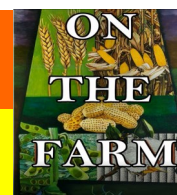


On The Farm in Alabama

AN ALABAMA EXTENSION NEWSLETTER FOR NORTH ALABAMA
ROW CROP FARMERS AND AGRIBUSINESS



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* 2023 Alabama Extension Wheat Audit (25 Production Practices to Higher Wheat Yields and Profits)

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Wheat roots are the least effective among the small grains in penetrating dense soils. Hardpans can develop and restrict root growth so deep tillage may be necessary for optimum yields. Photo shows the effective of young wheat plant above where subsoiler ran (left) versus where it didn't (right).

2023 Alabama Extension Wheat Audit

Twenty-five Production Practices to Higher Wheat Yields and Profits in North Alabama

1. Plant High Quality Seed*

Farmers may think they are saving dollars by planting bin-run wheat seed, but often it costs them money. Research has shown when a farmer's seed is of good quality (free of weed seed; undamaged by insects; has high germination and vigor; and is disease free) it can be successful in producing a good crop. Many times, however, research and experience have repeatedly demonstrated that planting bin-run or even custom-cleaned seed of low quality can lead to a disaster. If you are thinking about planting bin-run seed, consider the risks and legal aspects.

All professionally grown seed has passed both field inspection and seed testing standards for varietal purity, in addition to being free from certain weed and other crop seeds and certain diseases (such as loose smut). It has also been treated with a fungicide to control seed-borne and seedling diseases. Most professionally grown seed will exceed 90% germination. Most often this is not the case with bin-run seed.

When saving bin-run seed, farmers should have it tested to make sure it has high germination and is free of weed seed. The Alabama Department of Agriculture & Industries Seed Lab at 1445 Federal Drive, Montgomery, AL 36107 can perform this service. Seed quality can change dramatically during storage, so it should be tested in the fall before planting. When a grower plants farmer-saved seed, crop insurance may be denied unless the grower can prove a germination test was conducted and the seed was of good quality.

Most breeders of new wheat varieties have applied for and received intellectual property protection. In other words, the breeder has the legal right to determine who may purchase, propagate and market the variety. Intellectual property protection comes in two forms and many varieties are protected by both: the Plant Variety Protection Act (PVPA) as amended in 1994 and plant patents.

PVPA, as amended in 1994, allows a grower to collect and save seed produced from any legally purchased PVPA-protected variety. Farmers can use this seed for their own future planting, but they cannot sell, trade or transfer it to others for planting purposes. Most varieties fall under this designation but there are a few varieties that are patented and cannot be saved to replant. Seed of varieties by a plant patent may not be saved for seed under any circumstances.

Growers, to remain compliant with the law, must determine the level of intellectual property protection afforded to a variety. Here are some helpful hints for growers to follow to remain compliant with the law:

*The seed analysis tag will identify the variety as being protected by the PVPA

*The patent statement will likely be found on the seed bag

*Contact the developer/breeder of the variety

*For certified varieties contact the state seed certification agency

2. Use a Grain Drill to Plant Wheat

Wheat growers have called us numerous times due to poor wheat stands when broadcasting wheat seed. Rarely have we been called to look at a poor wheat stand associated with a grain drill. Broadcasting wheat seed is an accepted practice, but the risks of a poor stand when broadcasting are significantly higher with than with drilling. In general, drilling wheat seed yields 7 - 8% more than broadcasting and if incorporation of seed is poor, the yield differences are even greater.

*Helpful Tips When Broadcasting Wheat

*Some new tillage tools such as the turbo till do not incorporate seed very well. Field cultivators perform better than disks or turbo tills.

*When broadcasting, the spreading implement should be calibrated to spread 40 seeds per square foot.

*When mixing small grain seed with fertilizer, spreading should be done as soon as possible and not be left overnight. The longer small grain seed is left mixed with fertilizer the more potential for reduced germination.

3. Use Deep Tillage to Disrupt Hard Pans

No-till wheat can be productive (mostly on heavy, clayey soils) especially if the field has been in continuous no-till. Wheat is one of the least effective small grains in penetrating dense soils so the root canals of previous crops are critical to successful no-till production of wheat. Hardpans can develop where growers are going back and forth from no-till to conventional tillage.

