

SMALL GRAIN INSECT CONTROL

(Grain Production of Wheat, Barley, Oats, and Rye)

David Buntin, Research/Extension Entomologist

CROP/PEST	INSECTICIDE ¹	AMOUNT OF FORMULATION PER ACRE	LB. ACTIVE INGREDIENT PER ACRE	TREATMENT THRESHOLDS AND REMARKS
WHEAT and TRITICALE				
Aphids	Seed Treatments <u>imidacloprid</u> Gaucho 480 Gaucho 600, Attendant 600 Gaucho XT Enhance AW	1.0 fl. oz./100 lb. seed 0.8 fl. oz./100 lb. seed 3.4 fl. oz./100 lb. seed 4.0 fl. oz./100 lb. seed	0.03 lb./100 lb. seed 0.03 lb./100 lb. seed 0.03 lb./100 lb. seed 0.05 lb./100 lb. seed	Inspect fields at 30-40 days after planting, full tiller, and heading. Yield-reducing transmission of Barley Yellow Dwarf virus can occur during first two periods; transmission at heading is too late to reduce yield. Aphid treatment thresholds are: Seedlings (2/row ft.), 6-10 inch plants (6/row ft.), Stem elongation (2 per stem), Flag leaf (5/flag), Heading (10 per head to include flag), Soft/Hard Dough stages (Do not treat). NOTE: Seed treatment rates are for aphids but labeled rates Gaucho XT and Enhance AW also contains two fungicides. NOTE: Cruiser 5FS is available as a commercial seed treatment. Cruiser Wheat-pack also contains fungicides. Rate of CruiserMaxx Cereals is too low for effective aphid control.
	<u>thiamethoxam</u> Cruiser 5FS Cruiser Wheat-pack (5FS)	1.0 fl. oz./100 lb. seed 1.0 fl. oz./100 lb. seed	0.04 lb./100 lb. seed 0.04 lb./100 lb. seed	
	Foliar Treatments Baythroid XL (1EC)	2.4 fl. oz.	0.019	
	Dimethoate 4EC, 400 Dimethoate 2.67EC	0.5 - 0.75 pt. 0.75 - 1 pt.	0.25 - 0.375 0.25 - 0.375	
	Methyl 4EC PennCap-M	0.5 - 1.5 pt. 2 - 3 pt.	0.25 - 0.75 0.5 - 0.75	
	<u>lambda/gamma cyhalothrin</u> Karate Zeon 2.08, Warrior, Silencer, Lambda, others (1.0) Prolex 1.25 Proaxis 0.5	1.28 - 1.92 fl. oz. 2.56 - 3.84 fl. oz. 1.02 - 1.54 fl. oz. 2.56 - 3.84 fl. oz.	0.02 - 0.03 0.02 - 0.03 0.01 - 0.015 0.01 - 0.015	
Armyworm (True armyworm)	Baythroid XL (1EC)	1.8 - 2.4 fl. oz.	0.014 - 0.019	ARMYWORM (True armyworm): Usually late winter and spring at boot/head stage. Treat when larval numbers exceed 4 larvae per square foot before pollen shed and 8 larvae per square foot after pollen shed. NOTE: Tracer is most effective against small larvae.
	Lannate 2.4LV Lannate 90SP	1.5 pt. 0.5 lb.	0.45 0.45	
	Methyl 4EC PennCap-M	1 - 1.5 pt. 2 - 3 pt.	0.5 - 0.75 0.5 - 0.75	
	Mustang MAX, Respect (0.8EC)	3.2 fl. oz.	0.02	
	Sevin 80S Sevin XLR Plus, 4F	1.875 lb. 1.5 qt.	1.5 1.5	
	Tracer 4SC	1.5 - 2 fl. oz.	0.047 - 0.063	
	<u>lambda/gamma cyhalothrin</u> Karate Zeon 2.08, Warrior, Silencer, Lambda, others (1.0) Prolex 1.25 Proaxis 0.5	1.28 - 1.92 fl. oz. 2.56 - 3.84 fl. oz. 1.02 - 1.54 fl. oz. 2.56 - 3.84 fl. oz.	0.02 - 0.03 0.02 - 0.03 0.01 - 0.015 0.01 - 0.015	

SMALL GRAIN INSECT CONTROL (continued)

CROP/PEST	INSECTICIDE ¹	AMOUNT OF FORMULATION PER ACRE	LB. ACTIVE INGREDIENT PER ACRE	TREATMENT THRESHOLDS AND REMARKS
Fall armyworm, Beet armyworm, Yellowstriped armyworm, and Cutworms	Lannate 2.4LV Lannate 90SP	1.5 pt. 0.5 lb.	0.45 0.45	FALL, BEET, and YELLOWSTRIPED ARMYWORMS and CUTWORMS: Usually in fall on seedling plants. Treat when larval populations of any one or any combination of these insects exceed 3 larvae (1/2 inch long or larger) per square foot. NOTE: Tracer is more effective against small larvae. Tracer is not labeled for cutworm control.
	Mustang MAX, Respect (0.8EC)	4.0 fl. oz.	0.025	
	Sevin 80S Sevin XLR Plus, 4F	1.875 lb. 1.5 qt.	1.5 1.5	
	Tracer 4SC	1.5 - 3.0 fl. oz.	0.047 - 0.094	
	<u>lambda/gamma cyhalothrin</u> Karate Zeon 2.08 Warrior, Silencer, Lambda, others (1.0) Prolex 1.25 Proaxis 0.5	1.92 fl. oz. 3.84 fl. oz. 1.54 fl. oz. 3.84 fl. oz.	0.03 0.03 0.015 0.015	
Cerealeaf Beetle	Baythroid XL (1EC)	1.0 - 1.8 fl. oz.	0.008 - 0.014	CEREAL LEAF BEETLE: Treat when an average of 1/2 larva per stem are found. Warrior and Proaxis can be applied at 50% egg hatch. Other materials should not be applied until after 90% egg hatch. NOTE: lambda / gamma cyhalothrin products applied for cereal leaf beetle also provide aphid control for the remainder of the season.
	Lannate 2.4LV Lannate 90SP	0.75 - 1.5 pt. 0.25 - 0.5 lb.	0.225 - 0.45 0.225 - 0.45	
	<u>malathion</u> Malathion 57EC, 5EC Malathion 8EC	1.5 pt. 1.0 pt.	0.94 1.0	
	Mustang MAX, Respect (0.8E)	2.6 - 3.2 fl. oz.	0.015 - 0.02	
	<u>lambda/gamma cyhalothrin</u> Karate Zeon 2.08 Warrior, Silencer, Lambda, others (1.0) Prolex 1.25 Proaxis 0.5	1.28 - 1.6 fl. oz. 2.56 - 3.2 fl. oz. 1.02 - 1.28 fl. oz. 2.56 - 3.2 fl. oz.	0.02 - 0.25 0.02 - 0.25 0.01 - 0.0125 0.01 - 0.0125	
Grasshoppers	Baythroid XL (1EC)	1.8 - 2.4 fl. oz.	0.014 - 0.019	GRASSHOPPERS: Treat when populations are causing excessive (greater than 50%) defoliation. NOTE: Furan can NOT be applied after grain heads emerge from boot.
	Furadan 4F	0.25 - 0.5 pt.	0.125 - 0.25	
	<u>malathion</u> Malathion 57EC Malathion 8EC	1.5 - 2 pt. 1.0 - 1.25 pt.	0.94 - 1.25 1.0 - 1.25	
	Methyl 4EC PennCap-M	1 pt. 2 - 3 pt.	0.5 0.5 - 0.75	
	Mustang MAX, Respect (0.8E)	3.2 - 4.0 fl. oz.	0.02 - 0.025	
	Sevin 80S Sevin XLR Plus, 4F	1.25 - 1.875 lb. 1 - 1.5 qt.	1 - 1.5 1 - 1.5	
	<u>lambda/gamma cyhalothrin</u> Karate Zeon 2.08 Warrior, Silencer, Lambda, others (1.0) Prolex 1.25 Proaxis 0.5	1.28 - 1.92 fl. oz. 2.56 - 3.84 fl. oz. 1.02 - 1.54 fl. oz. 2.56 - 3.84 fl. oz.	0.02 - 0.03 0.02 - 0.03 0.01 - 0.015 0.01 - 0.015	

