

SMALL GRAIN: SMALL GRAIN INSECT CONTROL

Grain Production of Wheat, Triticale, Barley, Oats, and Rye

David Buntin, Research/Extension Entomologist

CROP/PEST	INSECTICIDE	MOA	AMOUNT OF FORMULATION PER ACRE	LB ACTIVE INGREDIENT PER ACRE	REI/PHI (Hours or Days) H-harvest grain G-grazing, hay	TREATMENT THRESHOLDS AND REMARKS
<p>Insecticides and products listed are for use on all cereal grain crops for grain production including wheat, triticale, barley, oats and rye, except where listed or noted in the insecticide column and remarks section. Products labeled for use only on wheat or wheat and triticale are dimethoate, Fastac EC and Tombstone.</p> <p>► ALL PRODUCTS LISTED IN THIS SECTION HAVE A BEE HAZARD RESTRICTION, EXCEPT FOR CHLORANTRANILIPROLE (CORAGEN, PREVATHON).</p>						
Aphids	SEED TREATMENTS					<p>Inspect fields 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.</p> <p>Aphid treatment thresholds are:</p> <ul style="list-style-type: none"> • Seedlings (2/row ft) • 6-10 inch plants (6/row ft) • Stem elongation (2/stem) • Flag leaf (5/flag) • Heading (10/head to include flag) • Soft/Hard Dough stages (Do not treat) <p>NOTE: OP insecticides, such as dimethoate, control aphids but are not effective at suppressing Barley Yellow Dwarf disease.</p> <p>NOTE: At labeled rates, Gaucho XT and Enhance AW also contain two fungicides.</p> <p>NOTE: Cruiser 5FS is available as a commercial seed treatment. Rates of CruiserMaxx Cereals and CruiserMaxx Vibrance alone are too low for effective aphid control.</p> <p>NOTE: NipsIt Inside may be sold as NipsIt Suite Cereals CVR that includes 2 fungicides.</p> <p>NOTE: Warrior II Zeon will replace Karate Zeon.</p> <p>NOTE: Transform wheat, triticale and barley only.</p>
	<i>imidacloprid</i> Gaucho 600, Attendant 600 Axxess	4A	0.8 fl oz/100 lb seed	0.03 lb/100 lb seed	12 Hr/ 45 D	
	Gaucho XT Enhance AW Warden Cereals HR		3.4 fl oz/100 lb seed 4 fl oz/100 lb 5-8 fl oz/100 lb	0.03 lb/100 lb seed 0.05 lb/100 lb seed 0.05-0.08 lb/100 lb seed		
	<i>thiamethoxam</i> Cruiser 5FS Cruiser Maxx Cereals Plus Cruiser 5FS	4A	1 fl oz/100 lb seed 5 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)	12 Hr/ 45 D	
	<i>clothianidin</i> NipsIt Inside	4A	0.75-1.79 fl oz/100 lb seed		12 Hr/ – Not listed	
	FOLIAR TREATMENTS					
	<i>beta-cyfluthrin</i> Baythroid XL 1EC	3A	2.4 fl oz	0.019	12 Hr/ H-30 D G-3 D	
	<i>dimethoate</i> (wheat only) Dimethoate 4EC, 400 Dimethoate 2.67EC	1B	0.5-0.75 pt 0.75-1 pt	0.25-0.375 0.25-0.375	48 Hr/ H-35 D G-35 D	
	<i>flupyradifurone</i> Sivanto Prime	4D	7-10 fl oz	0.09125-0.13	4 Hr/ H-21 D G-7 D	
	<i>gamma cyhalothrin</i> Declare 1.25 Proaxis 0.5	3A	1.54 fl oz 3.84 fl oz	0.015 0.015	24 Hr/ H-30 D G-7 D	
	<i>lambda cyhalothrin</i> Warrior II Zeon 2.08, Silencer, Lambda, others 1	3A	1.28-1.92 fl oz 2.56-3.84 fl oz	0.02-0.03 0.02-0.03	24 Hr/ H-30 D G-7 D	
	<i>lambda cyhalothrin & chlorantraniliprole</i> Besiege	3 + 28	5-10 fl oz/A	0.02-0.03 + 0.04-0.06	24 Hr/ H-30 D G-7 D	
	<i>sulfoxaflor</i> Transform 50WG	4C	0.75-1.5 fl oz	0.023-0.046	24 Hr/ H-14 D	

SMALL GRAIN INSECT CONTROL

CROP/PEST	INSECTICIDE	MOA	AMOUNT OF FORMULATION PER ACRE	LB ACTIVE INGREDIENT PER ACRE	REI/PHI (Hours or Days) H harvest grain G-grazing, hay	TREATMENT THRESHOLDS AND REMARKS
Armyworm True armyworm Fall armyworm, Beet armyworm, Yellowstriped armyworm, and Cutworms	<i>alpha-cypermethrin</i> Fastac 0.83EC (wheat, triticale only)	3A	1.8-3.8 fl oz	0.012-0.025	24 Hr/ H 14 D G 14 D	True armyworm usually infests wheat in late winter and spring at the boot/head stage. Treat when larval numbers exceed 4 larvae/sq ft before pollen shed and 8 larvae/sq ft after pollen shed. Fall armyworm, beet armyworm, yellowstriped armyworm and cutworm infestations usually occur in the 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)/sq ft. NOTE: Blackhawk and Radiant are most effective against small larvae. Blackhawk is not labeled for cutworm control. Radiant is not labeled for cutworms or yellowstriped armyworms NOTE: Baythroid and Tombstone products are effective against small larvae only. NOTE: Fastac and Tombstone products are not labeled for use on barley, oats or rye.
	<i>beta-cyfluthrin</i> Baythroid XL 1EC	3A	1.8-2.4 fl oz	0.014-0.019	12 Hr/ H 30 D G 3 D	
	<i>cyfluthrin</i> (wheat only) Tombstone Tombstone Helios 2	3A	1.8-2.4 fl oz	0.028-0.038	12 Hr/ H 30 D G 3 D	
	<i>chlorantraniliprole</i> Coragen 1.67SC Prevathon 0.43	28	3.5-5 fl oz 14-20 fl oz	0.045-0.065 0.047-0.067	4 Hr/ H 1 D G 1 D	
	<i>gamma cyhalothrin</i> Declare 1.25 Proaxis 0.5	3A	1.28-1.54 fl oz 3.2-3.84 fl oz	0.0125-0.015 0.0125-0.015	24 Hr/ 30 D G 7 D	
	<i>lambda cyhalothrin</i> Warrior II Zeon 2.08 Silencer, Lambda, others 1	3A	1.6-1.92 fl oz 3.2-3.84 fl oz	0.025-0.03 0.025-0.03	24 Hr/ H 30 D G 7 D	
	<i>lambda cyhalothrin</i> + <i>chlorantraniliprole</i> Besiege	3 + 28	5-10 fl oz/A	0.02-0.03 + 0.04-0.06	24 Hr/ H 30 D G 7 D	
	<i>methomyl</i> Annihilate LV	1A	0.75-1.5 pt	0.225-0.45	48 Hr/ H 7 D	
	<i>spinosad</i> Blackhawk (36%)	5	1.7-3.5 oz	0.038-0.075	4 Hr/ H 21 D G 3 D	
	<i>spinetoram</i> Radiant 1SC	5	3-6 fl oz	0.0234-0.0469	4 Hr/ H 21 D G 3 D	
<i>zeta-cypermethrin</i> Mustang Maxx, Respect 0.8EC	3A	3.2-4 fl oz	0.02-0.025	12 Hr/ H 14 D G 3 D		
Cereal Leaf Beetle	<i>alpha-cypermethrin</i> Fastac 0.83EC (wheat, triticale only)	3A	1.8-3.8 fl oz	0.012-0.025	24 Hr/ H 14 D G 14 D	Treat when an average of 1 larva and adult/4 stems are found. Warrior II (formerly Karate), Declare and similar products 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 NOTE: Fastac, Respect and Tombstone products are not labeled for use on barley, oats and rye.
	<i>beta-cyfluthrin</i> Baythroid XL 1EC	3A	1-1.8 fl oz	0.008-0.014	12 Hr/ H 30 D G 3 D	
	<i>cyfluthrin</i> (wheat only) Tombstone Tombstone Helios 2	3A	1-1.8 fl oz	0.016-0.028	12 Hr/ H 30 D G 3 D	

