



## WHEAT “CHEAT SHEET” FOR 2012 – 2013 SEASON



**Variety selection:** The ideal variety would get a “5-star rating”: 1) consistently high yield potential; 2) high test weight; 3) Hessian fly resistance; 4) resistance to leaf rust, mildew, and glume blotch; and 5) straw strength. Five-star wheats are rare for S. C. conditions and we usually settle for 3 to 4 out of 5. Moderate height is also desirable (except for straw production) to reduce lodging and residue for double-cropping.

### Selected Variety Notes:

**AGS 2026** is beardless, medium maturity and short height, with good resistance to leaf rust, and race L Hessian fly resistance. Mildew resistance is fair. AGS 2026 has demonstrated high yield potential. Test weight has been slightly below rest average.

**AGS 2035** is med-tall, bearded, medium maturity, with HF resistance below the lakes and good rust resistance. AGS 2035 has fair mildew resistance, but good resistance to soil-borne mosaic virus. This variety has demonstrated above average yield potential and good test weight.

**AGS 2060** is tall, bearded, early-med maturity (similar to AGS 2000) with HF resistance below the lakes and good rust resistance. AGS 2060 has fair mildew resistance and has demonstrated above average yield and test weight in the SC coastal plain. **AGS 2060 is highly susceptible to soil-borne mosaic virus.**

**Dyna-Gro Baldwin** is tall, bearded, med-late maturity, with some HF resistance below the lakes and good rust resistance. Baldwin has fair mildew resistance and has demonstrated above average yield and test weight in the SC coastal plain.

**Pioneer 26R10** is med-tall, bearded, late maturity with good test weight. Yield performance at Blackville was good in 2012. This variety has also produced above average yields in N. C. trials.

**Progeny 125** is a beardless, medium-height wheat with high yield and below average test weight in two years of testing at Blackville.

**Diversify:** Unless only a small acreage is involved, it is always a good idea to plant more than one variety to spread risk. Try at least 2 - 3 of the top varieties for your area depending on your acreage. Variations in pest severity and weather conditions will favor one variety over another in any given year. When trying a new variety for the first time, you should usually keep the majority of your acreage in a proven performer.

**Certified Seed:** Use of certified seed provides a level of insurance against poor germination, seedborne diseases, and weeds. Since we are dependent on the continued development and release of specialized varieties adapted to our climate and pest complex, it benefits everyone to obey all seed laws. PVP varieties (covered under the plant variety protection act) can only be saved for seed by the grower for use on their own farm. Patented varieties cannot be saved for seed.

### VARIETAL CHARACTERISTICS

**Maturity:** Maturity can be defined in different ways, and depending on the growing season, a medium maturity variety is often harvest ready within two - three days of an early variety planted on the same date. The most important consideration is that early varieties will joint and head earlier. Therefore, early varieties are more susceptible to stem freeze in March and head freeze in April if planted too early.

**Hessian Fly Resistance:** Varietal resistance has worked well in suppressing Hessian fly in S. C., but Hessian fly is a moving target. A “poor” rating indicates susceptibility throughout the state; “fair” indicates some resistance which may be inadequate under heavy pressure; “good” indicates resistance to the predominant fly races in the southern coastal plain (roughly below Lake Marion); Good +L indicates some resistance to race “L” Hessian fly found in the northern Coastal Plain (above Lake Marion). However, even varieties with race L resistance can fail north of the lakes. If a previously resistant variety fails on your farm you will need to protect it with insecticide or change varieties in the future.

# S. C. SELECTED WHEAT VARIETY CHARACTERISTICS AND PERFORMANCE - 2012

VARIETY	AWNS (beard)	MAT- <sup>a</sup> URITY	H. <sup>b</sup> FLY	POWDERY MILDEW <sup>c</sup>	LEAF RUST <sup>c</sup>	STRIPE RUST <sup>c</sup>	SBM <sup>c</sup>	HEIGHT <sup>d</sup>	STRAW STREN.	TEST WT.	TEST <sup>e</sup> WT. INDEX	YIELD (BU/AC)						YIELD <sup>e</sup> INDEX
												06	08	09	10	11	12	
*AGS 2026	N	E/M	Good+L	Fair	Good	Good	Good	Short	Fair	F/G	-0.8 <sup>4</sup>	--	--	88	72	95	90	+7.2 <sup>4</sup>
*AGS 2035	Y	M	Good	Fair-Good	Good	Good	Good	Med/Tall	Good	Good	+1.6 <sup>5</sup>	--	104	83	63	95	101	+4.6 <sup>5</sup>
AGS 2060	Y	E/M	Good	Fair	Good	Good	Poor	Tall	Fair	Good	+2.7 <sup>5</sup>	--	104	80	69	88	93	+2.5 <sup>5</sup>
AgriPro Arcadia	Y	E	Poor	Poor	Good	Good	?	Med/Tall	?	Good	-0.3 <sup>2</sup>	--	--	--	64	84	--	-5.3 <sup>2</sup>
AgriPro Magnolia	Y	M	Good	Poor	Fair	Good	?	Med/Tall	Good	Fair	-1.4 <sup>5</sup>	--	106	72	61	86	82	-4.2 <sup>5</sup>
AgriPro Oakes	Y	M	Poor	Poor	Fair	Good	?	Med	Good	Ex	+2.3 <sup>3</sup>	--	--	77	62	89	--	-3.1 <sup>3</sup>
*AgriPro Panola	Y	M	Poor	Fair	Fair	Good	Good	Med/Tall	Good	Fair	-1.6 <sup>7</sup>	97	107	80	65	94	--	+4.1 <sup>7</sup>
AgriPro SY9978	Y	M/L	Good+L?	Good	Good	?	?	Tall	?	Fair	-2.1 <sup>3</sup>	--	--	--	66	92	80	-3.8 <sup>3</sup>
AgriPro Coker 9553	Y	M	Poor	Poor	Fair	Good	Fair	Med	Good	Good	+1.5 <sup>6</sup>	80	97	--	61	88	82	-5.7 <sup>6</sup>
AgriPro Coker 9700	N	E	?	?	Good	?	?	Med	Good	Good	+1.0 <sup>2</sup>	--	--	--	--	84	89	-3.5 <sup>2</sup>
Pioneer 26R10	Y	L	Good?	Good	Fair	Good?	Fair?	Med	Good	Fair	-0.3 <sup>1</sup>	--	--	--	--	--	91	+4.9 <sup>1</sup>
*Pioneer 26R12	Y	L	Fair	Fair-Good	Good	Good	Fair	Med/Tall	Good	Ex	+2.3 <sup>9</sup>	98	99	81	62	94	82	+1.3 <sup>9</sup>
Pioneer 26R20	Y	M/L	Fair?	?	Good	?	?	Med	Good	G-Ex	+1.4 <sup>3</sup>	--	--	--	56	99	85	-2.5 <sup>3</sup>
Pioneer 26R61	Y	E/M	Good+L	Fair	Good	Good	Good	Med/Tall	Good	Ex	+2.1 <sup>13</sup>	91	102	72	61	82	86	-0.8 <sup>13</sup>
Progeny 117	N	E	?	Fair	Fair	Good?	Poor?	Med/Tall	?	Good	+0.2 <sup>1</sup>	--	--	--	--	--	89	+2.9 <sup>1</sup>
*Progeny 125	N	E	?	Fair	Good	?	?	Med	?	Fair	-2.1 <sup>3</sup>	--	--	--	75	99	90	+9.4 <sup>3</sup>
Progeny 185	N	M/L	Poor	Fair	Fair	?	?	Med	Good	Fair	-1.5 <sup>5</sup>	--	101	77	69	95	80	+0.7 <sup>5</sup>
Progeny 357	Y	M	?	Good	Fair	Fair?	Good?	Med	?	Fair	-3.3 <sup>1</sup>	--	--	--	--	--	82	-4.1 <sup>1</sup>
Progeny 870	Y	E/M	?	Good	Fair	Fair/Good	Fair?	Med	?	Fair	-1.4 <sup>1</sup>	--	--	--	--	--	78	-8.1 <sup>1</sup>
S. States 8308	Y	M	Fair	Fair?	Fair	Poor	Poor	Med	Good	Good	+0.7 <sup>6</sup>	96	101	75	56	95	85	-2.0 <sup>6</sup>
S. States 8500	Y	M	?	Good	Fair	?	?	Med/Tall	?	Fair	-1.1 <sup>2</sup>	--	--	--	--	94	86	+0.1 <sup>2</sup>
*S. States 8641	N	M	Good	Good	Fair	Good	Good	Med/Tall	Good	Good	-0.1 <sup>4</sup>	--	101	81	64	93	92	+1.4 <sup>5</sup>
S. States 5205	N	M	?	Good	Good	?	?	Short?	?	Fair	0.0 <sup>1</sup>	--	--	--	--	--	85	-1.1 <sup>1</sup>
*USG 3209	N	M	Fair	Good	Poor	Good	Good	Med	Good	Good	-0.3 <sup>12</sup>	97	112	70	62	94	96	+5.3 <sup>12</sup>
*Dyna-Gro Baldwin	Y	M/L	Good	Fair/Good	Good	Good	Good	Tall	Good	Good	+1.1 <sup>5</sup>	--	111	79	71	91	92	+4.8 <sup>5</sup>
Dyna-Gr Oglethorpe	N	E/M	Good+L	Fair/Good	Good	Good	Good	Med	Fair	Fair	-0.25 <sup>5</sup>	--	101	87	54	93	94	+0.5 <sup>5</sup>
Dyna-Gro 9053	Y	M/L	?	Fair	Fair	?	?	Short	?	F/P	-3.4 <sup>1</sup>	--	--	--	--	--	81	-5.1 <sup>1</sup>