SMALL GRAIN INSECT CONTROL (continued)

CROP/PEST	INSECTICIDE ¹	AMOUNT OF FORMULATION PER ACRE	LB. ACTIVE INGREDIENT PER ACRE	TREATMENT THRESHOLDS AND REMARKS
Green June beetle larvae	Sevin 80S Sevin XLR Plus, 4F	1.875 lb. 1.5 qt.	1.5 1.5	GREEN JUNE BEETLE LARVAE: Treat before planting if populations average 1 or more grub per square yard. Apply to infested pastures before seeding small grains. Sevin is not registered for use on barley, oats or rye.
Chinch bug	Baythroid XL (1EC)	2.4 fl. oz.	0.019	CHINCH BUG: Treat during the seedling stage when an average of 1 adult per 2 plants are found. On larger plants treat when 75 percent of the plants are infested. Gaucho, Attendant, and Cruiser seed treatments may provide control for a few weeks after planting. Chinch bugs are difficult to control in headed wheat.
	Mustang MAX, Respect (0.8E)	4.0 fl. oz.	0.025	
	<u>lambda/gamma cyhalothrin</u> Karate Zeon 2.08 Warrior, Silencer, Lambda, others (1.0)	1.92 fl. oz. 3.84 fl. oz.	0.03 0.03	
	Prolex 1.25 Proaxis 0.5	1.54 fl. oz. 3.84 fl. oz.	0.015 0.015	
Hessian fly	Seed Treatments <u>imidacloprid</u> Gaucho 480	2 - 3 fl. oz./100 lb. seed	0.0625 - 0.094 lb. / 100 lb. seed	HESSIAN FLY: Plant Hessian fly-resistant wheat varieties. Systemic insecticide seed treatments are recommended for susceptible cultivars. Systemic seed treatments may need highest rates for effective suppression. Gaucho XT alone may not provide good control. Rate of CruiserMaxx Cereals is too low for effective Hessian fly control. NOTE: Di-Syston 15G and 8E are no longer labeled for use on wheat, but older bags with wheat on the label can be used. Apply in-furrow at planting. NOTE: Apply Karate when adults are actively laying eggs. Apply based on egg sampling for best results.
	Gaucho 600, Attendant 600	1.6 - 2.4 fl. oz./100 lb. seed	0.0625 - 0.094 lb. / 100 lb. seed	
	Gaucho XT plus Gaucho 600	3.4 fl. oz./100 lb. seed 1.0 fl. oz./100 lb. seed	Combined: 0.0675 lb./100 lb. seed	
	<u>thiamethoxam</u> Cruiser 5FS	1.33 fl oz./100 lb. seed	0.06 lb./100 lb. seed	
Mites / Winter grain mite	Foliar Applications Karate Zeon, similar products (2.08CS)	1.92 fl. oz.	0.03	MITES: Treat when infestations are causing leaf discoloration in large areas of a field and mites are present. NOTE: Karate for suppression only.
	Methyl 4EC PennCap-M	1 - 1.5 pt. 2 - 3 pt.	0.5 - 0.75 0.5 - 0.75	
Stink bugs	Karate Z 2.08CS	1.92 fl. oz.	0.03	STINK BUGS: Numbers rarely reach levels needing control in wheat. Treat if stink bugs exceed 1 bug per square foot at milk stage. Control during medium-hard dough stages is not justified, except to prevent movement of bugs to susceptible crops in nearby fields as wheat matures.
	Baythroid XL (1EC)	1.8 - 2.4 fl. oz.	0.014 - 0.019	
	Methyl 4EC PennCap-M	1 - 1.5 pt. 2 - 3 pt.	0.5 - 0.75 0.5 - 0.75	
	Mustang MAX / Respect (0.8E)	3.2 - 4.0 fl. oz.	0.02 - 0.025	
Stink bugs	<u>lambda/gamma cyhalothrin</u> Karate Zeon 2.08 Warrior, Silencer, Lambda, others (1.0)	1.28 - 1.92 fl. oz. 2.56 - 3.84 fl. oz.	0.02 - 0.03 0.02 - 0.03	
	Prolex 1.25 Proaxis 0.5	1.02 - 1.54 fl. oz. 2.56 - 3.84 fl. oz.	0.01 - 0.015 0.01 - 0.015	

SMALL GRAIN INSECT CONTROL (continued)