SMALL GRAIN INSECT CONTROL

CROP/PEST	INSECTICIDE	MOA	AMOUNT OF FORMULATION PER ACRE	LB ACTIVE INGREDIENT PER ACRE	REI/PHI (Hours or Days) H-harvest grain G-grazing, hay	TREATMENT THRESHOLDS AND REMARKS
Cereal Leaf Beetle <i>continued</i>	<i>gamma cyhalothrin</i> Declare 1.25 Proaxis 0.5	3A	0.77-1.54 fl oz 2.56-3.84 fl oz	0.0075-0.015 0.01-0.015	24 Hr/ H 30 D G 7 D	
	<i>lambda cyhalothrin</i> Warrior II Zeon 2.08 Silencer, Lambda, others 1	3A	1.28-1.92 fl oz 2.56-3.84 fl oz	0.02-0.03 0.02-0.03	24 Hr/ H 30 D G 7 D	
	<i>lambda cyhalothrin & chlorantraniliprole</i> Besiege	3 + 28	5-10 fl oz/A	0.02-0.03 + 0.04-0.06	24 Hr/ H 30 D G 7 D	
	<i>malathion</i> Malathion 57EC, 5EC Malathion 8EC	1B	1.5 pt 1 pt	0.94 1	12 Hr/ H 7 D G 7 D	
	<i>methomyl</i> Annihilate LV	1A	0.75-1.5 pt	0.225-0.45	48 Hr/ H 7 D	
	<i>zeta-cypermethrin</i> Mustang Maxx, Respect 0.8EC	3A	2.6-3.2 fl oz	0.015-0.02	12 Hr/ H 14 D, G 14 D	
Grasshoppers	<i>alpha-cypermethrin</i> Fastac 0.83EC (wheat, triticale only)	3A	3.2-3.8 fl oz	0.020-0.025	24 Hr/ H 14 D G 14 D	Treat when grasshoppers are causing excessive (greater than 50%) defoliation.
	<i>beta-cyfluthrin</i> Baythroid XL 1EC	3A	1.8-2.4 fl oz	0.014-0.019	12 Hr/ H 30 D, G 3 D	NOTE: Fastac, Respect and Tombstone are not labeled for use on barley, oats and rye.
	<i>cyfluthrin</i> (wheat only) Tombstone Tombstone Helios 2	3A	1.8-2.4 fl oz	0.028-0.038	12 Hr/ H 30 D G 3 D	NOTE: Prevathon for best results add, methylated seed oil (MSO) at 1 gallon per 100 gallons of spray volume (1%v/v).
	<i>chlorantraniliprole</i> Coragen 1.67SC Prevathon 0.43	28	3.5-5 fl oz 14-20 fl oz	0.045-0.065 0.047-0.067	4 Hr/ H 1 D G 1 D	
	<i>gamma cyhalothrin</i> Declare 1.25 Proaxis 0.5	3A	1.02-1.54 fl oz 2.56-3.84 fl oz	0.01-0.015 0.01-0.015	24 Hr/ H 30 D	
	<i>lambda cyhalothrin</i> Warrior II Zeon 2.08 Silencer, Lambda, others 1	3A	1.28-1.92 fl oz 2.56-3.84 fl oz	0.02-0.03 0.02-0.03	24 Hr/ H 30 D G 3 D	
	<i>Lambda cyhalothrin & chlorantraniliprole</i> Besiege	3 + 28	5-10 fl oz/A	0.02-0.03 + 0.04-0.06	24 Hr/ H 30 D G 7 D	
	<i>malathion</i> Malathion 57EC, 5EC Malathion 8EC	1B	1.5 pt 1 pt	0.94 1	12 Hr/ H 7 D G 7 D	
	<i>zeta-cypermethrin</i> Mustang Maxx, Respect 0.8EC	3A	3.2-4 fl oz	0.02-0.025	12 Hr/ H 14 D G 14 D	

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CROP/PEST	INSECTICIDE	MOA	AMOUNT OF FORMULATION PER ACRE	LB ACTIVE INGREDIENT PER ACRE	REI/PHI (Hours or Days) H harvest grain G grazing, hay	TREATMENT THRESHOLDS AND REMARKS
Chinch bug	<i>alpha-cypermethrin</i> Fastac 0.83EC (wheat, triticale only)	3A	3.8 fl oz	0.025	12 Hr/ H 14 D G 14 D	<p>Treat during the seedling stage when an average of 1 adult/2 plants are found. On larger plants treat when 1 adult/stem or 50% of the plants are infested.</p> <p>Gaicho, Attendant, and Cruiser seed treatments may provide control for a few weeks after planting. Chinch bugs are difficult to control in headed wheat.</p> <p>NOTE: Fastac, Respect and Tombstone are not labeled for use on barley, oats and rye.</p>
	<i>beta-cyfluthrin</i> Baythroid XL 1EC	3A	2.4 fl oz	0.019	12 Hr/ H 30 D, G 3 D	
	<i>cyfluthrin</i> (wheat only) Tombstone Tombstone Helios 2	3A	2.4 fl oz	0.038	12 Hr/ H 30 D G 3 D	
	<i>gamma cyhalothrin</i> Declare 1.25 Proaxis 0.5	3A	1.54 fl oz 3.84 fl oz	0.015 0.015	24 Hr/ H 30 D G 7 D	
	<i>lambda cyhalothrin</i> Warrior II Zeon 2.08, Silencer, Lambda, others 1	3A	1.92 fl oz 3.84 fl oz	0.03 0.03	24 Hr/ H 30 D G 7 D	
	<i>lambda cyhalothrin & chlorantraniliprole</i> Besiege	3 & 28	5-10 fl oz/A	0.02-0.03 + 0.04-0.06	24 Hr/ H 30 D G 7 D	
	<i>zeta-cypermethrin</i> Mustang Maxx, Respect 0.8EC	3A	4 fl oz	0.025	12 Hr/ H 14 D, G 14 D	
Hessian fly	SEED TREATMENTS					<p>Plant Hessian fly-resistant wheat varieties.</p> <p>Systemic insecticide seed treatments are recommended for susceptible cultivars. Systemic seed treatments may need highest rates for effective suppression. Gaicho XT alone may not provide effective control. Rate of CruiserMaxx Cereals or Cruiser Maxx Vibrance alone is too low for effective Hessian fly control.</p> <p>NOTE: Barley is tolerant. Damage only occurs under severe infestations. Rye is highly resistant and oats are immune to Hessian fly.</p> <p>NOTE: Apply Warrior II (formerly Karate) or Declare when adults are actively laying eggs. Apply based on egg sampling for best results.</p>
	<i>imidacloprid</i> Gaicho 600, Attendant 600 Acess Gaicho XT plus Gaicho 600	4A	1.6-2.4 fl oz/100 lb seed 3.4 fl oz/100 lb seed plus 1 fl oz/100 lb seed	0.0625-0.094 lb/ 100 lb seed Combined: 0.0675lb/ 100 lb seed	12 Hr/ 45 D	
	<i>thiamethoxam</i> Cruiser 5FS Cruiser Maxx Cereals Plus Cruiser 5FS	4A	1.33 fl oz/100 lb seed 5 fl oz/100 lb seed plus 0.5 fl oz/100 lb seed	0.06 lb/100 lb seed 0.06 lb/100 lb seed (total)	12 Hr/ 45 D	
	<i>clothianidin</i> NipsIt Inside	4A	1.79 fl oz/ 100 lb seed	—	12 Hr/ —Not listed	
	FOLIAR TREATMENTS					
	<i>gamma cyhalothrin</i> Declare 1.25 Proaxis 0.5	3A	1.54 fl oz 3.84 fl oz	0.015 0.015	24 Hr/ H 30 D G 7 D	
	<i>lambda cyhalothrin</i> Warrior II Zeon 2.08, Silencer, Lambda, others 1	3A	1.92 fl oz 3.84 fl oz	0.03 0.03	24 Hr/ H 30 D G 7 D	
	<i>Lambda cyhalothrin & chlorantraniliprole</i> Besiege	3 & 28	5-10 fl oz/A	0.02-0.03 + 0.04-0.06	24 Hr/ H 30 D G 7 D	

SMALL GRAIN INSECT CONTROL

CROP/PEST	INSECTICIDE	MOA	AMOUNT OF FORMULATION PER ACRE	LB ACTIVE INGREDIENT PER ACRE	REI/PHI (Hours or Days) H harvest grain G-grazing, hay	TREATMENT THRESHOLDS AND REMARKS
Mites/Winter grain mite	<i>gamma cyhalothrin</i> Declare 1.25 Proaxis 0.5	3A	1.54 fl oz 3.84 fl oz	0.015 0.015	24 Hr/ H 30 D G 2 D	Treat when infestations are causing leaf discoloration in large areas of a field and mites are present. Infestations are usually associated with application of cattle manure or chicken litter. NOTE: Warrior II (formerly Karate) and Declare only provide mite suppression.
	<i>lambda cyhalothrin</i> Warrior II Zeon 2.08 Silencer, Lambda, others 1	3A	1.92 fl oz 3.84 fl oz	0.03 0.03	24 Hr/ H 30 D G 7 D	
	<i>lambda cyhalothrin & chlorantraniliprole</i> Besiege	3 & 28	5-10 fl oz/A	0.02-0.03 + 0.04-0.06	24 Hr/ H 30 D G 7 D	
Stink bugs	<i>alpha-cypermethrin</i> Fastac 0.83EC (wheat, triticale only)	3A	3.2-3.8 fl oz	0.020-0.025	12 Hr/ H 14 D G 14 D	Stink bugs rarely reach levels needing control in wheat. Treat if stinks bugs exceed 1 bug/sq ft 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. NOTE: Fastac, Respect and Tombstone are not labeled for use on barley, oats and rye.
	<i>beta-cyfluthrin</i> Baythroid XL 1EC	3A	1.8-2.4 fl oz	0.014-0.019	12 Hr/ H 30 D G 7 D	
	<i>cyfluthrin</i> (wheat only) Tombstone Tombstone Helios 2	3A	1.8-2.4 fl oz	0.028-0.038	12 Hr/ H 30 D G 3 D	
	<i>gamma cyhalothrin</i> Declare 1.25 Proaxis 0.5	3A	1.02-1.54 fl oz 2.56-3.84 fl oz	0.01-0.015 0.01-0.015	24 Hr/ H 30 D G 7 D	
	<i>lambda cyhalothrin</i> Warrior II Zeon 2.08 Silencer, Lambda, others 1	3A	1.28-1.92 fl oz 2.56-3.84 fl oz	0.02-0.03 0.02-0.03	24 Hr/ H 30 D G 7 D	
	<i>zeta-cypermethrin</i> Mustang Maxx, Respect 0.8EC	3A	3.2-4 fl oz	0.02-0.025	12 Hr/ H 14 D G 14 D	

