University of Kentucky
College of Agriculture, Food and Environment
*Cooperative Extension Service*

# Wheat Science

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**Research & Education Center**
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## What's inside



## *SELECTING WHEAT VARIETIES*

Carl Bradley — *Extension Plant Pathologist*
Bill Bruening — *Research Specialist*
Dave Van Sanford — *Wheat Plant Breeding*

One of the most critical management decisions Kentucky wheat producers must make in late summer/early fall is choosing which wheat varieties to grow. Even though Kentucky's climate is extremely variable from year to year, there are several must have traits: yield and test weight are always at the top of the list, but disease and lodging resistance are essential as well. Growers should look for those varieties with adaptation to Kentucky's extreme year to year climatic variation, and it is important that growers select varieties that differ in harvest maturity so that every variety is not ready to combine at once. In short, wheat growers can minimize risk by planting varieties that have demonstrated track records of good yield and test weight, which complement one another for disease resistance and maturity. Straw or forage yield potential might be another issue to consider. The rule of thumb for minimizing the potential loss to spring freezes is that the first variety planted in the fall should be a later heading variety, and varieties which head early should be planted last. Significant spring freeze damage has occurred in past growing seasons in Kentucky, and in general, it has been early flowering varieties planted too early in the fall that have been damaged by the freeze the most. Selection of varieties with differences in heading dates (maturity) is also important to ensure that the varieties planted are actually different and not the same genetic line licensed under different brand names. Plant height, head type and straw or forage yield potential, can also help navigate potential branding issues among a group of high grain yielding varieties. Maturity is also important when considering disease, in particular head scab (Fusarium Head Blight). In years when scab is a problem, early flowering varieties may be hit hard, while later flowering types may face less pressure, and vice versa depending on the season. Although scab was not a serious problem for most growers in Kentucky in 2018, our crop is always at risk because of the prevalent rotation in which wheat is planted after corn. While no varieties are completely resistant to scab, there are now a number of varieties which have shown moderate resistance. Under heavy scab pressure, utilization of varieties with resistance and applying the right fungicide at the proper time can dramatically minimize damage. Fungicides are great tools that can be used to help reduce scab,

nonetheless, susceptible varieties can still be severely damaged in years that are favorable for scab, despite the application of a fungicide. Though multiple characteristics need to be considered, variety selection is widely recognized as the simplest and most cost-effective way to maximize production profitability. The University of Kentucky wheat variety performance data is available online at http://www.uky.edu/Ag/wheatvarietytest/. Although head scab was not a major problem for growers in 2018, ratings were made at one location, and data were collected for leaf and glume blotch. These data are available in Table 13 of the 2018 variety bulletin (http://www2.ca.uky.edu/agcomm/pubs/PR/PR742/PR742.pdf).

## *CONSIDERATION OF PYROXASULFONE HERBICIDES FOR SUPPRESSION OF ANNUAL RYEGRASS IN WHEAT*

***Travis Legleiter—Assistant Extension Professor, Weed Science***

Italian or annual ryegrass (*Lolium perenne L. ssp. multiflorum* ) has been a major weed issue for Kentucky wheat growers for many years. The introduction of ALS-inhibiting herbicides that had selectivity on ryegrass brought about a great tool for controlling ryegrass in wheat postemergence. The addition of pinoxaden (Axial XL) to the ryegrass postemergence market only added to the arsenal of products for controlling this troublesome weed. Although, now we face many circumstances in which that arsenal has been almost completely depleted due to herbicide resistance. ALS-herbicide resistance is widespread across the state and at least one population of pinoxaden resistant ryegrass has been identified with multiple other suspected populations being identified. The depletion of the postemergence herbicide options enforces the need for a new strategy for controlling ryegrass in wheat.

Those farmers who are facing ALS-resistant ryegrass and potentially pinoxaden-resistant ryegrass should focus on the use of pyroxasulfone based residual herbicides. These products provide preemergence control of ryegrass only and do not control emerged ryegrass so timing is critical. Another consideration of application timing is the risk of potential crop injury. The labeled timing of each product varies but ranges from 14 day preplant to early wheat postemergence. Products currently available for use in wheat in Kentucky are Zidua, Fierce, and Anthem Flex. The labeled application timings for each product are outlined in Table 1.

