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In This Issue:

Selecting Wheat Varieties

Dave Van Sanford—Wheat Breeder & Bill Bruening—Variety Testing Specialist

Selection of wheat varieties is one of the most critical management decisions Kentucky wheat producers will make this fall. Yield potential is essential, but growers need to pay attention to other factors like disease resistance, adaptation to Kentucky's extreme year to year climatic variation, and the need to vary harvest maturity so that every variety is not ready to combine at once. Wheat growers can minimize their risks by planting several varieties with good yield potential & test weight that complement one another for disease resistance, maturity, and susceptibility to spring freeze damage. To minimize the potential for spring freeze damage, the first variety planted in the fall should be the one that breaks dormancy last in the spring, and the variety that breaks dormancy earliest should be the last to be planted.

The UK wheat variety performance data is available online in mid-July at http://www.uky.edu/Ag/wheatvarietytest/. How should a grower use UK's variety performance data in choosing wheat varieties? While the decision will never be simple, it can be made easier by following several principles which we often cite in these newsletter articles, at meetings and field days.

Multi-year / Multi-location Data

Many growers ask about the variety that looked best in this year's test. However, it is more useful to know which varieties have performed well under different conditions. When comparing yields from the variety performance report, it is important to note that the yield of a variety is relative and should only be compared with yields of other varieties in the same test or within the same year across locations. The overall state summary provides performance data across test locations / years. It provides the best estimate of varietal performance, particularly the 2 and 3 year averages. When selecting varieties, growers should utilize data from the overall state summary, as well as their regional test and determine which varieties performed well both in their regional test, as well as across all test locations/years. After identifying a group of varieties with high yield potential, varietal selection can be based on secondary characteristics such as head scab resistance, test weight, maturity, height, or straw yield potential.

To emphasize the importance of Kentucky's year to year environmental variability, the grower should recall the following: 2008 – timely planting conditions, wet cool spring, little disease pressure, cool temperatures during grain fill, favorable harvest weather and excellent yields; 2007 – wet fall delayed planting, record high temperatures in March followed by record lows in April resulted in severe freeze damage, hot dry weather during grain fill; 2006 - drought-like conditions throughout planting period affected emergence, hard freeze in late February caused some lodging due to freeze-weakened stems, ideal conditions during grain fill, record yields. Wheat varieties that performed well under these conditions are more likely to perform well again. For growers who want to try a new variety, do not use a variety that has not been evaluated. If a variety has been tested for one year only, use the overall state summary table; we do not recommended using single year data from a single (regional) test. Depending on a grower's location, additional variety performance data may be available from other (bordering) state variety testing programs. The UK Small Grain Variety Testing Program website has links to other state variety testing programs at http://www.uky.edu/Ag/wheatvarietytest/.

Sources of Information

In addition to the UK Variety Performance Report, growers should investigate other sources of information. It is very difficult to adequately sample all of the micro-environments in our state in the variety testing program. If your neighbor, who has similar soil types and a similar management style has had good success in growing a certain variety, you may want to try it on a small part of your acreage. Seed companies, consultants and agribusiness dealers have trials around the state; see if you can get a copy of their data. It may be useful to access data from other state variety testing programs to determine how widely adapted a variety is. The ultimate decision is yours, and you must evaluate the information, testing conditions, and the source of the data.

Economic Analysis

Farmers are always interested in high yields, but the highest yielding variety may not always be the most profitable. One needs to consider other economic factors such as disease susceptibility (may require fungicides), lodging (costs more to harvest), late maturity (delays soybean planting), potential straw yield as a secondary commodity and low test weight (discounts at the elevator). All of these factors require study to determine the most profitable varieties for your operation. The search for maximum productivity and profitability begins with variety selection.

How Much Fall N is Needed?

