

*2014 Annual Report  
& Research Summary*



**K E N T U C K Y**

*Small Grain*

**GROWERS' ASSOCIATION**





KySGGA  
P.O. Box 90  
Eastwood, KY 40018  
1-800-326-0906  
[www.kysmallgrains.org](http://www.kysmallgrains.org)

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Communications Director  
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Programs Director  
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## Kentucky Small Grain Promotion Council Annual Report

*From June 1, 2013 to May 31, 2014*

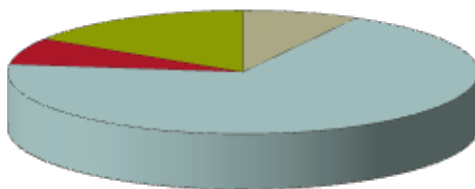
*Reviewed by Jones, Nale & Mattingly, PLC*

### REVENUE

Checkoff Assessments	\$755,995
Producer refunds and reimbursements	\$24,908
Net Checkoff Income	\$731,087
Interest Income	\$885
<b>Total Revenue</b>	<b>\$731,972</b>

### EXPENSES

Program Services:	
Market development and promotion	\$24,150
Research	\$216,331
Education	\$50,530
Administration	\$24,768
<b>Total Expenses</b>	<b>\$315,779</b>



Admin - 8%
Research - 69%
Market Dev. - 7%
Education - 16%

## Kentucky Small Grains welcomes new Communications Director

Kentucky Small Grains is pleased to announce its newest team member, Danielle Beard Hayden, who was hired as communications director on Oct. 10.

An Oklahoma native, Danielle is a 2012 graduate of Oklahoma State University where she majored in Agriculture Communications and Agriculture Economics. After college she began work as the associate editor of Farm Talk Newspaper, a four-state weekly

agriculture newspaper based out of Parsons, Kansas where she was eventually promoted to chief editor.

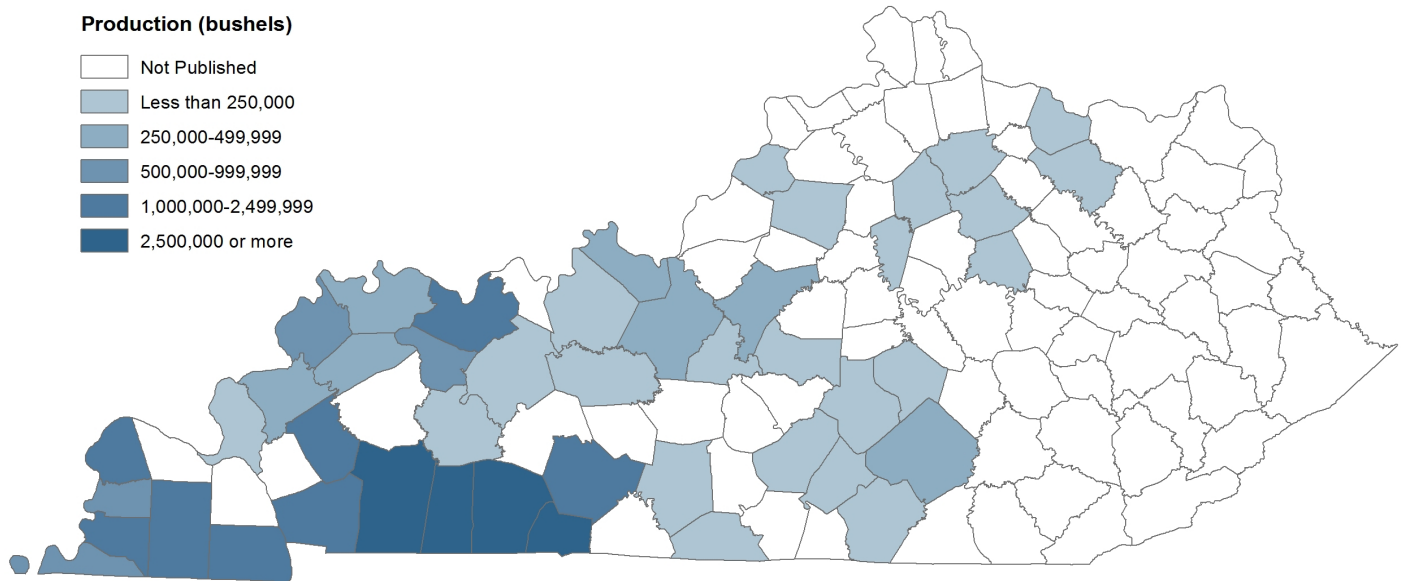
Since moving to the Bluegrass state, she has worked as a freelance writer and photographer for several cattle publications.

"We are excited about bringing a new, talented, young person on board," remarked Laura Knoth, Kentucky Small Grains Executive Director. "Danielle is committed to agriculture and

will help us tell the important story of Kentucky's grain industry."

