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

Wheat Science

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Research & Education Center
Princeton, KY 42445

What's inside

2018 SPRING WHEAT CONDITION

Dr. Carrie Knott—Extension Grains Crop Specialist

Across Kentucky, most of the wheat crop that was planted in October has established well and is between Feekes 4 and Feekes 6, for Central to Southern Kentucky, respectively. Of course, this is assuming that it did not drown out from all the rain in March.

However, the wheat crop that was planted in November, particularly mid- to late- November has not fared so well. The cold temperatures that began in November resulted in delayed wheat growth. In some cases, wheat that was planted after Thanksgiving did not emerge from the soil until late-February or early-March and have not yet or only recently begun to produce tillers. This is illustrated in Figure 1 where marked growth differences are apparent between wheat planted in late-November (center of photo) and that which was planted in mid-October (toward the far right and far left of the photo) at UK's Research and Education Center in Princeton.

I rarely recommend that a wheat crop be terminated, because wheat has a tremendous ability to tiller and produce good yields in most conditions. Unfortunately, for wheat that was planted in mid- to late- November, producers may need to consider whether continuing to manage the wheat crop will be more profitable than terminating the wheat now and establishing full-season soybean.

We know that in Kentucky, yield potential is greatest for wheat stands that have between 70 and 100 to 120 tillers per square foot (Table 1). Anything below 70 tillers per square foot typically does not attain maximum yield potential, but it is generally only about a 5 to 10% yield penalty. However, as stands thin significant yield loss can occur.

For wheat with visibly 'thin' stands, determining exactly how many tillers per square foot exist is important this year. This will allow a determination of whether the wheat/double-crop soybean or full-season would be more profitable. For the wheat in Figure 1 that was planted in late-November at Princeton, there were no tillers present in early March, only individual plants, due to cool growing conditions following planting. On average the plant counts were about 35 plants per square foot. This indicates that we established the desired plants per square foot. However, due to the cool conditions there are no tillers. We know that the fall tillers generate much of the yield potential in wheat. Since no fall tillers were established, the estimated yield potential is only 60-70% (Table 1). In contrast, the wheat that was planted in mid-October in Princeton produced adequate tillers in the fall and had about 90 tillers per square foot.

I am optimistic that wheat planted in October will be productive and profitable this year. Unfortunately, for 'thin' wheat stands and/or wheat that was planted in mid- to late- November, I am less optimist that it will be a profitable system this year.

Based upon the condition of late-planted wheat across the state, some Kentucky producers will have the difficult decision of terminating an unprofitable wheat crop to plant a more profitable full-season soybean crop this year.

Table 1. Modified excerpt of Table 3.4. Wheat yield potential based on plants per square foot from Comprehensive Guide to Wheat Management in Kentucky including estimated tiller counts.

Final Stand (%)	Tillers per ft^2	Plants per:		Estimated Potential Yield (%)
		$Foot^2$	$Yard^2$	
100	90-105	30-35	270-315	100
80	72-84	24-28	216-252	100
60	54-63	18-21	162-189	90-95
50	45-54	15-18	135-162	75-80
40	36-42	12-14	108-126	60-70
20	18-21	6-7	54-63	40-50

REVISED

ECONOMICS OF BALING WHEAT STRAW

Dr. Jordan Shockley—Extension Ag Economist

As wheat harvest quickly approaches, there may be an opportunity to improve profitability by baling the straw. Wheat straw is in high demand, especially in the Central Bluegrass region, as bedding for the horse industry. Recently, square bales of straw, both small and large, are getting harder and harder to find. Unfortunately, the primary wheat producing areas of the state are a far distance from the Central Bluegrass region, resulting in high transportation costs. However, due to high demand and low supply, it may be worth the time and effort.

Baling wheat straw is unique compared with baling hay. It is common for the baler to follow the combine as it is harvesting wheat for grain (or soon after). The combine will have the shredder fans turned off, and wheat straw is windrowed for baling. Therefore, baling costs will be less than hay since mowing, raking, or tedding are not required. In addition to the baling costs, there are costs associated with handling and moving the bales in the field, hauling bales to market, and the value of nutrients removed from the soil due to baling the straw. According to the University of Kentucky AGR -1 Lime and Nutrient Recommendations, the baling of wheat straw removes nitrogen, phosphorus, and potassium at a rate of 12 lbs, 4 lbs, and 20 lbs per ton of straw, respectively. Thus, as commercial fertilizer prices fluctuate, so would the cost for baling wheat straw.