Lloyd Murdock & Greg Schwab—Extension Soils Specialist

The very high price of nitrogen (N) fertilizers is causing many farmers to want to reduce all unnecessary or over applications. The amount of fall N needed for wheat is an excellent example. Historically, some N has been fall applied to wheat to ensure good growth and to promote tillering. This practice assumes that the soil does not supply enough N for growth in the fall. However, the amount of N needed in the plant is only about 20 to 30 lbs per acre. Nitrogen in excess of these levels is not taken up by the crop and is almost always lost before growth resumes in the spring. Several research studies conducted at the University of Kentucky indicate that, in almost all situations, enough nitrogen is supplied by the soil to meet the fall nutritional requirements of wheat. Most of the research was conducted on wheat following corn, where 150 lbs N/acre was applied to the previous corn crop and corn yields ranged from 50 to over 200 bu/acre.

One seven-year study conducted in the 1980's resulted in an average of 67.5 bu/acre when all the N was applied in the spring compared to 67.6 bu/acre when 30 lbs additional N was applied in the fall. Another study conducted over a 15-year period with no-till wheat-after-corn, produced an average of 97 bu/acre even though fall N was not applied. A separate four-year study of no-till wheat-after-corn, where fall plus spring applications were compared to spring only applications, showed 87.3 bu/acre and 90.1 bu/acre for the treatments, respectively.

Our research data does not support fall N application on wheat following corn regardless of tillage method used.

Therefore, we conclude that fall N applications to wheat would not be helpful except in extreme circumstances (extremely late planting or very reduced plant stands). The only common time that fall N is justified is when soil test phosphorus levels are low and a nitrogen-containing P fertilizer is used (18-46-0). Additional N supplied as a separate fertilizer (urea), will likely not increase wheat yields.

Insect Pest Management Decisions In Preparation for Planting Wheat

Doug Johnson—Extension Entomologist
Don Hershman—Extension Plant Pathologist

Insects & Mites:

There are three insects (one is a group of insects) and a mite that pose a threat to wheat in the fall. The "cereal" aphids are known for their ability to move the yellows viruses that cause Barley yellow dwarf. This is actually a large group of aphid species. Generally there are five species common in Kentucky, of which the bird cherry-oat aphid is the most important. The wheat curl mite may also cause considerable damage to wheat due largely to its' ability to move wheat streak mosaic virus. The other two insects, the Hessian fly and the fall armyworm, are problematic due to direct feeding on the plant. Although this is a quite diverse group of pests, all of them are affected by several common cultural concerns.

Cultural Concerns:

All of these fall pests have two important aspects in common: short term weather, especially temperature and the "green bridge". All insect development, that is, the rate at which they grow, feed, move and reproduce, etc. is largely governed by temperature. Additionally, in general, once a hard frost has occurred, and daily average temperatures fall below about 50^{o}F, these insect pests will be less important. In a warmer fall that lasts later into the year, these pests are likely to have a greater impact on the crop. Though there is nothing we can do about the short term weather, it is important that we understand when our crops are at greater risk to pests because of weather.

Another important cultural concern is the presence of a "green bridge". This "green bridge" is generally considered to be the presence of a host plant (usually volunteers of a crop plant) present throughout a break period from the previous crop to the emergence of the new crop. In wheat, this is most likely to occur in areas where wheat is grown as a single crop for most of the year, with only a short time between crops (e.g. Great Britain, American dry land west). In Kentucky, we usually have a full summer between our wheat crops and our fields are often rotated. These items usually prevent the "green bridge", but not always.

In the past several years, we have witnessed the presence of considerable over-summering volunteer wheat, and volunteer corn that has germinated after harvest. Both of these crops can provide the makings of a green bridge or an early start-up, for one or more of our fall pests. In particular during the drought of 2007, we saw considerable volunteer wheat from seed that had laid dormant during the hot dry summer, but germinated in early September, providing a host long before production wheat was planted. Additionally, in 2007 there was a marked increase of volunteer corn that emerged along with the production wheat. Both of these volunteer hosts, occurred in a fall that lasted quite late into the year, and the volunteers were often within fields of production wheat or very near.

Volunteer wheat and corn can serve as host plants for all of these fall pests. All of these pests can feed and reproduce on these crops and both corn and wheat can serve as a reservoir for the aphid and mite born viruses that result in barley yellow dwarf and wheat streak mosaic.

