

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 600, Attendant 600, Axxcess	0.8 fl. oz./100 lb. seed	0.03 lb./100 lb. seed	Inspect fields at 25-35 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 per row ft.), 6-10 inch plants (6 per row ft.), Stem elongation (2 per stem), Flag leaf (5 per 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. Rate of CruiserMaxx Cereals alone is too low for effective aphid control.
	Gaucho XT Enhance AW	3.4 fl. oz./100 lb. seed 4.0 fl. oz./100 lb	0.03 lb./100 lb. seed 0.05 lb./100 lb. seed	
	<u>thiamethoxam</u> Cruiser 5FS Cruiser Maxx Cereals plus Cruiser 5FS	1.0 fl. oz./100 lb. seed 5.0 fl. oz./100 lb. seed plus 0.5 fl. oz./100 lb seed	0.04 lb./100 lb. seed 0.04 lb./100 lb. seed (total)	
	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 cyhalothrin</u> Karate Zeon, others (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	
	<u>gamma cyhalothrin</u> Declare, 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	
Armyworm (True armyworm)	Baythroid XL (1EC)	1.8 - 2.4 fl. oz.	0.014 - 0.019	True armyworm usually infests wheat in late winter and spring at the 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, Radiant and Baythroid are most effective against small larvae.
	Lannate 2.4 LV 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	
	Tracer 4SC	1.5 - 2 fl. oz.	0.047 - 0.063	
	<u>lambda cyhalothrin</u> Karate Zeon others (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	
	<u>gamma cyhalothrin</u> Declare, 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	
	Radiant 1SC	3 - 6 fl. oz.	0.0234 - 0.469	
	Tombstone 2.0	1.8 - 2.4 fl. oz.	0.028 - 0.038	

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 2.4 LV Lannate 90SP	1.5 pt. 0.5 lb.	0.45 0.45	<p>Infestations 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.</p> <p>NOTE: Tracer and Radiant are most effective against small larvae. Tracer is not labeled for cutworm control. Radiant is not labeled for cutworms and yellowstriped armyworms</p>
	Mustang MAX, Respect (0.8EC)	4.0 fl. oz.	0.025	
	Tracer 4SC	1.5 - 3.0 fl. oz.	0.047 - 0.094	
	Methyl 4EC PennCap-M	0.5 - 1.5 pt. 2 - 3 pt.	0.25 - 0.75 0.5 - 0.75	
	<u>lambda cyhalothrin</u> Karate Zeon (2.08CS) Warrior, Silencer, Lambda, others (1.0)	1.92 fl. oz. 3.84 fl. oz.	0.03 0.03	
	<u>gamma cyhalothrin</u> Declare, Prolex (1.25) Proaxis (0.5)	1.54 fl. oz. 3.84 fl. oz.	0.015 0.015	
	Radiant 1SC	3 - 6 fl. oz.	0.0234 - 0.469	
	Tombstone 2.0	2.4 fl. oz.	0.038	
Cereal Leaf Beetle	Baythroid XL (IEC)	1.0 - 1.8 fl. oz.	0.008 - 0.014	<p>Treat when an average of 1/2 larva per stem are found. Warrior, Declare, and Proaxis can be applied at 50% egg hatch. Other materials should not be applied until after 90% egg hatch.</p> <p>NOTE: lambda / gamma cyhalothrin products applied for cereal leaf beetle also provide aphid control for the remainder of the season</p>
	Lannate 2.4 LV 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 cyhalothrin</u> Karate Zeon (2.08CS) Warrior, Silencer, Lambda, others (1.0)	1.28 - 1.6 fl. oz. 2.56 - 3.2 fl. oz.	0.02 - 0.25 0.02 - 0.25	
	<u>gamma cyhalothrin</u> Declare, Prolex (1.25) Proaxis (0.5)	1.02 - 1.28 fl. oz. 2.56 - 3.2 fl. oz.	0.01 - 0.0125 0.01 - 0.0125	
	Tombstone 2.0	1.0 - 1.8 fl. oz.	0.016 - 0.028	
	Grasshoppers	Baythroid XL (IEC)	1.8 - 2.4 fl. oz.	
<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	
<u>lambda cyhalothrin</u> Karate Zeon (2.08CS) 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	
<u>gamma cyhalothrin</u> Declare, 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	
Tombstone 2.0		1.8 - 2.4 fl. oz.	0.028 - 0.038	

