

SMALL GRAIN grower



KENTUCKY
Small Grain
GROWERS' ASSOCIATION

— Fall 2011 —

2011 Annual Research Report





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Kentucky Wheat Growers Produce Second Largest Crop in State History

Kentucky farmers harvested 30.8 million bushels of winter wheat in the summer of 2011 according to the Kentucky Field Office of USDA's National Agricultural Statistics Service. This was up 87 percent from 2010, and the second largest crop on Kentucky record. The 2008 crop was the largest at 32.7 million bushels.

Farmers harvested 440,000 acres for grain. This was up 190,000 acres from 2010. Yield was estimated at 70 bushels per acre, up 4 bushels from the 2010 yield.



Kentucky Small Grain Promotion Council Annual Report

From June 1, 2010 to May 31, 2011

Reviewed by Jones, Nale & Mattingly, PLC

REVENUE

Checkoff Assessments	\$245,313
Producer refunds and reimbursements	\$17,576
Net Checkoff Income	\$227,737
Interest Income	\$1,856
Total Revenue	\$229,593

EXPENSES

Program Services:	
Market development and promotion	\$17,759
Research	\$147,158
Education	\$39,589
Administration	\$23,578
Total Expenses	\$228,084



Market Development & Promotion - 8%
Research - 65%
Education - 17%
Administration - 10%

NAWG Sends Farm Policy Priority Letter to Ag Leaders following Super Committee Recommendation



Leaders of the Congressional Agriculture Committees recommended to the debt-deficit super committee in October that mandatory agriculture and nutrition programs should take \$23 billion in cuts as part of the overall effort to cut \$1.5 trillion from the federal budget.

NAWG President Wayne Hurst, a wheat farmer from Burley, Idaho, responded to leaders of the House and Senate Agriculture Committees with a letter asking them to consider policy priorities of the nation's wheat farmers. The following is a summary of those priorities:

- NAWG strongly opposes any reductions to the baseline available for the federal crop insurance program.
- NAWG opposes the elimination of direct payments in 2012. They believe a phase-down of the direct payment program, perhaps over as few as three years, would allow farmers, their landlords and lenders and rural economies to adjust.
- NAWG requests the formation of a safety net program based on revenue with the consideration of the following priorities:

Trigger mechanisms

- First priority -- On-farm trigger; by-commodity revenue
- Second priority -- On-farm trigger; whole farm revenue
- Third priority -- County trigger; by-commodity revenue
- Fourth priority -- County trigger; whole-farm revenue

Acres Priority to use planted acres over base acres

- As a revenue program is developed, NAWG looks forward to further development of a target price component that would cushion farmers, who are price takers, in disastrous price decline situations.
- NAWG would like to see authorization of a cereal research initiative for wheat, barley and oats, incorporating mandatory and discretionary funding, which would address critical needs of the cereal industry and of global food security.
- NAWG requests for the reauthorization of the MAP and FMD, as well as the export credit program, which are essential parts of our industry's export promotion strategy.
- NAWG believes maintaining a functioning farm safety net should be prioritized over private-land conservation in general, and specifically requests leadership to carefully examine the efficiencies that can be achieved by consolidating and streamlining conservation programs.

The full letter can be viewed at www.wheatworld.org.

With FTAs Signed, Wheat Growers Urge Quick Implementation

Leaders of the U.S. wheat industry applauded President Barack Obama's signing of three long-pending free trade agreements, with Colombia, Panama and South Korea.

Wheat growers are now urging the Administration to work closely with their trading partners to be sure the agreements enter into force as quickly as possible.

Wheat groups have already started the push to win back the wheat export business lost prior to the agreements.



Kentucky COMMODITY CONFERENCE

Friday, January 20, 2012
Holiday Inn University Plaza,
Bowling Green, KY

Agenda (all times CDT)

- | | |
|--------|---|
| 9 a.m. | Registration
Trade Show Open |
| 10:30 | Marketing and Farm Policy Session
<i>Sponsored by Syngenta</i>
Abner Womack, FAPRI
Cory Walters, UK
Sam Willett, NCGA |
| 12:30 | Luncheon and Keynote
<i>Sponsored by Monsanto</i>
Damian Mason, comedian and impressionist "Humor for the Heart of Agriculture" |
| 2:30 | Ky Soybean Association Annual Meeting |
| 3:30 | Ky Corn Growers Association Annual Meeting |
| 4:00 | Ky Small Grain Growers Association Annual Meeting |
| 4:30 | Environmental Session
<i>Sponsored by Opti-Crop</i>
Jimmy Palmer,
Kentucky Division of Water |
| 6:30 | Reception
<i>Sponsored by DuPont</i> |
| 7:00 | Awards Banquet
<i>Sponsored by Pioneer</i> |

Registration is available online at
www.kysmallgrains.org.

