Axial				E			E	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P

(continued on next page)

**Table 7. Herbicide efficacy for grasses and weeds (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			
<b>Postemergence (continued)</b>																																	
Banvel	P	P	P	P	P	P	P	E						G	FG	E	E	FG	GE		E	G		E	E			E			FG		
Beyond on Clearfield wheat	E	E	G	G	E	G	E	G						G		G	P	P	P		P	P			G			P			FG		
Bromoxynil 4 EC	P	P	P	P	P	P	P	G		F	G	G	P	P	GE	G	F	F	GE	G	G	G		G	G			G			G		
Bronate 4 EC	P	P	P	P	P	P	P												GE	G					E			G					
Clopyralid (Stinger)	P	P	P	P	P	P	P																										
2,4-D	P	P	P	P	P	P	P	E		P	P	G	G	G	E	E	F	P	G		G	G		E	E	G		G		G			
Express 75 DF	P	P	P	P	P	P	P	G						P		GE		F	G		G	G		G	G		F		GE				
Finesse DF	P	P	P	F	P	P	P	E	E	E	E	E	E	P	E	GE	E	E	F	P		E	E	F	E	E	F	E	E				
Finesse Broadleaf + Grass	F	G	P	F	P	P	G	E	E	E	E		E	P		E	E		P		E	E		E	E		F		GE				
Glean FC DF	P	P	P	F	P	P	P	E	E	E	E		E		E	E	E		G	P		E	E	G	E	E	F						
Harmony Extra DF*	P	P	P	P	P	P	P	E		G	G	E	F	P	G		G	FG	G	G	G	G		G	G		G		GE				
Hoelon 3EC	P	P	P	E	P	P	E	P	P	P	P	P	P	P		P	P	P	P	P	P	P	P	P	P	P	P	P	P				
Maverick Pro**	F	E	P	F	P	P	F	G							E	G	P	F	P		P	F		P	G		P	F					
MCPA	P	P	P	P	P	P	P							F	G		F	P	P		F	F	F	F	G		F	P					
Olympus	G	E	P	P	P	P	G	G	P	G	P		P	P	E	E	F		P		F	F		P	E	E	F	G					
Olympus Flex				G			G																										
Osprey	F	F	P	G	P	P	E			F			F		F		F				F			F									
Peak WDG	P	P	P	P	P	P	P	G		G			G	P	E	E	P	F	F		G	G		G		G		G					
PowerFlex***	GE	GE		G		G	GE				G					G	G											G					
Rave 59 WDG	P	P	P	P	P	P	P	E		G		G	FG		E	G	G	E	G	E	E	E	E	E	E	G	E	G					
Puma 1EC	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					

(continued on next page)

**Table 7. Herbicide efficacy for grasses and weeds (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
<b>Postemergence (continued)</b>																														
Sencor	G	E		E						E		P					G	G		E										
Starane	P	P	P	P	P	P	P							G	G				GE		F					F				
Tiller EC – Premix																														
<b>Harvest aids</b>																														
Ally																														
Clarity	P	P	P	P	P	P	P																							
Glyphosate	E	E	E	E	E	E	E																							
2,4-D	P	P	P	P	P	P	P																							
<b>Postharvest herbicides</b>																														
2,4-D	P	P	P	P	P	P	P					F		F				F	G			G								
Dicamba	P	P	P	P	P	P	P																							
Roundup	E	E	E	E	E	E	E	E	E	E	E	E	G	G		E	E	FG	E	E	E	E		G	E				G	
Tordon 22K	P	P	P	P	P	P	P						G						G		G									

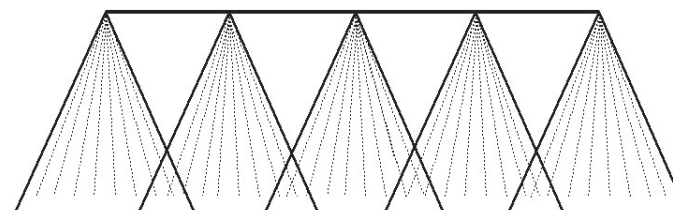
\*Harmony GT ratings

\*\*Maverick ratings

\*\*\*Based on limited ratings

## Figure 2. Boom sprayer calibration

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



**Chart for 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 =  $\frac{1}{128}$  of an acre).

**Example:** Calibration distance for 19-inch nozzle spacing =  $340 \div \frac{19}{12} = 215$  feet.

Source: *Suggestions for Weed Control in Cotton (B-5039)*, Texas AgriLife Extension Service.



The information given herein is for educational purposes only. Reference to commercial products or trade names is made with the understanding that no discrimination is intended and no endorsement by the Texas AgriLife Extension Service is implied.

Produced by AgriLife Communications and Marketing, Texas A&M System  
Extension publications can be found on the Web at: <http://agrilifebookstore.org>

Visit the Texas AgriLife Extension Service at <http://agrilifeextension.tamu.edu>

Educational programs of the Texas AgriLife Extension Service are open to all people without regard to race, color, sex, disability, religion, age, or national origin.

Issued in furtherance of Cooperative Extension Work in Agriculture and Home Economics, Acts of Congress of May 8, 1914, as amended, and June 30, 1914, in cooperation with the United States Department of Agriculture.  
Edward G. Smith, Director, Texas AgriLife Extension Service, Texas A&M System.

500, Revision