Danielle is replacing Jennifer Elwell, who has been with Kentucky Small Grains since 1998. Jennifer is now executive director of the Kentucky Agriculture and Environment in the Classroom and pursuing additional interests in ag education and farm public relations projects to serve a broader agricultural community.

## Winter Wheat Production, Kentucky, 2014



USDA, National Agricultural Statistics Service

# Gifts of Grain

*Kentucky Small Grain Growers Association  
Establishes research endowment fund at  
University of Kentucky*

The Kentucky Small Grain Growers Association (KySGGA) has established a research endowment fund at the University of Kentucky (UK) to ensure the advancement of production research crucial to Kentucky's grain farmers.

To date, Ky farmers have contributed \$18,000 and KySGGA has matched that amount. Which means the threshold has been established for the fund to begin growing interest.

Individual growers and businesses may donate to the fund, and KySGGA will match the sum of dona-

tions up to \$50,000. In addition to cash, growers and businesses may make an above the line deductible donation of grain. Donations should be made directly to the University of Kentucky College of Agriculture for the Kentucky Small Grains Growers Association Research Endowment. Checks can be mailed to:

University of Kentucky College of Agriculture  
Marci Hicks, Director of Development  
E S Good Barn  
1451 University Drive  
Lexington, Ky 40546-0097

For more information on how to make a gift of grain, contact Marci Hicks at 859.257.7200. For further information about the fund, please contact KySGGA Executive Director Laura Knoth at 800.326.0906 or by email at [laura@kysmallgrains.org](mailto:laura@kysmallgrains.org).





# PEMBROKE

**Certified Seed, No Strings Attached**

**SAVE IT.  
RESELL IT.  
REPRODUCE IT.**



Pembroke Varieties are developed by UK Wheat Science Group and released by KySGGA. Farmers, not KySGGA, profit from the release - royalties go to UK to improve wheat technology. Buyers fully own the technology. Once you buy the certified seed, you own it - all of it. No strings attached.



[www.kysmallgrains.org](http://www.kysmallgrains.org) - 800.326.0906



In conjunction with the University of Kentucky Wheat Breeding Program, KySGGA released its second variety in the Pembroke seed line.

This program releases

public wheat varieties. The buyers of this certified seed can save seed or resell seed with no penalties or fear of patent infringement. This year's released variety was Pembroke

2014. It experienced very successful sales — preliminarily, nearly 13,000 units were sold to farmers in four states. KySGGA did not retain income from any sales, all profits

were passed to UK's Wheat Breeding Program. "This program exemplifies the strong partnership between UK's Wheat Breeding Program and KySGGA" said Dr. Dave Van Sanford, wheat breeder at UK.

Farmers should look for a Pembroke 2016 to be released next season (in the 2015 calendar year). Don Halcomb, Chairman of the Ky Small Grains Promotion Council commented: "We are committed to investing Ky wheat farmers' resources into a program that ensures quality genetics address issues that are present in Ky growing conditions, like creating head scab resistant varieties."

More products are in the pipeline. "We look forward to continuing to enhance our relationship with Dr. Van Sanford," said KySGGA President Pat Clements. "Dave has been a value resource to

Kentucky farmers for decades. This project is an excellent way to allow him to expand upon the great genetics that he has provided for farmers over his career."



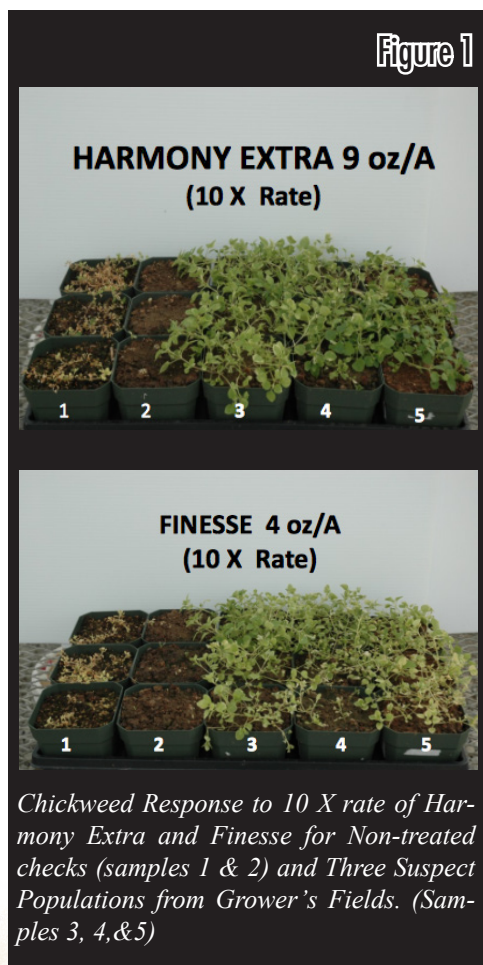
# ALS-Resistant Common Chickweed in Ky wheat