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Research REPORT

The Kentucky Small Grain Growers Association each year 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, continuing or were selected for new funding. Date and more in-depth results can be found at www.kysmallgrains.org.



Van Sanford named Fellow to Two Professional Societies

David Van Sanford, a wheat breeder and professor in the University of Kentucky College of Agriculture, has been selected a Fellow of the Crop Science Society of America and the American Society of Agronomy.

Fellows are nominated by colleagues to receive these honors. Only 0.3 percent of the members in each society receive this recognition.

In his breeding program, Van Sanford has focused on developing high yielding, scab resistant soft red winter wheat varieties.

"It's a great honor to receive recognition for my service and scientific contributions, but what really matters is our research is having a meaningful impact on society," Van Sanford said.

Soft Red Winter Wheat Breeding and Variety Development

Primary Investigator: David Van Sanford, University of Kentucky

The goal of the University of Kentucky wheat breeding program is to increase profitability of Kentucky's wheat production by developing and releasing improved wheat varieties with high yields and test weights, enhanced scab resistance and overall disease resistance, increased lodging resistance and increased profitability. Significant progress towards these goals requires long term, sustained effort and commitment. To date, more than \$700,000 has been directed to Van Sanford's wheat breeding research. This is an ongoing project.

2011 Results

Crossing: In greenhouse crossing this year, Van Sanford and his team made a total of 587 successful crosses based on yield, test weight and scab resistance. Fifty 3-way first generation crosses were sent to Argentina in April to plant a fast track increase that saves 1 year in development time. In the spring crossing cycle, they made 237 successful single first generation crosses in which both parents had high yield and test weight with some level of scab resistance.

Field plots and headrows: Plots and headrows were grown at four locations: Lexington, Woodford Co., Princeton, and Schochoh.

Line development: Approximately 600 fifth generation headrows were selected at Princeton, sickled and brought back to Lexington for threshing. Selection was based on height, maturity, scab and leaf disease symptoms. Progeny from these rows will be tested in unreplicated Preliminary Trials in 2012.

Yield testing: In the 2011 state variety trial only one breeding line, KY03C-1237-32 was formally entered in the test and it performed well across all locations. An additional 20 lines (The Super 20) were tested alongside the variety trial at all locations. Some of these lines did very well, topping the test at certain locations. Most of these lines have good scab resistance in addition to excellent yield and test weight.

Purification and Increase: Breeder seed increases of three KY lines were grown this year at Lexington. We have approximately 25 bu each of KY03C-1237-32, KY02C-3005-25 and KY02C-3004-07. The first line did well in the variety test this year and may be a candidate for the next Pembroke seed release. The other lines have excellent scab resistance but probably not the yield potential for a Pembroke line.

Scab screening: Scab screening in the irrigated, inoculated Lexington nursery was very successful this year. Based on severity and kernel damage ratings we have numerous resistant lines in the program. The fungicide x variety trials at both Princeton and Lexington were good tests with sufficient scab to test fungicide/variety combinations. Kentucky breeding lines entered in the test (KY designation) performed very competitively with lines that had established a good track record in the state variety test over the past 2 years. Read about additional scab research conducted by Van Sanford on page 10.

Farm Test of Crop Sensing for Site-Specific Nitrogen Fertilizer Application in Winter Wheat

Primary Investigator: Ole Wendroth, University of Kentucky

This project is a continuation of other projects headed by Wendroth which began in 2005. Over six years, the KySGGA has dedicated \$35,500 to the project.

In previous years, Wendroth found that wheat nitrogen fertilization and crop sensor experiments clearly showed that induced nitrogen deficiency could be identified in the spring time by canopy reflectance measurements resulting in optical indices such as Normalized Difference Vegetation Index (NDVI). Spatial variation and representativity of sensor measurements and their relationship to grain yield were quantified in a farmer's field in Western Kentucky. A wide range of nitrogen fertilization rates caused obvious differences in NDVI and yield. So in last year's study, Wendroth wanted to discover whether site-specific nitrogen application provided an advantage to the farmer compared to a uniform application.

The 2010/2011 study provided the following results:

1. NDVI measurements shortly before the second N split reflected spatial differences in wheat growth and zones with high NDVI required less nitrogen than zones with lower NDVI.
2. In this year and in this field, calibration plots were not useful to convert NDVI measurement into a target N application rate.
3. Poor wheat growth in a particular zone with low soil quality could be overcome by higher N applications. For a substantial area, the same wheat yield could have been obtained with a slightly lower N rate.

Based on these results, Wendroth postulated a new question: Should a wheat field be scanned for NDVI in an extra pass before N application or should scanning and site-specific N application be accomplished at the same time?