LSD (P= 0.05) The "least significant difference" indicates the yield difference that is statistically meaningful:

5 6 5 9 4 7

\* These varieties have shown the most consistent performance from a given seed source in the S. C. southern coastal plain.

a. Maturity based on jointing / heading dates and harvest maturity. Plant early varieties last to reduce freeze risk.

b. Hessian fly: Poor = no resistance; Fair = resistance under low pressure; Good = Resistant to most races below Lake Marion; Good+L = also resistant to race L but may fail above Lake Marion.

c. Powdery mildew, leaf rust, stripe rust resistance varies by region and can change rapidly; SBM = soilborne mosaic virus; ratings based on observations at Blackville if available, or other states.

d. Tall = over 41" (105 cm); short less than 37" (95 cm) under high yield conditions.

2

e. Yield Index or Test Weight Index shows in one number the percent above or below average in a series of tests (not all tested varieties shown). Superscript shows number of years compared.

The best varieties have a positive yield and test weight index over multiple years, plus good disease resistance, fly resistance, and straw strength. 2007 yield data lost to freeze.

**Disease Resistance:** Rust and mildew resistance can change even more rapidly than insect resistance, and disease ratings are always relative. The ratings used in the table are based on our latest observations at Blackville, when available, and neighboring states. Even varieties given only a “fair” rating exhibit a significant level of resistance when compared with highly susceptible varieties.

**Test Weight and Test Weight Index:** Test weight ratings are based on performance over a period of years, but this is one characteristic that is very stable. That is, test weights may vary greatly depending on field conditions, but high test weight varieties maintain consistently better test weights over many years. The test weight index shows the percent above or below average test weight in a series of trials. The superscript number shows how many years the variety was evaluated. For example, a TW index of 2.8<sup>3</sup> means that over a 3-year period the variety’s test weight was 2.8 % above the average of other varieties tested. This would be exceptional out-performance.

**Yield Index:** The yield index indicates the percent above or below test average yield and the superscript shows the number of years compared. Consistent yielders have a positive index over several years. A high or low number based on only one year’s information is less meaningful.

**Height:** A value over 41” (105 cm) is a tall wheat for our area and under 35” (90 cm) is relatively short. These heights are taken under high yield conditions. Keep in mind that some tall varieties have excellent straw strength and standability.

**Straw Strength:** Based on lodging comparisons (when available) at N rates of 90 - 120 lbs / ac.

### AGRONOMIC CONSIDERATIONS

**Seeding Rate:** Plant seed per foot, not bu. per acre. There can easily be a 30% to 40% difference in seed size dependent on variety and lot; but on average it takes about 120 lb seed/ac to reach the maximum seeding rate. Calibrate drill on hard ground where you can count seed. Shoot for a maximum of 21-22 seed per row ft. on 7” rows (12/ft. on 4”, 18/ft. on 6”, 24/ft. on 8”). For broadcast seeding, shoot for 36 - 40 seed/ft<sup>2</sup>.

**These are maximum wheat seeding rates, even for high management. Wheat compensates well for reduced seed rates and even skips in plant stands. Equivalent yields have been obtained with half seeding rates (18/ft<sup>2</sup>) and even with 18-inch row skips on 15 % of the field area. Don’t give up on reduced stands.** Maximum seeding rates can reduce barley yellow dwarf yield loss and provides some insurance against poor emergence.

Some seed companies now list seed size (seed/lb) on the bag. The following table is useful for determining how much seed to purchase, checking whether the drill is putting out the correct rate, and for calibrating broadcast seeding. **If no information is available on seed size, a good mid-range guess for the amount of wheat seed to purchase is 120 lb per acre.**

Small Grain Seeding Rates											
Use Seed Per Row Foot, Bu/ac only an Estimate											
Crop	lb/bu	Seed/ft <sup>2</sup>		Seed per row ft. by row spacing (inches)					Average seed/lb	Approx. Lb/ac	Approx Bu/ac
				4	6	7	8	10			
Wheat	60	Grain	36	12	18	21	24	30	13,000	120	2.0
		Graze	45	15	23	28	30	38			
Oats	32	Grain	24	8	12	14	16	20	13,000	80	2.5
		Graze	28	9	14	17	19	24			
*Barley	48	Grain	26	9	13	15	17	22	12,000	95	2.0
Rye	56	Grain	40	13	20	24	27	33	21,000	84	1.5
		Graze	53	18	27	32	36	45			
Triticale	48	Grain	26	9	13	15	17	22	12,000	95	2.0
		Graze	36	12	18	21	24	30			
*Hulless barley requires a substantially higher seeding rate: 40 seed/ft <sup>2</sup> (23 seed/row ft on 7” rows).											

## Maximum Wheat Seeding Rates For Grain Production (Lbs per Acre)

Seed Size (seed/lb)	% Germination		
	90 %	80 %	70 %
10,000	157	177	202
11,000	142	160	182
12,000	131	147	168
13,000	121	136	155
14,000	112	126	144
15,000	104	117	134
16,000	98	110	126
17,000	92	103	118
18,000	87	98	112
19,000	82	92	105
20,000	78	88	100

\*Rates for 90 % germination are equivalent to 36 seed/ft<sup>2</sup> or: 18 seed/row ft (6" rows); 21 seed/ft (7" rows); 24 seed/row ft (8" rows).

Consider increasing seeding rate 10 % for reduced tillage or broadcast (40 seed/ft).

For grazing wheat, increase seeding rate 25%.

**Seeding Depth:** Depth matters. A good target is 1" to 1.5" deep in moist soil. Over 2" can reduce tiller vigor, particularly if heavy rain prior to emergence washes more soil over the seed.