Growers can check for hardpans with a penetrometer or soil probe and if a hard pan has developed then deep tillage should be considered.

Wheat responds well to deep tillage when hard pans are present. Alabama, Georgia and South Carolina research have consistently shown increased wheat yields with deep tillage if a hardpan is present. Deeper tillage allows for easier root penetration, burial of diseased debris, possible dilution of root pathogens, and improved water infiltration. It is especially beneficial in wet years because low soil-oxygen conditions are compounded by compacted soils. Water-logged soils will reduce yield of most small grains due to poor root growth and nutrient uptake.

4. Plant During the Recommended Planting Dates

The recommended planting dates for north Alabama are October 15 - November 10. The optimum time to plant would be 7-10 days before and after the first average killing frost date. The higher altitudes, such as Sand Mountain, would have an earlier average killing frost so October 15 to November 1 would be a more optimum range of planting dates whereas much of the rest of north Alabama the optimum range would be October 25 to November 10. Wheat planted in this time frame has a better opportunity to develop enough tillers prior to January or early February. Fall tillers will have stronger roots, larger heads with better capacity for high test weights, and tolerate more stress. Research has shown fall tillers account for 85% of yield.

5. Plant High Yielding, Pest Resistant, Well Adapted Varieties to North Alabama

Growers should consider not only yield but other traits such as disease and Hessian fly resistance, straw strength (resistance to lodging), test weight, and maturity. The 2022-23 On-Farm Wheat Variety Trials is a resourceful guide.

6. Plant the Appropriate Number of Seeds Per Acre

Growers should base their seeding rate on seeds per acre, not bushels or pounds per acre. The number of wheat seed can vary greatly between 10,000 and 18,000 seeds per pound, so growers should know their seed size to properly determine their seeding rate. Optimum wheat seeding rates can vary greatly due to differences in seed quality, genetics, planting conditions or planting dates, and planting methods (drill versus broadcast). Multiple seeding rates studies conducted in the Southeast have shown that 1.2 to 1.6 million seeds (minimum germination 85%) is optimum but growers may need to go to 1.8 million seeds in adverse planting conditions. We use 1.6 million seeds as our standard seeding rate in the wheat variety trials. This equals to seeding about 30 - 35 seeds per square foot. If planting is delayed beyond optimum planting dates, then seeding rates should be increased to 1.8 million seeds per acre.

7. Plant at the Proper Depth

Wheat emerges best when planted 1-1.5 inches deep.

8. Use a No-Till Drill When Planting in Heavy Stubble

One of the biggest obstacles to getting a good stand in north Alabama is planting in heavy corn stubble. A no-till drill will help overcome this handicap.

9. Develop a Good Strategy to Control Weeds

A 'start clean-stay clean' weed control approach is of utmost importance for all cropping systems. Winter wheat is no different. A timely burndown application will ensure a clean seedbed at planting and eliminate early weed competition that can interfere with stand establishment. A couple of typical burndown recommendations for cleaning up general broadleaf and grassy weeds are 32 ounces per acre of a 4 lb formulation of glyphosate + 0.5 ounce per acre of FirstShot or 32 ounces per acre of glyphosate + 1.0 ounce per acre of Sharpen + MSO. Assuming resistant ryegrass is not present, glyphosate will have activity on most grasses that are present at burndown. Gramoxone may also be applied with FirstShot or Sharpen for increased effectiveness, especially if ALS-resistant weeds are present. Gramoxone is needed when targeting annual bluegrass (*Poa annua*) since it has a high tendency to form resistance to repeated applications of glyphosate. It will be much easier to control *Poa annua* prior to planting rather than waiting to do so after crop emergence. FirstShot provides good control of small henbit and other broadleaf weeds when mixed with glyphosate or Gramoxone. Sharpen does a decent job on henbit when mixed with glyphosate and provides excellent control of mareetail (horseweed). Both FirstShot and Sharpen can be applied prior to wheat emergence.