SMALL GRAIN FUNGICIDE SEED TREATMENTS

Wheat, Oats, Barley, Rye, Sorghum

Alfredo Martinez-Espinoza, Extension Plant Pathologist

FUNGICIDE	CROP	RATE/100 LB SEED	REMARKS
<i>captan</i> Captan 400	Wheat, Barley, Oats, Rye	See label	Controls seedling blights. Does not control smuts.
<i>carboxin</i> + <i>captan</i> Enhance	Wheat, Barley, Oats	4 oz	Controls loose smut, common and kernel bunt, seed rots and seedling diseases.
<i>carboxin</i> + <i>thiram</i> Vitavax 200 RTU-Vitavax-Thiram	Wheat, Barley, Oats, Triticale Wheat, Oats, Barley	2 oz 2-4 oz	Controls loose smut and stinking smut. Controls seedling blights. See label for specific rate for grains.
<i>carboxin</i> + <i>PCNB</i> + <i>metalaxyl</i> Prevail	Wheat, Oats, Barley	2.5-5 oz (wheat) 1.6-3.3 oz (oats)	Controls loose smut, common and kernel bunt, seed rots and seedling diseases from <i>Pythium</i> and <i>Rhizoctonia</i> .
<i>difenoconazole</i> Dividend	Wheat	0.5-1 oz	Controls loose smut and stinking smut.
<i>difenoconazole</i> + <i>metalaxyl</i> Dividend XL RTA Dividend XL Dividend Extreme	Wheat Wheat Wheat	5-10 oz 1-2 oz 0.5-1 oz	Controls loose smut, stinking smut, and <i>Pythium</i> damping-off. Grower and commercially applied.
<i>fludioxonil</i> Maxim 4FS	Barley, Millet, Oats, Rye, Sorghum, Triticale, Wheat	0.08-0.16 fl oz	Controls <i>Fusarium</i> , <i>Rhizoctonia</i> , <i>Helminthosporium</i> and weakly pathogenic fungi such <i>Aspergillus</i> and <i>Penicillium</i> .
<i>ipconazole</i> Rancona 3.8 FS Rancona Apex Vortex	Wheat, Barley, Oats, Rye	0.051-0.085 fl oz (3.8 FS) 5-8.3 fl oz (Apex)	Controls loose smut, common and kernel bunt, seed rots and seedling diseases.
<i>mefenoxam</i> Apron XL Apron XL-LS	Wheat, Barley, Millet, Oats, Rye, Sorghum, Triticale	0.042-0.08	Controls <i>Pythium</i> damping-off. Does not control smuts.
<i>metalaxyl</i> Allegiance	Wheat, Barley, Millet, Oats, Rye, Sorghum, Triticale	See label	Controls <i>Pythium</i> damping-off. Does not control smuts.
<i>metalaxyl</i> + <i>metconazole</i> + <i>clothianidin</i> NipsIt SUITE	Wheat, Oats, Barley	5-7.5 fl oz	Controls common smut, flag smut, loose smut, seed decay fungi, <i>Fusarium</i> seed scab, <i>Pythium</i> seed rot and seedling diseases. Early season <i>Fusarium</i> seedling dieback, early season <i>Rhizoctonia</i> root rot and early season common rot.

For information on CruiserMaxx Cereals (thiamethoxam + mefenoxam + difenoconazole), CruiserMaxx Vibrance Cereals (sedaxane + thiamethoxam + mefenoxam + difenoconazole), Cruiser Vibrance Quattro (thiamethoxam + mefenoxam + difenoconazole + sedaxane + fludioxonil), and Gaucho XT (imidacloprid + metalaxyl + tebuconazole), See the Insect Management Section of this guide. Commercial treatment of small grain seed is preferred, but a drill box treatment can be used with many formulations. Drill-box treatment may not give control equal to commercial treatment.

SMALL GRAIN FUNGICIDE SEED TREATMENTS

Wheat, Oats, Barley, Rye, Sorghum

FUNGICIDE	CROP	RATE/100 LB SEED	REMARKS
<i>penflufen</i> Evergol Prime	Wheat, Oats, Barley	0.32 fl oz	Controls loose smut, common and kernel bunt, seed rots and seedling diseases.
<i>prothioconazole + penflufen + metalaxyl</i> Evergol Energy	Wheat, Oats, Barley	1 fl oz	Controls loose smut, common and kernel bunt, seed rots and seedling diseases along with early suppression of powdery mildew, rust and glume/leaf blotch.
<i>sedaxane</i> Vibrance	Wheat, Barley, Oats, Rye, Triticale	0.08-0.16 fl oz	Controls loose smut, seed decay seedling blight and damping-off caused by <i>Rhizoctonia solani</i> .
<i>sedaxane + difenconazole + mefenoxam</i> Vibrance Extreme	Wheat, Barley, Oats, Rye, Triticale	2.8-5.6 fl oz	Controls smuts and bunts, general seed rot, seedling blight, root rot and damping-off caused by seed or soilborne <i>Fusarium</i> spp or <i>Rhizoctonia</i> spp, Seedling blight and root rot and damping-off caused by <i>Pythium</i> spp, seed borne <i>Septoria</i> , <i>Septoria</i> leaf blotch, and <i>Fusarium</i> seed scab.
<i>sedaxane + difenconazole + fludioxonil + mefenoxam</i> Vibrance Quattro	Wheat, Barley, Oats, Rye, Triticale	5 fl oz	Controls smuts and bunts, general seed rot, seedling blight, root rot and damping-off caused by seed or soilborne <i>Fusarium</i> spp or <i>Rhizoctonia</i> spp, Seedling blight and root rot and damping-off caused by <i>Pythium</i> spp, seed borne <i>Septoria</i> , <i>Septoria</i> leaf blotch, and <i>Fusarium</i> seed scab.
<i>tebuconazole</i> Raxil (in various combinations with other fungicides)	Wheat, Oats, Barley	3.5-4.6 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.
<i>triadimenol</i> Baytan 30 RTU Baytan-Thiram	Wheat, Barley, Oats, Rye All	0.75-1.5 oz 4.5-9 oz	Controls loose smut and stinking smut. Controls smuts and seedling blights.
<i>triticonazole + metconazole</i> Charter F	Wheat, Barley, Oats, Rye	5.4 fl oz	Controls loose smut, common and kernel bunt, seed rots and seedling diseases.

For information on CruiserMaxx Cereals (thiamethoxam + mefenoxam + difenconazole), CruiserMaxx Vibrance Cereals (sedaxane + thiamethoxam + mefenoxam + difenconazole), Cruiser Vibrance Quattro (thiamethoxam + mefenoxam + difenconazole + sedaxane + fludioxonil), and Gaucho XT (imidacloprid + metalaxyl + tebuconazole), See the Insect Management Section of this guide. Commercial treatment of small grain seed is preferred, but a drill box treatment can be used with many formulations. Drill-box treatment may not give control equal to commercial treatment.