**Planting Date:** Planting date is always a compromise between yield potential and frost / pest risks. Early planting can raise yield potential by increasing productive tiller count, promoting a larger plant, and prolonging the grain fill period; but early planting also exposes you to greater risk from spring freezes, Hessian fly, and aphid-transmitted barley yellow dwarf virus. For example, at Blackville it is risky to plant before Nov. 15, and we should try to finish by Dec. 1. In the northern coastal plain of S.C. the optimal planting date is about two weeks earlier (Nov. 1). Plant earlier-maturing varieties last to reduce freeze risk.

**Fertility:** A soil test is fundamental. **pH 5.8 - 6.4.** Over liming causes Mn deficiency and potential winter kill.

**Nitrogen:** 20 lb at-plant + 70 to 80 lb early to mid-February topdress (90 to 100 lbs total) is a good starting point for dryland wheat. Alternatively, initial N application can be delayed until mid-January. Typically there is adequate residual N to carry seedling wheat with adequate tillering until 30 units is applied in January. The balance of the N can then be applied in mid-February. There is no substitute for experience with N response on your soil and rotation. N application is critical prior to jointing in early March. Splitting spring N applications (Feb and Mar) can reduce leaching, but usually does not increase yield. Excessive N can increase disease, lodging and drought stress during head fill. Apply 10 - 15 lb sulfur; ideally about 1/3 at planting and the rest at topdress. If clay is within 12" of surface, there is little chance of a response to applied S.

**Phosphorus and potash** should be applied pre-plant by soil test (apply 80 lb/ac P or K if soil test is low; 40 lb/ac P or K if soil test is medium). K can be split fall and early spring on sandy soil. Breaking the hardpan greatly reduces S and N deficiency risk.

**Manganese** deficiency can be a significant problem in coastal plain wheat, even causing death of tillering wheat during cold snaps. Mn deficiency is often caused by high pH from over liming or excessive poultry litter. Foliar apply 0.5 lb elemental Mn (2 - 2.5 lb manganese sulfate) to correct Mn deficiency. A second application may be necessary in that Mn does not translocate to new foliage.

**Copper** deficiency can occur on poorly drained coastal plain soils and is corrected with foliar 0.25 – 0.5 lb copper (1-2 lb /ac copper sulfate) at first appearance (pale wheat with dry, twisted or "pigtailed" leaf tips) or preventatively on known deficient soils. High pH and phosphorus levels are also correlated with Cu deficiency.

**Poultry Litter** – Litter nutrient content can vary widely so have analysis from your source. Average litter analysis is about 3 : 3 : 2, so 1 ton of litter contains about 60 lb N : 60 lb P<sub>2</sub>SO<sub>4</sub> : 40 lb K<sub>2</sub>O. Using availability coefficients of 0.6 – 0.8 – 0.8, the **nutrient value of 1 ton of litter on average is about 36 lb N : 48 lb P<sub>2</sub>SO<sub>4</sub> : 32 lb K<sub>2</sub>O.**

**Tiller Counts:** A rule of 50 tillers per ft<sup>2</sup> is sometimes used to decide whether to make an early (“split”) N application in late January. However, a goal of 50 tillers per ft<sup>2</sup> is seldom a problem for November planted wheat in the S. C. coastal plain. Even if we get less than half a stand (10 plants per row ft out of 21 seed per row ft on 7” rows), it only takes a main stem and two tillers (3 stems) per plant to exceed 50 tillers per ft<sup>2</sup>. Multiply the stems per row ft by 1.7 to get stems per ft<sup>2</sup> on 7” rows (multiply stem count by 2 on 6” rows).

**Growth Regulator:** Cerone (ethephon 4lb/gal) is labeled at 0.5-0.75 pt/ac (applied from flag leaf emergence to early boot) to prevent lodging. This product should only be considered on irrigated wheat because drought stress during headfill will result in severe yield loss from Cerone application.

**Head Population:** Our target head population is 60 heads per ft<sup>2</sup> (6” rows = 30 heads/row ft, 7” rows = 35 heads/row ft, 8” rows = 40 heads/row ft. The typical reasons for falling short on head count include N deficiency due to rate, timing, leaching, or hardpan; and poor seedling vigor from deep planting. Water-logged soils during tillering also reduce stem count by depriving the roots of oxygen.

**Land Preparation:** Broadcast deep tillage is a key to high yield wheat in the S. C. coastal plain. Breaking the hardpan improves winter drainage and allows roots to reach nutrients and water held by the subsoil. Chiselplows often can’t reach hardpan. A Terramax or Paratill provides near broadcast deep tillage; V-ripper with 20” spacing is another option. Ripping between previous subsoil furrows after corn harvest is efficient and results in a firmer seedbed when done in advance. A firm seedbed is needed to control planting depth. Deep-tillage implements can also be used with a roller to firm and level the seedbed. Deep tillage operations are more effective when soils are dry.

**Broadcast Seeding:** Although grain drills result in much more consistent stands by precisely controlling seed placement; adequate stands and yields can be attained with broadcast seeding when seeding rate (approx. 36 – 40 ft<sup>2</sup>), a uniform distribution pattern, and soil incorporation depth are reasonably controlled. Seed should be lightly incorporated (up to 2”) into adequate soil moisture for best results.

Surface broadcasting of small grain seed without any covering by either soil incorporation or crop residue usually results in complete failure or erratic stands and therefore is not a recommended practice for grain production or cover crop establishment. Soil incorporation of seed is recommended for grain crop production.

Where small grains are intended only as a cover crop, broadcast seeding and covering with crop residue can produce adequate stands. For example seed covering and germination for a cover crop can be attained by surface seed broadcast followed by shredding of standing crop residue or broadcast seeding prior to cotton defoliation or soybean leaf drop.

**Irrigation:** Wheat yield responds to irrigation when drought stress is prevented during April (kernel formation and kernel fill). A soil tensiometer or a simple device to measure evapotranspiration (atmometer) can be used to measure weekly soil moisture water loss and replace evapotranspiration with irrigation (minus weekly rain). Sensors which directly measure soil water content are also now available. Avoid unnecessary irrigation particularly during flowering to reduce the risk of scab.

## Weed Control in Small Grains

### Mike Marshall, Extension Weed Specialist

#### *Preplant/Burndown Herbicides for Weed Management in Small Grains*

Herbicide	Rate/Acre Broadcast		Mode of Action	Preharvest Interval	Restricted Entry Interval
	Formulation	Active Ingredient			
Gramoxone SL (paraquat)	2.0-4.0 pt	0.5-1.0 lb	22	60 days	12 hours
Firestorm 3 S Parazone 3 S	1.5-2.0 pt				

**Comments:** *Labeled for preplant use in barley and wheat only.* GRAMOXONE is a RESTRICTED USE PESTICIDE. Add non-ionic surfactant at 1 pt per 100 gal of spray solution or crop oil concentrate at 1 gal per 100 gal of spray solution. Rate dependent on weed size. Apply before planting to effectively desiccate remaining summer weeds and newly emerging winter annuals for more efficient planting and reduce competition with small grain seedlings.

Glyphosate acid equivalent (ae)			9	7 days	4 hours
3.57 SL (3 lb ae)	1.0-3.0 pt	0.38-1.13 lb ae			
4.0 SL (3 lb ae)	1.0-3.0 pt				
5.0 SL (3.7 lb ae)	0.8-2.4 pt				
5.5 SL (4.5 lb ae)	11-32 fl oz				
6.0 SL (5 lb ae)	20-28 fl oz				

**Comments:** *Labeled for preplant for use in oats, wheat, barley, and rye.* Apply 2 to 4 weeks before planting date to control existing summer annual grass and broadleaf weeds and reduce competition with small grain seedlings.