by Jim Martin  
Extension Weed Scientist

Last fall we reported there were a number of fields in 2013 where common chickweed was not controlled with ALS- inhibitor herbicides such as Harmony Extra (thifensulfuron + tribenuron) and Finesse (chlor-sulfuron + metsulfuron). With the help of Wheat Tech and Kentucky Small Grain Growers Association, we conducted greenhouse and field trials that confirmed ALS-resistant common chickweed was present in Kentucky. Figure 1 shows chickweed survived Harmony Extra and Finesse applied at ten times the labeled rate.

A field trial was initiated last fall in Christian County to focus on postemergence treatments applied in the fall and spring (See Table 1). Metribuzin 75 percent DF at 2 or 4 oz/A applied to chickweed at 0.6 inches in diameter (Early Post Fall) provided 97 percent control of common chickweed. Similar results were observed when metribuzin, Huskie, or Starane Ultra were applied to chickweed 2.33 inches in diameter (Mid Post Fall). Delaying applications until spring when chickweed was 5.5 inches in diameter resulted in less control with Huskie and Starane Ultra. However, control was at least 93 percent for metribuzin applied in the spring at 4, 6, and 8 oz/A.



*Chickweed Response to 10 X rate of Harmony Extra and Finesse for Non-treated checks (samples 1 & 2) and Three Suspect Populations from Grower's Fields. (Samples 3, 4, & 5)*

One concern with metribuzin is the risk of crop injury due to susceptibility of wheat varieties. In order to minimize the risk of crop injury, some growers are using metribuzin at low rates in the fall when wheat begins tillering and chickweed plants are small.

Scientists at other Universities indicates Valor (flumioxazin) is also an effective option for managing ALS- resistant common chickweed. Abnormally warm soil temperatures will limit the length of weed control with Valor. Valor needs to be applied at 2 oz/A at least 7 days before planting no-till wheat. Seeds need to be planted at least 1 inch deep.

*This data is based on research conducted at one site and one season. Results may vary in other environmental conditions.*

Table 1. ALS-Resistant Common Chickweed Control with Postemergence Herbicides Christian County 2013 – 2014*			
Herbicide	Application Timing		
	Early Post Fall	Mid Fall Post	Spring Post
	-----% Chickweed Control -----		
Axiom 6 oz/A	87	---	---
Metribuzin 2 oz/A	97	96	73
4 oz/A	97	96	93
6 oz/A	---	---	100
8 oz/A	---	---	100
Huskie 13.5 oz/A		98	77
Starane Ultra 0.3 pt/A	---	93	---
0.4 pt/A	---	---	80
Clarity 4 oz/A	---	---	90
	LSD 8%		
	<u>Chickweed</u>	<u>Wheat</u>	
Early Post Fall (EP Fall): (11-07-13)	0.6" diameter	1 tiller	
Mid Fall Post: (12-02-13)	2.33" diameter	2 tiller	
Spring Post: (04-01-14)	5.5" diameter	7 tiller	



# Research REPORT

The Kentucky Small Grain Growers Association dedicates the largest portion of its budget to small grain research that may help increase grower success and profitability. The following report lists projects that are complete or continuing. More in-depth results can be found at [www.kysmallgrains.org](http://www.kysmallgrains.org)

## Effect of Plant Growth Regulator, Palisade 2EC and Different Nitrogen Rates on Wheat Growth and Yield

by Carrie Knott, Edwin Ritchey and David Van Sanford, UK

Winter wheat is an important crop in Kentucky and an essential staple to the world's diet. Continual wheat yield increases are needed to maintain profitable economic returns and to provide adequate grain supplies to feed the ever increasing global population. To increase wheat yields in Kentucky, producers are interested in considering inputs that are logistically feasible and result in profitable returns. One recent product that was labeled for winter wheat in 2012 is a plant growth regulator, Palisade 2EC®, marketed by Syngenta.

Palisade 2EC® has been reported to increase stem thickness and diameter and reduce plant height, thereby reducing plant lodging and yield losses.

In Kentucky, wheat lodging is typically not a widespread problem when good agronomic practices are followed. However, there is significant interest in Palisade 2EC® throughout the Commonwealth. The main questions being asked are: Do increased nitrogen rates increase wheat yields? Can plant growth regulators (PGR) reduce plant height and lodging and increase yields in high nitrogen production systems? Would a high nitrogen/PGR production system be profitable?