CROP/PEST	INSECTICIDE ¹	AMOUNT OF FORMULATION PER ACRE	LB. ACTIVE INGREDIENT PER ACRE	TREATMENT THRESHOLDS AND REMARKS
<p>BARLEY: Control recommendation for barley are similar to recommendations for wheat with the following exceptions:</p> <ol style="list-style-type: none"> 1. Baythroid, Dimethoate, Sevin, Warrior, Karate, Proaxis, Respect, and Mustang MAX are NOT registered for use on barley. 2. Remaining registered insecticides for aphid control may not suppress barley yellow dwarf virus effectively in barley. 3. Barley is essentially resistant to Hessian fly except under extremely high infestations. Routine use of an insecticide is NOT recommended for Hessian fly control on barley. 				
<p>OATS and RYE (NOTE: MOST INSECTICIDES LISTED FOR USE ON WHEAT ARE NOT LABELED FOR OATS AND RYE.)</p>				
Aphids	<p>Seed Treatments Gaucho XT Gaucho 600, Attendant 600</p>	<p>3.4 fl. oz./100 lb. 0.8 - 2.4 fl. oz./100 lb.</p>	<p>0.03 lb/100 lb. seed 0.03 - 0.094 lb/100 lb. seed</p>	<p>APHIDS: Recommended foliar treatments suppress/control aphids but will not effectively suppress Barley Yellow Dwarf virus infection. Aphid treatment thresholds are: Seedlings (10/row ft.), 6-10 inch plants (20/row ft.), Flag leaf (5/flag), Heading (10 per head to include flag), Soft/Hard Dough stages (Do not treat). NOTE: Gaucho XT and Gaucho 600 provides control for up to 45 days after planting. Gaucho XT also contains Raxil and Apron fungicides.</p>
	<p>Foliar Treatments Karate Zeon 2.08CS</p>	<p>1.28 - 1.92 fl. oz.</p>	<p>0.02 - 0.03</p>	
	<p><u>malathion</u> Malathion 57EC, 5EC Malathion 8EC</p>	<p>1.5 - 2.0 pt. 1.0 - 1.25 pt.</p>	<p>0.94 - 1.25 1.0 - 1.25</p>	
	<p>Methyl 4EC PennCap-M</p>	<p>0.5 - 1.5 pt. 0.5 - 1.5 pt.</p>	<p>0.25 - 0.75 0.25 - 0.75</p>	
Armyworm	<p>Karate Zeon 2.08CS</p>	<p>1.28 - 1.92 fl. oz.</p>	<p>0.02 - 0.03</p>	<p>ARMYWORM (True armyworm): Usually late winter and spring at boot/head stage. Treat when larval numbers exceed 4 larvae per square foot before pollen shed and 8 larvae per square foot after pollen shed. NOTE: Tracer is most effective against small larvae.</p>
	<p>Lannate 2.4LV Lannate 90SP</p>	<p>1.5 pt. 0.5 lb.</p>	<p>0.45 0.45</p>	
	<p><u>malathion</u> Malathion 57EC, 5EC Malathion 8EC</p>	<p>2 pt. 1.25 pt.</p>	<p>1.25 1.25</p>	
	<p>Methyl 4EC PennCap-M</p>	<p>1.5 pt. 2 - 3 pt.</p>	<p>0.75 0.5 - 0.75</p>	
	<p>Tracer 4SC</p>	<p>1.5 - 2.0 fl. oz.</p>	<p>0.047 - 0.063</p>	
Fall armyworm, Beet armyworm, Yellowstriped armyworm, and Cutworms	<p>Karate Zeon 2.08CS</p>	<p>1.28 - 1.92 fl. oz.</p>	<p>0.02 - 0.03</p>	<p>FALL, BEET, and YELLOWSTRIPED ARMYWORMS and CUTWORMS: Usually in fall on seedling plants. Treat when larval populations of any one or any combination of these insects exceed 3 larvae (1/2 inch long or larger) per square foot. NOTE: Tracer is most effective against small larvae.</p>
	<p>Lannate 2.4LV Lannate 90SP</p>	<p>1.5 pt. 0.5 lb.</p>	<p>0.45 0.45</p>	
	<p>Methyl 4EC</p>	<p>1.5 pt.</p>	<p>0.75</p>	
	<p>Tracer 4SC</p>	<p>1.5 - 3.0 fl. oz.</p>	<p>0.047 - 0.094</p>	
Cereal Leaf Beetle	<p>Karate Zeon 2.08CS</p>	<p>1.28 - 1.6 fl. oz.</p>	<p>0.02 - 0.03</p>	<p>CEREAL LEAF BEETLE: Treat when an average of 1/2 larva per stem are found. Treat after 90% egg hatch has occurred.</p>
	<p>Lannate 2.4LV Lannate 90SP</p>	<p>0.75 - 1.5 pt. 0.25 - 0.5 lb.</p>	<p>0.225 - 0.45 0.225 - 0.45</p>	
	<p><u>malathion</u> Malathion 57EC, 5EC Malathion 8EC</p>	<p>1.5 pt. 1.0 pt.</p>	<p>0.94 1.0</p>	
	<p>Tracer 4SC</p>	<p>3 fl. oz.</p>	<p>0.094</p>	

SMALL GRAIN INSECT CONTROL (continued)

CROP/PEST	INSECTICIDE ¹	AMOUNT OF FORMULATION PER ACRE	LB. ACTIVE INGREDIENT PER ACRE	TREATMENT THRESHOLDS AND REMARKS
Grasshoppers	Furadan 4F (oats only)	0.25 - 0.5 pt.	0.125 - 0.25	<p>GRASSHOPPERS: Treat when populations are causing excessive (greater than 50%) defoliation.</p> <p>NOTE: Furadan can NOT be applied to oats after grain heads emerge from boot.</p>
	Karate Zeon 2.08CS	1.28 - 1.92 fl. oz.	0.02 - 0.03	
	<u>malathion</u> Malathion 57EC, 5EC Malathion 8EC	1.5 - 2 pt. 1.0 - 1.25 pt.	0.94 - 1.25 1.0 - 1.25	
	Methyl 4EC PennCap-M	1 pt. 2 - 3 pt.	0.5 0.5 - 0.75	
Green June beetle larvae				GREEN JUNE BEETLE LARVAE: No effective insecticides are registered for use in oats and rye.
Chinch bug	Karate Zeon 2.08CS	1.92 fl. oz.	0.03	CHINCH BUG: Treat during the seedling stage when an average of 2 adults are found per 5 plants, on larger plants treat when 75 percent of the plants are infested. Chinch bugs are difficult to control.
	Methyl 4EC PennCap-M	1.5 pt. 3 pt.	0.75 0.75	
Hessian fly	Do not treat			HESSIAN FLY: Rye is resistant and oats are immune to Hessian fly.
Mites, Winter grain mite	Karate Zeon 2.08CS	1.92 fl. oz.	0.03	<p>MITES: Treat when infestations are causing leaf discoloration in large areas of a field and mites are present.</p> <p>NOTE: Karate for suppression only.</p>
	Methyl 4EC	1.5 pt.	0.75	
Stink bugs	Karate Zeon 2.08CS	1.92 fl. oz.	0.03	STINK BUGS: Numbers rarely reach levels needing control. Treat if stinks bugs exceed 1 bug per square foot at milk stage. Control during medium-hard dough stages is not justified, except to prevent movement of bugs as grain matures to susceptible crops in nearby fields.
	Methyl 4EC PennCap-M	0.5 - 1.5 pt. 1 - 3 pt.	0.25 - 0.75 0.25 - 0.75	

See Insecticide Use Restriction Use Chart next page.

SMALL GRAIN INSECT CONTROL (continued)

INSECTICIDE USE RESTRICTIONS FOR SMALL GRAIN CROPS

Insecticide	Brand Name	Days from Last Application		Restricted Entry Interval (hr)	Maximum Amount Allowed Per Acre Per Crop	Precautions
		Harvest	Grazing			
beta-cyfluthrin	Baythroid XL (1.0EC), generics	30	7	12	4.8 fl. oz. or 2 applications	Wheat only
carbaryl	Sevin	21	7	12	3 lb. ai	Do not use within 21 days of harvest for straw.
carbofuran	Furadan 4F	Head emergence	No	48	2 applications	Do not apply after grain head emergence from boot. Do not feed treated forage to livestock.
dimethoate	Dimethoate, generics	35	14	48	2 applications	
imidacloprid	Gaucho, Attendant	45	45	12	Seed treatment	Gaucho XT and Enhance AW formulation also contain fungicides.
lambda-cyhalothrin	Warrior, Silencer 1.0, Karate Z (2.08)	30	7	24	0.48 pt. 0.24 pt.	
gamma cyhalothrin	Proaxis (0.5) Prolex 1.25	30	7	24	0.48 pt. 0.19 pt.	
malathion	Malathion	7	7	12	No listed	Apply as needed.
methomyl	Lannate	7	10	48	1.8 lbs. ai	Maximum of 4 applications per crop.
methyl parathion	Methyl 4EC, Methyl parathion, Penncap-M	15	15	96	4EC: 3 pt. Penncap-M: 6 pt.	May be less effective under cool weather conditions.
spinosad	Tracer 4SC	21	14	4	9 fl. oz.	
thiamethoxam	Cruiser (5FS)	-	-	12	Seed treatment	See label for crop plant-back restrictions.
zeta-cypermethrin	Mustang MAX, Respect (0.8EC)	14	14	12	21.5 fl. oz.	Do not make applications less than 14 days apart.