Glyphosate (several brands)	see glyphosate	0.38-1.13 lb ae	9	45 days	4 hours
+ Harmony Extra SG (thifensulfuron)	0.45-0.9 oz	0.0094-0.0188	2		
+ tribenuron)		+ 0.0047-0.0094	2		

**Comments:** *Harmony Extra SG labeled for preplant use in wheat and barley only.* GLYPHOSATE + HARMONY EXTRA SG may be used as a burndown treatment prior to, or shortly after planting (but before crop emergence). Consult glyphosate product to determine if an adjuvant is needed. If an adjuvant is needed, then add NIS (80% active or greater) at 1 qt/100 gallons of spray solution plus urea ammonium nitrate (28-32% N) or ammonium sulfate (AMS) at 2 lb/A.

Valor SX (flumioxazin)	2.0 oz	0.064 lb	14	--	12 hours
---------------------------	--------	----------	----	----	----------

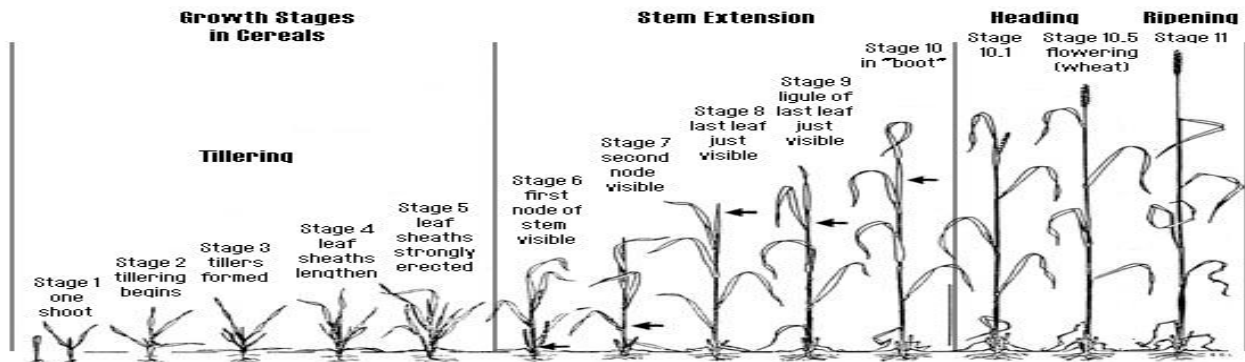
**Comments:** *VALOR SX is labeled for preplant use in wheat only.* For preplant weed control use only in no-till or minimum tillage fields where previous year's crop residue has not been incorporated into the soil. Plant wheat no sooner than 7 days after VALOR SX application. Do not irrigate between emergence and spike growth stage. Wheat must be planted a minimum of 1 inch deep. Do not graze until wheat has reached 5 inches in height. Do not apply more than 2.0 oz/A of VALOR during a single growing season.

# Weed Response to Herbicides for Small Grain Weed Management<sup>1</sup>

	PRE	POSTEMERGENCE													
	Hoelon	Achieve	Axial XL	Axiom	Banvel/Clarity	Beyond	Buctril	Express	Finesse	Harmony Extra	Hoelon	MCPA	Osprey	PowerFlex	2,4-D
barley, little	N	N	N	G	N	G	N	N	---	N	N	N	---	---	N
bluegrass, annual	N	N	N	G	N	G	N	N	N	N	N	N	G	---	N
buttercup	N	N	N	---	F	N	F	E	G	G	N	---	---	---	G
cheat	N	N	N	E	N	G	N	N	---	N	N	N	P	FG	N
chickweed, common	N	N	N	G	F	F	F	G	G	G	N	P	FG	FG	P
cornflower	N	N	N	---	FG	---	GE	---	F	P	N	---	P	---	G
dock, curly	N	N	N	N	F	N	PF	E	---	E	N	P	P	P	P
eveningprimrose, cutleaf	N	N	N	---	G	---	P	F	---	G	N	E	P	P	E
garlic/onion, wild	N	N	N	N	F	N	F	P	P	E	N	P	P	P	F
henbit	N	N	N	GE	F	G	F	G	G	G	N	P	G	FG	P
horseweed	N	N	N	---	GE	---	G	F	---	F	N	F	N	P	G
knawel	N	N	N	---	G	---	P	---	---	G	---	---	---	---	P
mustard, wild	N	N	N	G	F	F	G	E	G	E	N	GE	G	GE	GE
pepperweed, Virginia	N	N	N	---	F	---	FG	---	---	G	N	---	---	---	E
pennycress, field	N	N	N	---	F	---	G	---	G	G	N	---	---	---	G
radish, wild	N	N	N	G	F	F	G	E	G	E	N	GE	G	GE	GE
ryegrass, Italian <sup>2</sup>	E*	GE*	E*	G	N	G	N	N	F	N	E*	N	E*	E*	N
shepherdspurse	N	N	N	---	FG	---	G	---	G	E	N	GE	---	---	GE
swinecress	N	N	N	---	---	---	GE	---	---	E	N	G	E	---	G
vetch	N	N	N	---	E	N	G	G	---	P	N	---	PF	N	G

<sup>1</sup>Key to Response Ratings: E = excellent control, 90% or better; G = good control, 80 to 90%; F = fair control, 50 to 80%; P = poor control, 25 to 50%; N = no control, less than 25%; --- = Insufficient Data.

<sup>2</sup>Will not control biotypes resistant to this class of chemistry.



### ***Preemergence (PRE) Herbicides for Weed Management in Small Grains***

Herbicide	Rate/Acre Broadcast		Mode of Action	Preharvest Interval	Restricted Entry Interval
	Formulation	Active Ingredient			

Hoelon 3EC (diclofop)	2.0-2.66 pt	0.75-1.0 lb	1	77 days	48 hours
--------------------------	-------------	-------------	---	---------	----------

**Comments:** *Labeled for use in wheat only.* HOELON is a RESTRICTED USE PESTICIDE. Controls non-HOELON resistant Italian ryegrass in fall planted wheat. HOELON may be tank mixed with liquid fertilizers when making preemergence applications. Use higher rate if Italian ryegrass pressure is high. Do not incorporate.

**Resistance Management:** *ACCCase-resistant (MOA=1) Italian ryegrass has been documented in South Carolina. Continued reliance on ACCCase-inhibiting herbicide products, such as HOELON, ACHIEVE, and AXIAL, will enhance selection and spread of resistant biotypes. Therefore, consider adding AXIOM or PROWL H2O to your herbicide program for resistance management.*

### ***Early POST (Spike Stage) Herbicides for Weed Management in Small Grains***

Herbicide	Rate/Acre Broadcast		Mode of Action	Preharvest Interval	Restricted Entry Interval
	Formulation	Active Ingredient			

Axiom 68 WDG	6.0-8.0 oz			120 days	12 hours
(flufenacet		0.14-0.21 lb	15		
+ metribuzin)		+ 0.03-0.05 lb	5		

**Comments:** *Labeled for wheat only.* AXIOM contains metribuzin, which may injure certain wheat varieties, consult label for details. Apply AXIOM from spike to 3-leaf growth stage. Controls henbit, wild radish, and annual bluegrass. Activity on annual ryegrass is good, depending on timely rainfall after application. For sequential applications, do not apply more than 8 oz/A of AXIOM per growing season.