In 2013, a preliminary replicated trial to examine the effect of Palisade 2EC® at five nitrogen rates (0,

50, 100, 150, 200lb n/a) and three wheat varieties (Pioneer Brand 25R32, Pembroke 2014, Truman) was established at the University of Kentucky Research and Education Center, Princeton, Ky. Four replications of small research plots (four by ten feet) were established. Palisade 2EC® (5oz/A) and nitrogen was applied at Feekes 5. Six random plants per plot were harvested May 21, 2014. Internodal lengths were measured for all internodes and peduncle length was measured. Diameter for each internode and the peduncle was measured in the middle of each internode or peduncle.

Six mature wheat heads were harvested per plot (June 19, 2014) and the number of spikelets per head were measured. The number of seed per spikelet and seed weight will be measured. Plant height was measured June 19, 2014. Wheat plots were harvested June 25, 2014; yield and test weights were measured. Data were analyzed as a split-split plot design using PROC MIXED in SAS (version 9.3; SAS Institute, 2001).

In the preliminary trial, mean plant height for all three varieties at harvest was shorter for wheat treated with Palisade 2EC® than for the untreated control (UTC) when N rates were 0 and 50lb n/a. When N rates were at recommended (100lb n/a) or high rates (150 and 200lb

n/a) statistical differences were not detected. It was surprising that Palisade 2EC® did not reduce plant height at all N rates given the numerous reports in other states that it consistently reduced plant height. In 2014, a variety of unusual weather events occurred. Delayed wheat planting, extremely cold temperatures, and prolonged cold temperatures in the winter and spring may have reduced overall wheat height in 2014. Plant height for the three varieties used in this study was obtained from the University of Kentucky Small Grain Variety Testing Program (<http://www.uky.edu/Ag/wheatvarietytest/>) from 2011-2013. When plant height of each of the varieties was compared to previous years an 2014, height was always shorter in 2014 than previous years.

In 2014, the length of the peduncle for all varieties was shorter when treated with Palisade 2EC® for all N rates except 200lb n/a. The internodal lengths did not differ. For internode diameter, internodes 2 and 3 diameters at 200lb n/a were larger when Palisade 2EC® was applied. The only consistent findings were that the diameter of all internodes and the peduncle were smaller when Palisade 2EC® was applied to wheat that did not receive any additional nitrogen (0lb n/a).



For number of spikelets per head, both Pembroke 2014 and Truman had more spikelets per head after Palisade 2EC® was applied than for the untreated control (UTC). In both cases, the increase was less than one spikelet per head. Yield, test weight, number of seed per head, and seed weight data has not yet been analyzed. It will be very interesting to determine whether yield differs exist between the wheat treated with Palisade 2EC® and the UTC and if specific reasons for yield differences, if detected, can be determined based upon the data collected.

Although considerable data was collected in 2014 for differences between wheat when Palisade

2EC® was applied and an UTC at five rates, 2014 was an unusual year. The wheat crop in 2014 was shorter than normal. This likely also reduced lodging. In fact, in early June 2014 wheat in this study began to lean over, but within three days there was no detected lodging or leaning visible. Ideally, an additional year of investigation at numerous locations is necessary to determine the profitability of Palisade 2EC in intensive wheat management programs in Kentucky.

The expected outcome of this project is the feasibility of utilizing a plant growth regulator (PGR) to increase wheat profitability. Theoretically, wheat yields should in-

crease as nitrogen rates increase. In wheat increased nitrogen rates typically increases plant lodging and reduces yield. Utilizing a PGR, such as Palisade 2EC®, may provide an opportunity to increase nitrogen rates and yields without the risk of plant lodging. According to chemical representatives Palisade 2EC® may also have the potential to increase yield of certain wheat varieties, even in the absence of lodging differences. Understanding whether a yield increase is observed in Kentucky with the application of a PGR and the maximum N rate to be used in combination with PGRs to maximize profits is the ultimate goal of this project.

## Product Evaluation Protocol and the Next Big Thing in Wheat Production

*by John Grove and Bill Bruening, UK*

Many Kentucky wheat producers attempt to evaluate one or more new agronomic products during a growing season. They learn from these comparisons, if done well. However, the cost of comparisons, in terms of planning, execution and evaluation is not small and the time is particularly critical. Time resources may be limited by seasonal conditions near planting and harvest, and the time required to on-farm evaluate products with costs between \$5 and \$30 per acre may become too high, causing the evaluation to be less than well done, even abandoned.

The benefit of this information is not easy to make, nor is the improved yield potential easy to estimate, but if the results of this were to reduce use of non-beneficial products by \$10/acre, the 500,000 acres of wheat annually harvested in Kentucky would result in a benefit of \$5 million to Kentucky wheat growers.

A new trial was established at the Princeton and Education Center on a Crider silt loam. The trial site is in a corn-wheat-doublecrop soybean rotation. There would be ten treatments, with one check/control treatment and nine product treatments and six replications. The six replications allow statistical detection/fair evaluation of the products that promise smaller yield increases (around 5 percent) assuming reasonable in-field variation.