Wendroth says it seems more logical to scan a field first, then spend time on the data analysis necessary for creating a map and only then applying the fertilizer. But this means an extra pass and more time. So is it worth the extra pass and time, or can scanning and fertilization be accomplished at the same time? Stay tuned.

Improving Nitrogen Application Technology Under Kentucky Conditions

Primary Investigator: Lloyd Murdock, University of Kentucky

The objective of this continuing study is to: 1) Adopt the Greenseeker/nitrogen technology to Kentucky conditions using small plots and on-farm tests, and 2) Fine tune nitrogen recommendations under today's production practices and varieties for the most economical nitrogen rate on well-drained and marginally drained soils. The KySGGA has dedicated \$30,000 to the project to date.

During the 2010/2011 study, Murdock found that the Greenseeker treatment (variable rate nitrogen-VRN) was consistently higher in yield for the tested fields. The yield increases were about 5 bu/ac in one field and 2 bu/ac in the other for an average of about 3.5 bu/ac.

The average N rate applied was about the same for the VRN and the flat rate treatments. This meant that the yield gains were due to the N being applied more nearly according to the plant needs.

The returns (\$/a) for the use of the VRN was about \$30/ac in one field and \$11/ac in the other for an average of \$20.50/ac. This does not consider the initial cost of the Greenseeker system.

This is the second year the VRN technology using the Greenseeker has been scientifically tested on a field basis, and the results have been positive.

For both years, the yield increase has averaged about 4 bu/ac and has been statistically significant at the 0.1 level each time. The N rates are similar between the treatments with average of about 8 lb/ac more N used in the VRN treatment.

What is Greenseeker and how can we make it more suitable for Kentucky?

The Greenseeker is a real-time, on-the-go sensor/applicator that senses the health of the wheat crop at the time nitrogen is applied and then simultaneously adds the precise amount of nitrogen that is determined to be needed by the machine. The sensing and application technology part of the machine has been very accurate and reliable. Lloyd Murdock says that the weak part of the process has been the algorithm (formula) that is placed in the software of the machine to tell it how much nitrogen to add based on the plant health NDVI readings.

Research at Oklahoma State University and Virginia Polytechnic Institute and State University showed favorable results by increasing or maintaining wheat yields while reducing nitrogen application rates. Both places had different algorithms. Using these two algorithms and adding another that was quite different, the results in Kentucky were not as favorable. Using this technology with existing software is not feasible in Kentucky.

Therefore, Murdock began to gain the information needed to develop an algorithm for Kentucky. Small plots using different nitrogen rates applied at different times on different soils were used in the process.

With five years of research, an average algorithm was calculated from all the years where the data was considered to be reliable. The findings will allow Murdock to fine tune future nitrogen application research.

Performance of Small Grain Varieties in Kentucky

Primary Investigator: Bill Bruening, University of Kentucky

The University of Kentucky Small Grain Variety Testing Program evaluates wheat and barley varieties that are commercially available or may soon be available to farmers. Annual variety performance testing provides farmers, seed producers, extension agents and consultants with current, unbiased information to help them select the varieties best adapted to their locality and individual requirements.

During the 2010-11 growing season, one-hundred wheat entries from seed companies/breeders were evaluated across Kentucky at seven test locations. In addition to evaluating wheat varieties for differences in grain yield potential, the UK wheat variety tests also evaluate characteristics, such as test weight, heading date, plant height, winter hardiness, lodging and disease reaction. Additional specialized tests were conducted to measure wheat varietal differences in post-grain harvest straw yields, differences in wheat forage biomass yields and barley & oat variety performance at single locations.

This is an ongoing project. The Kentucky Small Grain Growers Association has dedicated nearly \$90,000 to the project to date.



For the full results online, visit www.uky.edu/Ag/wheatvarietytest/ or request a copy from your county extension office.

Wheat Yield Response to Wide Rows

Primary Investigators: Chad Lee and Lloyd Murdock, University of Kentucky

Many farmers in Kentucky and surrounding areas are interested in planting wheat in 15-inch rows. In general, a planter does a better job of seed placement than a drill. Many producers who grow wheat occasionally no longer own drills. If wheat could be successful in 15-inch rows, then these producers could avoid the additional cost of a drill. For three seasons, the Kentucky Small Grain Growers have sponsored a research project on wheat in 15-inch rows.

Jim Herbek and Chad Lee, extension agronomists, for the University of Kentucky, planted wheat in Princeton and near Lexington, Kentucky in 2008, 2009 and 2010. In all cases, the studies were no-tillage and followed corn. In the first two seasons, three wheat varieties were tested. AgriPro Coker Branson, Beck's 122 and Pembroke were seeded the first two seasons. There were no interactions between variety and row width for the first two seasons, so only Pembroke was seeded for 2010-2011. All varieties tested were considered to tiller well, so the lack of differences between varieties may be attributed to the tillering capabilities of all three varieties.