Two of the most troublesome weeds in winter wheat are annual (Italian) ryegrass and field brome. It's always a difficult task when trying to eliminate a grassy weed in a grass crop so control efforts are more successful before the weeds emerge.

Pyroxasulfone has been the main active ingredient for annual ryegrass control as a PRE or delayed-PRE treatment. The Alabama Department of Agriculture & Industries has now approved the use of Anthem Flex as a PRE application right behind the planter, which should expand the window of opportunity for ryegrass control prior to germination. Anthem Flex may be used as a broadcast PRE treatment at planting from 2.75 to 4.5 fluid ounces per acre depending on soil type. This should only be applied to a uniform, prepared seedbed to ensure proper row closure and soil coverage over the seed. There is a risk of wheat stunting if rain washes herbicide onto exposed seed during germination.

Zidua, Anthem Flex, and Fierce EZ can still be applied as a delayed preemergence application when 80% germination has been reached and wheat seeds have a shoot 0.5 inch long, but emerged weeds may not be controlled.

This should be used in no-till or minimum tillage fields where the previous year's crop residue has not been incorporated into the soil and wheat is planted at least one inch deep.

Based on research conducted in the Tennessee Valley region and other collaborators' work across the Southeast, timely applications have resulted in successful control of annual ryegrass.

Other effective options are Powerflex HL, Anthem Flex, and Axial Bold as a post emergence application. Powerflex HL is labeled at a rate of 2.0 ounces per acre in conjunction with an adjuvant (see label for details) and can be applied from the 3-leaf stage but before jointing. Both Powerflex HL and Anthem Flex have activity on annual ryegrass and several broadleaf weeds including henbit. Powerflex HL should not be applied within 7 days before or after a nitrogen application.

Axial Bold is also used on frequent basis for annual ryegrass control. Axial Bold is labeled at a rate of 15 ounces per acre and has a built-in surfactant. It can be applied from the two-leaf stage but before pre-boot stage. Axial Bold can be applied anytime during this window regardless of nitrogen application. Generally, control is increased when applications are made to small actively growing ryegrass and when average daytime temperatures are above 60F.

Quelex provides postemergence broadleaf weed control of henbit, horseweed (mareetail), mustards, hairy vetch and suppresses Canada thistle. Quelex may be applied from two-leaf to flag leaf emergence and cannot be applied within 60 days of harvest. It works very slowly so don't expect to see activity for at least 2.5 to 3 weeks after application.

When Quelex is applied alone, use a non-ionic surfactant (NIS) at 1.6-4 pints per 100 gallons of spray solution or a crop oil concentrate or methylated seed oil at 4-8 pints per 100 gallons of spray solution. Field observations indicate that when applying Quelex with liquid nitrogen and a NIS, the foliar burn has been much more severe than when applying with liquid nitrogen alone.

10. Soil Test and Fertilize for High Yields

Soil pH should be between 6.0 - 6.5 for high yields. All phosphorus and potassium should be applied in fall if fertilizing for wheat only. Growers have been successful applying poultry litter pre-plant. A nutrient analysis should be taken and application rate applied according to the nutrient content if using poultry litter. In general, two tons of poultry litter per acre is sufficient for fall growth. There is an increased risk of excessive growth and winter injury if more poultry litter is applied in the fall.

11. Apply P and K for Both Wheat and Soybeans at Wheat Planting

Research in north Alabama shows no yield advantages between applying all the P and K for both wheat and soybeans

when planting wheat versus applying the recommended amounts at planting of each crop. Growers should ask for wheat/soybean recommendations when submitting soil samples.

12. Apply Nitrogen in the Fall to Encourage Tiller Production

In general, 30 pounds of nitrogen per acre should be applied just prior to or at-planting. Fall tillers account for 75-85% of the large heads that contribute to higher yields so getting wheat off to a good start is critical. There may be some nitrogen credit given to some legumes, such as peanuts, but it is critical to have nitrogen available to encourage tiller production before winter. No nitrogen credit should be given to soybeans as they often use more nitrogen than they produce. It is important not to over-fertilize with nitrogen in the fall as it may cause excessive growth and result in winter injury.