SMALL GRAIN INSECT CONTROL (continued)

CROP/PEST	INSECTICIDE ¹	AMOUNT OF FORMULATION PER ACRE	LB. ACTIVE INGREDIENT PER ACRE	TREATMENT THRESHOLDS AND REMARKS
Chinch bug	Baythroid XL (IEC)	2.4 fl. oz.	0.019	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 cyhalothrin</u> Karate Zeon (2.08CS) Warrior, Silencer, Lambda, others (1.0)	1.92 fl. oz. 3.84 fl. oz.	0.03 0.03	
	<u>gamma cyhalothrin</u> Declare, 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 600, Attendant 600 Acesss	1.6 - 2.4 fl. oz./100 lb. seed	0.0625 - 0.094 lb. / 100 lb. seed	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 effective control. Rate of CruiserMaxx Cereals alone is too low for effective Hessian fly control. NOTE: Di-Syston 15G and 8E and Thimet / Phorate 20G are no longer labeled for use on wheat. NOTE: Apply Karate or Declare when adults are actively laying eggs. Apply based on egg sampling for best results.
	Gaucho XT plus Gaucho 600	3.4 fl. oz./100 lb. seed plus 1.0 fl. oz./100 lb. seed	Combined: 0.0675 lb./100 lb. seed	
	<u>thiamethoxam</u> Cruiser 5FS Cruiser Maxx Cereals plus Cruiser 5FS	1.33 fl oz./10 0 lb. seed 5.0 fl. oz./100 lb. seed plus 1.0 fl. oz./100 lb seed	0.06 lb./100 lb. seed 0.06 lb./100 lb. seed	
	Foliar Applications Karate Zeon, similar products (2.08CS)	1.92 fl. oz.	0.03	
	Declare (1.25)	1.54 fl. oz.	0.015	
Mites / Winter grain mite	Methyl 4EC PennCap-M	1 - 1.5 pt. 2 - 3 pt.	0.5 - 0.75 0.5 - 0.75	Treat when infestations are causing leaf discoloration in large areas of a field and mites are present. NOTE: Karate and Declare for suppression only.
	Declare (1.25) Karate Z (2.08CS)	1.54 1.92 fl. oz.	0.015 0.03	
Stink bugs	Baythroid XL (IEC)	1.8 - 2.4 fl. oz.	0.014 - 0.019	Stink bugs rarely reach levels needing control in wheat. 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 to susceptible crops in nearby fields as wheat matures.
	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	
	<u>lambda cyhalothrin</u> Karate Zeon (2.08CS) 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	
	<u>gamma cyhalothrin</u> Declare, 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	
	Tombstone (2.0)	1.8 - 2.4 fl. oz.	0.028 - 0.038	

SMALL GRAIN INSECT CONTROL (continued)