SMALL GRAIN FUNGICIDE SEED TREATMENTS

(Wheat, Oats, Barley, Rye)

Alfredo Martinez, Extension Plant Pathologist

FUNGICIDE	CROP	RATE/100 LB SEED	REMARKS
Captan	All	See label	Controls seedling blights. Does not control smuts.
Thiram	Wheat, Barley, Rye	See label	Controls seedling blights. Does not control smuts. Can be used for drill-box treatment.
Carboxin-Thiram Vitavax 200 RTU-Vitavax-Thiram	All Wheat, Oats, Barley	2.0 oz. 2.0-4.0 oz.	Controls loose smut and stinking smut. Controls seedling blights. See label for specific rate for grains.
Triadimenol Baytan 30 RTU Baytan-Thiram	All All	0.75-1.5 oz.. 4.5-9.0 oz.	Controls loose smut and stinking smut. Controls smuts and seedling blights.
Difenoconazole Dividend	Wheat	0.5-1.0 oz.	Controls loose smut and stinking smut.
Difenoconazole-Metalaxyl Dividend XL RTA Dividend XL Dividend Extreme	Wheat Wheat Wheat	5-10 oz. 1.0-.2.0 oz. 0.5-1.0 oz.	Controls loose smut, stinking smut, and Pythium damping-off. Grower and commercially applied.
Meta laxyl Apron XL Allegiance	All All	0.32-0.64 oz. See label	Controls Pythium damping-off. Does not control smuts.
Tebuconazole Raxil (in various combinations with other fungicides)	Wheat, Oats, Barley	3.5 to 4.6 fl. oz.	Controls loose smut and stinking smut. Controls seedling blights. Commercially-applied and drill-box formulations available.

Commercial treatment of small grain seed is preferred, but a drill-box treatment can be used with many formulations. Drill-box treatments may not give control equal to commercial treatment.

WHEAT DISEASE CONTROL

DISEASE	CHEMICAL AND FORMULATION	RATE PER ACRE	REMARKS AND PRECAUTIONS
Stagonospora Leaf and Glume Blotch, Leaf Rust, Stripe Rust, Powdery Mildew, Tan Spot	Propiconazole Tilt Propimax	4 ozs.	Tilt can be applied until heading stage (Feekes 10.5). Do not apply Tilt after this growth stage to avoid possible illegal residues. Tank mixes of half rates of Tilt + Quadris are also effective.
	Azoxystrobin Quadris	6.2-10.8 oz.	Apply after Feekes 6 but not later than Feekes 10.5. Do not harvest treated wheat for forage. A crop oil concentrate adjuvant may be added at 1.0% v/v to optimize efficacy.
	Pyraclostrobin Headline	6-9 oz.	Apply no later than Feekes 10.5
	Metconazole Caramba	10-14 oz	Maximum number of applications per season=2; Minimum time from application to harvest=30 days
	Propiconazole-trifloxystrobin Stratego	10 oz.	Do not apply more than 2 applications of Stratego per season. Do not apply after Feekes 10.5
	Propiconazole-azoxystrobin Quilt	7-14 oz	Applications may be no closer than a 14 day interval. Quilt can be applied up to Feekes growth stage 10.5.

A foliar fungicide point system is available for guidance in wheat disease control. See the Wheat Production Guide available from your County Extension Agent.

SMALL GRAINS WEED CONTROL

A. Stanley Culpepper-Extension Weed Scientist
R. Dewey Lee-Extension Agronomist

Weeds Controlled	Herbicide, Formulation, and Mode of Action Code ¹	Amount of Formulation (broadcast rate/acre)	Pounds Active Ingredient (broadcast rate/acre)	REMARKS AND PRECAUTIONS (read all labels)
WHEAT: Preplant No-Till				
Emerged annual weeds, volunteer corn	paraquat: (Gramoxone Inteon) 2 SL (Firestorm, Parazone) 3SL MOA 22	2 to 4 pt 1.33 to 2.7 pt	0.5 to 1.0	Apply before crop emerges. Rate depends on weed size; see label. Add nonionic surfactant at 1 pt per 100 gal of spray or crop oil concentrate at 1 gal per 100 gal of spray. Other paraquat formulations may be available.
Emerged annual weeds, control or suppression of perennial weeds	glyphosate 3.57 SL (3 lb a.e.) 4 SL (3 lb a.e.) 5 SL (3.7 lb a.e.) 5.5 SL (4.5 lb a.e.) 6 SL (5 lb a.e.) MOA 9	1 to 3 pt 1 to 3 pt 0.8 to 2.4 pt 11 to 32 fl oz 10 to 28 fl oz	0.38 to 1.13	Apply before crop emerges. Rate depends upon weed size; see label. Adjuvant recommendation varies by glyphosate brand. Select or Select Max may be mixed with glyphosate to control volunteer Roundup Ready corn but wheat can not be planted for 30 days after application. Corn \leq 12 inch: apply Select at 4 to 6 fl oz or Select Max at 6 fl oz. Corn 12-24 inch: apply Select at 6 to 8 fl oz or Select Max at 9 fl oz.
WHEAT: Preemergence				
Annual ryegrass and annual broadleaf weeds	chlorsulfuron + metsulfuron-methyl (Finesse) 75 WDG MOA 2 + 2	0.5 oz	0.0195 + 0.0039	Ryegrass control is variable; expect suppression. May stunt wheat on sandy soils. Do not use where a later application of Osprey or PowerFlex is anticipated. Plant only STS soybeans following wheat harvest. Crop injury may result if an organophosphate is used. See label for rotational restrictions.
WHEAT: Postemergence Spike				
Wild radish, henbit, annual ryegrass and annual bluegrass	flufenacet + metribuzin (Axiom) 68 WDG MOA 15 + 5	4 to 10 oz	0.136 to 0.034 + 0.34 to 0.085	Apply to wheat in the spike stage of growth. Check label for use on cultivar planted. Preemergence applications can cause severe injury. For most Georgia soils, 6 to 8 oz/A of product is ideal. If Axiom is activated prior to ryegrass emergence then control will be good but if ryegrass emerges prior to Axiom activation then control will be poor.
WHEAT: Postemergence				
Annual ryegrass	diclofop-methyl (Hoelon) 3 EC MOA 1	1.33 to 2.67 pt	0.5 to 1.0	Apply when ryegrass is in the one- to four-leaf stage and prior to first wheat node (joint) developing. See label for specific rates depending on weed size and environmental conditions. Do not make more than one application per season. Do not tank mix with broadleaf herbicides or use liquid nitrogen as the carrier. May add 1 to 2 pt per acre of crop oil concentrate when conditions are dry or when ryegrass is large. In most cases, crop oil is not necessary. Crop injury may result if an organophosphate is used. To minimize resistance: Rotate Axial or Hoelon with Osprey or PowerFlex. Avoid rotating PowerFlex and Osprey. Avoid rotating Hoelon and Axial. Adding Axiom or Prowl H20 to a program would be beneficial.

¹Mode of Action (MOA) code can be used to delay weed resistance by increasing herbicide diversity in a management program.