In each season of the study, there were no interactions between study location and treatments, so yields were averaged over locations. In the 2008-2009 season, wheat in 7.5-inch rows yielded about 7.7 bushels per

acre (or 8.5%) greater than wheat in 15-inch rows. In the 2009-2010 season, wheat yields were not significantly different in any row width or at lower seeding rates in 15-inch rows. In the 2010-2011 season, wheat yields in 3.75-inch rows and 7.5-inch rows were 9.0 and 8.4 bushels per acre, respectively, greater than wheat yields in 15-inch rows.

Wheat in 15-inch rows provided excellent yields in this study with seasonal averages at 78 or more bushels per acre. However, in two of the three years, the wheat yields in 15-inch rows were about 8.5 to 10% less than wheat yields in 7.5-inch rows. Wheat in 3.75-inch rows yielded similarly to wheat in 7.5-inch rows. For wheat in 15-inch rows, reducing the seeding rate did not reduce yields. Wheat in 15-inch rows seeded at 25 seeds per square foot yielded similarly to wheat seeded at 35 seeds per square foot. This is a 28% reduction in seeding rate with no significant yield losses.

In the 2010-2011 season, the researchers also examined the impact of corn residue on

wheat yields. In some treatments, the loose residue was removed from the test plots before planting, while in most treatments, the residue remained on the soil. There was no difference in yield with and without the corn residue. Producers with 15-inch rows most likely would be pleased with yields above 70 bushels per acre. Producers who want to use 15-inch rows should consider reducing seeding rates to save a little more on seeding costs. However, the reduction in seeding rates from 35 to 25 seeds per square foot only saves about \$10/acre. The yield losses of 8.5 to 10% cost about \$40/acre under current pricing. So, as long as the commodity price of wheat remains high, producers will make more money most years by planting wheat in 7.5-inch rows. If wheat commodity prices drop, there may be a time when planting wheat in 15-inch rows is as profitable as wheat in 7.5-inch rows.

This project received \$17,500 from the Kentucky Small Grain Growers Association over three years. The research is complete.



Survey of the Tissue Nutrient Status of Winter Wheat in Kentucky

Primary Investigator: Edwin Ritchey, University of Kentucky

Plant tissue analyses are more reliable indicators for some secondary and micronutrient deficiencies than soil tests since Mehlich 3 soil tests have not been calibrated for wheat yield response to sulfur, boron, copper, manganese, or Zn in Kentucky. Tissue sampling at the latest acceptable stage (initial flowering) gives the best picture of the general nutritional status of the plant. At this plant growth stage most of the nutrient uptake has occurred. When reproductive growth begins (i.e. seed or grain development) nutrients contained in the plant are reallocated from the plant leaves to seed development. This study was initiated in 2011, as wheat was reaching maturity, to determine if there were any secondary or micronutrient deficiencies present in wheat in western Kentucky.

Plant tissue concentrations from 29 fields in 15 counties were compared to sufficiency ranges reported in University of Kentucky AGR-92, Sampling Plant Tissue for Nutrient Analysis. If the nutrient concentrations were within those ranges, then no nutritional problems were expected. But Ritchey said values can be below this range and still not exhibit nutritional deficiencies.

Tissue sampling did not detect any deficiencies for phosphorus (P), calcium (Ca), sulfur (S), boron (B), manganese (Mn), or iron (Fe). The most noticeable "deficiencies" in tissue nutrient concentrations occurred with nitrogen (N), potassium (K), magnesium (Mg), and zinc (Zn).

Nitrogen applications are not based on a soil test, rather tillage practice and yield potential. The lower tissue N values maybe due to several factors. One possibility would be the loss of nitrate (N-NO₃⁻) due to leaching if excess precipitation is present. Precipitation was much higher than the 30 year mean for all of the weather recording stations in or near the sampled areas and could explain the low tissue N leaf concentration in several of the samples. Another explanation is that although tissue N concentrations were low, they were not critically low or yield limiting. And finally, tissue testing might not be well correlated for N.

Tissue analysis values for the majority of the locations indicated K levels below the sufficiency range, however they were not

excessively low and were probably not limiting grain yield. Further, rainfall was greatly above the 30 year average for surrounding weather reporting stations, particularly for April, the month of sampling. This great deviation in rainfall could have lead to lower values due to uptake issue in the saturated soils. Although tissue testing is a useful tool in diagnosing nutrient deficiencies, especially micronutrients, it is somewhat unreliable for macronutrients, particularly K. Ritchey also found that a high soil test K value does not mean that a plant will have "sufficient" K present in the tissue.