Volunteer hosts particularly wheat that are present through the summer or well before the planting and emergence of our crop allows these pests to continue their life cycles through the summer, or to get a head start on their fall population development. Preventing/removing these hosts should play an important role in preventing problems from these pests. For example, in every case that we have seen the wheat curl mite and the resulting damage from wheat streak mosaic, has been in association with volunteer wheat. In speaking with colleagues in Nebraska, the presence of volunteer wheat is nearly always the cause of this problem. Additionally, in 2007 when a large population of fall armyworm was noted, many production wheat fields which contained volunteer corn were infested. Fortunately, fall armyworms prefer corn and generally stayed on the corn plants within the wheat field! This situation may not have ended so well had the pest in question been the wheat curl mite (and we would not have known this until wheat streak mosaic symptoms showed in the spring).

Certainly it is not possible to remove all alternative hosts, particularly during the summer. Corn, for example, is a crop during the summer and in Kentucky we generally plant wheat following a corn crop. But even with corn, we should strive for a break period between corn harvest and wheat emergence where there are no live plants (especially grass weeds, e.g. Johnson grass). Additionally, there are many other wild grasses and grass weed hosts on which these pests can live. However, managing to eliminate these crop plants as volunteers in production fields, as early as possible, especially in the fields that are planned for wheat production, can greatly aid in reducing the impact of these pests.

So what can/should you do?

1. Rotate fields in which wheat is planted to another crop.
2. Maintain good grass weed control in fields to be planted to wheat.
3. Set your combines to reduce seed loss as much a possible.
4. Consider controlling grass weeds and volunteer grass crops in production wheat fields.
5. Plant your production wheat after the Hessian fly free date.

A concluding note about controlling volunteer crops; In this issue, Dr. Jim Martin has provided information on control of these crop as weeds. Please read this article. Just remember, from the insect management standpoint, these crops must be dead, not dying, to prevent pest build up. Techniques that do not kill the plants (mowing, for example) will not work. Techniques that kill the plants slowly will allow the pests to remain until the host plants are dead.

Strategies for Controlling Volunteer Corn and Wheat

James R. Martin—Extension Weed Specialist

Current combines are efficient, but not perfect. It is not unusual to leave some crop seed in the field resulting in volunteer plants. Volunteer corn and wheat are examples that often occur in Kentucky. We tend to overlook these as being a serious threat to wheat, yet there are cases where growers may need to control them.

VOLUNTEER CORN: Last season there were many fields that appeared almost solid green with volunteer plants after corn harvest. Part of this may be attributed to the stress of last summer's dry weather which limited kernel size and allowed more seed to pass through the combine. Improper adjustment of combines may be another reason for greater than normal seed loss. Even though 2% is considered acceptable loss, this could leave a substantial amount of corn seed for fields averaging 200 or more bu/A.

There is some debate whether volunteer corn is a threat to wheat. One viewpoint is that volunteer plants will eventually be killed from fall's freezing temperatures before they can impact wheat. Another opinion is that early-season competition from volunteer corn will impact growth and yield of wheat.

Limited research this past season showed 11% lower wheat yield if volunteer corn was not controlled. It is not clear if this trend in yield loss will hold true for every case, but it does show significant economic losses can occur from volunteer corn competition.

The germination pattern of volunteer corn may be uniform or sporadic, depending on a number of factors, including duration and pattern of rainfall following harvest. Volunteer corn at UKREC germinated uniformly last season due to the rainfall over a six-day period soon after corn harvest and a three-day period approximately two weeks later. The development of volunteer corn was fairly uniform and ranged from 6 to 8½ inches tall at the time of planting wheat in mid October. Sporadic germination patterns that are associated with irregular rainfall may make it difficult to determine the optimum time for controlling volunteer corn. It is possible that implementing control options well ahead of wheat planting will allow for escapes if seed germination is extended over a long period.

The options for managing volunteer corn include tillage or a foliar applied herbicide. Tillage provides immediate results, but may increase the risk of soil erosion and more time relative to using burndown herbicides. While tillage will destroy emerged volunteer corn plants, it may stimulate germination of any remaining seeds that were incorporated in the soil during the tillage process.

Glyphosate controls volunteer corn providing plants do not originate from corn with the 'glyphosate-tolerant' or Roundup Ready trait. The fact a significant number of Kentucky's corn acres are planted to glyphosate-tolerant hybrids limits the opportunity to use glyphosate. Glyphosate usually requires 7 or more days to kill plants; consequently, it may not be the right choice if immediate control is needed.