CROP/PEST	INSECTICIDE ¹	AMOUNT OF FORMULATION PER ACRE	LB. ACTIVE INGREDIENT PER ACRE	TREATMENT THRESHOLDS AND REMARKS
OATS, RYE, and BARLEY (NOTE: MOST INSECTICIDES LISTED FOR USE ON WHEAT ARE NOT LABELED FOR OATS, RYE, AND BARLEY)				
Aphids	Seed Treatments Gaucho XT Gaucho 600, Attendant 600 <u>thiamethoxam</u> Cruiser 5FS (barley only)	3.4 fl. oz./100 lb. of seed 0.8 - 2.4 fl. oz./100 lb. of seed 0.75 - 1.33 fl. oz./100 lb. seed	0.03 lb/100 lb. of seed 0.03 - 0.094 lb/100 lb. of seed 0.04 lb/100 lb. seed	Aphid treatment thresholds are: Seedlings (10 per row ft.), 6-10 inch plants (20 per row ft.), Flag leaf (5 per flag leaf), 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. NOTE: Karate will aid in the suppression of Barley Yellow Dwarf virus infection in oats and barley. Other foliar insecticides will control aphids but not suppress barley yellow dwarf infection. NOTE: Cruiser is not labeled for use on oats and rye.
	Foliar Treatments Karate Zeon 2.08CS	1.28 - 1.92 fl. oz.	0.02 - 0.03	
	malathion Malathion 57EC, 5EC Malathion 8EC	1.5 - 2.0 pt. 1.0 - 1.25 pt.	0.94 - 1.25 1.0 - 1.25	
	<u>methyl parathion</u> Methyl 4EC PennCap-M	0.5 - 1.5 pt. 0.5 - 1.5 pt.	0.25 - 0.75 0.25 - 0.75	
Armyworm	Karate Zeon 2.08CS	1.28 - 1.92 fl. oz.	0.02 - 0.03	True armyworm usually infests in 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 and Radiant are most effective against small larvae.
	Lannate 2.4 LV Lan-nate 90SP	1.5 pt. 0.5 lb.	0.45 0.45	
	<u>malathion</u> Malathion 57EC, 5EC Malathion 8EC	2 pt. 1.25 pt.	1.25 1.25	
	Methyl 4EC PennCap-M	1.5 pt. 2 - 3 pt.	0.75 0.5 - 0.75	
	Radiant 1SC	3 - 6 fl. oz.	0.0234 - 0.469	
	Tracer 4SC	1.5 - 2.0 fl. oz	0.047 - 0.063	
Fall armyworm, Beet armyworm, Yellowstriped armyworm, and Cutworms	Karate Zeon 2.08CS	1.28 - 1.92 fl. oz.	0.02 - 0.03	Infestations 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 and Radiant are most effective against small larvae. Tracer is not labeled for cutworm control. Radiant is not labeled for cutworms and yellowstriped armyworms.
	Lannate 2.4 LV Lannate 90SP	1.5 pt. 0.5 lb.	0.45 0.45	
	Methyl 4EC	1.5 pt.	0.75	
	Radiant 1SC	3 - 6 fl. oz.	0.0234 - 0.469	
	Tracer 4SC	1.5 - 3.0 fl. oz	0.047 - 0.094	
Cereal Leaf Beetle	Baythroid XL (1.0)	1.8 - 2.4 fl. oz.	0.014 - 0.019	Treat when an average of 1/2 larva per stem are found. Treat after 90% egg hatch has occurred.
	Karate Zeon 2.08CS	1.28 - 1.6 fl. oz.	0.02 - 0.03	
	Lannate 2.4 LV 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	
	Tracer 4SC	3 fl. oz.	0.094	

SMALL GRAIN INSECT CONTROL (continued)

CROP/PEST	INSECTICIDE ¹	AMOUNT OF FORMULATION PER ACRE	LB. ACTIVE INGREDIENT PER ACRE	TREATMENT THRESHOLDS AND REMARKS	
Chinch bug	Baythroid XL (1.0)	2.4 fl. oz.	0.019	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.	
	Karate Zeon 2.08CS	1.92 fl. oz.	0.03		
	<u>methyl parathion</u> Methyl 4EC	1.5 pt.	0.75		
	Pennacap-M	3 pt.	0.75		
Grasshoppers	Baythroid XL (1.0)	1.8 – 2.4	0.014 – 0.019	Treat when grasshopper populations are causing excessive (greater than 50%) defoliation.	
	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		
	<u>methyl parathion</u> Methyl 4EC Pennacap-M	1 pt. 2 - 3 pt.	0.5 0.5 - 0.75		
Green June beetle larvae				No effective insecticides are registered for use against Green June beetle larvae in oats, rye and barley.	
Hessian fly	Do not treat			Barley is tolerant to Hessian fly; damage only occurs under severe infestations. Rye is resistant and oats are immune to Hessian fly.	
Mites, Winter grain mite	Karate Zeon 2.08CS	1.92 fl. oz.	0.03	Treat when infestations are causing leaf discoloration in large areas of a field and mites are present. NOTE: Karate for suppression only.	
	Methyl 4EC	1.5 pt.	0.75		
Stink bugs	Baythroid XL (1.0)	2.4 fl. oz.	0.019	Stink bugs 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.	
	Karate Zeon 2.08CS	1.92 fl. oz.	0.03		
	<u>methyl parathion</u> Methyl 4EC	0.5 - 1.5 pt.	0.25 - 0.75		
	Pennacap-M	1 - 3 pt.	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	3	12	4.8 fl. oz.	
cyfluthrin	Tombstone (2.0)	30	7	12	4.8 fl. oz.	
dimethoate	Dimethoate, other brands	35	14	48	2 applications	
imidacloprid	Gaicho, Attendant	45	45	12	Seed treatment	Gaicho XT and Enhance AW formulation also contain fungicides.
lambda-cyhalothin	Warrior, Silencer 1.0, Karate Z (2.08)	30	7	24	0.48 pt. 0.24	
gamma-cyhalothrin	Proaxis (0.5) Declare, Prolex 1.25	30	7	24	0.48 pt. 0.19	
malathion	Malathion	7	7	12	No listed	Apply as needed.
methomyl	Lannate	7	10	48	1.8 lbs. a.i.	Maximum of 4 application per crop.
methyl parathion	Methyl 4EC, Methyl parathion, Pennacp-M	15	15	96	4EC: 3 pt. Pennacp-M: 6 pt.	May be less effective under cool weather conditions.
spinetoram	Radiant 1SC	21	3	4	28 fl. oz.	
spinosad	Tracer 4SC	21	14	4	9 fl. oz.	
thiamethoxam	Cruiser (5FS)	-	-	12	Seed treatment	See label for crop plant-back restrictions. Not registered for use on oats and rye.
zeta-cypermethrin	Mustang MAX, Respect (0.8EC)	14	14	12	21.5 fl. oz.	Do not make applications less than 14 days apart.