Several tissue Mg values were below the sufficiency range. This could also be due to the same reasons suggested for N and K and doubtful that they are yield limiting to wheat. University of Kentucky Lime and Nutrient Recommendations (AGR-1) does not recommend Mg additions if soil test Mg values are above 60 lbs/A due to a low probability of a yield response. All soil test values for Mg are well above this level.

Zinc was the micronutrient that was most often below the sufficiency level. Wheat is not a crop that is very sensitive to Zn deficiency and Zn deficiency is not commonly seen in Kentucky. The tissue Zn concentrations were usually only marginally low, the lowest 14 ppm, and most likely not limiting wheat yields. Several of the low tissue Zn levels can be explained by a high soil pH coupled with somewhat high soil phosphorus (P) levels, both which reduce Zn availability. A few of the samples have adequate Zn present, moderate soil test P (STP) levels, and reasonable pH, however are below the reported sufficiency range for wheat. These fields might have a potential nutrient deficiency that needs further investigation.

The other micronutrient that was below the sufficiency range was copper (Cu), but like Zn usually only slightly below. The literature reports that wheat is more sensitive to low Cu than Zn, but Cu deficiencies mainly occur on organic soils (peat or muck), which are not common to Kentucky.

There were three nutrients in the survey that were above the critical range, calcium (Ca), boron (B), and manganese (Mn). There are no direct toxicity problems associated with

high Ca levels and no visual symptoms directly related to Ca toxicity. A potential problem that may occur with elevated Ca levels is reduced nutrient uptake by other nutrients, particularly K and Mg, due to competition with other nutrients. The slightly elevated levels of Ca in this survey are of no great concern. Boron (B) was marginally high at two locations and well above the sufficiency range at one location. The highest testing location had received long-term poultry litter applications and probably influenced B levels to some extent. There were four tissue concentrations that were above the sufficiency range for Mn. Manganese availability is increased at lower, more acidic pH values and/or when reducing conditions are present in the soil (such as prolonged waterlogged soils). The samples that were above the sufficiency range had pH values below pH 6, with one at pH 5.3. Adjusting soil pH by liming would alleviate this potential toxicity problem. Overall for this survey, there is not great concern for Kentucky producers.

Murdock and Call conducted a similar study in 1999 and 2000 and did not observe any tissue deficiencies for macronutrients. Ritchey's instinct is that either climatic influences (i.e. high rainfall) or insufficient yield correlation with tissue concentration was the reason for their observations. However, with numerous tissue concentrations for N, K and Mg below the sufficiency range and abnormally high precipitation it would be a good idea to conduct this survey for another year. No samples were below the sufficiency range for sulfur.

Murdock and Call (1999) also found no concern with sulfur in their survey but approximately 10% (3 out of 29) of the fields sampled for our survey had applied sulfur-containing fertilizer. Are producers applying S based on soil test, recommendations from consultants, or for other reasons? Another year of data with similar results would strengthen the fact that typically soils in Kentucky do not require sulfur additions for maximum yield. Ritchey would also like to determine if there are any concerns with Cu or Zn, both having several low testing tissue samples during this survey.

Managing Giant Ragweed & Marestalk in Wheat

Primary Investigator: James Martin, University of Kentucky

Giant ragweed and marestalk are examples of weeds that emerge in wheat. While they may sometimes interfere with wheat harvest, the greatest concern is their impact on double-crop soybeans following wheat harvest. Marestalk is especially difficult to control since most populations are tolerant to glyphosate.

Limited observations indicate such management practices as a competitive stand of wheat may aid in the control of weeds that later become a problem in soybeans. It is also believed some of the herbicides used to control cool-season weeds in wheat may improve control of other weeds that occur in soybeans.

This research is a part of a long-term project to evaluate the effect of seeding rate of wheat and certain wheat herbicides on managing giant ragweed and marestalk. KySGGA is funding the project for a third year and has dedicated \$18,000.

Seeding Rate Experiments: In most instances there tended to be fewer giant ragweed and marestalk plants in the X seeding rate compared with the $\frac{1}{2}$ X seeding rate and in the case of marestalk. In 2010, the difference was statistically significant. In 2011 the density of giant ragweed in the X seeding rate was numerically greater than that for the $\frac{1}{2}$ X rate, however the difference was not statistically significant.

In all instances both giant ragweed and marestalk were numerically shorter in the X seeding rate than the $\frac{1}{2}$ X seeding rate. However, the only cases where the differences were statistically significant were in 2010 for giant ragweed plants in the skip and harvest rows and in 2011 for marestalk plants in the skip row.

Having wheat as a vegetative winter cover did significantly limit the number of giant ragweed and marestalk plants both years when compared with the fallow plots. In all instances, the surviving giant ragweed and marestalk plants were numerically shorter in wheat compared with the fallow plots. The only situations where the differences in plant heights were not statistically significant were for marestalk in both skip and harvest rows in 2010.