Paraquat provides rapid control of vegetation; therefore, it may be preferred over glyphosate if speed of control is desired. Paraquat helps manage volunteers with GMO traits, including glyphosate-tolerant corn. Paraquat alone tends to be inconsistent in controlling corn that originates from seed that were planted or incorporated in soil. We have seen this when we try to kill corn for replant situations in the spring. However, limited research last fall showed at least 95% control for corn plants from seeds that were not incorporated into soil. Our current theory is that the growing points of volunteer corn plants originated from seed on or near the soil surface and were exposed to paraquat and other related stresses.

Research on the use of Finesse showed up to 60% control of volunteer corn within 7 days after planting no-till wheat. Finesse is a premix of ALS inhibitor herbicides and is slow in its activity. Unfortunately, frost occurred before Finesse reached maximum activity; consequently we were unable to determine if the herbicide would have eventually killed the volunteer plants. Plans are to do additional research to determine if Finesse is an option for managing volunteer corn in no-till wheat. The advantage of Finesse is that it would likely provide residual activity for any later emerging volunteer plants as well as help in managing Italian ryegrass. The rotational crop restrictions for Finesse require an interval of at least 6 months before planting STS soybeans. **(Currently Finesse is not labeled for volunteer corn).**

VOLUNTEER WHEAT: Most volunteer wheat seed germinate after wheat harvest, however, it is possible for seed to survive 16 months, and in some cases up to 2 years before germinating. While volunteer wheat plants usually succumb to heat, dry soil, and diseases, there are cases where they survive up through planting of this fall's wheat crop. The fact that most, if not all, of Kentucky wheat is grown in a rotation with other crops, limits the chances of direct competition of volunteer wheat to this fall's wheat crop, yet the surviving volunteers could serve as host to other pests that will cause a problem to neighboring fields planted to wheat.

Options for controlling volunteer wheat are similar to those mentioned for volunteer corn and include tillage or a burndown application of either glyphosate or paraquat. Keep in mind that control of volunteer wheat with paraquat may be inconsistent when wheat plants are tillering.

Approximate Costs for Controlling Volunteer Corn or Wheat

Method	Approximate Cost[1]
Tillage with tandem disc	$ 11.50/A
Gramoxone Inteon (paraquat) 2 to 2.5 pt/A (1-3" weeds)	$13.25-15.00/A
2.5 to 3. pt/A (3-6" weeds)	$15.00-16.50/A
3 to 4 pt/A (6" weeds)	$16.50-20.00/A
Roundup PowerMax (glyphosate)	
11 oz/A (6" weeds)	$11.75/A
16 oz/A (12" weeds)	$13.50/A
22 oz/A (18" wheat) (20" corn)	$15.50/A

[1] Tillage cost from G. Halich (Ag Econ Ext No 1008-01). Costs for burndown herbicides include expenses for adjuvants and application.

Why Not "A Little" Tillage for No-Till Wheat?

John H. Grove—Research Specialist for Soil Fertility

Previous Kentucky research has shown that continuous no-tillage soil management generally increases summer annual crop (corn and soybean) yield. This is not the case with winter annual crops (barley and wheat), where yields have been not been improved with no-tillage. Tillage can change the soil environment, burying residue, decreasing soil moisture, raising soil temperature and reducing soil compaction (within the tilled volume). The question is, if no-till wheat soils are no more productive than tilled (chisel plowed/disked) wheat soils, is there some less intense level of tillage that is more optimal? Could no-till wheat yields be improved with "a little" tillage?

Recently, both pasture aerators (Aerway, etc.) and rotary harrows (Phoenix, Phillips, etc.) have been used by some wheat producers. These implements are less aggressive than chisel plows/disks, disturbing less soil prior to otherwise no-till wheat establishment. The objective of the field experiments reported here was to evaluate whether aeration and rotary harrow tillage would increase wheat yields relative to no-tillage. The work was done on two different soils (Maury and Loradale silt loams), for three years (2005-07 harvest years), near Lexington. The Loradale soil exhibited less slope and deeper topsoil. Aeration or aeration plus rotary harrow tillage (Genesis II helical tine aerator equipped with a rotary harrow) was compared with no-tillage at each of four rates of fertilizer nitrogen (N). In all cases, a Lilliston 9680 no-till drill was used to establish 30-40 seed per square foot into corn residues.