***Premixed or Co-Packed Insecticide Products:** As of October 2010, no premixed or co-packaged insecticide products are registered for use on wheat, oats, rye, and barley.

SMALL GRAIN FUNGICIDE SEED TREATMENTS

(Wheat, Oats, Barley, Rye, Sorghum)

Alfredo Martinez, Extension Plant Pathologist

FUNGICIDE	CROP	RATE/100 LB SEED	REMARKS
Captan Captan 400	Wheat, Barley, Oats, Rye	See label	Controls seedling blights. Does not control smuts.
Carboxin-Thiram Vitavax 200 RTU-Vitavax-Thiram	Wheat, Barley, Oats, Triticale 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.
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.
Fludioxonil Maxim 4FS	Barley, Millet, Oats, Rye, Sorghum, Triticale, Wheat	0.08-0.16 fl oz	Controls Fusarium, Rhizoctonia, Helminthosporium and weakly pathogenic fungi such Aspergillus and Penicillium.
Ipconazole Vortex	Sorghum	0.051-0.17 fl oz	Controls Fusarium, Rhizoctonia, Phomopsis and weakly pathogenic fungi such Aspergillus, Alternaria, Cladosporium, Mucor and Penicillium.
Mefenoxan Apron XL, Apron XL-LS	Wheat, Barley, Millet, Oats, Rye, Sorghum, Triticale	0.042-0.08	Controls Pythium damping-off. Does not control smuts.
Metalaxyl Allegiance	Wheat, Barley, Millet, Oats, Rye, Sorghum, Triticale	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.
Thiram	Wheat, Barley, Rye	See label	Controls seedling blights. Does not control smuts. Can be used for drill-box treatment.
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.

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	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.
	Metconazole Caramba	10-14 oz	Maximum number of applications per season=2; Minimum time from application to harvest=30 days
	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.
	Propiconazole-azoxystrobin Quilt, QuiltXcel	7-14 oz	Applications may be no closer than a 14 day interval. Quilt can be applied up to Feekes growth stage 10.5.
	Propiconazole-trifloxystrobin Stratego	10 oz.	Do not apply more than 2 applications of Stratego per season. Do not apply after Feekes 10.5
	Prothioconazole Proline	4.3-5 fl oz	For optimum disease control, the lowest labeled rate of a spray surfactant should be tank mixed with Proline. Up to two applications of Proline can made per year.
	Prothiconazole + Tebuconazole Prosaro	6.5 - 8.2 fl. oz	Begin applications preventively when conditions are favorable for disease development. For optimum disease control, the lowest labeled rate of a spray surfactant should be tank mixed with Prosaro.
	Pyraclostrobin Headline	6-9 oz.	Apply no later than Feekes 10.5
	Pyraclostrobin + Metconazole Twinline	7-9 fl oz	Do not apply more than 2 applications per season. Do not apply after Feekes 10.5
Tebuconazole Folicur	4 fl oz	Folicur is not longer manufactured (2009). No end-user restrictions for disease control, use until supply lasts. Not labeled for Powdery mildew control.	