### ***Postemergence (POST) Herbicides for Weed Management in Small Grains***

Herbicide	Rate/Acre Broadcast		Mode of Action	Preharvest Interval	Restricted Entry Interval
	Formulation	Active Ingredient			

Achieve 40DG (tralkoxydim)	6.9-9.2 oz	0.18-0.25 lb	1	60 days	12 hours
-------------------------------	------------	--------------	---	---------	----------

**Comments:** *Labeled for wheat and barley only.* Apply when crop reaches 1- to 4-leaf stage. Always add Supercharge adjuvant at 2 qt/100 gallons of spray solution. Apply in at least 10 gallons of water carrier per acre. **Rainfast interval = 1 hour.**

**Resistance Management:** *ACCCase-resistant (MOA=1) Italian ryegrass has been documented in South Carolina. Continued reliance on ACCCase-inhibiting products, such as HOELON, ACHIEVE, and AXIAL, will enhance selection and spread of resistant biotypes. Therefore, consider adding AXIOM or PROWL H2O to your herbicide program for resistance management.*

***Postemergence (POST) Herbicides for Weed Management in Small Grains (cont)***

Herbicide	Rate/Acre Broadcast		Mode of Action	Preharvest Interval	Restricted Entry Interval
	Formulation	Active Ingredient			

Axial XL 0.42 SL (pinoxaden)	16.4 fl oz	0.054 lb	1	60 days	48 hours
---------------------------------	------------	----------	---	---------	----------

**Comments:** *Labeled for wheat and barley only.* Apply from 2-leaf to the pre-boot stage. No other surfactants are required. **Rainfast interval = 30 minutes.**

**Resistance Management:** *ACCase-resistant (MOA=1) Italian ryegrass has been documented in South Carolina. Continued reliance on ACCase-inhibiting products, such as HOELON, ACHIEVE, and AXIAL, will enhance selection and spread of resistant biotypes. Therefore, consider adding AXIOM or PROWL H2O to your herbicide program for resistance management.*

Banvel 4SL (dicamba)	0.25 pt	0.125 lb	4	24 hours	24 hours
-------------------------	---------	----------	---	----------	----------

Clarity 4SL

**Comments:** *Labeled for wheat, barley, and oat.* Apply BANVEL or CLARITY after tillering but before crop reaches the jointing growth stage. Best results are obtained if applied when daytime temperatures are above 50 F. Liquid nitrogen may be used as the carrier. **Rainfast interval = N/A (suggest 1 hour minimum).**

Beyond 1 AS (imazamox)	4.0-6.0 fl oz	0.031-0.047 lb	2	0 days	4 hours
---------------------------	---------------	----------------	---	--------	---------

**Comments:** **USE ONLY on CLEARFIELD WHEAT VARIETIES!** Apply to wheat from two to four leaf stage to control annual bluegrass, Italian ryegrass, wild radish, and henbit. Apply with NIS at 2 qt/100 gal and UAN at 1-2 qt/A or AMS at 1.5-3 lbs/A. Do not apply more than 8 oz/A per season. **Rainfast interval = 1 hour.**

Buctril 4 EC (bromoxynil)	0.75-1.0 pt	0.375-0.5 lb	6	45 days	24 hours
------------------------------	-------------	--------------	---	---------	----------

**Comments:** *Labeled for wheat, oats, rye, and barley.* Apply from emergence to boot stage; best results are obtained when applied during the fall. Controls several annual broadleaf weeds. In wheat and barley, BUCTRIL may be tank mixed with HOELON for increased weed spectrum. Do not exceed 1 pt/A per season of BUCTRIL. **Rainfast interval = N/A (suggest 1 hour minimum).**

Express 75 WDG (tribenuron)	0.25-0.5 oz	0.012-0.023 lb	2	45 days	12 hours
--------------------------------	-------------	----------------	---	---------	----------

**Comments:** *Labeled for wheat and barley only.* Apply EXPRESS after 2-leaf stage up to flag leaf emergence. Add 0.5 to 4 pt of NIS per 100 gal of spray solution plus 2 qt/A of UAN or 2 lb/A of AMS. EXPRESS alone provides partial control of wild garlic, henbit, and wild radish. Tank mix with 0.25 to 0.375 lb a.i. of MCPA for improved control of wild radish (less than 6" diameter rosette). **Rainfast interval = 2-3 hours.**



**Postemergence (POST) Herbicides for Weed Management in Small Grains (cont)**

Herbicide	Rate/Acre Broadcast		Mode of Action	Preharvest Interval	Restricted Entry Interval
	Formulation	Active Ingredient			

Osprey 4.5SC (mesosulfuron)	4.75 oz	0.013 lb	2	30 days	4 hours
--------------------------------	---------	----------	---	---------	---------

**Comments:** *Labeled for wheat only.* For control ACC-ase annual ryegrass and other broadleaf weeds. Applications may be made from time of emergence up to the jointing stage of development. Apply with NIS at 2 qt/100 gal and UAN at 1-2 qt/A or AMS at 1.5-3 lb/A. MSO at a rate of 1.5 pt/A in a minimum of 10 gallons carrier per acre may be substituted for the NIS and nitrogen additives. OSPREY may be applied in a fertilizer solution; however, nitrogen must not exceed 15% (1.5 gallons of Nitrogen in 10 gallons of spray solution). A NIS at 1 qt/100 gal is required for fertilizer carrier applications. The use of a fertilizer/water carrier will increase potential for crop response. Tank mix partners include MCPA, BUCTRIL, EXPRESS, FINESSE, HARMONY EXTRA, STRATEGO, TILT, TOPSIN M, WARRIOR, SEVIN XLR, Z-CYPE. Do not apply more than 4.75 oz/A per season. Do not tank mix and apply OSPREY with MALATHION, MANCOZEB, DI-SYSTON, or METHYL PARATHION. **Rainfast interval = 4 hours.**

**Resistance Management:** *ALS-resistant (MOA=2) Italian ryegrass has been documented in South Carolina. Continued reliance on ALS-inhibiting products, such as OSPREY and POWERFLEX, will enhance selection and spread of resistant biotypes. Therefore, consider adding AXIOM or PROWL H2O to your herbicide program for resistance management.*

PowerFlex 7.5DF (pyroxsulam)	3.5 oz	0.016 lb	2	60 days	12 hours
---------------------------------	--------	----------	---	---------	----------

**Comments:** *Labeled for wheat only.* For control of ACCase-resistant annual ryegrass and other annual grass and broadleaf weeds. Apply from 3-leaf to jointing stage. Apply with NIS at 1 to 2 qt/100 gal of spray solution or COC at 1.0-1.25 gal/ 100 gal of spray solution. Application of ammonium nitrogen fertilizer (topdress) 7 days before or after an application of POWERFLEX can result in stunting and foliar crop burn; therefore, do not apply topdress during this time period. If applied in fluid fertilizer, reduce NIS rate to 1 qt/100 gal of spray solution. Do not apply an organophosphate insecticide within 5 days before or 5 days after an application of POWERFLEX. **Rainfast interval = 4 hours.**

**Resistance Management:** *ALS-resistant (MOA=2) Italian ryegrass has been documented in South Carolina. Continued reliance on ALS-inhibiting products, such as OSPREY and POWERFLEX, will enhance selection and spread of resistant biotypes. Therefore, consider adding AXIOM or PROWL H2O to your herbicide program for resistance management.*

Prowl H2O 3.8 CS (pendimethalin)	1.5-3.0 pt	0.71-1.43 lb	3	60 days	24 hours
-------------------------------------	------------	--------------	---	---------	----------

**Comments:** *Labeled for wheat only.* Apply PROWL H2O prior to weed emergence from the 1<sup>st</sup> leaf growth stage up to before the flag leaf is visible. Emerged weeds will not be controlled by PROWL H2O. Plant wheat seed at least 1/2-inch to 1-inch deep to avoid crop injury. Do not apply more than 3.0 pt/A per season.