Although statistical analysis for comparing skip rows to harvest rows were not made, there were some interesting trends observed. The density and heights of giant ragweed and marestalk were usually numerically less in the harvest rows than in the skip rows. Exceptions occurred in 2010, where plant heights were numerically greater in the harvest row than the skip row for giant ragweed at the $\frac{1}{2}$ X seeding rate and for marestalk for both X and $\frac{1}{2}$ X seeding rates.

The number of heads and yield of the wheat in the X seeding rate were often numerically greater than those in the $\frac{1}{2}$ X rate, but rarely was this difference statistically significant. Wheat yield also tended to be numerically greater for the X seeding rate than the $\frac{1}{2}$ X seeding rate.

Herbicide Experiments: It was difficult to assess the impact of preharvest herbicide treatments on giant ragweed and marestalk due to dry weather after wheat harvest in the 2009-2010 studies. A slight improvement in control appeared to occur in some instances with herbicides. The addition of 2,4-D ester with glyphosate did not appear to improve control of either giant ragweed or marestalk in wheat but improved control in the fallow areas.

The herbicide trials that were conducted during the 2010-2011 season had very few giant ragweed and marestalk plants; consequently, no control ratings for these species were made. However, data were collected on weed species that were present.

Visual control ratings of henbit and percent infestation ratings for honeyvine milkweed were done in the spring of 2011 for study 1 (the trial originally targeted for giant ragweed). Finesse provided superior control of henbit; whereas, Peak provided only 63% control of this weed. Wheat yields in this study were equal for all treatments, including the non-treated check.

Visual estimates of percent infestation of dandelion were done in the spring of 2011 for study 2 (the trial originally targeted for marestalk). The herbicide treated plots had approximately half the infestation of dandelion compared with the check plots. The fact Roundup WeatherMAX (glyphosate) was applied as a burndown to all herbicide treated plots may have helped limit dandelion growth.

The fact there were no statistical differences in wheat yield in study 1 indicated competition from henbit was not a limiting factor. In study 2 all herbicide treatments had similar wheat yields and exceeded the yield of the non-treated check by 13.8 to 21.2 bu/A. The level of dandelion infestation was sufficient to limit wheat yield and did warrant use of herbicide treatments.



Research Summary

The vegetative cover that wheat provided throughout the winter and early spring helped control of giant ragweed and marestalk by limiting the number of plants when compared with the fallow areas. There was a slight trend in fewer weeds in wheat planted at the recommended rate than wheat seeded at nearly half the recommended rate; yet the differences were rarely statistically significant.

In most cases wheat also improved weed control by limiting size of weeds; especially giant ragweed, when compared with the fallow areas in 2010. In a few instances the heights of weeds were slightly shorter in the X seeding rate compared with those in the $\frac{1}{2}$ X seeding rate.



Winter Barley Breeding and Research at Virginia Tech

Primary Investigators: W.S. Brooks, C.A. Griffey, Virginia Polytechnic Institute

The Virginia Tech barley breeding program continues to develop and improve yield potential and end use quality of new barley lines derived from crosses made between superior hulled breeding lines and cultivars, such as Thoroughbred, with outstanding hulless lines. Other breeding populations derived from crosses with barley lines introduced from various sources, including lines from the Barley Coordinated Agricultural Project (Barley CAP) are being advanced in the program. Significant progress already has been made in the development of winter barley lines. Brooks and his team have developed elite barley lines having potential for use in multiple end-use markets. Their focus is on better understanding of the genetic basis of yield potential in both hulled and hulless barley lines. Improving the yield potential of hulless barley, with its superior grain composition and nutritional quality, will have several practical benefits to producers and end users.

Meanwhile, VA Tech is pleased to report the official release of 'Atlantic' winter barley

(tested as VA06B-19). Atlantic winter barley provides barley producers and end users in the Eastern United States with a widely adapted, early maturing winter cultivar having superior grain quality and high resistance to Powdery mildew based on its performance in State and Uniform winter barley yield nurseries. It also has performed well in tests conducted in one or more of the barley production regions of Maryland, North Carolina and Virginia.

This season (2010-2011), approximately, 71 advance barley lines were evaluated in replicated yield tests at locations in Kentucky, Maryland, Virginia, North Carolina, and Delaware. Subsequently, yield potential of 75 hulled and 75 hulless sister lines derived from crosses between Thoroughbred and other advance hulless barley lines were evaluated in an observation yield test.