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
Lynn M. Sosnoskie-Weed Science

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. 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 (lb a.e.)	Apply before crop emerges. 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 < 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.
Summer and winter annual weeds including wild radish, henbit and chickweed	glyphosate (numerous brands) + thifensulfuron-methyl + tribenuron-methyl (Harmony Extra SG with TotalSol) 50 SG	See glyphosate 0.45 to 0.9 oz	0.38 to 1.13 (lb a.e.) + 0.0094 to 0.0188 + 0.0047 to 0.0094	May be used as a burndown treatment prior to, or shortly after, planting (prior to emergence).
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. A rate of 0.5 oz/A is the maximum labeled use rate and is recommended for ryegrass control. If ryegrass is not present, a lower rate may be used, see label.
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 (up until 3 leaf stage). Check label for use on cultivar planted. Preemergence applications can cause severe injury on light soils. 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. Heavy rains following application may cause wheat stunting.
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. Warning: Will not control Hoelon-resistant ryegrass. To minimize resistance , make only one application of Hoelon OR Axial in a field every two years. Adding Axiom or Prowl H2O to the 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, 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. <i>DO NOT</i> 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. <i>Ryegrass resistant to Osprey is becoming more common in Georgia. To minimize resistance: Make only one application of Osprey OR PowerFlex in a field every two years. Adding Axiom or Prowl H2O to a program would be beneficial.</i>
Annual ryegrass	pinoxaden (Axial) 0.83 EC (Axial XL) 0.42 EC MOA 1	8.2 fl oz 16.4 fl oz	0.053	Apply to wheat with two leaves up to pre-boot when ryegrass has one leaf to two tillers. If using Axial, add Adigor adjuvant at 9.6 fl oz per acre. If using Axial XL, no additional adjuvant is required. Mixtures with Harmony Extra improve broadleaf control. 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 (if needed); mix thoroughly and add the nitrogen. Although a water/nitrogen solution may be used as a carrier it is discouraged to avoid reduced ryegrass control. Axial and Hoelon have the same mode of action; therefore, Axial may not control Hoelon-resistant ryegrass. Research in Georgia has shown Axial to kill about 50% of the Hoelon-resistant populations that have been studied. To minimize resistance: Make only one application of Axial OR Hoelon in a field every two years. Adding Axiom or Prowl H2O to a program would be beneficial.
Annual ryegrass and wild radish	pyroxsulam (PowerFlex) 7.5 WDG MOA 2	3.5 oz	0.0164	Apply from three-leaf wheat through jointing. Apply after majority of ryegrass is emerged but before it exceeds the two-tiller stage. Add crop oil concentrate at 1% v/v (1 gal per 100 gal spray 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, use a non-ionic surfactant at 1 pt per 100 gal solution. Although a water/nitrogen solution may be used as a carrier it is discouraged to avoid reduced ryegrass control. An independent liquid ammonium nitrogen fertilizer application should not be made within 7 days of application. Minimum rotation for soybean and cotton planted after winter wheat harvest is 3 months. UGA research has shown no problems double cropping cotton or soybeans behind PowerFlex-treated wheat thus far. <i>Ryegrass resistant to Osprey is becoming more common in Georgia. Ryegrass resistant to Osprey is likely resistant to PowerFlex. To minimize resistance, make only one application of PowerFlex or Osprey in a field every two years. Adding Axiom or Prowl H2O to a program would be beneficial.</i>
Fair to good residual control of annual ryegrass	pendimethalin (Prowl H2O) 3.8 AS MOA 3	1.5 to 2.5 pt	0.71 to 1.18	Apply from 1st leaf stage of wheat up to flag leaf. 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.