13. Topdress with Nitrogen in a Timely Manner

Nitrogen rates will vary according to soil type, variety lodging resistance, irrigation capability, previous crop, yield goal, etc. In general, total nitrogen rates range from 100 - 120 pounds per acre in the spring. Spring nitrogen should be applied at or just before stem elongation. Stem elongation in north Alabama occurs from mid-to-late February. In extreme North Alabama stem elongation may not occur until early March.

14. Count Tillers and Determine if a Split Application of Nitrogen is Warranted **

When wheat reaches Zadoks growth stage 25 (late January to mid-February in North Alabama) count tillers to see if a split application of nitrogen is needed prior to the onset of stem elongation. If tiller counts (a stem with at least three leaves) are low, 80 tillers per square foot or less, nitrogen applications at this time are critical for improving yield potential. Some nitrogen will still be needed to maximize yield potential if tiller counts are lower than 100. If tiller counts exceed 100 or more per square foot at Zadoks GS 25, then apply all remaining nitrogen at or just before GS 30 (stem elongation).

15. Tissue Test for Nutrient Deficiencies

Tissue testing should begin at full tiller to monitor for nutrient deficiencies. Visual sulfur and nitrogen deficiencies are similar (pale green to yellow tissue). Sulfur deficiencies may occur when the nitrogen:sulfur ratio exceeds 18:1. A ratio of nitrogen:sulfur between 9:1 and 18:1 should be maintained for optimum growth. A good insurance policy would be to apply sulfur with nitrogen applications on wheat (28-0-0-5 is a common and excellent source of both nitrogen and sulfur). A tissue sample at Zadoks growth stage 30 (Feekes 5) can help determine the proper amount of nitrogen to topdress.

We have seen boron deficiencies in our tissue sampling of wheat with high yield potential in north Alabama. Boron is important in wheat pollination and kernel set.

A good insurance policy would be to apply 0.25 pound per acre of boron with fungicide applications.

16. Control Aphids and Scout for Insect Pests

Controlling aphids is essential to protect against barley yellow dwarf and cereal yellow dwarf, diseases caused by viruses that are spread by aphids. In north Alabama, an insecticide seed treatment of either imidacloprid, thiamethoxam, or clothianidin at the aphid rate may provide the best insurance for early-season control (chart on page 5). A foliar spray with a pyrethroid insecticide 30 days after planting may be necessary, based on scouting, if a seed treatment is not used. If the winter is especially warm, also check for aphids in late winter and early spring, at the time of the nitrogen application, and apply an insecticide if aphids exceed threshold.

Cereal leaf beetles may cause problems around flag leaf and after. Scout wheat for this pest from late March through the end of April, and apply a foliar insecticide if populations exceed one cereal leaf beetle egg or larva per every two stems. Don't let this pest get ahead of you. Once you see feeding damage on the leaves you have already lost some yield.

17. Protect Against Hessian Fly

Early planted wheat is at the greatest risk from Hessian fly so it is important to plant in the Hessian fly-free dates. The recommended planting dates for north and central Alabama are October 15-November 10 if growing wheat for grain. The recommended window for south Alabama is November 15-December 1. Seed treatments may provide some control shortly after planting, but are not effective for winter or spring infestations. Also, large populations may overcome seed treatments shortly after planting. There is always a risk from Hessian fly, so rotating your wheat and choosing a Hessian fly resistant variety is recommended. Varietal selection is our most effective and cost efficient control method for Hessian fly control. Producers should use local resistant varieties that may vary from region to region due to local biotypes of this pest. Two excellent resources of wheat variety susceptibility to Hessian flies are Dr. David Buntin's, University of Georgia Grain Crop Entomologist, *Hessian fly resistance and situation in Georgia winter wheat in 2023*, and *Auburn's Hessian Fly Ratings, 2022-23* based on Dr. Buntin's Hessian fly ratings and authored by Henry Jordan, Auburn Variety Testing Manager, Dr. Buntin, and Dr. Kesheimer. Dr. Buntin notes, "Keep in mind the virulence of the Hessian fly population may be different in your area so some varieties that rate as resistance here in Georgia may not be resistant for Alabama. But most likely they will be."