2,4-D 4L amine	0.5-1.0 pt	0.25-0.5 lb	4	14 days	12 hours
2,4-D 4L ester	0.5-1.0 pt	0.25-0.5 lb			

**Comments:** *Labeled for wheat, barley, oats, and rye.* Oats are less tolerant of 2,4-D than barley, wheat, or rye. For fall seeded oats, use the lower rate to avoid injury. For control of weeds such as vetch, wild mustard and radish, apply after crop is fully tillered but before jointing. Do not apply under conditions which favor drift onto nearby, sensitive crops. **Rainfast interval = N/A (suggest 1 hour).**

## Harvest Aids for Small Grains

Herbicide	Rate/Acre Broadcast		Mode of Action	Preharvest Interval	Restricted Entry Interval
	Formulation	Active Ingredient			

Glyphosate acid equivalent (ae)			9	7 days	12 hours
---------------------------------	--	--	---	--------	----------

3.57 SL (3 lb ae)	2.0 pt	0.75 lb ae			
4.0 SL (3 lb ae)	2.0 pt				
5.0 SL (3.7 lb ae)	1.6 pt				
5.5 SL (4.5 lb ae)	22 fl oz				
6.0 SL (5 lb ae)	20 fl oz				

**Comments:** Labeled for wheat and barley. Apply after hard dough stage of grain (30% or less grain moisture) at least 7 days before harvest. Do not apply to wheat or barley grown for seed. Do not apply more than 0.75 lb ae/A for a preharvest application. **Rainfast interval = N/A (suggest 1 hour).**

Valor SX (flumioxazin)	1.5-2.0 oz	0.048-0.064 lb	14	10 days	12 hours
------------------------	------------	----------------	----	---------	----------

**Comments:** Labeled for wheat only. Apply after wheat reaches the hard dough stage and grain has no more than 30% moisture. Glyphosate is the recommended tank mix partner to control existing weeds and aid in harvest. Apply in a minimum of 10 gallons spray solution per acre by ground application and a minimum of 5 gallons per acre by aerial application. For proper desiccation, add a methylated seed oil which contains at least 15% emulsifiers and 80% oil at 1 qt/A plus a spray grade nitrogen source (either ammonium sulfate at 2-2.5 lb/A or 28-32% nitrogen solution at 1-2 qt/A. **Rainfast interval = N/A (suggest 1 hour).**

2,4-D 4L amine	1.0 pt	0.5 lb	4	14 days	12 hours
2,4-D 4L ester	1.0 pt				

**Comments:** Labeled for wheat, barley, oats, and rye. Apply 2,4-D when grain is in the hard dough stage or later to control weeds that interfere with harvest or to suppress perennial weeds at least 14 days before harvest. Do not apply from early boot to milk stage of growth development. Do not apply more than 1.0 pt/A per application or under conditions which favor drift onto nearby, sensitive crops. **Rainfast interval = N/A (suggest 1 hour).**

**Crop Replant and Rotation Restrictions for Small Grain Herbicides**

	TIME INTERVAL (MONTHS)										
	Barley	Corn	Cotton	Grain Sorghum	Oats	Peanuts	Rye	Soybeans	Sunflower	Tobacco	Wheat
Achieve	1	3.5	3.5	3.5	1	3.5	1	3.5	3.5	3.5	1
Axial XL	0	4	4	4	4	4	4	4	4	4	0
Axiom	12	0	8	12	12	12	12	0	12	12	4
Banvel/Clarity	Spring										
Beyond	9	8.5	9	9	9	9	4	0	9 <sup>b</sup>	9	3 <sup>a</sup>
Buctril	1	1	1	1	1	1	1	1	1	1	1
Express	0	0.5	0.5	0.5	1.5	1.5	1.5	0.5	1.5	1.5	0
Finesse	16	18	18	4	10	4	4	6	4	4	4
Glyphosate	0	0	0	0	0	0	0	0	0	1	0
Gramoxone SL	0	0	0	0	0	0	0	0	0	0	0
Hoelon	12	12	12	12	12	12	12	12	12	12	12
Harmony Extra SG	0	0.5	0.5	0.5	0	1.5	1.5	0.5	1.5	1.5	0
Harmony Extra XP	0	0.5	0.5	0.5	0	1.5	1.5	0.5	1.5	1.5	0
Osprey	1	12	3	10	10	3	10	3	1	10	0.25
MCPA	No information on Label										
Nimble	0	0.5	0.5	0.5	1.5	1.5	1.5	0.5	1.5	1.5	0
PowerFlex	9	9	3	3	9	9	12	3	3	12	1
Prowl H2O	0	0	0	0	0	0	0	0	0	0	4
Valor SX	3	0.5	-- <sup>c</sup>	1	-- <sup>d</sup>	0	3	0	1	1	1
2,4-D	Do not replant areas treated with 2,4-D other than with crops listed on the label										

## Small Grain Disease Control

### Jay W. Chapin, Extension Specialist Emeritus

Diseases	Product	Rate Fl oz / Ac	Comments
<b>Powdery Mildew, Leaf Rust, Leaf /Glume Blotch, Tan Spot, Stripe Rust</b>	Caramba	10 oz	<p><b>The most effective preventative fungicide timing for wheat yield response is usually just after the flag leaf has fully emerged (boot stage).</b> This flag leaf application usually controls the two greatest yield threats – leaf rust and glume blotch. If head scab is a concern, a slightly later timing (see comments below) still provides some rust and glume blotch protection. Wheat with 60 bu/ac yield potential is most likely to respond to fungicide treatment.</p> <p>Treat <b>powdery mildew</b> if 20 % of leaf area is infected on leaf below flag leaf, and cool (high &lt; 75 F), wet weather predicted.</p> <p><b>NOTE:</b> Early treatments for powdery mildew during tillering do not provide adequate residual control of rust infections.</p> <p><b>Leaf Rust</b> susceptible varieties should be treated preventatively at fully emerged flag leaf, or at the first sign of rust if earlier.</p> <p>Treat for <b>leaf/glume blotch</b> or <b>tan spot</b> if 25 % of stems have a lesion on leaf below flag leaf.</p> <p>Thus far economic injury from <b>stripe rust</b> has been rare in SC. Stripe rust is a very aggressive disease which responds best to preventative treatment of the emerged flag leaf. Standard preventative treatment at flag leaf emergence should prevent damage under S. C. conditions. If a rescue treatment is needed for stripe rust (not common leaf rust) use Tilt.</p>
	Tebuconazole (generic Folicur)	4 oz	
	Headline 2.1	6-9 oz	
	Proline	4.3 – 5.7	
	Prosaro	6.5 oz	
	Quadris 2.1 F	6.2-10.8 oz	
	Quilt	10-14 oz	
	QuiltXcel	7 – 14 oz	
	Stratego 1.0 lb	10 oz	
	Twinline	9 oz	
Tilt 3.6 EC	4 oz		
PropiMax 3.6 EC	4 oz		
Bumper	4 oz		
<b>Head Scab</b>	Caramba	14 – 17 oz	Applications for head scab should be made when 50% of the heads are fully emerged. Scab suppression requires excellent coverage of the heads. See label for nozzle and spray volume recommendations.
	Tebuconazole	4 oz	
	Proline	4.3 – 5.7 oz	
Prosaro	8.5 oz		
<b>Smuts and Seedling blights</b>	<b>Product</b>	<b>Rate fl or dry oz per 100 lb Seed</b>	<b>Comments</b>
	Baytan 30	0.75-1.5 oz	<p><b>Note:</b> Fungicide seed treatments provide relatively cheap stand insurance and smut protection.</p> <p>Grower and commercially applied available.</p> <p>Raxil formulated in various combinations with other fungicides, insecticides.</p> <p>Gaucho XT also control aphids and gives some Hessian fly suppression.</p> <p>Enhance AW is a hopperbox fungicide and insecticide treatment which also controls aphids and gives some Hessian fly suppression.</p>
	RTU Baytan-Thiram	4.5-9.0 oz	
	Dividend XL	5.0-10.0 oz	
	RTA	1.0-2.0 oz	
	Dividend XL	0.5-1.0 oz	
	Dividend		
	Extreme	3.5-4.6 fl oz	
		5 fl oz	
	Raxil	3.4 fl oz	
Raxil MD-W			
Gaucho XT	2.0 oz		
	2.0-4.0 oz		
Vitavax 200			
RTU Vitavax-Thiram	4 oz		
Enhance AW			