SMALL GRAINS WEED CONTROL (continued)

Weeds Controlled	Herbicide, Formulation, and Mode of Action Code¹	Amount of Formulation (broadcast rate/acre)	Pounds Active Ingredient (broadcast rate/acre)	REMARKS AND PRECAUTIONS (read all labels)
WHEAT: Postemergence (continued)				
Annual ryegrass, very small wild radish and henbit	mesosulfuron-methyl (Osprey) 4.5 WDG MOA 2	4.75 oz	0.013	Apply to ryegrass between one-leaf and two-tiller while wheat is emerged but before jointing. Add a non-ionic surfactant (at least 80% active) at 2 qts per 100 gal. spray solution with ammonium nitrogen fertilizer (28-0-0, 30-0-0, 32-0-0) at 1 to 2 qt per acre. <u>DO NOT</u> topdress within 14 days of Osprey application. Do not use liquid nitrogen as the carrier. May mix Osprey with Harmony Extra. Do not mix with 2,4-D or MCPA. To minimize resistance: Rotate Axial or Hoelon with Osprey or PowerFlex. Avoid rotating PowerFlex and Osprey. Avoid rotating Hoelon and Axial. Adding Axiom or Prowl H20 to a program would be beneficial.
Annual ryegrass	pinoxaden (Axial) 0.83 EC MOA 1	8.2 fl oz	0.053	Apply to wheat with two leaves up to pre-boot when ryegrass has one leaf to two tillers. Add Adigor adjuvant at 9.6 fl oz per acre. If mixing with Harmony Extra, add Harmony first, then Axial, and then adjuvant. May be applied in water/nitrogen mixtures containing up to 50% liquid nitrogen by volume. Add water to tank, then add Axial, and then the adjuvant; mix thoroughly and add the nitrogen. To minimize resistance: Rotate Axial or Hoelon with Osprey or PowerFlex. Avoid rotating PowerFlex and Osprey. Avoid rotating Hoelon and Axial. Adding Axiom or Prowl H20 to a program would be beneficial.
Annual ryegrass and wild radish	pyroxulam (PowerFlex) 7.5 WDG MOA 2	3.5 oz	0.0164	Limited research in GA, use on very small acreage. Apply from three-leaf wheat through jointing. Apply after majority of ryegrass is emerged but before it exceeds the two-tiller stage. Add non-ionic surfactant at 1 qt per 100 gal solution. May tank mix with Harmony Extra. Do not mix with dicamba, 2,4-D, or MCPA. Can be applied in water-nitrogen mixture containing up to 50% liquid nitrogen by volume, or a maximum of 30 lb/A. If applying in liquid nitrogen, reduce surfactant to 1 pt per 100 gal solution. Current labeling is 9 month rotation to soybean and 12 months to cotton. Initial, very limited research, has shown no problems double cropping cotton or soybeans behind PowerFlex-treated wheat. To minimize resistance: Rotate Axial or Hoelon with Osprey or PowerFlex. Avoid rotating PowerFlex and Osprey. Avoid rotating Hoelon and Axial. Adding Axiom or Prowl H20 to a program would be beneficial.
Fair to good residual control of annual ryegrass	pendimethalin (Prowl H ₂ O) 3.8 AS MOA 3	1.5 to 2.5 pt	0.71 to 1.18	Apply from 1 st leaf stage of wheat until before flag leaf is visible. Prowl should be applied prior to weed emergence as emerged weeds are not controlled. May tank mix with any postemergence herbicide labeled for use in wheat. See label for this information and restrictions.

¹Mode of Action (MOA) code can be used to delay weed resistance by increasing herbicide diversity in a management program.

SMALL GRAINS WEED CONTROL (continued)

Weeds Controlled	Herbicide, Formulation, and Mode of Action Code ¹	Amount of Formulation (broadcast rate/acre)	Pounds Active Ingredient (broadcast rate/acre)	REMARKS AND PRECAUTIONS (read all labels)
WHEAT: Postemergence (continued)				
Small wild radish and wild mustard; wild garlic, curly dock, and most winter annual broadleaf weeds	thifensulfuron-methyl + tribenuron-methyl (Harmony Extra SG with TotalSol) 50 SG MOA 2 + 2	0.45 to 0.9 oz	0.0094 to 0.0188 + 0.0047 to 0.0094	Apply after two-leaf stage of wheat but prior to flag leaf being visible. Most winter annuals can be controlled with 0.45 to 0.6 oz/A; however, 0.75 to 0.9 oz/A is recommended for controlling wild garlic or small wild radish. Add 1 qt of nonionic surfactant per 100 gal of spray solution. For best results, apply when weeds are in the two- to four-leaf stage, temperatures are above 50 F, and not drought stressed. Garlic should be less than 12 in. tall and should have 2 to 4 in. of new growth. Liquid nitrogen may be used as the carrier. When applying Harmony using nitrogen as the carrier, reduce surfactant rate to 0.5 to 1.0 pint per 100 gal of solution (wheat burn may still be noted). May also tank mix Harmony with 0.25 to 0.375 lb active ingredient of 2,4-D or MCPA for improved control of wild radish. Do not use surfactant if Harmony and 2,4-D or MCPA are applied in nitrogen.
Partial control of wild garlic, henbit, and wild radish	tribenuron-methyl (Express SG with TotalSol) 50 SG MOA 2	0.25 to 0.5 oz	0.008 to 0.0155	Apply after two-leaf stage of wheat but prior to flag leaf being visible. Add 1 qt of nonionic surfactant per 100 gal of spray solution. Only partial control of wild garlic, henbit, shepherdspurse, and wild radish. Apply when weeds are small and not drought stressed. May be applied in mixture with some liquid fertilizers; however, some discoloration and stunting may occur with this mixture; see label. <u>Suggest mixing with 0.25 to 0.375 lb a.i. of MCPA for improved control of wild radish when wheat has at least 2 tillers but before jointing. Add 1 pt/A of surfactant with this Express plus MCPA mixture.</u>
Most winter annual broadleaf weeds except chickweed, henbit, and knawl	2,4-D amine (various brands) 3.8 L 2,4-D ester (various brands) 3.8 L 2,4-D ester (various brands) 5.7 L 2,4-D acid/ester (Weedone 638) 2.8 L MOA 4	1.0 to 1.25 pt 1.0 to 1.25 pt 0.67 to 0.84 pt 1.0 to 1.25 pt	0.48 to 0.6 0.48 to 0.6 0.48 to 0.6 0.35 to 0.43	Apply after wheat is fully tillered (stages 4 and 5 on Feekes scale) but before jointing. Spraying wheat too young or after jointing may reduce yields. Better results obtained when day-time temperatures are above 50 F. Increase rate by 50% to control com cockle. For wild onion or wild garlic, increase rate according to respective labels for better control. Georgia research has shown greater injury by 2,4-D when using liquid nitrogen as the carrier. Ester formulations can be added directly into nitrogen. If using amine formulation, premix in water (1 part 2,4-D to 4 parts water) and add mixture to nitrogen with strong agitation. Amine formulations give less burn than ester formulations in nitrogen. Ester formulations may be more effective on weeds in cool conditions. May be tank mixed with several other herbicides; see labels.
	MCPA (various brands) 4.0 L (various brands) 3.7 L MOA 4	0.5 to 1.0 pt 0.5 to 1.0 pt	0.25 to 0.5 0.23 to 0.46	Apply to wheat after tillering (preferably 2+ tillers) but before jointing. Apply before weeds are in the four-leaf stage or two inches in height. Rosette weeds should be treated when less than one inch in diameter. Rates may be increased according to labels. Wheat should be fully tillered before high rates are applied. No spray additive required. May be tank mixed with several other herbicides; see labels. <u>Mixtures of MCPA plus Express are more effective than either product applied alone.</u>

¹Mode of Action (MOA) code can be used to delay weed resistance by increasing herbicide diversity in a management program.