Potential for barley-based ethanol production continues to provide opportunity for a new market for winter barley in eastern U.S. This not only will create an important market for barley throughout the eastern region, but



also will provide valuable feed ingredients for domestic animals and eventually may be used to produce enriched food products for human consumption. With the cost of feed ingredients on the rise, animal producers are seeking lower cost feed options and therefore barley specifically aimed at the feed market could provide the needed alternative feed crop for animal producers. The Virginia Tech breeding program will continue to work with interested parties in evaluating the potential of barley for these and other diverse purposes. Through these efforts, the quality and value of winter barley has increased greatly during the past two years.

This is an ongoing project with Virginia Tech. Funding to date from the KyGGA is \$10,000. Previous support was for the development of hulless barley lines.

Development of Chia as a New Grain Crop for Kentucky

Primary Investigator: David Hildebrand, University of Kentucky

David Hildebrand is evaluating chia as a new crop for Kentucky farmers due to its high levels of omega-3 fatty acids and soluble fiber. After five years of initial studies, Hildebrand has developed an early-flowering chia line for Kentucky and is evaluating the field performance for yield potential, agronomic performance, oil content and characteristics, and optimize production practices (row spacing, fertilization, planting dates, etc.). He is also processing the seeds of the top lines into oil, fiber and high-protein meal for testing, as well as, looking at new product development and marketing opportunities.

The KySGGA is funding the project for a third year, having provided \$20,000 to date. The following is an update from Hildebrand on the study:

In our evaluation of promising renewable oil sources that can be produced on a large scale economically we find that *Salvia hispanica* is the most promising oil source. Plants have high vigor and production potential with few inputs. However no existing *S. hispanica* lines can produce seed in Kentucky or most of the US.

We have developed many new *S. hispanica* lines that can produce seed in Kentucky and most of the US. A patent application has been submitted on our unique new chia lines. Preliminary field trials indicate that competitive seed and oil yields can be obtained with efficient

mechanical planting and harvesting and low production costs.

Salvia hispanica seed oil is the highest source of omega-3 fatty acids known, and this provides superior edible and industrial uses than other renewable oils. We have been able to convert *S. hispanica* oil into forms valuable as renewable chemicals including lubricants and biodiesel and an IP disclosure has been submitted on this process.

Salvia hispanica is particularly adapted for growth and high yield potential in Kentucky and other areas where corn grows well. Both corn and *S. hispanica* were originally domesticated in meso-America and like corn, *S. hispanica* grows and produces better in the US corn belt than in meso-America. Our new early flowering *S. hispanica* lines will allow us to exploit this opportunity.

Further no large scale processing of *S. hispanica* seeds into oil for wide scale use of the oil in edible and industrial markets has been established yet. Small scale production of *S. hispanica* oil for very high value nutraceutical uses such as ω 3 oil capsules is well established.

The most promising lines from the 2009 field trials were grown out in sufficiently large scale field production trials on a UK farm in Lexington in the 2010 growing season to establish good production practices and select top yielding lines. Our top lines have yielded well over 1,000 kg/acre under good growing conditions.



New Projects Selected for 2011-2012

Impact of Climate Change on Wheat Production in Kentucky

**Primary Investigators: David Van Sanford
& Katie Russell, University of Kentucky**

The primary objective of this project is to determine the likely impact of climate change on Kentucky agriculture. Investigators say it will be necessary to determine what is known about climate change at our latitude/longitude and in our environment, what research is already being done and by whom, and what gaps there are that might be filled by future Kentucky-based research efforts. Their approach to this will be based on four activities: scientific literature review, review future climate scenarios and historic wheat data to develop a basic wheat yield model, conduct a climate change workshop, and interact with leading scientists on the topic.

2011 Funding: \$5,000

Tracking the Source of Aphid- Vectored Virus in Winter Wheat

**Primary Investigator: James Harwood &
Katelyn Kowles, University of Kentucky**

The University of Kentucky will work to develop an easy and reliable sampling technique for local movement of aphids, document the timing and source of viruliferous aphids into winter wheat fields, track the spatial and temporal movement of Barley Yellow Dwarf Virus through winter wheat fields and make management recommendations to Kentucky growers for local aphid control.

2011 Funding: \$8,521

Head Scab Research Update

Breeding More Scab Resistant Wheat

Written by Katie Pratt, University of Kentucky

Fusarium head blight, also known as head scab, is not an annual problem in wheat, but it is an annual concern of wheat producers. When a significant amount of head blight is widespread throughout an area, it can cause substantial crop losses and loss of income for producers.



During the 1990s, U.S. producers lost an estimated \$3 billion to the disease. More recently, as a result of a widespread occurrence of fusarium head blight in 2009 in Kentucky, the state's producers lost an estimated \$30 million.