WHEAT DISEASE CONTROL

Alfredo Martinez-Espinoza, Extension Plant Pathologist

DISEASE	CHEMICAL	MOA	RATE PER ACRE	REI (Hours)	REMARKS AND PRECAUTIONS
Stagonospora Leaf and Glume Blotch, Leaf Rust, Stripe Rust, Powdery Mildew, Tan Spot	<i>azoxystrobin</i> Quadris, Equation, Satori	11	6.2-10.8 oz 4-12 fl oz	4 H	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% v/v to optimize efficacy.
	<i>azoxystrobin + cyproconazole</i> Azure Xtra	11 + 3	3.5-6.8 fl oz	12 H	Apply product at 3.5 oz/A in the spring at Feekes 5. Apply 5-6.8 fl oz/A between Feekes 8-10.51.
	<i>azoxystrobin + propiconazole</i> Quilt, QuiltXcel, Avaris, Trivapro B	11 + 3	7-14 oz	12 H	Applications may be made no closer than a 14-day interval. Quilt and QuiltXcel can be applied up to Feekes growth stage 10.5. QuiltXcel has a higher rate of azoxystrobin. Low rates of Quilt and QuiltXcel are used for spring suppression of early season diseases, 10.5 fl oz and above are used for flag leaf protection and maximizing yield potential. Trivapro A + Trivapro B = Trivapro co-pack. Do not apply more than 28 fl oz/A of Trivapro B per year.
	<i>azoxystrobin + tebuconazole</i> Custodia	11 + 3	6.4-8.6 fl oz	12 H	Should be applied prior to disease development up to late head emergence (Feekes 10.5). Do not apply after this stage.
	<i>benzovindiflupyr</i> Trivapro A	7	4 fl oz	12 H	Combining Trivapro A and Trivapro B co-pack: Apply in spring for early disease control or Feekes 8 through Feekes 10.5.4 for disease control on flag leaf. Make applications no closer than 14 days apart. Do not apply more than 14 fl oz/A of Trivapro A per year.
	<i>fluoxyroxad + pyraclostrobin</i> Priaxor	7 + 11	4-8 fl oz	12 H	Apply no later than the beginning of flowering (Feekes 10.5 Zadok's 59). Maximum number of applications per season is 2.
	<i>fluoxyastrobin</i> Evito	11	2-4 fl oz	12 H	For optimum results, begin applications preventatively and continue on a 14-21 day interval. Do not make more than 2 sequential applications. Apply prior to disease development from Feekes 5 (Zadok's 31) up to late head emergence at Feekes 10.5 (Zadok's 59).
	<i>fluoxyastrobin + tebuconazole</i> Evito T	11 + 3	4-6 fl oz	12 H	Apply a maximum of 2 applications per season Apply no later than Feekes 10.5. For optimum results, apply the first application at shooting-pseudostem erected (approximately Feekes 5, Zadok's 31) and a second application no later than heading completed (Feekes 10.5, Zadok's 54).
	<i>fluoxyastrobin + flutriafol</i> Fortix	11 + 3	2-3 fl oz 4-6 fl oz	12 H	For early season control. Apply Fortix when flag leaf is 50% to fully emerged. Apply preventative when conditions for disease are favorable for development.*Supplemental labeling
	<i>metconazole</i> Caramba	3	10-14 oz	12 H	Maximum number of applications per season is 2. Minimum time from application to harvest is 30 days.
	<i>picoxyastrobin</i> Approach	11	3-4 fl oz 6-12 fl oz	12 H	For early season preventive disease control. Begin applications of Approach prior to disease development and continue on a 7-14 day interval, depending on the targeted disease. Use higher rate and shorter interval when disease pressure is high.
	<i>picoxyastrobin + cyproconazole</i> Approach Prima	11 + 3	3.4-6.8 fl oz	12 H	For early season preventive disease control. Begin applications of Approach Prima prior to disease development and continue on a 7-14-day interval, depending on the targeted disease. Use higher rate and shorter interval when disease pressure is high.
<i>propiconazole</i> Tilt, Propimax	3	4 oz	12 H	Tilt can be applied until heading stage (Feekes 10.5). Do not apply Tilt after this growth stage to avoid possible illegal residues.	
<i>propiconazole + azoxystrobin</i> Quilt QuiltXcel Avaris	3 + 11	7-14 oz	12 H	Applications may be made no closer than a 14 day interval. Quilt and QuiltXcel can be applied up to Feekes 10.5. QuiltXcel has a higher rate of azoxystrobin. Low rates of Quilt and QuiltXcel are used for spring suppression of early season diseases. 10.5 fl oz and above are used for flag leaf protection and maximizing yield potential.	

WHEAT DISEASE CONTROL

DISEASE	CHEMICAL	MOA	RATE PER ACRE	REI (Hours)	REMARKS AND PRECAUTIONS
Stagonospora Leaf and Glume Blotch, Leaf Rust, Stripe Rust, Powdery Mildew, Tan Spot (continued)	<i>propiconazole + trifloxystrobin</i> Stratego	3 + 11	10 oz	12 H	Do not apply more than 2 applications of Stratego per season. Do not apply after Feekes 10.5.
	<i>prothioconazole</i> Proline	3	4.3-5 fl oz	12 H	For optimum disease control, the lowest labeled rate of a spray surfactant should be tank mixed with Proline. Up to 2 applications of Proline may be made per year.
	<i>prothioconazole + tebuconazole</i> Prosaro	3 + 3	6.5-8.2 fl oz	12 H	Begin applications of Prosaro 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.
	<i>prothioconazole + trifloxystrobin</i> Stratego YLD	3 + 11	4 fl oz	12 H	Begin applications preventively when conditions are favorable for disease development. Do not make more than 2 applications/season. Do not apply after Feekes 10.5. Do not apply within 35 days of harvest.
	<i>pyraclostrobin</i> Headline	11	6-9 oz	12 H	Apply no later than Feekes 10.5.
	<i>pyraclostrobin + metconazole</i> Twinline	11 + 3	7-9 fl oz	12 H	Do not apply more than 2 applications/season. Do not apply after Feekes 10.5.
	<i>tebuconazole</i> Folicur Several others products have tebuconazole as the active ingredient. Check label of specific products.	3	4 fl oz	12 H	Folicur is no longer manufactured (2009). No end-user restrictions for disease control. Use until supply is exhausted. Not labeled for powdery mildew control. For all tebuconazole products, a maximum of 4 fl oz/A/season may be applied.
	<i>tebuconazole + trifloxystrobin</i> Absolute	3 + 11	3-5 fl oz	12 H	Begin applications preventively when conditions are favorable for disease development. For optimum disease control apply 5 fl oz at flag leaf stage (Feekes 8-9). For early season suppression of Tan Spot, Leaf Blight and Powdery Mildew, apply at 3-4 oz. Do not apply more than 5 fl oz/season. Do not apply after Feekes growth stage 10.5.2. Do not apply within 35 days of harvest. Do not use with adjuvants.

Economic yield response to control wheat diseases is most likely to occur in fields with yield potentials of more than 50 bu/A and varieties with fair to poor resistance. ***Always follow label instructions, recommendations and restrictions.***

DISEASE	CHEMICAL	MOA	RATE PER ACRE	REI/PHI (Hours or Days)	EFFICACY
Fusarium Head Blight (SCAB)	<i>metconazole</i> 8.6% Caramba 0.75 SL	3	13.5-17	12 H/ 30 D	G
	<i>propiconazole</i> 41.8% Tilt 3.6 EC	3	4	12 H/ Apply at 50% flowering	P
	<i>prothioconazole</i> 41% Proline 480 SC	3	5-5.7	12 H/ 30 D	G
	* <i>tebuconazole</i> 38.7% Folicur 3.6 F	3	4	12 H/ 30 D	F
	<i>prothioconazole</i> 19% + <i>tebuconazole</i> 19% Prosaro 421 SC	3 + 3	6.5-8.2	12 H/ 30 D	G

Timing of fungicide application is crucial for the control of FHB. Research indicates that products within the triazole class of fungicides are most effective if applied at flowering (Feekes 10.5.1). Strobilurin fungicides are not recommended for management of FHB. Data from other states indicates that Strobilurin fungicides can increase the DON content of FHB-infected grain.

*A maximum of 4 fl oz of tebuconazole-containing products may be applied per acre per crop season. Table modified from 2015 fungicide table produced by “The North Central Regional Committee on Management of Small Grain Diseases (NCERA-184).”

Efficacy categories: P–Poor; F–Fair; G–Good; VG–Very Good; E–Excellent.

SMALL GRAIN WEED CONTROL

A. Stanley Culpepper, Extension Weed Scientist

WEEDS CONTROLLED	HERBICIDE	MOA	AMOUNT OF FORMULATION (Broadcast Rate/Acre)	LBS ACTIVE INGREDIENT (Broadcast Rate/Acre)	REI/PHI (Hours or Days)	REMARKS AND PRECAUTIONS (READ ALL LABELS)
WHEAT: PREPLANT NO-TILL						
Emerging annual weeds, volunteer corn	<i>paraquat</i> : Gramoxone 2 SL Firestorm, Parazone 3 SL	22	2-4 pt 1.33-2.7 pt	0.5-1	24 H/ N/A	Apply before crop emerges. Add nonionic surfactant at 1 pt/100 gal of spray or crop oil concentrate at 1 gal/100 gal of spray. Control of 12" corn at 1.5 pt/A is about 80% but may provide acceptable control until frost; see label.
Emerging annual weeds, control or suppression of perennial weeds	<i>glyphosate</i> 3.57 SL (3 lb ae) 4 SL (3 lb ae) 5 SL (3.7 lb ae) 5.5 SL (4.5 lb ae) 6 SL (5 lb ae)	9	32-48 fl oz 24-36 fl oz 23-34 fl oz 22-32 fl oz 19-29 fl oz	0.75-1.13 (lb ae)	4 H/ N/A	Apply before crop emerges. Adjuvant needs vary by brand. Tank mixes must follow the most-restrictive REI/PHI. Select 2 EC or Select Max 0.97 EC may be mixed with glyphosate to control volunteer Roundup Ready corn but wheat cannot be planted for 30 days after application. Corn <12": Apply Select at 4-6 fl oz or Select Max at 6 fl oz. Corn 12-24": Apply Select at 6-8 fl oz or Select Max at 9 fl oz. REI: 24 hr; PHI: N/A; MOA 1. Harmony Extra 50 SG with TotalSol at 0.45-0.9 oz/A may be mixed with glyphosate for improved control of wild radish, henbit and chickweed. Harmony Extra SG can be applied prior to or shortly after planting but prior to wheat emergence. REI: 12 hr; PHI: N/A; MOA 2. 2,4-D amine 3.8 L at up to 1 pt/A may be mixed with glyphosate to control most weeds. Check 2,4-D label of brand used but some labels note to "plant only labeled crops within 29 days following application." Research currently suggests plantback intervals of 24 days plus 1" of rain between application and planting is needed. Without required rainfall, serious injury can occur. REI: 48 hr; PHI: N/A; MOA 4. Valor 51 WDG at 1-2 oz/A may be mixed with glyphosate to provide residual control of radish, henbit, chickweed, and even ryegrass if herbicide reaches soil and is activated. A minimum of 30 days must pass, and 1" of rainfall must occur, between application and planting wheat; suggest 40 days on sands. REI: 12 hr; PHI: N/A; MOA 14.
WHEAT: PREEMERGENCE						
Annual ryegrass and annual broadleaf weeds	<i>chlorsulfuron</i> + <i>metsulfuron-methyl</i> Finesse 75 WDG	2 + 2	0.5 oz	0.0195 + 0.0039	4 H/ N/A	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.