Table 1 and Table 2 below estimate the costs for both small and large square wheat straw bales. Included in each table is the estimated ownership cost of baling wheat straw, as well as the custom hire cost. The nutrient removal costs are based on collecting one ton of straw per acre, the removal rates above, and the current cost of urea ($340/ton), DAP ($454/ton) and potash ($325/ton). All custom hire rates are based on the 2018 Custom Machinery Rates Applicable to Kentucky which is found at the following link: http://www.uky.edu/Ag/AgEcon/pubs/CustomRatesKY.pdf. Ownership costs for baling and hauling are based on $15/hr for labor and $2.50 fuel price. For both baling scenarios, it was assumed to be used 100 hours per year. Also, two hauling scenarios were examined. The cost were calculated for hauling 35,000 lbs of straw a distance of 100 miles and hauling 200 miles. The total costs indicate that regardless of the scenario, large squares cost less per ton than small. However, the demand is higher for small square bales due to the ease of handling when used for bedding. Furthermore, it is cheaper to custom hire baling of large bales versus owning the equipment and only operating the assumed 100 hours annually. Therefore, use both tables as a guide for estimating the cost of baling wheat straw and compare to the current market price to determine if an opportunity exists. Look forward to a decision tool that will available which calculates costs based on your baling scenario.

Table 1. Estimated ownership and custom hire costs for small square bales (50 lbs) of wheat straw harvesting one ton of straw per acre.

	Ownership		Custom Hire	
	$/ton	$/bale	$/ton	$/bale
Nutrient Removal				
N (12 lbs/ton)	$4.43	$0.11	$4.43	$0.11
P2O5 (4 lbs/ton)	$1.40	$0.03	$1.40	$0.03
K2O (20 lbs/ton)	$5.42	$0.14	$5.42	$0.14
Baling	$27.10	$0.68	$34.00	$0.85
Handling & Moving	$34.00	$0.85	$34.00	$0.85
Hauling				
100 miles	$12.34	$0.31	$24.29	$0.61
200 miles	$24.69	$0.62	$48.57	$1.21
TOTAL – 100 miles	$84.69	$2.12	$103.53	$2.59
TOTAL – 200 miles	$97.04	$2.43	$127.82	$3.20

Table 2. Estimated ownership and custom hire costs for large square bales (800 lbs) of wheat straw harvesting one ton of straw per acre.

	Ownership		Custom Hire	
	$/ton	$/bale	$/ton	$/bale
Nutrient Removal				
N	$4.43	$1.77	$4.43	$1.77
P2O5	$1.40	$0.56	$1.40	$0.56
K2O	$5.42	$2.17	$5.42	$2.17
Baling	$34.45	$13.78	$21.25	$8.50
Handling & Moving	$8.63	$3.45	$8.63	$3.45
Hauling				
100 miles	$12.34	$4.94	$24.29	$9.71
200 miles	$24.69	$9.88	$48.57	$19.43
TOTAL – 100 miles	$66.66	$26.66	$65.41	$26.16
TOTAL – 200 miles	$79.01	$31.60	$89.69	$35.88

UNNECESSARY USE OF PYRETHROIDS IN WHEAT CAN LEAD TO APHID RESISTANCE AND BARLEY YELLOW DWARF VIRUS OUTBREAKS

Dr. Raul Villanueva—Extension Entomologist (REC—Princeton)

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In western Kentucky, wheat aphid monitoring has not detected the presence of this bug so far. This doesn't mean that aphids are not in fields. They are out there at such low numbers that they cannot be detected through our sampling method. This outcome is different from the high populations recorded in the 2017 winter. The aphid decline might be the result of lower temperatures experienced this winter (versus the winter of 2017), and the continuous rains this year.

Kentucky's Aphid Species

In Kentucky, there is a complex of aphid species that feeds on wheat. The most important are the bird cherry oat (Figure1a), English grain, greenbug, and corn leaf aphids. Their role as vectors of Barley Yellow Dwarf Virus (BYDV), has branded them as key pests of wheat grain production. These aphid species overwinter as nymphs and can be active when temperatures are above 45° F. It is known that BYDV infections are more damaging when they occur in early growth stages of wheat plant. Thus, aphids have more opportunities to infect young plants under this climatological circumstance (temperatures >45° F).