SMALL GRAINS WEED CONTROL (continued)

Weeds Controlled	Herbicide, Formulation, and Mode of Action Code¹	Amount of Formulation (broadcast rate/acre)	Pounds Active Ingredient (broadcast rate/acre)	REMARKS AND PRECAUTIONS (read all labels)
WHEAT: Preharvest				
Annual broadleaf and grass weeds, suppression of perennial weeds	glyphosate 3.57 SL (3 lb a.e.) 4 SL (3 lb a.e.) 5 SL (3.7 lb a.e.) 5.5 SL (4.5 lb a.e.) 6 SL (5 lb a.e.) MOA 9	2 pt 2 pt 1.6 pt 22 fl oz 20 fl oz	0.75	Apply after hard dough stage of grain (30% or less grain moisture) but at least 7 days before harvest. Do not apply to wheat grown for seed.
Annual broadleaf weeds	2,4-D amine (various brands) 3.8 SL MOA 4	1 to 2 pt	0.48 to 0.95	Apply when grain is in the hard dough stage (30% or less grain moisture) or later. Do not allow drift to sensitive crops. Amine formulations STRONGLY ENCOURAGED .
BARLEY: Preplant No-Till				
Emerged annual weeds, volunteer corn	paraquat (Gramoxone Inteon) 2SL (Firestorm, Parazone) 3 SL MOA 22	2.0 to 4.0 pt 1.3 to 2.7 pt	0.5 to 1.0	Apply before crop emerges. Rate depends on weed size; see label. Add nonionic surfactant at 1 pt per 100 gal of solution or crop oil concentrate at 1 gal per 100 gal of solution.
Emerged annual weeds, control or suppression of perennials	glyphosate 4 SL (3 lb a.e.) 5.4 SL (4 lb a.e.) 5.0 SL (4.14 lb a.e.) 5.5 SL (4.5 lb a.e.) 6 SL (5 lb a.e.) MOA 9	16 to 48 fl oz 12 to 36 fl oz 12 to 34 fl oz 11 to 32 fl oz 10 to 29 fl oz	0.38 to 1.13 (lb a.e.)	Apply before crop emerges. Rate depends upon weed size; see label. Follow label directions on glyphosate brand used. Adjuvant recommendation varies by glyphosate brand. Select or Select Max may be mixed with glyphosate to control volunteer Roundup Ready corn but barley can not be planted for 30 days after application. Corn ≤ 12 inch: apply Select at 4 to 6 fl oz or Select Max at 6 fl oz. Corn 12-24 inch: apply Select at 6 to 8 fl oz or Select Max at 9 fl oz.
BARLEY: Postemergence				
Annual ryegrass	diclofop-methyl (Hoelon) 3 EC MOA 1	1.33 to 2.67 pt	0.5 to 1	Apply when ryegrass is in the one- to four-leaf stage and after tiller initiation but prior to jointing of barley. Make only one application per year. See label for specific rates depending on weed size and environmental conditions. Do not tank mix with broadleaf herbicides or use liquid nitrogen as the carrier. Do not add crop oil. Apply only to the following barley varieties: Anson, Boone, Callio, Henry, Milton, Molly Bloom, Mulligan, Nomini, Pennco, Starling, Sussex, and Wysor. Cold (lower than 40°F) and/or prolonged wet conditions increases barley sensitivity to Hoelon. In-furrow application of organophosphate type insecticides prior to Hoelon application may cause injury. Warning: Will not control Hoelon-resistant ryegrass.

¹Mode of Action (MOA) code can be used to delay weed resistance by increasing herbicide diversity in a management program.

SMALL GRAINS WEED CONTROL (continued)

Weeds Controlled	Herbicide, Formulation, and Mode of Action Code¹	Amount of Formulation (broadcast rate/acre)	Pounds Active Ingredient (broadcast rate/acre)	REMARKS AND PRECAUTIONS (read all labels)
BARLEY: Postemergence (continued)				
Annual ryegrass (cont.)	pinoxaden (Axial) 0.83 EC MOA 1	8.2 fl oz	0.053	Apply to barley with two or more leaves and when ryegrass has one leaf to two tillers. Add Adigor Adjuvant at 9.6 fl oz per acre. If mixing with Harmony Extra, add Harmony first, then Axial, and then adjuvant. May be applied in water/nitrogen mixtures containing up to 50% liquid nitrogen by volume. Add water to tank, then add Axial, and then the adjuvant; mix thoroughly and add the nitrogen. Axial usually, but not always, controls Hoelon-resistant ryegrass. Very limited research has been conducted with this product on barley; try on very limited acreage only.
Small wild radish and wild mustard; wild garlic, curly dock, and most winter annual broadleaf weeds	thifensulfuron-methyl + tribenuron-methyl (Harmony Extra SG with TotalSol) 50 SG MOA 2 + 2	0.45 to 0.9 oz	0.0094 to 0.0188 + 0.0047 to 0.0094	Apply after two-leaf stage of barley but prior to flag leaf being visible. Use higher rates for wild garlic and wild radish. Often more effective in warmer temperatures (50°F or more) and when weeds are actively growing. Add 1 qt of nonionic surfactant per 100 gal of spray mix. May use liquid nitrogen as carrier. May tank mix with 0.25 to 0.375 lb active ingredient of MCPA or 2,4-D for improved control of wild radish; add 1 pint of surfactant per 100 gal of solution for these mixtures. Do not mix with Hoelon.
Partial control of wild garlic, henbit, and wild radish	tribenuron-methyl (Express SG with TotalSol) 50 SG MOA 2	0.25 to 0.5 oz	0.0078 to 0.0155	Apply after two-leaf stage of barley but prior to flag leaf being visible. Add 1 qt of nonionic surfactant per 100 gal. of spray solution. Apply when weeds are small and not drought stressed. May be applied in mixture with some liquid fertilizers; however, some injury may occur; see label. <u>Suggest mixing</u> with 0.125 to 0.375 lb active ingredient of MCPA for improved control of wild radish and other broadleaf weeds when barley has at least 2 tillers but before jointing. Add 1 pt/A of surfactant per 100 gal. of solution with the Express plus MCPA mixture.
Most winter annual broadleaf weeds except chickweed, henbit, and knawel	MCPA (numerous brands) 4.0 lbs/gal 3.7 lbs/gal MOA 4	0.5 to 1.0 pt 0.5 to 1.0 pt	0.25 to 0.5 0.23 to 0.46	Apply to barley after tillering but before jointing. Apply before weeds are in the four-leaf stage or two inches in height. Rosette weeds should be treated when less than one inch in diameter. Higher rates may be used for problem weeds when barley is fully tillered, see label. No spray additive required. May tank mix with several other herbicides; see labels. <u>Mixtures of MCPA plus Express are more effective than either product applied alone.</u>
	2,4-D amine (various brands) 3.8 SL	1.0 pt	0.48	Apply after barley is fully tillered but before jointing. Spraying barley too young or after jointing may reduce yields. Increase rate by 50% to control corn cockle. For wild garlic, increase rate according to label. Better results are obtained when day-time temperatures are above 50°F. Liquid nitrogen may be used as a carrier for 2,4-D. Ester formulations can be added directly into nitrogen. If using amine formulation, premix in water (1 part 2,4-D to 4 parts water) and add mixture to nitrogen with strong agitation. Amine formulations give less burn than ester formulations in nitrogen. May be tank mixed with other herbicides; see labels.
	2,4-D ester (various brands) 3.8 SL	1.0 pt	0.48	
	2,4-D ester (various brands) 5.7 SL	0.67 pt	0.48	
	2,4-D acid/ester (Weedone 638) 2.8 SL	1.0 pt	0.35	
MOA 4				

¹Mode of Action (MOA) code can be used to delay weed resistance by increasing herbicide diversity in a management program.