Spring rescue treatments, unfortunately, are rarely effective in controlling Hessian fly. Foliar insecticides target the adult and are most effective in the fall. The best strategy when dealing with a large spring infestation is to start

planning for next year. Hessian flies will spend the summer as a puparium sometimes called a “flaxseed” in wheat stubble, so disking after harvest is a effective preventative practice. Burning may reduces numbers, but many flaxseeds are below the soil line and can survive.



Hessian fly pupae

Photo: John C. French Sr., Retired , Universities: Auburn, GA, Clemson and U of MO, Bugwood. org

18 . Protect Against Disease

Two applications of a fungicide, depending on weather conditions, may be necessary to protect the plant from diseases and achieve a high yield. Photosynthates

For susceptible varieties, systemic neonicotinoid seed treatments when applied at a high rate will help control fall Hessian fly infestations but will not prevent infestations in winter or spring. Seed treatments are not needed on resistance varieties for Hessian fly control.

Insecticide	Trade Names	Aphid Rate (fl. Oz per 100 lb of Seed)	Hessian fly Rate (fl. Oz per 100 lb of Seed)	REI (hours)/ PHI (days)
imidacloprid	Guacho 600, Attendant 600, Access, Enhance AW, others	0.8 fl. oz	1.6 to 2.4 fl. oz	12 hours/45 days
thiamethoxam	Cruiser 5FS	1.0 fl. oz	1.33 fl. oz	12 hours/45 days
clothianidin	Nipsit Inside, Poncho	0.75 fl. oz	1.79 fl. oz.	12 hours/not listed

The aphid rate is the standard low-rate treatment. It may suppress light to moderate Hessian fly infestations, but the Hessian fly rate is recommended for expected large infestations. These seed treatments often come as a premix of the aphid rate and fungicides. Additional insecticide may need to be added to achieve the higher rate. Insecticide seed treatments also will help control aphids and barley yellow dwarf virus infection in the autumn. In February through mid-March, a foliar application of lambda cyhalothrin also may suppress fall or spring infestations but effective control is difficult. This application must be applied while adults are active and eggs are being laid, so sampling of eggs on leaves is needed for proper timing.***

***Hessian fly variety resistance and situation in Georgia winter wheat in 2023 by Dr. David Buntin, University of Georgia Grain Crop Entomologist

produced by the flag leaf may contribute up to 50% of the grain yield so it is critical to protect the flag leaf from disease. Another fungicide application at early flowering (anthesis) may be necessary to protect the plant from *Fusarium* Head Blight (scab). Severe scab outbreaks are likely when three or more rain or irrigation events occur from the start of flowering through three to five days post-bloom, particularly on scab-susceptible varieties. Extended post-flowering rains also contribute to increased disease severity and elevated mycotoxin contamination. Conversely, dry weather patterns during this time will suppress scab development. Wheat drilled behind no-till corn is at the highest risk for *Fusarium* Head Blight outbreak given favorable weather patterns for the disease.

The best fungicides for reducing *Fusarium* Head Scab are Prosaro, Proline, Caramba and Maravis Ace. Propiconazole (poor control) and Tebuconazole (fair control) are also labeled for *Fusarium* Head Blight. Please note that these are all triazole (Group 3) fungicides, or in the case of Marvis Ace, a triazole + SDHI (Group 7) fungicide. Application of strobilurin (Group 11) fungicides have shown to increase DON levels in wheat by killing fungus competing against the DON mycotoxin.

Fungicides for *Fusarium* Head Scab must be sprayed at early flowering to be effective, which may make a fungicide application difficult since the weather conditions that are favorable for scab are also unfavorable for fungicide applications. (Continued on page 6)

The Marvis Ace label gives more application timing flexibility. Marvis Ace is labeled as early as 50% head emergence though flowering. Strobilurin fungicides such as Quadris, Evito, Approach, and Headline or fungicides with strobilurin combinations such as Quilt, QuiltXcel, Stratego YLD, Stratego, Approach Prima, Twinline, Priaxor, or Absolute should be avoided during flowering.