After the tillage operations, there was very little reduction in residue coverage of the soil surface (data not shown). Tillage did break the corn residue into smaller pieces and less stover remained attached to the soil. Grain yield was generally not influenced by an interaction between tillage and N treatments and only the yield response to the tillage treatments is reported (below).

Wheat Yield Response to Tillage

Tillage Used	Harvest Year			3-Year Average
	2005	2006	2007	
Location 1—Maury Silt Loam				
No-Till	***66.4a**	**70.2a**	**46.4a**	**61.0a**
Aeration	**61.8a**	**74.0a**	**47.5a**	**61.1a**
Location 2—Loradale Silt Loam				
No-Till	**69.4a**	**90.3a**	**56.0a**	**71.9a**
Aeration	**75.2a**	**89.0a**	**56.0a**	**73.4a**
Aeration + Harrow	**71.1a**	**90.1a**	**56.9a**	**72.7a**

*within a location-year, mean values followed by the same letter are not significantly different, at the 90% level of confidence.

Wheat yields were lower on the Maury silt loam, which is less productive for winter wheat. Yields were lowest in 2007, due to freeze damage. The 2005-2006 wheat production season was excellent, for both soils. However, no-till wheat yields were not improved by "a little" tillage, regardless of location. Scratching the soil merely scoured the wallet.

Kentucky IPM
Research and Extension
2008 Impact Report

University of Kentucky Wheat Science Group
Wins Southern Region IPM
"Pulling Together" Award

May 2008

Since 1997, members of six departments within the University of Kentucky College of Agriculture have pulled together and pooled their respective knowledge to assist the state's wheat producers.

This unique group works to improve the efficiency and economics of wheat production. These efforts have paid off in such areas as improved yields and a higher percentage of no-till production. Their efforts have been noticed by producers, crop consultants and colleagues with the latest recognition coming from the U.S. Department of Agriculture's Southern Region Integrated Pest Management Center.

The wheat group received the IPM Center's "Pulling Together" award following its annual field day on May 20. This award recognizes success by a group in any aspect of developing, promoting, teaching, and implementing integrated pest management. Integrated pest management is an approach to managing risks associated with pests and pest management that optimizes economic, environmental and social benefits.

The unique relationship among so many varied departments set the Wheat Science Group apart from other group nominations for the award, said Rosemary Hallberg, communications specialist for the center.

Scott Smith, dean of the UK College of Agriculture, presented the award. Smith was chair of the agronomy department when the

Wheat Science Group was formed and helped provide funding to get their efforts under way. Today, the group is self supporting.

"The Wheat Science Group exemplifies what the college is all about – working collaboratively through research, extension and teaching to improve the lives of Kentucky's residents," Smith said.

The group consistently focuses on the importance of using scouting, thresholds and no-till in wheat production. They developed many of their research and education priorities in conjunction with the Kentucky Small Grain Growers Association, county agricultural extension agents, wheat consultants and agribusinesses.

University of Kentucky Wheat Science Group
Wins Southern Region IPM "Pulling Together" Award

Who was responsible?

Integrated pest management is an important aspect of the UK Wheat Science Group's efforts, and over the years the IPM Center has been supportive of their efforts, said group member Doug Johnson, extension entomologist and UK IPM coordinator.

"There is a real melding of a lot of different things to move Kentucky forward in efficiency and economics," Johnson said. "The key to our success is that we are all sold on a common goal."

Departments represented in the Wheat Science Group include plant pathology, entomology, plant and soil sciences, biosystems and agricultural engineering, agricultural economics, and agricultural communications.

The Southern Region IPM Center works with USDA, land grant universities and other partners in promoting and facilitating the development and implementation of integrated pest management in many settings across the region.

Contact Information for Wheat Science Group Programs and Activities-

Additional Information and contact names and email addresses for project participants can be obtained from –

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