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

SMALL GRAINS WEED CONTROL

WEEDS CONTROLLED	HERBICIDE	MOA	AMOUNT OF FORMULATION (Broadcast Rate/Acre)	LBS ACTIVE INGREDIENT (Broadcast Rate/Acre)	REI/PHI (Hours or Days)	REMARKS AND PRECAUTIONS (READ ALL LABELS)
WHEAT: DELAYED PRE-EMERGENCE						
Residual control of annual ryegrass; <i>Zidua must be activated prior to ryegrass emergence for excellent control.</i>	<i>pyroxasulfone</i> Zidua 85 WG	15	0.7-1 oz	0.037-0.053	12 Hr/ N/A	Plant wheat seed 0.75-1.25" deep. Cannot apply to broadcast seeded wheat. Seed must be uniformly covered without furrows to avoid injury. Apply Zidua when 80% of germinated wheat seeds have a shoot at least ½" long up through wheat spiking. Use 0.7-1 oz/A on coarse soils; rate can be increased to 1.25 oz/A on medium to fine soils. Label restricts irrigation until wheat is emerged.
WHEAT: POSTEMERGENCE SPIKE THROUGH EARLY POST						
Wild radish, henbit, and suppresses annual ryegrass	<i>flufenacet + metribuzin</i> Axiom 68 WDG	15 + 5	4-8 oz	0.136-0.027 + 0.34-0.068	12 H/ N/A	Wheat seed should be planted at least 1" deep. Apply to wheat in the spike stage of growth (up until 2 leaf stage). Preemergence applications can cause severe injury on light soils. For most Georgia soils, ≤6 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. Rotation to soybean is 0 months, cotton 8 months, many other crops 18 months.
Residual control of annual ryegrass; <i>Zidua must be activated prior to ryegrass emergence for excellent control.</i>	<i>pyroxasulfone</i> Zidua 85 WG	15	1-2 oz	0.037-0.074	12 H/ N/A	Apply to wheat at spiking up to the 4th tiller growth stage. May mix with Axial and apply between 2 leaf and 4 tiller wheat to control emerged ryegrass plants (those not resistant to Axial) and provide residual control. Residual control by Zidua is much greater than that by Prowl for ryegrass.
Residual control of annual ryegrass, wild radish, and many other weeds. <i>Fierce must be activated prior to weeds reaching ¼" for excellent control.</i>	<i>pyroxasulfone + flumioxazin</i> Fierce 76 WDG	15 + 14	1.5 oz	0.04 + 0.031	12 H/ N/A	Wheat must be planted 1-1.5" deep; cannot treat broadcast seeded wheat. Apply to wheat from spike through the 2-leaf stage; DO NOT APPLY PREEMERGENCE . Apply only in water; no additives. New label; limit acres treated. Visual leaf tip burn and chlorosis will likely be observed. Ideally, the application is made after spike wheat but before weed emergence. No rotational concerns for corn, cotton, peanut or soybean.
WHEAT: POSTEMERGENCE						
Emerged annual ryegrass.	<i>diclofop-methyl</i> Hoelon 3 EC	1	1.33-2.67 pt	0.5-1	24 H/ 77 D	Treat before wheat begins to joint. Apply 1.33 pt/A on 2-leaf ryegrass, 2 pt/A on 2-leaf to initial tillering ryegrass; and 2.67 pt/A on 1-tiller ryegrass. One application per season. Do not tank mix with broadleaf herbicides or use liquid nitrogen as the carrier. May add 1-2 pt/A of crop oil concentrate when conditions are dry or when ryegrass is large. Crop oil usually not necessary. Crop injury may result if organophosphate is used. Ryegrass resistance to Hoelon is common. To minimize resistance: Make at most 1 application of Hoelon OR Axial in a field every 2 years.

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

SMALL GRAINS WEED CONTROL

WEEDS CONTROLLED	HERBICIDE	MOA	AMOUNT OF FORMULATION (Broadcast Rate/Acre)	LBS ACTIVE INGREDIENT (Broadcast Rate/Acre)	REI/PHI (Hours or Days)	REMARKS AND PRECAUTIONS (READ ALL LABELS)
WHEAT: POSTEMERGENCE (continued)						
Emerged annual ryegrass, small wild radish, henbit and chickweed. Very effective on annual bluegrass.	<i>mesosulfuron-methyl</i> Osprey 4.5 WDG	2	4.75 oz	0.013	4 H/ 60 D	Apply to ryegrass between 1 leaf and 1 tiller while wheat is emerged but before jointing. Add a nonionic surfactant (at least 80% active) at 2 qts/100 gal spray solution plus ammonium nitrogen fertilizer (28-0-0, 30-0-0, 32-0-0) at 1-2 qt/A. DO NOT topdress within 14 days of application. Do not use liquid nitrogen as the carrier. May mix Osprey with Harmony Extra. Do not mix with 2,4-D or MCPA. Cotton/soybean can be planted 90 days after application. Ryegrass resistance to Osprey is common. To minimize resistance: Make at most 1 application of Osprey OR PowerFlex in a field every 2 years.
Annual ryegrass.	<i>pinoxaden</i> Axial XL 0.42 EC	1	16.4 fl oz	0.053	48 H/ 60 D	Apply to ryegrass prior to 2 tillers while wheat has at least 2 leaves but before pre-boot. No adjuvant required. Mixtures with Harmony Extra will improve broadleaf control. UGA suggests not mixing with nitrogen but label allows water/nitrogen mixtures containing up to 50% liquid nitrogen by volume. Add water to tank, then add Axial; then mix thoroughly and add nitrogen. May mix with Zidua for residual control; see Zidua above. One application per crop and any crop can be planted 90 days after application. Axial and Hoelon have the same mode of action. Research in Georgia has shown Axial to kill about 85% of the Hoelon-resistant populations studied. To minimize resistance: Make at most 1 application of Hoelon OR Axial in a field every 2 years.
Annual ryegrass and wild radish.	<i>pyroxsulam</i> PowerFlex HL 13.13 WDG	2	2 oz	0.0164	12 H/ 60 D	Apply to ryegrass prior to 2 tillers while wheat has at least 3 leaves but before jointing. Add crop oil concentrate at 1-1.25% v/v (1-1.25 gal/ 100 gal spray solution). Can tank mix with Harmony Extra. Do not mix with dicamba, 2,4-D, or MCPA. UGA suggests not mixing with nitrogen but label allows water-nitrogen mixture containing up to 50% liquid nitrogen by volume (<30 lb/A of nitrogen). If applying in liquid nitrogen, use a nonionic surfactant at 0.25% v/v, instead of crop oil. An independent liquid ammonium nitrogen fertilizer application should not be made within 7 days of application; also do not apply organophosphates within 5 days of PowerFlex. May plant soybean or cotton after the following April. Ryegrass resistance to PowerFlex is common. To minimize resistance make only 1 application of Osprey OR PowerFlex in a field every 2 years.
Fair residual control of annual ryegrass; must be activated prior to weed emergence.	<i>pendimethalin</i> Prowl H20 3.8 AS	3	1.5-2.5 pt	0.71-1.18	24 H/ 60 D	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. Zidua is more effective on ryegrass.