19. Consider a Plant Growth Regulator if Lodging is a Concern

There is a fine line between adequate nitrogen for high yields and lodging. If lodging is a concern, a plant growth regulator can reduce lodging and improve yields. Plant growth regulators interfere with the biosynthesis of gibberellic acid to prevent cell elongation, which shortens the internodes and strengthens the stem. Some varieties are more prone to lodge and may be a candidate for a growth regulator.

20. Use Tramlines

This is the one production practice that is the least likely to be used except by growers striving for very high yields. Tramlines can be established by closing one or more openings in the drill when planting the crop to match the traffic pattern. This can be done by mechanically retrofitting the drill with clutches attached to the metering cup to close the opening to leave unplanted rows designed to fit the wheel spacing of your sprayer or tractor. Devices can be purchased to establish tramlines on any tractor width in any multiple of drill widths.

Tramlines may also be formed after the crop has emerged by chemically killing the rows with glyphosate that match the width of the implements used to apply fertilizer or pesticides. Precision tools such as light bars and GPS guidance systems can help reduce the error of overlapping when attempting to chemically kill rows to produce a tramline. Chemically kill wheat early once the plant has one to two well-developed leaves.

Using tramlines in intensively managed wheat makes applying uniform sprays much easier. They improve the precision of applications. They can be used as guides for repeated applications and save on the cost of aerial applications. They reduce the chance of disease development when compared to plants that are crushed by running over standing wheat. Research has shown that the border plants will compensate for yield losses by 50 - 60%, whereas plants damaged by tires rarely produce good grain.

21. Irrigation#

Most of north Alabama's wheat crop is non-irrigated. Irrigation will especially be beneficial in dry falls in establishing a stand during the optimal planting period or, in the case of last year, when drought in late April and May cause significant yield reductions. High yielding wheat needs 14-17 inches of water depending on weather conditions and length of growing season. Wheat requires about six inches of water as a threshold for grain yield.

Each additional inch of water will provide 4-5 bushels per acre. In well-drained soils, the roots of wheat will extract water from a depth of three feet. Wheat is most sensitive to water stress in the boot to flowering stage. Irrigation should be avoided prior to and during flowering to help avoid *Fusarium* head scab. Water in the root zone should be adequate prior to flowering.

Wheat can use up to 0.3 inches of water per day depending on air temperatures and cloud cover. Daily water use is referred to as evapotranspiration (ET) and depends on plant development and weather conditions. Wheat's water use will generally peak between heading and early dough stage.

22. Harvest Wheat as Early as Possible

Wheat easily sprouts when the grain is exposed to rainy weather after maturity. Harvest the crop as soon as possible to avoid field losses and maintain good quality grain. Dry the wheat if harvesting above 15% moisture.

23. Get Your Planters and Combines in Running Order Before They are Needed

It is important to make sure all equipment is properly calibrated and ready to run when it comes time to plant or harvest. Avoiding delays is critical to insure high yields.

24. Make Plans to Control Insects if Storing Wheat- Please refer to Alabama Extension IPM guide "Stored Grains-Insect Pest Management Recommendations for On-Farm Stored Commodities in the Southeast". Please give us a call if you need a copy.

25. Selling Wheat Straw

There has been a demand for wheat straw and if the price for wheat straw is good, this gives growers another opportunity to add to the bottom line. Growers should account for the nutrient removal of wheat straw. Two tons per acre of wheat straw will remove about 30 pounds of nitrogen; 7.5 pounds of phosphate; 59 pounds of potassium; and 11 pounds of sulfur per acre.

Thank you for the valuable input of Dr. Dewey Lee, former University of Georgia Extension agronomist and former Alabama Extension entomologist Dr. Kathy Flanders.

***Some of step one was adapted from the North Carolina State bulletin *Risks and Recommendations for Planting Farmer-Saved Wheat Seed* by Jan Spears and Randy Weisz.**

****Based on excellent research by Dr. Wade Thomason, Extension grain specialist at Virginia Tech University.**

Step 18 was adapted from *Crop Usage, Available Soil Moisture and Irrigation for Small Grains* by Minnesota small grain specialist Jochum Wiersman.