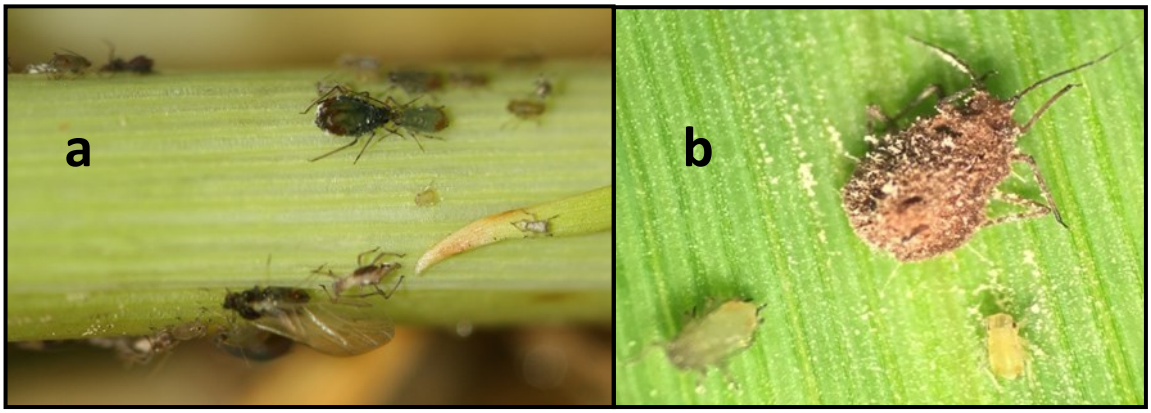

Figure 1. (a) Several stages of bird cherry oat aphids, and (b) an adult aphid killed by an unidentified epizootic entomopathogen. This entomopathogen wiped out an aphid outbreak in 2017. (Photo credits: Yaziri Gonzales).

Management

I have heard that many farmers, as well as personnel conducting research, have been spraying their wheat fields with pyrethroids during the last 2 weeks. This is done as a tank mix where herbicides and insecticides are applied together. Pyrethroid applications are made for two reasons: (1) as a preventive effort to reduce BYDV infections and (2) the low cost of this type of insecticide.

As an applied entomologist I would not have any objection to these applications; however, in many cases this tactic is completed without taking tallies of aphids in wheat fields. If aphids are not present, farmers are making some unnecessary expenditures and might be affecting natural enemies.

In 2017, we worked in two barley fields where pyrethroid sprays were applied twice in the fall of 2016 and at least three times between February and April 2017. Aphid populations were at least 20 fold above the threshold on wheat (**greater than 10 aphids at more than 60 days post-emergence**) when we visited these fields by late April. A possible case of aphid resistance to pyrethroids might had occurred in these fields; however, an epizootic entomopathogen (Figure 2) and aphid parasitoids wiped out the aphids in less than 2 weeks. Thus aphid resistance to pyrethroids was not verified in this case.

From my point of view, this year, farmers should consider restricting pyrethroid usage due to the low number of aphids. Also, the continuous rainfall occurring this spring might have been causing high aphid mortalities. Something that needs to be considered is that a temporary suspension on pyrethroid use early this spring could disrupt populations of aphids that might have developed pyrethroid resistance as they hybridize with populations without this resistance. Aphid resistance can lead to survival of aphids and outbreaks of BYDV.

All of this implies that aphid monitoring should be continued, and if tallies are above the threshold levels, a foliar insecticide application needs to be considered.

Additional Information

For more information check the following:

Entomopathogenic Fungus may Cause High Mortality on Aphids (https://kentuckypestnews.wordpress.com/2017/04/04/entomopathogenic-fungus-may-cause-high-mortality-on-aphids/)

Wheat: Earlier Aphid Occurrences May Be a Consequence of the 2017's Warm Winter: (https://www.kygrains.info/blog/2017/2/22/wheat-earlier-aphid-occurrences-may-be-a-consequence-of-the-2017s-warm-winter)

Predicting Insect Development Using Degree Days (EntFact-123)

Aphids and Barley Yellow Dwarf (BYD) in Kentucky Grown Wheat (EntFact-121)

THE WORLD ON APRIL 4—ECONOMICS

Dr. Todd D. Davis—Extension Grain Marketing Specialist

"May you live in interesting times" is attributed to a Chinese curse. The times are indeed interesting in the grain markets, as China has announced proposed tariffs on corn and corn products; soybeans and soy products; and wheat. China has not announced when these tariffs will be imposed; however, the news rocked the commodity markets lower. By the time you read this article, the markets may have shaken off the initial bearish response. Regardless, this is an excellent opportunity to reflect on profit potential and what price risk opportunities look like for corn, soybeans, and wheat.