SMALL GRAINS WEED CONTROL

WEEDS CON-TROLLED	HERBICIDE	MOA	AMOUNT OF FORMULATION (Broadcast Rate/Acre)	LBS ACTIVE INGREDIENT (Broadcast Rate/Acre)	REI/PHI (Hours or Days)	REMARKS AND PRECAUTIONS (READ ALL LABELS)
WHEAT: POSTEMERGENCE (continued)						
Wild garlic, curly dock, many other winter annual broadleaf weeds. Will not control primrose. Wild radish must be <1". Harmony is almost never an effective tool for radish when applied alone.	<i>thifensulfuron-methyl</i> + <i>tribenuron-methyl</i> Harmony Extra SG with TotalSol 50 SG Harmony Extra, Nimble, others 75 WDG	2 + 2	0.45-0.9 oz 0.3-0.6 oz	0.0094-0.0188 + 0.0047-0.0094	48 H/ 60 D	Apply after 2-leaf stage of wheat but prior to flag leaf. Most winter annuals can be controlled with 0.6-0.75 oz/A of Harmony Extra 50SG; however, 0.75-0.9 oz/A is recommended for controlling wild garlic or wild radish. For best results, apply when weeds are in the 2-4-leaf stage, temperatures are above 50° F and not stressed. Garlic should be less than 12" and should have 2-4" of new growth. Make no more than 2 applications per year applying a max of 1.5 oz/A of Harmony Extra Total Sol or equivalent active ingredient with other products. A nonionic surfactant at the rate of 1 qt/100 gal of spray solution is recommended when applied in water. Liquid nitrogen may be used as the carrier; in this case, premix the herbicide in water and add the mixture to nitrogen with agitation; add 0.5-1 pt nonionic surfactant to 100 gal spray solution. For radish, tank mix with 0.375-0.5 lb active ingredient of MCPA or 2,4-D (12-16 oz/A of 3.8 lb ai/A material). Add 0.5-1 pt nonionic surfactant /100 gal spray solution. If mixing 2,4-D or MCPA with Harmony Extra and using nitrogen as carrier, eliminate surfactant. Follow wheat stage of growth restrictions for 2,4-D or MCPA.
Partial control of wild garlic, henbit and wild radish. Harmony Extra is usually much more effective.	<i>tribenuron-methyl</i> Express SG TotalSol 50 SG Express 75 WDG	2	0.25-0.5 oz 0.167-0.33 oz	0.008-0.0155	12 H/ 45 D	Apply after 2-leaf stage of wheat but prior to flag leaf. Add 1 qt of nonionic surfactant/100 gal of spray solution. 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. If applying in liquid nitrogen; add 0.5-1 pt nonionic surfactant/100 gal of spray solution. Suggest mixtures with 0.375-0.5 lb active ingredient of 2,4-D or MCPA for improved control of wild radish (add 0.5-1 pt nonionic surfactant/100 gal spray solution). If mixing 2,4-D or MCPA with Express and using nitrogen as the carrier, use at most 0.5 pt of nonionic surfactant/100 gal of spray solution. Follow wheat stage of growth restrictions for MCPA or 2,4-D when using these mixtures.
Most winter annual broadleaf weeds except chickweed, henbit, geranium, clover, red sorrel and knawel.	<i>2,4-D amine</i> various brands 3.8 L <i>2,4-D ester</i> various brands 3.8 L <i>2,4-D ester</i> various brands 5.7 L	4	1-1.25 pt 1-1.25 pt 0.67-0.84 pt	0.48-0.6 0.48-0.6 0.48-0.6	48 H/ 14 D	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. STRONGLY SUGGEST mixtures with Harmony Extra as noted above. One application per crop allowed.

SMALL GRAINS WEED CONTROL

WEEDS CONTROLLED	HERBICIDE	MOA	AMOUNT OF FORMULATION (Broadcast Rate/Acre)	LBS ACTIVE INGREDIENT (Broadcast Rate/Acre)	REI/PHI (Hours or Days)	REMARKS AND PRECAUTIONS (READ ALL LABELS)
WHEAT: POSTEMERGENCE (continued)						
Most winter annual broadleaf weeds except chickweed, henbit, geranium, clover, red sorrel and knawel.	MCPA 4 SL 3.7 SL	4	12-20 fl oz 12-20 fl oz	0.375-0.625 0.347-0.58	48 H/ –	Apply 12-16 fl oz/A when wheat has at least 2 tillers and 16-20 fl oz/A when wheat is fully tillered. Do not apply after jointing and weeds should be less than 2” in height or diameter. No spray additive needed. STRONGLY suggest mixtures with Harmony Extra as noted on previous page.
WHEAT: PREHARVEST						
Annual broadleaf and grass weeds, suppression of perennial weeds.	<i>glyphosate</i> 3.57 SL (3 lb ae) 4 SL (3 lb ae) 5 SL (3.7 lb a.e) 5.5 SL (4.5 lb ae) 6 SL (5 lb ae)	9	2 pt 2 pt 1.6 pt 22 fl oz 20 fl oz	0.75 (lb ae)	4 H/ 7 D	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.	<i>2,4-D amine</i> various brands 3.8 SL	4	1 pt	0.48	48 H/ 14 D	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 during this time of year. Pre-harvest interval of 14 days is required.
BARLEY: PREPLANT NO-TILL						
Emerged annual weeds, volunteer corn.	<i>paraquat</i> Gramoxone 2 SL Firestorm, Parazone 3 SL	22	2-4 pt 1.3-2.7 pt	0.5-1	24 H/ N/A	Apply before crop emerges. Add nonionic surfactant at 1 pt/100 gal of solution or crop oil concentrate at 1 gal/100 gal of solution. Control of 12” corn at 1.5 pt/A is about 80% but may provide acceptable control until frost; see label.
Emerged annual weeds, control or suppression of perennials.	<i>glyphosate</i> 4 SL (3 lb ae) 5.4 SL (4 lb ae) 5 SL (4.14 lb ae) 5.5 SL (4.5 lb ae) 6 SL (5 lb ae)	9	32-48 fl oz 24-36 fl oz 23-34 fl oz 22-32 fl oz 19-29 fl oz	0.75-1.13 (lb ae)	4 H/ N/A	Apply before crop emerges. Adjuvant needs vary by brand. Tank mixes must follow the most-restrictive REI/PHI. Select 2 EC or Select Max 0.97 EC may be mixed with glyphosate to control volunteer Roundup Ready corn, but barley cannot be planted for 30 days after application. Corn <12”’: Apply Select at 4-6 fl oz or Select Max at 6 fl oz. Corn 12-24”’: Apply Select at 6-8 fl oz or Select Max at 9 fl oz. REI: 24 hr; PHI: N/A; MOA 1. Harmony Extra 50SG with TotalSol at 0.45-0.9 oz/A may be added to improve control of wild radish, henbit and chickweed. Harmony Extra SG can be applied prior to or shortly after planting but prior to barley emergence. REI: 12 hr; PHI: N/A; MOA 2. 2,4-D amine at up to 1 pt/A (3.8 L product) may be mixed with glyphosate to control most weeds. Check 2,4-D label of brand used but some labels note to “plant only labeled crops within 29 days following application.” Research currently suggests plantback intervals of 24 days plus 1” of rain between application and planting is needed. Without required rainfall, serious injury can occur. REI: 48 hours; PHI: N/A; MOA 4.

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

SMALL GRAINS WEED CONTROL

WEEDS CONTROLLED	HERBICIDE	MOA	AMOUNT OF FORMULATION (Broadcast Rate/Acre)	LBS ACTIVE INGREDIENT (Broadcast Rate/Acre)	REI/PHI (Hours or Days)	REMARKS AND PRECAUTIONS (READ ALL LABELS)
BARLEY: POSTEMERGENCE						
Annual ryegrass.	<i>diclofop-methyl</i> Hoelon 3 EC	1	1.33-2.67 pt	0.5-1	24 H/ 66 D	Apply when ryegrass is in the 1-4-leaf stage and after barley has tiller initiation but prior to jointing. One application per year. See label for specific rates depending on cultivar planted, ryegrass size, and environmental conditions. Do not tank mix with broadleaf herbicides or use liquid nitrogen as the carrier. Do not add crop oil. 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. Ryegrass resistance to Hoelon is common. To minimize resistance: Make at most one application of Hoelon or Axial in a field every 2 years.
	<i>pinoxaden</i> Axial XL 0.42 EC	1	16.4 fl oz	0.053	48 H/ 60 D	Apply to barley with 2 or more leaves and when ryegrass has less than 2 tillers. No additional adjuvant is required. Strongly encourage not mixing with nitrogen but label allows water/nitrogen mixture containing up to 50% nitrogen. Add water to tank, then add Axial, then mix thoroughly and add the nitrogen. 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 85% of the Hoelon-resistant populations. To minimize resistance: Make at most 1 application of Hoelon or Axial in a field every 2 years.
Wild garlic, curly dock, many other winter annual broadleaf weeds. Will not control primrose. Wild radish must be <1". Harmony is almost never an effective tool for radish when applied alone.	<i>thifensulfuron-methyl</i> + <i>tribenuron-methyl</i> Harmony Extra SG with TotalSol 50 SG Harmony Extra, Nimble 75 WDG	2 + 2	0.45-0.9 oz 0.3-0.6 oz	0.0094-0.0188 + 0.0047-0.0094	12 H/ 45 D	Apply after 2-leaf stage of barley but prior to flag leaf being visible. Most winter annuals can be controlled with 0.75 oz/A of Harmony Extra 50 SG with TotalSol (0.5 oz of Harmony Extra or Nimble 75 WDG); however, 0.75-0.9 oz/A (0.5-0.6 oz of Harmony Extra or Nimble 75WDG) is recommended for controlling wild garlic or small wild radish. Add 1 qt of nonionic surfactant/100 gal of spray solution. For best results, apply when weeds are in the 2-4-leaf stage, temperatures are above 50° F, and not drought stressed. Garlic should be less than 12" tall with 2-4" of new growth. Liquid nitrogen may be used as the carrier. When using nitrogen as the carrier, reduce surfactant rate to 0.5-1 pt/100 gal of solution (burn may still be noted). Tank mix with 0.375-0.5 lb ai of 2,4-D or MCPA (12-16 fl oz/A of 3.8 lb material) to control wild radish. Do not use surfactant if applying with 2,4-D or MCPA in nitrogen. If applying 2,4-D or MCPA follow barley stage of growth restrictions.