The Small Grain Growers are invited to nominate up to six products for evaluation. A modern, high yielding soft red winter wheat variety would be used. Plot man-

agement (soil pH, N, P and K, and weed, disease and insect control) will follow UK recommendations and will be optimized to the site and the season. Bruening will be in charge of trial establishment, maintenance and harvest — yield, test weight and grain moisture. Grove will be in charge of product evaluation protocols and all other evaluations/sampling needs related to product effectiveness. The student intern(s) will accompany Bruening and Grove for the duration of the wheat production season.

The additional measures/samples to be taken are difficult to estimate at the outset, but could include stand establishment, soil penetration resistance, available soil nutrient levels, crop dry matter accumulation at critical growth stages, plant tissue sampling, chlorophyll meter readings, or active canopy sensor (NDVI) evaluations. At harvest, the plots will be threshed using a small plot combine and the yield, test weight and grain moisture determined. If needed, grain protein will be determined.

As this is applied field research, predicted outcomes are speculative. We hope that one or more of these product materials/protocols raises wheat yield and/or quality. A report of results would be made widely available to wheat producers, through the Small Grain Growers Association, or perhaps alongside the report for the wheat variety trials. Undergraduate agronomy students would receive wheat production training.



# Improved Chia Production & Product Usage

by David Hildebrand, University of Kentucky

Work conducted at the University of Kentucky and Chris Kummer's farm has indicated that Chia, (*Salvia Hispanica*) can be an economically viable new crop for Ky farmers.

The objectives of this research are to: 1.) Develop new lines with improved yield and other agronomic performance characteristics by traditional breeding and further mutagenesis. 2.) Expanded NIR & NMR calibrations for rapid, non-destructive analyses of additional chia seed components. 3.) The genotype and environmental effects on seed composition analyzed of materials produced in 2014. 4.) Post harvest control of germination and microbial contamination. 5.) Further market development of nutrigel fiber,  $\omega 3$  oil and improved protein product streams from chia. 6.) Determination of the molecular genetic basis of long day flowering in chia for more efficient improvement.

The main goal of this research remains the further development of chia as a sustainable oil source for edible and renewable chemical applications

as well as fiber for food and medicinal applications and a high protein source for food and feed. These in turn will provide a major new market for farmers. The most promising lines from the 2014 harvests will be used in replicated agronomic performance trials at UK research farms. Data on total plant biomass and seed yield will be collected, as well as flowering date, harvest date, lodging score, and any pest problems. Harvested seed will be analyzed for protein, oil, fiber and other components.

The most promising chia germplasm from around the world will be assembled and our best existing lines will be subjected to a further round of mutagenesis. Breeding for higher yielding chia lines that can set seed in Kentucky will continue to be expanded by crossing with the best additional chia genetic materials.

The oil and protein contents of the harvested seeds as well as fatty acid composition will also be determined. These will be planted by mid- to late May for full season chia. Some will also again be planted in mid July to as-

sess if any of these lines will be suitable for double cropping behind wheat or barley or even flax or winter canola. To ensure that meaningful results are obtained for farmers, minimal irrigation will be applied if needed to obtain a moderate crop in the 2015 growing season.

For commercialization of these lines as a high  $\omega 3$  oil in addition to whole seeds we are further screening and selecting lines for higher oil and  $\omega 3$  levels. We have established a very efficient screen for higher oil chia lines and have found considerable variability for oil content. Thus we will be able to readily develop new higher oil lines. NMR calibrations will be developed in addition to NIR oil calibrations. Protein, moisture and fatty acid NIR calibrations will also be developed and added.

Further work will be conducted on processing and marketing chia for new commercialization opportunities for Ky growers for food, health

and renewable chemical markets. For expanding market opportunities for chia growers we will continue to work with experts in nutrition and medicine and high chia content product development. It has become apparent that chia may be the best source of soluble fiber in addition to  $\omega 3$  fatty acids. We will further study the formation, isolation, health properties, processing and marketing opportunity of chia soluble fiber in addition to the oil and high protein meal especially the viscosity as this is a very important parameter for the marketing of such products for food, health, cosmetic and industrial applications. The oxidative stability of chia oil and whole chia seed products is being studied for special high value health, nutraceutical and food applications. The chemical processes for converting chia oil into a high value renewable lubricant/motor oil will be further refined.





# Kentucky Small Grain Variety Test Results Include Oats Evaluation

by Bill Bruening, Research Specialist, University of Kentucky

In Kentucky there are approximately 1000 acres of oats produced on around 90 farms annually. Of the winter small grain crops grown in Kentucky, oats are the least cold tolerant and most susceptible to winter kill. Most oats produced in the U.S. are spring oats grown in cooler northern states such as Minnesota, Wisconsin, North and South Dakota. Kentucky is at the northern range of the winter oat production area. Winter oats are used for livestock feed as either grain or forage/silage. The standard grain test weight for oats is 32 lbs/bu compared with 60 lbs/bu for wheat. This explains why oat grain yields of 140 bu/a are not unusual. The low test weight is due to the energy rich “groat” grain being covered by a fibrous hull and volumetrically a substantially greater portion of air space per bushel.