SMALL GRAINS WEED CONTROL (continued)

Weeds Controlled	Herbicide, Formulation, and Mode of Action Code¹	Amount of Formulation (broadcast rate/acre)	Pounds Active Ingredient (broadcast rate/acre)	REMARKS AND PRECAUTIONS (read all labels)
BARLEY: Preharvest				
Annual broadleaf weeds	2,4-D amine (various brands) 3.8 SL MOA 4	1.0 to 2.0 pt	0.48 to 0.95	Apply when grain is in the hard dough stage or later. Do not allow drift to sensitive crops. Amine formulations recommended as sensitive crops such as vegetables, tobacco, and cotton are usually nearby.
Annual weeds, suppression of perennials	glyphosate (Roundup WeatherMax) 5.5 SL (4.5 lb a.e.) MOA 9	11 to 22 fl oz	0.39 to 0.74	FEED BARLEY ONLY. Apply after the hard-dough stage and when the grain contains 20 percent moisture or less. Stubble may be grazed immediately after harvest. Do not apply on barley grown for seed! Apply at least 7 days prior to harvest.
OATS: Preplant No-Till				
Emerged annual weeds, control or suppression of perennials	glyphosate 4 SL (3 lb a.e.) 5.4 SL (4 lb a.e.) 5.0 SL (4.14 lb a.e.) 5.5 SL (4.5 lb a.e.) 6 SL (5 lb a.e.) MOA 9	16 to 48 fl oz 12 to 36 fl oz 12 to 34 fl oz 11 to 32 fl oz 10 to 29 fl oz	0.38 to 1.13 (lb a.e.)	Apply before crop emerges. Rate depends upon weed size; see label. Follow label directions on glyphosate brand used. Adjuvant recommendation varies by glyphosate brand. Select or Select Max may be mixed with glyphosate to control volunteer Roundup Ready corn but oats can not be planted for 30 days after application. Corn ≤ 12 inch: apply Select at 4 to 6 fl oz or Select Max at 6 fl oz. Corn 12-24 inch: apply Select at 6 to 8 fl oz or Select Max at 9 fl oz.
OATS: Postemergence				
Small wild radish and wild mustard; wild garlic, curly dock, and most winter annual broadleaf weeds	thifensulfuron-methyl + tribenuron-methyl (Harmony Extra SG with TotalSol) 50 SG MOA 2 + 2	0.45 to 0.6 oz	0.0094 to 0.0125 + 0.0047 to 0.0063	Apply after three-leaf stage of oats but prior to flag leaf being visible. Wild garlic should be less than 12 in. tall and should have 2 to 4 in. of new growth. Often more effective in warmer temperatures (50°F or more) and when weeds are actively growing. Add 1 qt of nonionic surfactant per 100 gal of spray solution. Liquid nitrogen may be used as the carrier. May tank mix with 0.25 to 0.375 lb active ingredient of MCPA or 2,4-D for improved control of wild radish; add 1 pint of surfactant per 100 gal of solution. Oats are more sensitive to a 2,4-D mixture than wheat.
Most winter annual broadleaf weeds except chickweed, henbit, and knawel	MCPA (numerous brands) 4.0 lbs/gal 3.7 lbs/gal MOA 4	0.5 to 1.0 pt 0.5 to 1.0 pt	0.25 to 0.5 0.23 to 0.46	Apply only to fully tillered oats before weeds are in the four-leaf stage or two inches in height. Rosette weeds should be treated when less than one inch in diameter. No spray additive required. Mixtures with Harmony Extra have been extremely effective in Georgia research.
	2,4-D amine (various brands) 3.8 SL MOA 4	1.0 pt	0.48	Apply after oats are fully tillered but before jointing. Spraying oats too young or after jointing may reduce yields. Oats are less tolerant of 2,4-D than wheat. Better results are obtained when day-time temperatures are above 50°F. Liquid nitrogen may be used as a carrier for 2,4-D. Premix in water (1 part 2,4-D to 4 parts water) and add mixture to nitrogen with strong agitation.

¹Mode of Action (MOA) code can be used to delay weed resistance by increasing herbicide diversity in a management program.

SMALL GRAINS WEED CONTROL (continued)

Weeds Controlled	Herbicide, Formulation, and Mode of Action Code¹	Amount of Formulation (broadcast rate/acre)	Pounds Active Ingredient (broadcast rate/acre)	REMARKS AND PRECAUTIONS (read all labels)
OATS: Preharvest				
Annual broadleaf weeds	2,4-D amine (various brands) 3.8 SL MOA 4	1 to 2 pt	0.48 to 0.95	Apply when grain is in hard dough stage or later. Do not allow drift to sensitive crops such as cotton, vegetables and tobacco. Apply only labeled AMINE formulations.
RYE: Preplant				
Emerged annual weeds, control or suppression of perennials	glyphosate 4 SL (3 lb a.e.) 5.4 SL (4 lb a.e.) 5.0 SL (4.14 lb a.e.) 5.5 SL (4.5 lb a.e.) 6 SL (5 lb a.e.) MOA 4	16 to 48 fl oz 12 to 36 fl oz 12 to 34 fl oz 11 to 32 fl oz 10 to 29 fl oz	0.38 to 1.13 (lb a.e.)	Apply before crop emerges. Rate depends upon weed size; see label. Follow label directions on glyphosate brand used. Adjuvant recommendation varies by glyphosate brand. Select or Select Max may be mixed with glyphosate to control volunteer Roundup Ready corn but rye can not be planted for 30 days after application. Corn ≤ 12 inch: apply Select at 4 to 6 fl oz or Select Max at 6 fl oz. Corn 12-24 inch: apply Select at 6 to 8 fl oz or Select Max at 9 fl oz.
RYE: Postemergence				
Most winter annual broadleaf weeds except chickweed, henbit, and knawel	MCPA (numerous brands) 4.0 lbs/gal 3.7 lbs/gal MOA 4	0.5 to 1.0 pt 0.5 to 1.0 pt	0.25 to 0.50 0.23 to 0.46	Apply to rye after two tillers but before jointing. Apply before weeds are in the four-leaf stage or two inches in height. If weed forms rosette, apply before weeds exceed one inch in diameter. No spray additive required. May increase rate to control biennial and perennial weed species, consult label. May be tank mixed with several other herbicides; see labels.
	2,4-D amine (various brands) 3.8 SL	1.0 pt	0.48	Apply after rye is fully tillered but before jointing. Spraying rye too young or after jointing can reduce yields. Better results are obtained when day-time temperatures are above 50°F. Liquid nitrogen may be used as a carrier for 2,4-D. Ester formulations can be added directly into nitrogen. If using amine formulation, premix in water (1 part 2,4-D to 4 parts water) and add mixture to nitrogen with strong agitation. Amine formulations give less burn than ester formulations in nitrogen.
	2,4-D ester (various brands) 3.8 SL	1.0 pt	0.48	
2,4-D ester (various brands) 5.7 SL	0.67 pt	0.48		
RYE: Preharvest				
Annual broadleaf weeds	2,4-D ester (various brands) 3.8 SL (various brands) 5.7 SL MOA 4	1 to 2 pt 0.67 to 1.3 pt	0.48 to 0.95	Apply when grain is in the hard dough stage or later. Do not allow drift to sensitive crops, especially cotton and tobacco. Apply only labeled AMINE formulations.