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)				
Wild garlic, curly dock, most winter annual broadleaf weeds but wild radish must be small. <u>Will not control large wild radish late in the season when applied alone!</u>	thifensulfuron-methyl + tribenuron-methyl (Harmony Extra SG with TotalSol) 50 SG (Harmony Extra, Nimble) 75WDG MOA 2 + 2	0.45 to 0.9 oz 0.3 to 0.6 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 0.6 oz/A of Harmony Extra 50 SG with TotalSol (0.4 oz of Harmony Extra or Nimble 75 WDG); however, 0.75 to 0.9 oz/A (0.5 to 0.6 oz of Harmony Extra or Nimble 75 WDG) 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 with 2 to 4 in. of new growth. Liquid nitrogen may be used as the carrier. When using nitrogen as the carrier, reduce surfactant rate to 0.5 to 1.0 pint per 100 gal of solution (burn may still be noted). May also tank mix 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 applying with 2,4-D or MCPA in nitrogen.
Partial control of wild garlic, henbit, and wild radish	tribenuron-methyl (Express SG TotalSol) 50 SG (Express) 75 WDG MOA 2	0.25 to 0.5 oz 0.167 to 0.33 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. 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 MOA 4	1.0 to 1.25 pt 1.0 to 1.25 pt 0.67 to 0.84 pt	0.48 to 0.6 0.48 to 0.6 0.48 to 0.6	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 daytime temperatures are above 50° F. Increase rate by 50% to control corn 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 (numerous brands) 4.0 SL 3.7 SL MOA 4	1.0 pt 1.0 pt	0.5 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 but wheat should be fully tillered before using these increased rates. No spray additive required. May be tank mixed with several other herbicides; see labels. <u>Mixtures of MCPA plus Express or Harmony Extra 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 (lb a.e.)	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. Use only amine formulations as sensitive crops are likely nearby.
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. 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. 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 1.0	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.
	pinoxaden (Axial) 0.83 EC (Axial XL) 0.42 EC MOA 1	8.2 fl oz 16.4 fl oz	0.053	Apply to barley with two or more leaves and when ryegrass has one leaf to two tillers. If using Axial, add Adigor adjuvant at 9.6 fl oz per acre. If using Axial XL, no additional adjuvant is required. 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 (if needed); mix thoroughly and add the nitrogen. Although a water/nitrogen solution may be used as a carrier it is discouraged to avoid reduced ryegrass control. Axial and Hoelon have the same mode of action; therefore, Axial may not control Hoelon-resistant ryegrass. Research in Georgia has shown Axial to kill about 50% of the Hoelon-resistant populations that have been studied.

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)				
Wild garlic, curly dock, most winter annual broadleaf weeds but wild radish must be small. <u>Will not control large wild radish late in the season when applied alone!</u>	thifensulfuron-methyl + tribenuron-methyl (Harmony Extra SG with TotalSol) 50 SG (Harmony Extra, Nimble) 75WDG MOA 2 + 2	0.45 to 0.9 oz 0.3 to 0.6 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. Most winter annuals can be controlled with 0.6 oz/A of Harmony Extra 50 SG with TotalSol (0.4 oz of Harmony Extra or Nimble 75 WDG); however, 0.75 to 0.9 oz/A (0.5 to 0.6 oz of Harmony Extra or Nimble 75 WDG) 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 with 2 to 4 in. of new growth. Liquid nitrogen may be used as the carrier. When using nitrogen as the carrier, reduce surfactant rate to 0.5 to 1.0 pint per 100 gal of solution (burn may still be noted). May also tank mix 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 applying with 2,4-D or MCPA in nitrogen.
Partial control of wild garlic, henbit, and wild radish	tribenuron-methyl (Express SG TotalSol) 50 SG (Express) 75 WDG MOA 2	0.25 to 0.5 oz 0.167 to 0.33 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 with 0.25 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.</u>
Most winter annual broadleaf weeds except chickweed, henbit, and knawel	MCPA (numerous brands) 4.0 SL 3.7 SL MOA 4	1.0 pt 1.0 pt	0.5 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 or Harmony Extra are more effective than either product applied alone.</u>
	2,4-D amine (various brands) 3.8 SL 2,4-D ester (various brands) 3.8 SL 2,4-D ester (various brands) 5.7 SL MOA 4	1.0 to 1.25 pt 1.0 to 1.25 pt 0.67 to 0.84 pt	0.48 to 0.6 0.48 to 0.6 0.48 to 0.6	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.

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. Use only amine formulations 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. 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				
Wild garlic, curly dock, most winter annual broadleaf weeds but wild radish must be small. Will <u>not</u> control large wild radish late in the season when applied alone!	thifensulfuron-methyl + tribenuron-methyl (Harmony Extra SG with TotalSol) 50 SG (Harmony Extra, Nimble) 75WDG MOA 2 + 2	0.45 to 0.6 oz 0.3 to 0.4 oz	0.0094 to 0.0125 + 0.0047 to 0.0063	Apply after three-leaf stage of oats but prior to jointing. 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. When using nitrogen as the carrier, reduce surfactant rate to 0.5 to 1.0 pint per 100 gal of solution (burn may still be noted). May also tank mix with 0.25 lb active ingredient of 2,4-D or MCPA for improved control of wild radish. Do not use surfactant if applying with 2,4-D or MCPA in nitrogen. 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 SL 3.7 SL MOA 4	1.0 pt 1.0 pt	0.5 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 (numerous 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. Notice only an amine formulation of 2,4-D is recommended due to crop response.