In Kentucky, oats should be planted between September 15 – October 15 at a rate of 60-90 lbs/acre for grain and 90-120 lbs for forage production. Fungicide seed treatments are an inexpensive and effective method of protecting seeds and seedlings from disease. Insecticide seed treatments will also provide some protection from fall insects, such as aphids which can be an issue with early fall planting in warmer conditions. Management of oats is similar to wheat with the exception of spring N fertilization, where a single application of 60 lbs N is recommended in early March. Excessive N rates can cause lodging and disease issues. Oat grain

reaches harvest maturity at approximately the same time as a mid-late maturing wheat.

Kentucky Small Grain Variety Performance Test Results are available at <http://www.uky.edu/Ag/wheatvarietytest/>. The UK program evaluated winter oat varieties for grain, forage and straw yield potential. Additionally characteristics, such as test weight, heading date, plant height, winter hardiness, and

the wheat variety forage test (4.75 tons/A data not shown). The oat straw yields averaged 1.75 tons/A which was more than the wheat variety straw test (1.45 tons/A). This test is unique in that it is the only known test to evaluate oat varieties for straw yield in addition to grain and forage yield potential. This data can be very useful for growers who are producing oats for regional horse markets where both grain

TABLE 18. 2013-14 Kentucky Oat Variety Tests.

VARIETY	2013 Grain Yield (Bu/A)*	2013 Forage Yield DM (Tons/A)	2013 Straw Yield DM (Tons/A)	2013 Test Wt. (Lb/bu)	2013 Lodging (%)	2013 Height (In)	2013 Heading Date > May 1	2013 Winter Survival (%)	2014 Winter Survival (%)
Gerard 229	148.1	4.29	1.25	35.6	50	39	19	100	0
RAM 99016	146.9	4.61	1.94	33.8	15	49	16	100	0
Gerard 224	142.9	3.54	1.57	35.0	68	42	17	100	0
Horizon 306	136.9	4.21	2.50	35.4	13	44	19	100	0
Rodgers	133.5	3.78	1.76	33.0	43	43	17	83	0
SS 76-40	130.9	3.70	2.14	34.4	8	39	18	100	0
SS 76-50	129.4	3.10	1.56	33.5	15	37	18	53	0
SS 76-30	118.6	2.73	1.73	33.2	40	43	17	93	0
Brooks	112.0	3.83	1.74	32.0	38	42	19	90	0
NC10-5069	108.8	3.52	1.57	31.8	73	36	20	60	0
NC09-4503N (naked)	97.5	3.87	1.44	39.5	48	43	16	97	0
NC10-5051	88.5	2.10	2.05	34.8	75	43	19	100	0
FL02011 (naked)	40.3	1.29	1.50	.	0	35	20	23	n/a
<b>AVERAGE</b>	<b>118.0</b>	<b>3.43</b>	<b>1.75</b>	<b>34.3</b>	<b>37</b>	<b>41</b>	<b>18</b>	<b>85</b>	<b>0</b>

Location: Bluegrass Region - Fayette Co.; Conventional tillage.

Planting dates: 10-16-12; 10-22-13; DM=Dry Matter Yield @ Milk Stage - Forage Harvest date: 5-30-13.

Grain and straw harvest date: 6/26/13; \* 32-lb standard bushel weight.

lodging are also evaluated.

In Table 18, data are presented for the 2013 and 2014 tests. In the 2014 test, all of the plants died from winter kill following the severe & unusually cold winter. Planting was delayed due to wet conditions which may have also contributed to the susceptibility of winter kill. Results from 2013 show a broad range of winter survival (23% - 100%). In 2013 grain yields ranged from 40 bu/a to 148 bu/a (note 2 varieties were naked oats which shed the hull at harvest & yield the groat grain only). Forage yield at milk stage averaged 3.43 tons/acre which was lower than the average yield from

(feed) and straw (bedding) yields can affect production profitability.

The palatability and quality of oats as forage is reported to be the best of small grains, however because of its lack of cold hardiness – it is not recommended in Kentucky. Wheat also produces high quality forage and typically does not have winter survival issues and can be planted later. Grain producers must also weigh the winter survival risk when contracting for oat grain production. In most years winter kill is not a big issue, particularly if you plant early at the recommended seeding rate and select a high yielding variety with a good winter survival rating.