A Western Kentucky grain farmer's expectation on 2018 crop profitability is substantially different on April 4 as compared to that on April 3. The soybean market had the strongest negative reaction to the tariff announcement. The futures market believed that China would exclude soybeans from retaliatory tariffs because that country needs U.S. soybeans to meet demand. About 30% of China's total soybean use in 2017 was from soybeans produced in the United States. The announcement of possible tariffs had the greatest impact on soybeans by reducing Western Kentucky cash forward contract bids by $0.24 per bushel in one day. Corn forward contract bids were trimmed by $0.05 per bushel due to the tariff news. Wheat was not affected because the U.S. does not have a significant wheat trade with China.

The projected profitability on April 3 had the wheat / double-crop soybeans (WDCB) crop enterprise with the largest budgeted return over total budgeted costs of +$14 per acre. Notice that the cost of land, even owned land, is charged $175 per acre in rent. The budgets include overhead expense and family living expense of $40 per acre. The combination of good yields and better than expected prices made the WDCB enterprise the most profitable enterprise. Full season soybeans were budgeted to have -$57/acre return over total costs with corn budgeted at a -$127 per acre return over total costs.

	Projected Returns on April 3, 2018			
	Corn	Soybean	Wheat	DC Soybeans
Yield	175	55	80	45
CFC Price [1/]	$3.88	$10.09	$4.62	$10.09
Revenue	$679	$555	$370	$454
Total Variable Costs	$528	$348	$292	$239
Return over TVC	$151	$207	$78	$216
Rent	$175	$175	$88	$88
Return over TVC+Rent	-$24	$32	-$9	$128
Overhead	$63	$49	$43	$22
Family Living	$40	$40	$20	$20
Return over Budgeted Costs	-$127	-$57	-$73	$86

[1/] CFC price is the average Western Kentucky forward contract bids on DTN for harvest delivery.

	Projected Returns on April 4, 2018			
	Corn	Soybean	Wheat	DC Soybeans
Yield	175	55	80	45
CFC Price	$3.83	$9.85	$4.62	$9.85
Revenue	$670	$542	$370	$443
Total Variable Costs	$528	$348	$292	$239
Return over TVC	$142	$194	$78	$205
Rent	$175	$175	$88	$88
Return over TVC+Rent	-$33	$19	-$9	$117
Overhead	$63	$49	$43	$22
Family Living	$40	$40	$20	$20
Return over Budgeted Costs	-$136	-$70	-$73	$76

[1/] CFC price is the average Western Kentucky forward contract bids on DTN for harvest delivery.

The announcement of proposed tariffs reduced the WDCB enterprise profitability by $11 per acre. Full season soybean's profitability was reduced by $13/acre, and corn's profitability was reduced by $9/acre. Again, this is due to the market's reaction to possible tariffs. Expectations are for even lower corn and soybean prices if China implements tariffs on corn and soybean products.

I hope that managers had taken advantage of corn and soybean futures prices as both markets had a February rally and provided an opportunity to remove some price risk. Managers should continue to monitor the futures market to continue to remove price risk when opportunities occur. Corn, soybeans, and wheat suffer from ample stocks that will cap price potential. Anything that limits production will contribute to higher prices. Anything that reduces demand (like a tariff) will push prices lower.

Trevor Gilkey receives 2018 UK Wheat Science Service Award

At the 2018 UK Wheat Science Winter Wheat Meeting held at Hopkinsville, KY, Caldwell county grower Trevor Gilkey was presented the 2018 UK Wheat Science Award.

This award was developed to recognize individuals that have contributed to the success of the UK Wheat Science Group. To effectively conduct high level research projects, many tests need to be conducted in growers fields to mimic a real farm environment. In many cases UK Ag research is limited by the availability of UK research farm space or soil /environmental characteristics that are not suitable to conduct particular tests.