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. 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 SL 3.7 SL MOA 4	1.0 pt 1.0 pt	0.50 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. 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 amine (various brands) 3.8 SL	1.0 pt	0.48	
	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 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 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. 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.
Wild garlic, curly dock, most winter annual broadleaf weeds but wild radish must be small. Will not control large wild radish late in the season when applied	thifensulfuron-methyl + tribenuron-methyl (Harmony Extra SG with TotalSol) 50 SG (Harmony Extra, Nimble) 75WDG MOA 2 + 2	0.45 to 0.9 oz 0.3 to 0.6 oz	0.0094 to 0.0188 + 0.0047 to 0.0094	Apply after two-leaf stage of triticale but prior to flag leaf being visible. Most winter annuals can be controlled with 0.6 oz/A of Harmony Extra 50 SG with TotalSol (0.4 oz of Harmony Extra or Nimble 75 WDG); however, 0.75 to 0.9 oz/A (0.5 to 0.6 oz of Harmony Extra or Nimble 75 WDG) 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 using nitrogen as the carrier, reduce surfactant rate to 0.5 to 1.0 pint per 100 gal of solution (burn may still be noted).
Partial control of wild garlic, henbit, and wild radish	tribenuron-methyl (Express SG TotalSol) 50 SG (Express) 75 WDG MOA 2	0.25 to 0.5 oz 0.167 to 0.33 oz	0.008 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.

SMALL GRAIN WEED RESPONSE TO HERBICIDES

A. Stanley Culpepper-Extension Weed Scientist
Lynn M. Sosnoskie-Weed Science

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 chick weed	P	P	G	G	P-F	G		G
common ragweed	G	F			E	P-F	E	
cornflower	G				G-E	P		F
cudweed	G-E	G-E		E	G	E		
curly dock	P	P		P	P-F	E		
dandelion	E	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	F-G	F-G			F	P		
henbit	P	P	F	G	F	G	F-G	G
horsenettle	F	F			F			
horseweed	F	F			F	F-G		
knawel	P				P	G		
lambsquarters	G	G			E	E	G	
plantains	E	E		E	E	E		
shepherd's-purse	G-E	G-E		E	G	E	G	G
swinecress	G	G		G-E	G-E	E		
thistles	G	G			G	F-G	F-G	
vetch	G				F	P		
Virginia pepperweed	E			E	F-G	G		
wild garlic	F	P			P	G-E	E	P
wild mustard	E	G-E	F	E	F-G	F-G	G	G
wild radish	E	G-E	F	E	F-G	F-G	G	G

¹ Timely postemergence application.

² Applied p reemergence.

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 XL¹	Axiom²	Hoelon¹	Osprey¹	PowerFlex¹
annual bluegrass	N	G	N	G	
annual ryegrass	G-E ³	P-G ⁴	E ⁵	G-E ⁶	G-E ⁶
buttercup	N		N		
common chick weed	N		N	F-G ⁷	F-G ⁷
common ragweed	N		N		
cornflower	N		N	P	
cudweed	N		N		
curly dock	N		N	P	
dandelion	N		N		
dogfennel	N		N		
eveningprimrose	N		N	P	P
field pennycress	N		N		
goldenrod	N		N		
hairy vetch	N		N		
henbit	N	G-E	N	G ⁷	
horsenettle	N		N		
horseweed	N		N		
knawel	N		N		
lambsquarters	N		N		
plantains	N		N		
shepherd's-purse	N		N		
swinecress	N		N	E	
thistles	N		N		
vetch	N		N	P-F ⁷	
Virginia pepperweed	N		N		
wild garlic	N		N	P	
wild mustard	N	G-E	N	G	G-E
wild radish	N	G-E	N	G	G-E

¹ Timely postemergence application.

² Applied spike to wheat but PRE to weeds.

³ Axial and Hoelon have a similar mode of action. Axial controls about 50% of the Hoelon-resistant ryegrass populations studied in Georgia.

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 Will not control ALS-resistant ryegrass.

⁷ 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%.