¹Mode of Action (MOA) code can be used to delay weed resistance by increasing herbicide diversity in a management program.

SMALL GRAINS WEED CONTROL (continued)

Weeds Controlled	Herbicide, Formulation, and Mode of Action Code¹	Amount of Formulation (broadcast rate/acre)	Pounds Active Ingredient (broadcast rate/acre)	REMARKS AND PRECAUTIONS (read all labels)
TRITICALE: preplant				
Emerged annual weeds, control or suppression of perennials	glyphosate 4 SL (3 lb a.e.) 5.4 SL (4 lb a.e.) 5.0 SL (4.14 lb a.e.) 5.5 SL (4.5 lb a.e.) 6 SL (5 lb a.e.) MOA 9	16 to 48 fl oz 12 to 36 fl oz 12 to 34 fl oz 11 to 32 fl oz 10 to 29 fl oz	0.38 to 1.13 (lb a.e.)	Apply before crop emerges. Rate depends upon weed size; see label. Follow label directions on glyphosate brand used. Adjuvant recommendation varies by glyphosate brand. Select or Select Max may be mixed with glyphosate to control volunteer Roundup Ready corn but triticale can not be planted for 30 days after application. Corn ≤ 12 inch: apply Select at 4 to 6 fl oz or Select Max at 6 fl oz. Corn 12-24 inch: apply Select at 6 to 8 fl oz or Select Max at 9 fl oz.
TRITICALE: Postemergence				
Annual broadleaf weeds	bromoxynil (Buctril) 2 EC (Buctril) 4 EC MOA 6	2 pt 1 pt	0.5	Can be applied from triticale emergence until boot stage. Controls 1 to 2 inch wild mustard, wild radish, swinecress, shepherdspurse, filed pennycress, Virginia pepperweed, and knawel. Does not control wild garlic, chickweed, or henbit.
Annual broadleaf weeds and ryegrass suppression	chlorsulfuron + metsulfuron methyl (Finesse) 75 WDG	0.2 to 0.4 oz	0.008 + 0.0016 to 0.016 + 0.0031	Can be applied after the two-leaf stage but before flag leaf is visible. See label for weeds controlled, application rates, use of surfactant, and rotational restrictions. Early application necessary for ryegrass suppression. See comments under wheat, preemergence section.
Small wild radish and wild mustard; wild garlic, curly dock, and most winter annual broadleaf weeds	thifensulfuron-methyl + tribenuron-methyl (Harmony Extra SG with TotalSol) 50 SG MOA 2+ 2	0.45 to 0.9 oz	0.0094 to 0.0188 + 0.0047 to 0.0094	Apply after two-leaf stage of triticale but before flag leaf is visible. Often more effective in warmer temperatures (50°F or more) and when weeds are actively growing. Add 1 qt of nonionic surfactant per 100 gal of spray solution. Liquid nitrogen may be used as the carrier.
Partial control of wild garlic, henbit, and wild radish	tribenuron-methyl (Express TotalSol) 50 SG MOA 2	0.25 to 0.5 oz	0.0078 to 0.0155	Apply after two-leaf stage of triticale but prior to flag leaf being visible. Add 1 qt of nonionic surfactant per 100 gal of spray mix. Apply when weeds are small and not stressed. May be applied in mixture with some liquid fertilizers; however, some discoloration and stunting may occur; see label.

¹Mode of Action (MOA) code can be used to delay weed resistance by increasing herbicide diversity in a management program.

Important Note: Observations in Georgia wheat fields indicate crop damage when 2,4-D is tank mixed with liquid nitrogen. This also may be evident with other herbicide-nitrogen mixtures. To avoid possible damage and obtain better weed control, herbicides and nitrogen should be applied separately.

SMALL GRAIN WEED RESPONSE TO HERBICIDES

A. Stanley Culpepper-Extension Weed Scientist
R. Dewey Lee-Extension Agronomist

WEEDS	2,4-D ¹	MCPA ¹	Express ¹	Express + MCPA ¹	Buctril ¹	Harmony Extra ¹	Peak ¹	Finesse ²
annual bluegrass	N	N	N	N	N	N	N	N
annual ryegrass	N	N	N	N	N	N	N	F
buttercup	G					G		G
common chickweed	P	P	G	G	PF	G		G
common ragweed	G	F			E	PF	E	
cornflower	G				GE	P		F
cudweed	GE	GE			G	E		
curly dock	P	P			PF	E		
dandelion	E	E			E			
dogfennel	G	F			GE	E		
eveningprimrose	E	E		E	F-G	F-G	F-G	
field pennycress	G				G	G		G
goldenrod	F	G			F			
hairy vetch	FG	FG			F	P		
henbit	P	P	F	G	F	G	FG	G
horsenettle	F	F			F			
horseweed	F	F			F	FG		
knawel	P				P	G		
lambsquarters	G	G			E	E	G	
plantains	E	E			E	E		
shepherd's-purse	GE	GE			G	E	G	G
swinecress	G	G			GE	E		
thistles	G	G			G	FG	FG	
vetch	G				F	P		
Virginia pepperweed	E				FG	G		
wild garlic	F	P			P	E	E	P
wild mustard	GE	G	FG	E	G	G	GE	G
wild radish	GE	G	FG	E	FG	G	GE	G

¹ Timely postemergence application.

² Applied preemergence.

Key: E = excellent control, 90% or better; G = good control, 80% to 90%; F = fair control, 70% to 80%; P = poor control, 25 to 50%; N = no control, less than 25%

SMALL GRAIN WEED RESPONSE TO HERBICIDES (continued)

WEEDS	Axial ¹	Axiom ²	Hoelon ¹	Osprey ¹	PowerFlex ¹
annual bluegrass		G	N	G	
annual ryegrass	G-E ³	G ⁴	E ⁵	G-E	G-E
buttercup			N		
common chickweed			N	F-G ⁶	
common ragweed			N		
cornflower			N	P	
cudweed			N		
curly dock			N	P	
dandelion			N		
dogfennel			N		
eveningprimrose			N	P	
field pennycress			N		
goldenrod			N		
hairy vetch			N		
henbit		G-E	N	G ⁶	
horsenettle			N		
horseweed			N		
knawel			N		
lambsquarters			N		
plantains			N		
shepherd's-purse			N		
swinecress			N	E	
thistles			N		
vetch			N	P-F ⁶	
Virginia pepperweed			N		
wild garlic			N	P	
wild mustard		G-E	N	G ⁶	G-E
wild radish		G-E	N	G ⁶	G-E

¹ Timely postemergence application.

² Applied spike to wheat but PRE to weeds.

³ Axial and Hoelon have similar mode of action. Axial may not control Hoelon-resistant ryegrass.

⁴ Provides good control if Axiom is activated prior to ryegrass germination, poor control if ryegrass emerges prior to Axiom activation.

⁵ Will not control Hoelon-resistant ryegrass.

⁶ Weeds must not be larger than 2 inches at time of application.

Key: E = excellent control, 90% or better; G = good control, 80% to 90%; F = fair control, 70% to 80%; P = poor control, 25 to 50%; N = no control, less than 25%