As mentioned above there is a risk of injury to wheat with the pyroxasulfone products. The risk of injury depends on soil type, planting conditions, and environmental conditions. Fields with coarse soils and low organic matter are at greater risk of pyroxasulfone injury than those with medium and fine texture soils with higher organic matter. Wheat should be planted at least 1-inch-deep to avoid injury and poor planting conditions such as cloddy seed beds or unclosed furrows increase risk of injury due to direct exposure of seed to the herbicide. Heavy rainfall and saturated soils following pyroxasulfone application can concentrate the herbicide in the seed furrow and also cause significant injury. Avoidance of these environmental conditions can significantly reduce the risk of wheat injury.

The risk of pyroxasulfone injury to emerging wheat is greatest when applications are made preemergence and prior to wheat germination, thus the majority of Kentucky labels are restricted to delayed preemergence applications. This timing is from when 80% of the wheat plants have at least a ½ inch long shoot until spiking. This timing may only span a couple of days and can be very difficult to time. The other fallacy with this timing is that often ryegrass is emerging with wheat and the pyroxasulfone application fails to control those already emerged or emerging ryegrass plants, so a postemergence herbicide must be included to control those emerged or emerging plants.

Most of the pyroxasulfone labels also allow for early postemergence timings that pose the least amount of risk for wheat injury. Although again any ryegrass that has emerged prior to this application will not be controlled by the pyroxasulfone. Farmers may consider split applications in which they apply part of their ryegrass residual preemergence and follow that with the remainder of residual applied early postemergence prior to any ryegrass emergence. Refer to table 1 for maximum allowable cumulative rate of each product per year.

Currently only Fierce is allowed to be applied Preplant to wheat in Kentucky and requires at least 14 days between application and planting to reduce risk of Injury. Zidua and Anthem Flex currently are restricted to delayed Pre and Early POST applications in Kentucky, although supplemental labeling for Anthem Flex preemergence could potential be available for the 2018 wheat planting season.

While there is risk of crop injury with the pyroxasulfone products the benefit of suppressing ryegrass emergence can outweigh these risk in many cases. This is especially true for those farmers who are dealing with ALS and pinoxaden-resistant ryegrass populations. In numerous studies conducted at the University of Kentucky pyroxasulfone has shown superb suppression of ryegrass when applied appropriately and prior to ryegrass germination.

**Table 1.** Pyroxasulfone based herbicides for use in wheat to suppress annual ryegrass emergence.

| Trade Name | Active Ingredients | Labeled Application Timings[1] | Use Rates[2] | Maximum Cumulative Rate per year |
|---|---|---|---|---|
| Zidua | Pyroxasulfone | Delayed PRE & Early POST | 0.7 to 2.5 oz/A | 2.5 oz/A |
| Zidua SC | Pyroxasulfone | Delayed PRE & Early POST | 1.25 to 4 fl oz/A | 4 fl oz/A |
| Anthem Flex | Pyroxasulfone + Carfentrazone | Delayed PRE & Early POST[3] | 2.0 to 4.5 fl oz/A | 4.5 fl oz/A |
| Fierce | Pyroxasulfone + flumioxazin | 14 DPP[4] | 3 oz/A | 3 oz/A |

[1] **14 DPP:** Fourteen days prior to wheat planting. **Delayed PRE:** 80% germinated wheat with ½" shoots up to spiking. **Early POST:** Spiking to 4 tiller wheat

[2] Refer to herbicide labels for use rates by soil texture and application timing

[3] At time of publication supplemental labeling had been submitted for allowance Preemergence applications of Anthem Flex in the state of Kentucky, although approval is still pending.

[4] Labeling of Fierce in wheat is through 24c supplemental label valid in Kentucky till December 31, 2022

## University of Kentucky Fragipan Field Day
## *"Breaking Down the Fragipan - Yes it Can be Done"*

**October 3, 2018 - Location: UKREC Farm - Registration begins at 8:00 AM (CDT)**

***"The fragipan is a naturally occurring soil horizon that virtually stops water movement and root growth. The fragipan layer is due to the cementation of soil particles causing this very dense layer. It commonly begins 20 to 24 inches below the surface. There are about 3 million acres in Kentucky and 50 million in the U.S. Our research proves that the aluminosilicate binding agent can be dissolved making a deeper more productive soil. We believe that, over a period of years, a 25% yield increase of corn and soybeans is possible on many of these soils. Several methods show promise but the one that has the most proof and in which we have the most confidence, at this time, is annual ryegrass. It has exudates in its deep rooting system that dissolve the cement and degrades the fragipan. We have found evidence of this in the laboratory, greenhouse, and the field when it is grown as a cover crop or a forage. The effect is accumulative. So it takes several years to make large changes." Lloyd Murdock***