# Soft Red Winter Wheat Breeding and Variety Development for Kentucky

by David Van Sanford, University of Kentucky

The objective of the UK wheat-breeding program is to develop and release profit increasing wheat varieties with high yields, high test weight and resistance to economically significant diseases such as head scab, leaf blotch, glume blotch, leaf rust and stripe rust. We also focus on important agronomic traits like straw strength, freeze resistance, earliness, as well as acceptable milling and baking quality.

The inoculated, irrigated scab-screening nursery will be planted at Lexington; this ½ acre nursery includes 3000-4000 rows of breeding material, advanced lines and varieties. We will measure scab incidence and severity, scabby seed and DON levels. Scab screening of all breeding lines will also be carried out in the greenhouse. Yield, test weight and scab traits will be measured in an inoculated, replicated, non-irrigated Fungicide x Variety test at Princeton and Lexington.

## Variety Release, Purification and Increase

Several hundred acres of Pembroke 2014 were grown in Fulton, Logan and Nelson counties and seed of the variety will be available for sale this fall. The following increases were grown in Yuma, Arizona: KY03C-1002-02, which will likely be named Pembroke 2016 was increased to produce approximately 500 bushels per acre which is in storage at Clements Ag Supply. Two lines that did very well in the 2013 Wheat Trial, KY03C-1237-05 and KY03C-1237-10 were increased in Yuma and approximately 50 bushes per acre of each was produced.

## Crossing

In greenhouse crossing this year we made a total of 392 three-way and approximately 300 single crosses using parents selected for yield, test weight, scab resistance and other traits. The single cross hybrids will go back into the greenhouse this fall for an additional round of crossing while the 3-way crosses will be planted in rows at Princeton.

## Line Development

F5 headrows were grown at Princeton in 2013-14. Approximately 750 rows were selected based on height, maturity, scab and septoria symptoms as well as overall vigor. Initially 1200 rows were selected, but then a late scab infection provided a chance to remove susceptibles and keep only resistant lines. Seed from these headrows will go into a one rep preliminary trial to be grown at Lexington, Schochoh and Princeton in 2014-15.

## Yield Testing

After a hard winter and late spring, harvest began only slightly late for us at Schochoh on June 19. We were able to complete offstation harvest in a timely fashion and are within a week of completing Lexington harvest. Ten Kentucky breeding lines were tested in the 2014 state variety trial; there were several that were in the hunt, but none were off the chart. The line of greatest interest, Pembroke 2014, averaged 93.5 bu/a with an exceptional 62lb test weight. Test weights of most Kentucky entries in the variety trial were excellent.

## Scab Screening

Scab screening in the irrigated, inoculated Lexington nursery was successful this year. A very high level of scab pressure developed over time so maximum incidence and severity were achieved. We will have the opportunity to find the most resistant lines once kernel damage is assessed and DON levels are measured. This data will be supplemented with the greenhouse screening data. This week all rows will be sickled; threshing and seed evaluation will occur over the next four weeks. Natural scab occurred in the plots at Lexington and Woodford County; this data will be incorporated into our overall scab profile of breeding lines.

# Fragipan Remediation

by Lloyd Murdock, University of Kentucky

This is an attempt by a group of senior scientists to help solve a significant soil problem in Kentucky. The fragipan is a naturally occurring restrictive layer in about 2.7 million acres of Kentucky soils and 50 million in the U.S. The pan virtually stops water movement and root growth and its depth averages about 20 to 24 inches in these soil types in Kentucky. The pan greatly restricts the movement of water and growth of roots and restricts productivity of all crops grown on these soils.

The objective of this research is to discover a method that would cause remediation of the top of the fragipan by a cost effective method using cost effective materials that would improve crop production enough to make it a remediating practice economically attractive.

We are becoming more convinced that we are making some beginning progress on breaking down the fragipan. The laboratory work showed that ryegrass was one of the materials tested that would break apart the pan.

*Continued on Page 11*



# Improvement and Development of Barley for Use in Feed, Malt & Fuel

by W.S. Brooks, C.A. Griffey, M.E. Vaughn, S. Malla & W.E Thomason, Virginia Tech

The Virginia Tech barley-breeding program is the largest and one of only a few surviving programs in the Eastern United States. Our program is significantly diverse with breeding efforts focused on development of superior, widely adapted, high yielding, winter barley cultivars and a major focus on incorporation of value-added traits geared towards development of new markets. As a result, two winter barley varieties (Amaze 10-hulless and Secretariat-hulled) were released from the breeding program. The white seeded winter hulless barley variety Amaze 10 tested as VA07H-31WS was officially released in April 2013; whereas, the hulled barley variety Secretariat evaluated as VA08B-85 was released in March 2014, and both varieties are targeted for production in the mid-Atlantic and southeastern United

States as a potential commodity for feed, fuel and food.