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

SMALL GRAINS WEED CONTROL

WEEDS CONTROLLED	HERBICIDE	MOA	AMOUNT OF FORMULATION (Broadcast Rate/Acre)	LBS ACTIVE INGREDIENT (Broadcast Rate/Acre)	REI/PHI (Hours or Days)	REMARKS AND PRECAUTIONS (READ ALL LABELS)
BARLEY: POSTEMERGENCE <i>(continued)</i>						
Partial control of wild garlic, henbit and wild radish. Harmony Extra is usually a more effective option.	<i>tribenuron-methyl</i> Express SG TotalSol 50 SG Express 75 WDG	2	 0.25-0.5 oz 0.167-0.33 oz	0.0078-0.0155	12 H/ 45 D	Apply after 2-leaf stage of barley but prior to flag leaf being visible. Add 1 qt of nonionic surfactant/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. Suggest mixing with 0.375-0.5 lb ai of MCPA or 2,4-D (12-16 fl oz of 3.8 lb ai material) for improved control of wild radish and other broadleaf weeds. If applying 2,4-D or MCPA, follow barley stage of growth restrictions.
Most winter annual broadleaf weeds except chickweed, henbit, geranium, red sorrel, clover and knawel.	MCPA (numerous brands) 4 SL 3.7 SL	4	 12-20 fl oz 12-20 fl oz	 0.375-0.625 0.347-0.58	48 H/ –	Apply 12-16 fl oz/A when barley has at least 2 tillers and 16-20 fl oz/A when barley is fully tillered. Do not apply after jointing and weeds should be less than 2” in height or diameter. No spray additive needed. <i>STRONGLY suggest mixtures with Harmony Extra, as noted on previous page.</i>
	<i>2,4-D amine</i> various brands 3.8 SL	4	1-1.25 pt	0.48-0.6	48 H/ 14 D	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. Mixtures of 2,4-D with Harmony Extra are more effective, see Harmony section on previous page. Only 1 application of 2,4-D in crop allowed.
	<i>2,4-D ester</i> various brands 3.8 SL		1-1.25 pt	0.48-0.6		
<i>2,4-D ester</i> various brands 5.7 SL	0.67-0.84 pt		0.48-0.6			
BARLEY: PREHARVEST						
Annual broadleaf weeds.	<i>2,4-D amine</i> various brands 3.8 SL	4	1 pt	0.48	48 H/ 14 D	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.
Annual weeds, suppression of perennials.	<i>glyphosate</i> Roundup WeatherMax 5.5 SL (4.5 lb ae)	9	11-22 fl oz	0.39-0.74	4 H/ 7 D	FEED BARLEY ONLY. Apply after the hard-dough stage and when the grain contains 20% 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.

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SMALL GRAINS WEED CONTROL

WEEDS CONTROLLED	HERBICIDE	MOA	AMOUNT OF FORMULATION (Broadcast Rate/Acre)	LBS ACTIVE INGREDIENT (Broadcast Rate/Acre)	REI/PHI (Hours or Days)	REMARKS AND PRECAUTIONS (READ ALL LABELS)
OATS: PREPLANT NO-TILL						
Emerged annual weeds, control or suppression of perennials.	<i>glyphosate</i> 4 SL (3 lb ae) 5.4 SL (4 lb ae) 5 SL (4.14 lb ae) 5.5 SL (4.5 lb ae) 6 SL (5 lb ae)	9	32-48 fl oz 24-36 fl oz 23-34 fl oz 22-32 fl oz 19-29 fl oz	0.75-1.13 (lb ae)	24 H/ N/A	Apply before crop emerges. Adjuvant needs vary by brand. Tank mixes must follow the most-restrictive REI/PHI. Select 2 EC or Select Max 0.97 EC may be mixed with glyphosate to control volunteer Roundup Ready corn, but oats cannot be planted for 30 days after application. Corn <12": Apply Select at 4-6 fl oz or Select Max at 6 fl oz. Corn 12-24": Apply Select at 6-8 fl oz or Select Max at 9 fl oz. REI: 24 hr; PHI: N/A; MOA 1. 2,4-D amine 3.8 L at up to 1 pt/A may be mixed with glyphosate to control most weeds. Check 2,4-D label of brand used but some labels note to "plant only labeled crops within 29 days following application." Research is in progress to determine ideal plantback intervals but 24 days and 1" of rain between application and planting is suggested. REI: 48 hr; PHI: N/A; MOA 4.
OATS: POSTEMERGENCE						
Wild garlic, curly dock, many other winter annual broadleaf weeds. Will not control primrose. Wild radish must be <1". Harmony is almost never an effective tool for radish when applied alone.	<i>thifensulfuron-methyl</i> + <i>tribenuron-methyl</i> Harmony Extra SG with TotalSol 50 SG Harmony Extra, Nimble 75 WDG	2 + 2	0.45-0.6 oz 0.3-0.4 oz	0.0094-0.0125 + 0.0047-0.0063	12 H/ 45 D	Apply after 3 leaf stage of oats but prior to jointing. Wild garlic should be less than 12" tall and should have 2-4" 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/100 gal of spray solution. Liquid nitrogen may be used as the carrier. When using nitrogen as the carrier, reduce surfactant rate to 0.5-1 pt/100 gal of solution (burn may still be noted). Tank mix with 0.25-0.375 lb ai of 2,4-D or MCPA (8-12 fl oz/A of 3.8 L product) to control wild radish. Do not use surfactant if applying with 2,4-D or MCPA in nitrogen. Mixtures with MCPA or 2,4-D must be applied to fully tillered oats but before jointing.
Most winter annual broadleaf weeds except chickweed, henbit, geranium, red sorrel, clover and knawel.	MCPA 4 SL 3.7 SL	4	12-16 fl oz 12-16 fl oz	0.375-0.5 0.347-0.46	12 H/ 45 D	Apply up to 16 fl oz/A when oat is fully tillered. Do not apply after jointing and weeds should be less than 2" in height or diameter. No spray additive needed. Mixtures of MCPA with Harmony Extra are far more effective, see Harmony section above.
	2,4-D amine (numerous brands) 3.8 SL	4	12-16 fl oz	0.36-0.48	48 H/ 14 D	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. Mixtures of 2,4-D with Harmony Extra are more effective, see Harmony section above. One application of 2,4-D in crop only.
OATS: PREHARVEST						
Annual broadleaf weeds	<i>2,4-D amine</i> various brands 3.8 SL	4	1 pt	0.48	48 H/ 14 D	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.

SMALL GRAINS WEED CONTROL

WEEDS CONTROLLED	HERBICIDE	MOA	AMOUNT OF FORMULATION (Broadcast Rate/Acre)	LBS ACTIVE INGREDIENT (Broadcast Rate/Acre)	REI/PHI (Hours or Days)	REMARKS AND PRECAUTIONS (READ ALL LABELS)
RYE: PREPLANT						
Emerged annual weeds, control or suppression of perennials.	<i>glyphosate</i> 4 SL (3 lb ae) 5.4 SL (4 lb ae) 5 SL (4.14 lb ae) 5.5 SL (4.5 lb ae) 6 SL (5 lb ae)	9	32-48 fl oz 24-36 fl oz 23-34 fl oz 22-32 fl oz 19-29 fl oz	0.75-1.13 (lb ae)	4 H/ N/A	Apply before crop emerges. Adjuvant needs vary by brand. Tank mixes must follow the most-restrictive REI/PHI. Select 2 EC or Select Max 0.97 EC may be mixed with glyphosate to control volunteer Roundup Ready corn, but rye cannot be planted for 30 days after application. Corn <12": Apply Select at 4-6 fl oz or Select Max at 6 fl oz. Corn 12-24": Apply Select at 6-8 fl oz or Select Max at 9 fl oz. REI: 24 hr; PHI: N/A; MOA 1. 2,4-D amine 3.8 L at up to 1 pt/A may be mixed with glyphosate to control most weeds. Check 2,4-D label of brand used but some labels note to "plant only labeled crops within 29 days following application." Research currently suggests plantback intervals of 24 days plus 1" of rain between application and planting is needed. Without required rainfall, serious injury can occur. REI: 48 hours; PHI: N/A; MOA 4.
RYE: POSTEMERGENCE						
Most winter annual broadleaf weeds except chickweed, henbit, geranium, red sorrel, clover and knawel.	MCPA 4 SL 3.7 SL	4	12-20 oz 12-20 oz	0.375-0.625 0.347-0.58	48 H/ 14 D	Apply 12-16 fl oz/A when rye has at least 2 tillers and 16-20 fl oz/A when rye is fully tillered. Do not apply after jointing, and weeds should be less than 2" in height or diameter. No spray additive needed.
	<i>2,4-D amine</i> various brands 3.8 SL	4	1 pt	0.48	48 H/ 14 D	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. Only 1 application of 2,4-D in crop allowed.
	<i>2,4-D ester</i> various brands 3.8 SL		1 pt	0.48		
<i>2,4-D ester</i> various brands 5.7 SL		0.67 pt				
RYE: PREHARVEST						
Annual broadleaf weeds.	<i>2,4-D amine</i> various brands 3.8 SL	4	1 pt	0.48	48 H/ 14 D	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 during this time of year.
TRITICALE: PREPLANT						
Emerged annual weeds, control or suppression of perennials.	<i>glyphosate</i> 4 SL (3 lb ae) 5.4 SL (4 lb ae) 5 SL (4.14 lb ae) 5.5 SL (4.5 lb ae) 6 SL (5 lb ae)	9	32-48 fl oz 24-36 fl oz 23-34 fl oz 22-32 fl oz 19-29 fl oz	0.75-1.13 (lb ae)	4 H/ 45 D	Apply before crop emerges. Adjuvant needs vary by brand. Tank mixes must follow the most-restrictive REI/PHI. Select 2 EC or Select Max 0.97 EC may be mixed with glyphosate to control volunteer Roundup Ready corn, but triticale cannot be planted for 30 days after application. Corn <12": Apply Select at 4-6 fl oz or Select Max at 6 fl oz. Corn 12-24": Apply Select at 6-8 fl oz or Select Max at 9 fl oz. REI: 24 hr; PHI: N/A; MOA 1. Harmony Extra 50 SG at 0.45-0.9 oz/A may be added to improve control of wild radish, henbit, and chickweed. Harmony Extra SG can be applied prior to or shortly after planting but prior to emergence. REI: 48 hours; PHI: N/A; MOA 2.