***CCA CEU's available SW 2.0, PM .5, & CM 1.0***

- **What is the Fragipan and How Does it affect Farming? (location: the pit)** *Tasios Karathanasis, University of KY PhD; Jerry McIntosh, NRCS soil scientist and Steve Blanford, NRCS soil scientist*
- **What Breaks Down the Fragipan (laboratory discoveries)** *Chris Matocha, University of KY PhD*
- **Fragipan Breakdown in the Field and in the Greenhouse** *Lloyd Murdock, University of KY PhD*
- **17 Years of Experience with Annual Ryegrass on a Fragipan Soil** *Ralph (Junior) Upton, Illinois Producer*
- **Economics of Breaking Down the Fragipan** *Jordan Shockley, University of KY PhD*
- **Rooting Patterns and Growth of Annual Ryegrass** *Dave McNear, University of KY*
- **Annual Ryegrass as a Cover Crop or a Forage** *Dan Towery, Indiana* Ag Conservation Solutions *and Chris Teutsch, University of KY PhD*

**For More Information:**

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# *2018-19 WHEAT SITUATION AND OUTLOOK: Potential for Greater Exports?*

***Todd D. Davis, Extension Grain Marketing Specialist***

The August *World Agricultural Supply and Demand Estimates (WASDE)* report released on August 10 provided an update of the U.S. and world wheat supply and use fundamentals. Most of the farm press focused on the report's estimates for corn and soybeans as the August report has the first production estimates based on in-field measurements and a survey of farmers. Winter wheat, on the other hand, has used in-field measurements and farmer surveys to estimate the 2018 yield since May. The USDA reports reveal the potential for a bullish wheat market based on declining U.S. stocks as well as reduced stocks and production in major exporting countries.

USDA is projecting ending stocks to be reduced by 165 million bushels to 935 million bushels for the 2018-19 marketing-year (Table 1). If realized, this would be a 46-day reduction in stocks and would be the smallest relative ending stocks since the 2014-15 marketing-year. This reduction in ending stocks will support higher farm-level wheat prices with the U.S. farm price projected at $5.10/bushel for the 2018-19 marketing-year (Table 1).

**Table 1. U.S. Wheat Supply and Use**

| | 2015-16 | 2016-17 | 2017-18 Estimated | 2018-19 Projected | Change from 17-18 |
|---|---|---|---|---|---|
| Planted Acres (million) | 55.0 | 50.1 | 46.0 | 47.8 | +1.8 |
| Harvested Acres (million) | 47.3 | 43.9 | 37.6 | 39.6 | +2.0 |
| Yield (bushels/acre) | 43.6 | 52.7 | 46.3 | 47.4 | +1.1 |
| | ---------- Million Bushels ---------- | | | | |
| Beginning Stocks | 752 | 976 | 1,181 | 1,100 | -81 |
| Production | 2,062 | 2,309 | 1,741 | 1,877 | +136 |
| Imports | 113 | 118 | 157 | 135 | -22 |
| Total Supply | 2,927 | 3,402 | 3,079 | 3,112 | +33 |
| Food | 957 | 949 | 964 | 970 | +6 |
| Seed | 67 | 61 | 64 | 62 | -2 |
| Feed and Residual | 152 | 156 | 48 | 120 | +72 |
| Exports | 775 | 1,055 | 901 | 1,025 | +124 |
| Total Use | 1,952 | 2,222 | 1,978 | 2,177 | +199 |
| Ending Stocks | 976 | 1,181 | 1,100 | 935 | -165 |
| Stocks/Use | 50.0% | 53.2% | 55.6% | 42.9% | -12.7% |
| Days of Stocks | 183 | 194 | 203 | 157 | -46 |
| U.S. Marketing-Year Average Price ($/bu) | $4.89 | $3.89 | $4.73 | $5.10 | +$0.37 |

Source:August 2018 WASDE - USDA: WAOB.