For more than 12 years Trevor as been collaborating with Dr. Ole Wendroth in Soil Physics research conducting large-scale agronomic field research project. This unique collaboration has resulted in improved nitrogen and irrigation management for growers and produced scientific publications for international audiences.

Farmers like Trevor and other individuals that support or advocate for UK research are essential for conducting cutting edge research to address current and future needs for successful sustainable crop production.

Wheat Field School of 2018 on April 26th

These in-depth, hands-on trainings are held throughout the year during periods that are important to grain production, such as green up, planting and harvesting. The training is geared toward crop advisors, managers, consultants or anyone else involved in wheat production.

Topics will include:

- ***Fungicide and sprayer technology***
- ***Techniques for managing nitrogen***
- ***Plant growth regulators***
- ***Economics of baled wheat straw***
- ***Current wheat outlook and potential return to storage***
- ***Grain storage***
- ***Managing insects in grain storage***

The Field School will be held on the UKREC Farm (1205 Hopkinsville Street in Princeton, KY) from 9 am - 4:00 pm CST, with lunch included. Class size is limited to 30 people per training. This training will be held rain or shine, so please dress appropriately.

REGISTRATION IS REQUIRED.

To register, please visit:
https://wheatflowering2018.eventbrite.com

CCA and PAT credits are TBA.

This school is funded in part by the Kentucky Small Grain Growers Association.

If you have any issues or questions with registration, please contact Kelsey Mehl at 270-365-7541 ext. 200 or kelsey.mehl@uky.edu

WHEAT FIELD DAY

MAY 8, 2018 UKREC FARM

REGISTRATION:

8 am (CST)

WAGONS ROLL:

8:45 am (CST)

LOCATION:

1205 Hopkinsville St.

Princeton, KY 42445

APPROVED CREDITS

CCA: CM 2, PM 1

Pesticide Credits: Pending

For additional information contact:

Colette Laurent

UK Grain Crops Coordinator

claurent@uky.edu

(270) 365-7541 Ext 264

TOPICS INCLUDE:

- Wheat Variety Trials (Walk Through)
- Why Keep Wheat in the Rotation?
- Insecticide Treated Seed: a Tough or Easy Decision for its use on Wheat?
- Herbicide Resistance Update
- Identifying and Predicting Management-Related Growth Stages in Wheat
- Wheat Outlook, Profitability Potential, and Returns to Storage Economics
- Using Wheat as a Cover Crop
- Economics of Harvesting Wheat Straw
- Fungicide Management of Fusarium Head Blight

Lunch Sponsored by:

KENTUCKY Small Grain GROWERS' ASSOCIATION

COLLEGE OF AGRICULTURE, FOOD AND ENVIRONMENT
Grain and Forage Center of Excellence

University of Kentucky

Spray Clinic to Be Held at UKREC

The University of Kentucky Field School will be hosting a Spray Clinic that is set for July 17th at the University of Kentucky Research and Education Center. The spray clinic will feature in field demonstrations and an interactive experience for clinic participants. Topics covered in the clinic include sprayer cleanout, sprayer safety on the road, sprayer setup and calibration, overviews of latest spray technology, nozzle selection for effective herbicide application, herbicide drift management, and considerations for fungicide applications in wheat, corn, and soybean. The event is tentatively set to be held from 8am to 4pm at the University of Kentucky Research and Education Center. Look for further details and registration links on the KyGrains Blog (KyGrains.info) in the near future.

Any questions about the spray clinic can be directed to Dr. Travis Legleiter (Travis.Legleiter@uky.edu).

"Breaking Down the Fragipan" Field Day—October 3, 2018

University of Kentucky Research & Education Center—Princeton

- **Fragipan—What It is**
- **Methods to Disintegrate the Fragipan**
- **Implementing an Annual Ryegrass Solution**
- **What it means for Yields and Economic Returns**

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

- ***UK Wheat Field School—April 26—UKREC Farm, Princeton, KY***
- ***UK Wheat Field Day—May 8—UKREC Farm, Princeton, KY***
- ***UK Field School hosting a Spray Clinic—July 17—UKREC Farm, Princeton, KY***
- ***UK Corn, Soybean & Tobacco Field Day—July 24—UKREC Farm, Princeton, KY***
- ***UK "Breaking Down the Fragipan" Field Day—October 3– UKREC Farm, Princeton, KY***

Carrie Knott, Extension Grain Crops Specialist