## Disease Response to Small Grain Fungicides

	Rate (fl oz)	Powdery Mildew	Leaf and Glume Boltch	Tan Spot	Stripe Rust	Leaf Rust	Head Scab
Caramba	10-17	G	G	F	G-E	E	G
Tebuconazole (generic Folicur)	4	F	G	G	G-E	E	F
Headline	6-9	F	G-E	E	G-E	E	P
Proline	4.3-5.7	G	G	G	G-E	E	G
Prosaro	6.5-8.5	G	G	G	G-E	E	G
Quadris	6.2-10.8	F	G	E	G-E	E	P
Quilt	10-14	G-E	G	E	E	E	P
QuiltXcel	7 - 14	G-E	G	E	E	E	P
Stratego	10	E	G	E	G	G	P
Twinline	7-9	G-E	G	E	E	E	F
Tilt	4	E	G	G	G	G	P

E=excellent, G=good, F=fair, P=poor

## Small Grain Fungicide Use Precautions

Active Ingredient	Brand Name	Application Restriction	Small Grains Labeled
<b>Foliar Fungicides</b>			
azoxystrobin	Quadris	up to flowering	wheat, barley
metconazole	Caramba	30 day preharvest	wheat, barley, oats, rye triticale
metconazole + pyraclostrobin	Twinline, Multiva	30 day preharvest	wheat, barley, oats, rye triticale
propiconazole	Tilt, PropiMax, Bumper	up to flowering	wheat, barley, rye, oats
propiconazole + azoxystrobin	Quilt, QuiltXcel	up to flowering	wheat, barley, triticale
propiconazole + trifloxystrobin	Stratego	up to fully emerged flag leaf	wheat
prothioconazole	Proline	30 day preharvest	wheat, barley, oats, rye, triticale
prothioconazole + tebuconazole	Prosaro	30 day preharvest	wheat, barley, oats
pyraclostrobin	Headline	up to flowering	wheat, rye, barley
tebuconazole	Orius, Monsoon, Tebuzol, etc.	30 day preharvest	wheat, barley
<b>Seed Treatments</b>			
carboxin + captan	Enhance AW	seed treatment	wheat, barley, oats
carboxin-thiram	Vitavax 200, RTU Vitavax-Thiram	seed treatment	wheat, oats, barley, rye
difenoconazole- metalaxyl	Dividend XL, Dividend Extreme	seed treatment	wheat, barley
tebuconazole	Raxil	seed treatment	wheat, oats, barley
triadimenol	Baytan 30	seed treatment	wheat, oats, barley, rye

## SMALL GRAIN INSECT CONTROL

Jay W. Chapin, Extension Specialist Emeritus

Pest	Product	Rate /acre	Comments
<b>aphids</b>	<b><u>Seed Treatments</u></b>		<p>Preventative aphid treatment for barley yellow dwarf virus suppression is recommended for high yield wheat and oat production under SC conditions. Either seed treatment or foliar pyrethroid application are both effective.</p> <p>Seed treatments provide early season control of aphids and barley yellow dwarf. Seed treatments also suppress Hessian fly, but will not control heavy HF infestations. For Hessian fly suppression, Enhance AW 4 oz / 100 lb, 1.6 fl oz / 100lb Gaucho 600, or 1.33 fl oz / 100lb Cruiser is recommended.</p> <p>A foliar pyrethroid application in topdress N by mid-February (early Feb. better yet ) is also highly effective in suppressing aphid virus transmission.</p> <p>Aphid treatments are most likely to be profitable on early-planted high-yield-potential wheat (60+ bu/ac). The key pest is the <b>oat-bird cherry aphid</b> which is the major vector or carrier of barley yellow dwarf virus. This aphid typically has a dark green body with reddish area on the “rear end”.</p> <p>If preventative treatment was not previously applied, aphid treatment is recommended if you find 8 oat-bird cherry aphids per row foot prior to jointing.</p> <p><b>Oats are more susceptible to barley yellow dwarf than wheat. Enhance AW hopper box seed treatment is recommended to control aphids and smut on oats. If a foliar pyrethroid is used to control aphids on oats, treatment should be earlier (Dec. – Jan.) than on wheat.</b></p> <p>Karate, Warrior, Silencer have been particularly effective in suppressing barley yellow dwarf virus on oats and wheat and giving season-long protection against later head infestation by English grain aphids on wheat.</p> <p><b>English grain aphids</b> (light green bodies with long black “exhaust pipes” protruding upward from rear end) increase during jointing and move to heads as they emerge in April.</p> <p><b>The treatment guideline for English grain aphid is 2-3/stem during jointing; 5/stem at head emergence to blooming; 10/stem at milk; dough stage is too late to spray. Wheat treated earlier for virus prevention should not have significant aphid infestation of the heads.</b></p>
	Enhance AW	4.0 oz / 100 lb	
	Gaucho 600, Axxess, Attendant 600	0.8 fl oz / 100 lb	
	Gaucho XT	3.4 fl oz / 100 lb	
	Cruiser 5FS	1.0 fl oz / 100 lb	
	<b><u>Foliar</u></b>		
	Karate Z, others	1.3 – 1.9 oz (1 gal / 100-66 ac)	
	Warrior, Silencer, others, 1EC	2.6 – 3.8 oz (1gal /50-33 ac)	
Baythroid XL 1EC	2.4 fl oz (1 gal / 53 ac)		
Declare, Prolex	1.0 – 1.5 fl oz (1 gal / 128-85 ac)		
Proaxis 0.5	2.6 – 3.8 fl oz (1 gal / 49-33 ac)		

<b>Cereal Leaf Beetle</b>	Baythroid XL	1.0 – 1.8 fl oz	Cereal leaf beetles first hatch out in March and peak feeding occurs in April. <b>Treat if you have 1 larva on every other stem (average of 0.5 larvae / stem).</b>  Karate, Warrior, Silencer also provide season-long aphid control.
	Karate Z, others	1.3 - 1.9 oz	
	Warrior, Silencer, others, 1EC	2.6 - 3.8 oz	
	Mustang MAX Respect 0.8 EC	2.6 - 3.2 oz	
	Declare, Prolex Proaxis 0.5	1.0 – 1.5 fl oz 2.6 – 3.8 fl oz	
	Tombstone 2.0	2.4 oz	
<b>Pest</b>	<b>Product</b>	<b>Rate /acre</b>	<b>Comments</b>
<b>True Armyworm</b>	Baythroid XL 1 EC	1.8 – 2.4 fl oz	<b>Treat when armyworm populations reach 2 per drill ft.</b> True armyworm infestations usually occur after flag leaf emergence.  Karate or Warrior treatment also provides season-long aphid control.
	Karate Z, others	1.9 oz	
	Warrior, Silencer, others, 1EC	3.8 oz	
	Lannate LV Lannate 90 SP	1.5 pt 0.5 lb	
	Mustang MAX Respect 0.8 EC	3.2 oz	
	Declare, Prolex Proaxis 0.5	1.5 fl oz 3.8 fl	
	Radiant 1 SC	3 – 6 oz	
Tombstone 2.0	2.4 oz		
<b>Fall Armyworm</b>	Sevin 80S	1.75 lb	<b>Treat if the stand is threatened before frost.</b> Fall armyworm infestations may occur on early planted seedling stage small grain.
	Sevin XLR	1.5 qt	
	Sevin 4F	1.5 qt	
	Karate Z, others	1.9 oz	
	Warrior, Silencer, others, 1EC	3.8 oz	
	Lannate LV Lannate 90 SP	1.5 pt 0.5 lb	
	Mustang MAX Respect 0.8 EC	3.2 oz	
	Declare, Prolex Proaxis 0.5	1.5 fl oz 3.8 fl oz	
Radiant 1 SC	3 – 6 oz		
Tombstone 2.0	2.4 oz		