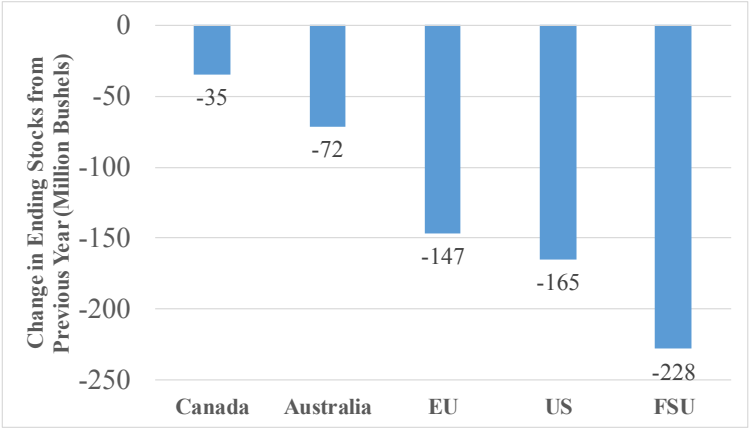
The August report reduced yield by 0.1 bushels/acre from the previous estimate, which resulted in a 4 million bushel reduction in the 2018 wheat crop from the July estimate. Total wheat supply is projected to increase by 33 million bushels from last year due to a smaller carry-in and reduced imports.

Total wheat use is projected to increase by 199 million bushels primarily due to a greater quantity exported. USDA is likely overstating wheat feed use given the apparent abundance of corn. Regardless, the strong use will reduce stocks.

World wheat stocks are also projected to decline in the 2018-19 marketing-year. The August report projects global wheat stocks to be lowered by almost 613 million bushels from last year. The projected change in wheat stocks for the primary wheat producing and exporting countries are shown in Figure 1. The European Union (EU) and the Former Soviet Union (FSU) are projected to trim wheat stocks by 147 and 228 million bushels, respectively. Also, Australia and Canada are projected to have lower stocks. Production problems globally may provide an opportunity for the United States to export more wheat as we serve as the reserve supplier for the rest of the world. Exports may shift to the United in early 2019 once other countries do not have an exportable supply available at competitive prices. Further increases in U.S. exports will help reduce domestic stocks and provide fundamental support for higher wheat prices. Again, this may take some time to develop as the rest of the world turns to the residual supplier for wheat.

I have not had the opportunity to say this in quite a while – wheat market fundamentals have become more bullish, and wheat may be an alternative for Kentucky farmers who have not seeded wheat the last few years. Farmers ought to budget potential returns to a wheat/double-crop soybean enterprise for 2019. Especially if both the corn and soybean markets remain under pressure due to trade uncertainty and large 2018 corn and soybean crops.

Figure 1. Projected Change in Ending Stocks for Major Wheat Exporters from 2017-18 to 2018-19 Marketing-years (Million Bushels)




## *IN-FURROW STARTER FERTILIZER FOR WHEAT*

***J.H. Grove—Soil Fertility Researcher***
***C.A. Knott—Extension Grain Crop Specialist***
***K.S. Rod—Agronomy Graduate Student***
***E.L. Ritchey—Extension Soil Specialist***

With thinking about wheat planting has come the usual, and less usual, questions about fall soil fertility. This article is prompted by recent questions about one of the less usual topics, in-furrow starter fertilizer for wheat. What, how, why/when and why/when not?

For wheat, in-furrow starter fertilizer can be applied in a number of ways, depending upon residue management (no, minimum or full tillage), equipment (conventional drill or air seeder), and product (dry or liquid). Placement can occur behind a coulter but ahead of seed delivery, with seed delivery, or after seed delivery but usually before the press wheel. Chosen products most always provide phosphorus (P), usually contain nitrogen (N) and occasionally also provide potassium (K), sulfur (S) or micronutrients. This article will emphasize P because wheat's need for fall N alone can more easily be provided for with a broadcast N fertilizer source.

In general, closer seed-fertilizer proximity increases P use efficiency, reduces P fixation in some soils, and can improve early crop growth and vigor with stressful planting conditions. Due to a fertilizer's salt index, care must be taken to avoid overly high in-furrow starter rates, depending upon the chosen fertilizer material, that will delay/reduce germination and emergence. Phosphate sources vary considerably in their salt index, with diammonium phosphate (18-46-0) being about 3 times higher than triple-super (0-46-0), and the other common P sources falling in between. The different placement tactics described above result in different degrees of seed-fertilizer contact. Soil moisture at planting and soil texture also complicate predictions of any salt effect. In general, in-furrow starter P rates range from 5 to 20 lb $P_2O_5$/acre.