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

SMALL GRAINS WEED CONTROL

WEEDS CONTROLLED	HERBICIDE	MOA	AMOUNT OF FORMULATION (Broadcast Rate/Acre)	LBS ACTIVE INGREDIENT (Broadcast Rate/Acre)	REI/PHI (Hours or Days)	REMARKS AND PRECAUTIONS (READ ALL LABELS)
TRITICALE: POSTEMERGENCE						
Most winter annual broadleaf weeds except chickweed, henbit, geranium, red sorrel, clover and knawel.	<i>2,4-D amine</i> various brands 3.8 SL	4	12-16 oz/A	0.36-0.48	48 H/ 14 D	Some 2,4-D products are not labeled for triticale. For those that are, apply after triticale is fully tillered but before jointing. Spraying when 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. Only 1 application of 2,4-D in crop allowed. <i>Mixtures with Harmony Extra suggested, see Harmony section on next page.</i>
A few annual broadleaf weeds; often less effective than Harmony Extra.	<i>bromoxynil</i> Buctril 2 EC Buctril 4 EC	6	2 pt 1 pt	0.5	96 H/ 45 D	Can be applied from triticale emergence until boot stage. Controls 1-2" wild mustard, wild radish, swinecress, shepherdspurse, field pennycress, Virginia pepperweed, and knawel. Does not control wild garlic, chickweed or henbit.
Annual broadleaf weeds and ryegrass suppression.	<i>chlorsulfuron</i> + <i>metsulfuron methyl</i> Finesse 75 WDG	2 + 2	0.2-0.4 oz	0.008 + 0.0016 to 0.016 + 0.0031	4 H/ -	Can be applied after the 2 leaf stage but before flag leaf is visible. See label for weeds controlled, application rates, and use of surfactant. Plant only STS soybeans following triticale harvest. Early application necessary for ryegrass suppression. See comments under wheat.
Emerged annual ryegrass, small wild radish, henbit, and chickweed. Very effective on annual bluegrass.	<i>mesosulfuron-methyl</i> Osprey 4.5 WDG	2	4.75 oz	0.013	4 H/ 60 D	No Georgia data; limit treated areas until experience gained. For fall sown crop only. Apply to ryegrass between 1 leaf and 1 tiller while wheat is emerged but before jointing. Add a nonionic surfactant (at least 80% active) at 2 qts/100 gal spray solution plus ammonium nitrogen fertilizer (28-0-0, 30-0-0, 32-0-0) at 1-2 qt/A. DO NOT topdress within 14 days of application. Do not use liquid nitrogen as the carrier. May mix Osprey with Harmony Extra. Do not mix with 2,4-D or MCPA. Cotton/soybean can be planted 90 days after application. Ryegrass resistance to Osprey is common. To minimize resistance: Make at most 1 application of Osprey OR PowerFlex in a field every 2 years. Study label closely.

SMALL GRAINS WEED CONTROL

WEEDS CONTROLLED	HERBICIDE	MOA	AMOUNT OF FORMULATION (Broadcast Rate/Acre)	LBS ACTIVE INGREDIENT (Broadcast Rate/Acre)	REI/PHI (Hours or Days)	REMARKS AND PRECAUTIONS (READ ALL LABELS)
TRITICALE: POSTEMERGENCE (continued)						
Annual ryegrasses and wild radish.	<i>pyroxsulam</i> PowerFlex HL 13.13 WDG	2	2 oz	0.0164	12 H/ 60 D	<p><i>No Georgia data; try on limited acres.</i> Apply to ryegrass prior to 2 tillers while wheat has at least 3 leaves but before jointing. Add crop oil concentrate at 1-1.25% v/v (1-1.25 gal/100 gal spray solution). May tank mix with Harmony Extra. Do not mix with dicamba, 2,4-D, or MCPA. UGA suggests not mixing with nitrogen but label allows water-nitrogen mixture containing up to 50% liquid nitrogen by volume (<30 lb/A of nitrogen). If applying in liquid nitrogen, use a nonionic surfactant at 0.25% v/v, instead of crop oil.</p> <p>An independent liquid ammonium nitrogen fertilizer application should not be made within 7 days of application; also do not apply organophosphates within 5 days of PowerFlex. May plant soybean or cotton after the following April.</p> <p>Ryegrass resistance to PowerFlex is common. To minimize resistance: Make only 1 application of Osprey OR PowerFlex in a field every 2 years.</p> <p>Study label closely.</p>
Wild garlic, curly dock, many other winter annual broadleaf weeds. Will not control primrose. Wild radish must be <1". Harmony is almost never an effective tool for radish when applied alone.	<i>thifensulfuron-methyl</i> + <i>tribenuron-methyl</i> Harmony Extra SG with TotalSol 50 SG Harmony Extra, Nimble 75 WDG	2 + 2	0.45-0.9 oz 0.3-0.6 oz	0.0094-0.0188 + 0.0047-0.0094	12 H/ 45 D	<p>Apply after 2 leaf stage of triticale but prior to flag leaf being visible. Most winter annuals can be controlled with 0.75 oz/A of Harmony Extra 50 SG; however, 0.75-0.9 oz/A is recommended for controlling wild garlic or small wild radish. Add 1 qt of nonionic surfactant/100 gal of spray solution. For best results, apply when weeds are in the 2-4-leaf stage, temperatures are above 50° F, and not drought stressed. Garlic should be less than 12" tall and should have 2-4" of new growth.</p> <p>Liquid nitrogen may be used as the carrier. When using nitrogen as the carrier, reduce surfactant rate to 0.5-1 pt/100 gal of solution (burn may still be noted). Tank mix with 0.375 lb active ingredient of 2,4-D (12 fl oz/A of 3.8 L product) for control of wild radish. Do not use surfactant if applying with 2,4-D or MCPA in nitrogen. Mixtures with 2,4-D must be applied to fully tillered triticale but before jointing</p>
TRITICALE: PREHARVEST						
Annual broadleaf weeds.	<i>2,4-D amine</i> various brands 3.8 SL	4	1 pt	0.48	48 H/ 14 D	<p>Some products are not labeled for triticale; for those that are, apply when grain is in the hard dough stage or later. Do not allow drift to sensitive crops, especially cotton and tobacco.</p> <p>Apply only labeled AMINE formulations during this time of year.</p>

Mode 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

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

E – excellent control, 90% or better
 G – good control, 80%-90%
 F – fair control, 60%-80%
 P – poor control, 30%-60%
 N – no control, less than 30%

¹ Timely postemergence application.

² Applied preemergence.

SMALL GRAIN WEED RESPONSE TO HERBICIDES

WEEDS	Axial XL ¹	Axiom ²	Zidua ²	Fierce ²	Hoelon ¹	Osprey ¹	PowerFlex ¹
annual bluegrass	N	G			N	G-E	P-F
annual ryegrass	G-E ³	P-G ⁴	G-E ⁵	G-E ⁵	E ⁶	G-E ⁷	G-E ⁷
buttercup	N				N		
common chick weed	N			G-E	N	F-G ⁸	F-G ⁸
common ragweed	N				N		
cornflower	N				N	P	
cudweed	N				N		
curly dock	N				N	P	
dandelion	N				N		
dogfennel	N				N		
evening primrose	N			E	N	P	P
field pennycress	N				N		
goldenrod	N				N		
hairy vetch	N				N		
henbit	N	G-E	P-F	G-E	N	G-E ⁷	G ⁷
horsenettle	N				N		
horseweed	N			G-E	N		
knawel	N				N		
lambsquarters	N			E	N		
plantains	N				N		
shepherd's-purse	N				N		
swinecress	N			G-E	N	E	
thistles	N				N		
vetch	N				N	P-F ⁸	
Virginia pepperweed	N				N		
wild garlic	N				N	P	
wild mustard	N	G	P-F	G-E	N	G	G-E
wild radish	N	G	P-F	G-E	N	G	G-E

E – excellent control, 90% or better
 G – good control, 80%-90%
 F – fair control, 60%-80%
 P – poor control, 30%-60%
 N – no control, less than 30%

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 85% of the Hoelon-resistant populations studied in GA.

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

⁵ For this level of control, Zidua must be activated prior to ryegrass emergence. For Fierce, ryegrass must be less than 1/4" when activated.

⁶ Will not control Hoelon-resistant ryegrass.

⁷ Will not control ALS-resistant ryegrass.

⁸ Weeds must not be larger than 2" at time of application.