Meanwhile, increased interest in local and regional production of winter malt barley by producers and the malting industry has prompted the Virginia Tech breeding program to expand efforts to develop malt barley varieties adapted to the mid-Atlantic and south eastern United States. We have initiated population development and a series of field testing trials to develop superior winter malt barley varieties that are widely adapted to these regions. Our strategy is to select and use superior germplasm from the Uniform Winter Malt Barley Trial as parents in crosses with elite material from our program. We will develop winter malting varieties that are valuable to local producers and the malting and brewing industries. In

addition, in order to accelerate the development of superior, widely adapted, high yielding winter malt barley varieties, our breeding program in collaboration with Oregon State University has initiated development of pure lines using double-haploid techniques. These double-haploid lines will be planted in field trials this fall and evaluated in the 2014-2015 season. Pure lines possessing good agronomic characteristics and malt quality will be selected and advanced in yield tests in our breeding program.

Vireol Bio Energy LLC acquired the former Osage Bio Energy facility and has begun production of ethanol in the City of Hopewell, VA. The company will produce ethanol from corn, barley and other small grains. The state of the art plant will be the largest ethanol plant on the East Coast. The Com-



monwealth of Virginia is partnering with the City of Hopewell and Vireol Bio Energy on this project through the Governor's Agriculture and Forestry Industries Development Fund (AFID). Vireol Bio Energy plans to produce over 170 million gallons of ethanol over a three year period, utilizing corn, wheat and barley, which will be blended with gasoline for fuel.

Barley improvement at Virginia Tech is a collaborative effort of the Plant Breeding and Genetics program of the Crop and Soil Environmental Sciences Department and the Virginia Tech Cooperative Extension Service. Specific breeding goals include high yield, resistance to diseases (leaf rust, powdery mildew, net blotch and fusarium head blight), and favorable feed, fuel, malting and brewing characteristics.

## ~~~~~ **Fragipan continued...**

The things we are seeing in the greenhouse also indicate that this may be taking place in some of the cores. We are not quite to the point that we can begin to make measurements on the greenhouse cores but the visual results indicate something is happening. We have a ryegrass/no ryegrass cover crop trial planted on a fragipan field at the University

of Kentucky Research and Education Center. We have completed two full years of the trial. The first year there was no difference in the corn yields in the trial regardless of whether the corn had a ryegrass cover crop or no over crop. The trial was repeated this year on the same plots. This year there was a 12 bushel/ac (25 percent) advantage for soybeans to have a ryegrass cov-

er crop for two consecutive years. I am not sure what happened but something happened. It is felt that at least part of the increase is due to a partial degradation on the fragipan. There is still much to do and many unknowns but things seem to indicate we are moving in the right direction. This is a long-term solution so only time will tell.





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## KENTUCKY WHEAT YIELD CONTEST WINNERS ANNOUNCED



*Pictured right, Duncan Gillum receives his top no-till yield award at the 2014 Ky Commodity Conference*

Congratulations to the 2014 winners of UKCES Kentucky Wheat Production Contest. The top wheat yield in Kentucky, 120.26 bushels per acre, was achieved by Jeff Coke in Daviess County. Coke's field was disced twice. The top no-till yield was 115.98 bushels per acre submitted by Duncan Gillum, of Todd County. Both Coke and Gillum are repeat winners from 2013.

State and Area winners will be recognized at the Kentucky Commodity Conference on January 16, 2015 in Bowling Green, Kentucky. Each will receive a trophy and monetary prize from the Kentucky Small Grain Growers Association.

Full results of the contest entries are below. Additional herbicide, fungicide, and insecticide information can be found at <http://www.uky.edu/Ag/GrainCrops/YieldContest/2014YieldContests/2014WheatContestSummary.pdf>



*Pictured left, Jeff Coke receives his top wheat yield award at the 2014 Ky Commodity Conference*

Winner	County	Area	Division	Variety	Yield	Planting Date	Row Width	Fall N	Fall P205	Fall K20	Winter N	Spring N	Total N
<b>State Awards</b>													
Jeff Coke	Daviess	2	Tillage	Steyer Kidwell	120.26	10/12	7.5	27	69	150	70	60	157
Duncan Gillum	Todd	1	No-Till	Dyna-Gro 9012	115.98	10/11	7.5	31.5	80.5	75	50	60	141.5
<b>Area Awards</b>													
Merle Coblentz	Todd	1	Tillage	Becks 113	105.31	10/16	7.5				54	54	108
SBJ Fischer	Daviess	2	Tillage	Dyna-Gro 97Y10	105.73	10/10	7.5	27	69	90	30	70	127
Gary Summers	Simpson	3	Tillage	So. States 8870	109.98	10/20	6		50	75	60	50	110
Homestead Family Farms	Washington	4	No-Till	Dyna-Gro 9911	112.34	10/20	7.5	30		100	120	9	159