A review of recent research reports from other states (Virginia, Nebraska, Kansas and Oklahoma) finds no value to in-furrow starter for wheat when planting dates are early or optimal (little stress). Late (cold soil) planted wheat tillering, growth and vigor were enhanced by in-furrow starter use, but yield was not always increased because late planted wheat generally experienced later grainfill that sometimes coincided with hotter weather.

Soil pH and P levels also played a large role in yield responses to in-furrow starter P. When soil pH was low (below 5.2) there was a greater probability of a yield benefit to in-furrow starter P. When soil test P was medium-high (actual numerical value depends on the extractant being used), there was little chance of a yield benefit and no chance of a positive return on investment. Recent work in Kentucky, by Carrie Knott and Katherine Rod, further confirms this observation. Across 6 site-years of data, with Mehlich soil test P ranging from 49 to 100 lb P/acre, two wheat varieties (Pembroke 2016 and Pioneer 26R53), and two seeding rates (35 and 56 seeds/$ft^2$), wheat yield without in-furrow starter P averaged 78 bu/acre, and 73 bu/acre where 42 lb in-furrow starter $P_2O_5$/acre (as 0-46-0) was used for October planted wheat. With November planted wheat, they found yields of 64 bu/acre (no starter) and 66 bu/acre (with the 42 lb in-furrow starter $P_2O_5$/acre).

In summary, in-furrow starter P for wheat is of no value when planting on time into fields whose soils have been well managed as regards soil pH and soil test nutrient levels. This is an important consideration, given that planting while applying starter materials can significantly slow the planting process – driving establishment of a greater portion of the crop into a less favorable fall growth period, especially when fall weather conditions are already challenging.

# Late Season Field School - Sept 6, 2018

The University of Kentucky is holding a Late Season Field School on September 6, 2018. Sign in begins at 8:30 am and the workshop will run from 9:00 am to 4:00 pm.(CT) Lunch will be included and the training will be outside so dress appropriately for the field and weather. This will be the last field school event of 2018 and is geared towards crop advisors, consultants, and individuals seeking to improve agricultural management and productivity. Class size is limited to 30 people, and registration is required. To register, visit https://uklateseason2018.eventbrite.com.

Topics will include:

- Fertility Management for Small Grains
- Assessing the Impact of Late-Season Disease Issues in Corn
- Corn Nutrition/What Things Look Like at the End of the Season
- Management of Foliar Disease of Soybean
- Herbicide Carryover Potential and Herbicide Injury Diagnosis
- Soybean Growth Staging and Management Decisions for Pesticide Applications

# Congratulations to Dr. Dave Van Sanford

## 2018-2019 University of Kentucky Research Professorship Award Winner

**Dr. Dave Van Sanford,** Professor and Wheat Breeder, has been awarded a 2018-2019 University of Kentucky Research Professorship. This award recognizes faculty members who have demonstrated excellence in research and creative work that addresses scientific, social, cultural, economic or health challenges in our region and around the world.

# USEFUL RESOURCES

College of Agriculture, Food and Environment

WHEAT SCIENCE GROUP

http://wheatscience.ca.uky.edu/home

KyGRAINS.info

**Crops Marketing and Management Update**

http://www.uky.edu/Ag/AgEcon/extcmmu.php

Kentucky Pest News

Entomology · Plant Pathology · Weed Science

http://kentuckypestnews.wordpress.com/

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RETURN SERVICE REQUESTED


| DATE | EVENT | TIMES (CST) | LOCATION |
|---|---|---|---|
| **SEPTEMBER 6, 2018** | **FIELD SCHOOL** | **9-4** | **UKREC** |
| **OCTOBER 3, 2018** | **UK FRAGIPAN FIELD DAY** | **8-NOON** | **UKREC** |
| **JANUARY 8, 2019** | **UK WINTER WHEAT MEETING** | **8-3** | **HOPKINSVILLE KY** |
| **MARCH 6, 2019** | **2018 IPM TRAINING** | **9-4** | **TBA** |
| **MAY 14, 2019** | **UK WHEAT FIELD DAY** | **9-NOON** | **PRINCETON KY** |
| **JULY 23, 2019** | **UK CORN, SOYBEAN & TOBACCO FIELD DAY** | **8-NOON** | **PRINCETON KY** |

Carrie Knott, Extension Grain Crops Specialist