<b>Grasshoppers</b>	Baythroid XL	2.4 fl oz	Grasshoppers typically attack wheat after flag leaf emergence. There are no well established thresholds for grasshopper treatment. Prevent flag leaf defoliation.
	Karate Z, others Warrior, Silencer, others, 1EC	1.9 oz 3.8 oz	
	Malathion 8 EC Malathion 57 EC	1.25 pt 2.0 pt	
	Methyl Parathion 4 EC PennCap-M	1 pt 2-3 pt	
	Mustang MAX , Respect 0.8 EC	3.2 – 4.0 oz	
	Declare, Prolex Proaxis 0.5	1.5 fl oz 3.8 fl oz	
	Tombstone 2.0	2.4 oz	
<b>Pest</b>	<b>Product</b>	<b>Rate /acre</b>	<b>Comments</b>
<b>Spider Mites / Winter Grain Mite</b>	Methyl Parathion 4 EC	1 – 1.5 pt	Treat when mites are present and causing leaf discoloration. Late season (dough stage) populations are unlikely to cause economic injury.
	PennCap-M	2 -3 pt	
<b>Hessian Fly</b>	<b>Varietal resistance is the most economical way to manage Hessian fly.</b> HF resistance declines over time and varies by location depending on the predominant races of Hessian fly present. Treat susceptible varieties on farms with a history of economic damage. Proximity to wheat stubble from previous crop increases HF risk. <b>When possible, try to rotate wheat blocks at least 1/3 – 1/2 mile away from previous year’s stubble. Wheat planted in the coastal plain before 15 Nov is most susceptible to HF.</b> Wheat, barley, and triticale are susceptible to HF. Rye has low susceptibility to Hessian fly and oats are immune to any injury.		
<b>Hessian Fly (continued)</b>	<u>Seed Treatment</u> Enhance AW	4 oz / 100 lb	Seed treatments will suppress but not control Hessian fly. Seed treatments also provide early season control of aphids and barley yellow dwarf. Enhance AW and Gaucho XT also control smut and certain seedling diseases. Gaucho XT only has one-half the insecticide active ingredient of the 1.6 oz rate of Gaucho 600. Adding 0.8 oz Gaucho 600 to Gaucho XT gives the same level of a.i. as 1.6 oz Gaucho 600.  Foliar treatment at early post emergence (2-4 leaf stage) may reduce fall infestation on susceptible varieties. March treatment (jointing) timed to spring HF egg laying is recommended if 10% of stems are infested by February.
	Gaicho 600, Axxess Attendant 600 Cruiser 5FS	2.4 fl oz/100 lb	
	Gaicho XT + Gaicho 600	3.4 fl oz + 1.0 fl oz / 100 lb	
	Cruiser 5FS	1.33 fl oz / 100 lb	
	<u>Foliar</u> Karate Z, others Warrior, Silencer, others, 1EC	1.9 oz 3.8 oz	
<b>Insecticide seed treatment note:</b> The amount of insecticide active ingredient actually applied to 100 lb of seed for labeled rates of imidicloprid formulations is as follows: Enhance AW 4 oz (0.05 lb ai); Gaucho XT 3.4 fl oz (0.03 lb ai) + Gaucho 600 1.6 fl oz (0.06 lb ai) = 0.094 ai; Gaucho 600 2.4 fl oz (0.094 ai).			

### Small Grain Insecticide Use Precautions

Active Ingredient	Brand Name	Pre-Harvest (Days)	Pre-Grazing (Days)	Small Grains Labeled
beta-cyfluthrin	Baythroid XL 1 EC	30	7	wheat
carbaryl	Sevin	21	7	wheat, triticale
cyfluthrin	Tombstone 2.0	30	7	wheat, triticale
imidacloprid	Enhance AW, Gaucho	45	45	wheat, oats, barley
lambda-cyhalothrin	Karate Z 2.08 Warrior	30	7	wheat, oats, barley, rye, triticale
gamma cyhalothrin	Declare, Proaxis 0.5	30	7	wheat, triticale
malathion	Malathion	7	7	wheat, oats, barley, rye, triticale
methomyl	Lannate	7	10	wheat, oats, barley, rye, triticale
methyl parathion	Methyl 4EC PennCap-M	15	15	wheat, oats, barley, rye, triticale
spinetoram	Radiant 1 SC	21	3	wheat, oats, barley, rye, triticale
spinosad	Tracer	21	14	wheat, oats, barley, rye, triticale
thiamethoxam	Cruiser 5FS	seed treat.	no grazing restriction	wheat, barley, triticale
zeta-cypermethrin	Mustang MAX Respect 0.8 EC	14	14	wheat, triticale

### STORED SMALL GRAIN INSECT PROTECTION

Grain Protectants		
Treatment	Rate	Comments
Storcide II	12.5 oz / 5gal / 1000 bu wheat 9.9 oz / 5gal / 1000 bu barley 6.6 oz / 5gal / 1000 bu oats	Apply to grain stream as a course spray. See label.
Diacon II	14 fl oz / 1000 bu wheat 12 fl oz / 1000 bu barley 8 fl oz / 1000 bu oats	See label.
Diacon D	8 – 10 lb / 1000 bu (wheat oats, barley, rye, triticale)	Apply dust as uniformly as possible. See label.
Empty Bin Residual Treatment		
Treatment	Comments	
Diacon II, Diacon D	Diacon will not kill adults, only immatures.	
Storcide II	Application can only be made from outside bin using automated equipment. See label.	
Suspend SC	Apply to all surfaces prior to storage. See label.	
Tempo SC Ultra	Apply to all interior surfaces and allow to dry before storage. Do not apply to grain. See label.	
Grain Fumigants		
Treatment	Comments	
Al phosphide Mg phosphide ProFume ECO2FUME	Fumigation should only be performed by trained and certified applicators. Consult labels for certification / licensing requirements.	

## **Acknowledgements**

**Dr. James Camberato (Research / Extension Agronomist, Purdue University) has provided invaluable assistance with small grain fertility issues over many years.**

**Some information on insect pest control and all information on stored grain protection was taken from sections of the 2012 Georgia Pest Management Handbook (Dr. David Buntin and Dr. Michael Toews authors, respectively). However responsibility for any errors in reproduction, rewording, or other use of their information rests solely with David Gunter.**

**A large portion of this year's Cheat Sheet came from the hard work of Dr. Jay Chapin who developed and managed this publication for many years. I would also like to thank Dr. Chapin for helping me during my first season as Extension Small Grain Specialist. He trained me as an agent and continued to do so after his retirement and I feel that I can still ask him for help at any time.**

**Prepared by: David Gunter, Extension Specialist; Mike Marshall**

**Extension Weed Scientist; and James S. Thomas, Ag. Science Assoc.**

**Edisto REC, 64 Research Rd., Blackville, SC 29817; 803-284-3343 ext. 226 [dgunter@clemson.edu](mailto:dgunter@clemson.edu)**