David Van Sanford, wheat breeder in the University of Kentucky College of Agriculture, has worked to breed varieties that are resistant to Fusarium head blight. With funding from the United States Wheat and Barley Scab Initiative, he's conducting research on the effectiveness of a new piece of equipment that may boost Fusarium resistance in several varieties.

The equipment is a high speed, imaged-based optical sorter designed by U.S. Department of Agriculture scientists in Northern Kansas.

"If this works in our breeding populations, the susceptible seeds will be eliminated prior to planting and the seeds that we take to the field will have a pretty good level of scab resistance," he said. "It could save time and money and ideally help us get to the end product more quickly."

The machine has a camera mounted to it that photographs each seed as it passes through one of three vibration channels. If the image shows grain that appears to have Fusarium, the camera will send the image to a microprocessor that triggers a burst of air to remove the kernel from the channel and into a waste bin.

In 2010, Van Sanford began a study where half of the wheat seed went through the sorter before going to the field at UK's Spindletop Research Farm in Lexington. Wheat from the study was harvested during June. Researchers will plant two seedlots, sorted and unsorted in October and analyze the results comparing sorted and unsorted wheat by next summer.

If the test proves successful, Van Sanford will conduct additional research about whether running seeds through the machine more times creates a higher level of Fusarium resistance.

If the results are promising, this technology could be applied to the thousands of populations that are handled by the breeding program, Van Sanford said.

Control of Fusarium Head Blight and Deoxynivalenol Requires More Than Fungicide Use: Integrated Control of FHB Using Fungicides and FHB Resistant Varieties

By Don Hershman and Bill Bruening, University of Kentucky

Fusarium head blight and associated contamination of grain by deoxynivalenol (DON) are major concerns for Kentucky wheat producers. FHB reduces grain yield, test weight, and seed germination/vigor. Excessive DON reduces marketability and end use of harvested grain.

Experience managing FHB and DON with fungicides in Kentucky (and elsewhere) is clear: **Fungicides do a good job when disease conditions are light. However, when disease pressure is moderate to severe, unacceptable levels of FHB and DON often result, even if the best available fungicide targeting FHB/DON is applied.**

Since 1998, the U.S. Wheat and Barley Scab Initiative (USWBSI) has supported Uniform Fungicide Trials (UFT's) across the U.S., covering all classes of wheat. These studies involve cooperating scientists testing a common set of fungicide treatments on FHB-susceptible wheat varieties, under significant FHB pressure. In 2008, Paul et al. summarized and published* the results of 10 years of UFT's. They concluded that the combination of prothioconazole plus tebuconazole (Prosaro®) was the most efficacious fungicide for suppressing FHB (52% compared to the non-treated check), followed by metconazole (Caramba®; 50%), prothioconazole (Proline®; 48%), tebuconazole (Folicur® and generic products; 40%), and propiconazole (Tilt®; 32%). For DON, Caramba®, Proline®, and Prosaro® provided similar levels of DON suppression (42-45%), followed by Folicur® (23%), and Tilt® (12%).

The above levels of FHB and DON control (what scientists term "suppression") would not translate into acceptable results in, say, a situation where FHB incidence is 60% (i.e., six in 10 heads have FHB symptoms), average severity is 40% (i.e., heads with symptoms have an average 40% of their total surface area diseased), and DON in harvested grain is 8.0 parts per million (ppm) - all of which are reasonable levels when FHB is severe. Said another way, if the aforementioned FHB incidence, severity, and DON levels were reduced by about one-half (maximum expected when a fungicide is applied), one would still experience significant yield and quality reductions, and perhaps have grain rejected at

the point of sale (due to excessive DON), even after applying the best fungicide available. This is simply unacceptable, but this scenario is a common in a big FHB year.

There has been tremendous progress in recent years in developing varieties that resist FHB and DON. However, just like fungicides, relying on resistant varieties to control FHB and DON, to the exclusion of fungicides, often gives poor results in a high disease environment. Due to frequently unacceptable results when fungicides or resistant varieties are used as the sole weapon against FHB and DON, several years ago scientists began to study if FHB/DON suppression could be improved when a fungicide is applied to the best available FHB-resistant varieties. As a result, the USWBSI began to fund Uniform Trials on Integrated FHB Control. The results, thus far, have been very promising and suggest that up to 74% control of FHB and DON is possible when fungicides are applied to the best available FHB-resistant varieties.

The decision to apply a fungicide for FHB/DON suppression is made in the spring, depending on the risk of FHB. FHB risk, in turn, can be monitored, on-line, by going to the Wheat FHB Prediction Center maintained by Penn State University <http://www.wheatscab.psu.edu>. However, the decision to mitigate the risk of serious FHB/DON by planting a resistant variety must be made before fall planting, many months before the resistance is actually needed.

The University of Kentucky Small Grain Variety Testing Program annually publishes disease ratings for all wheat varieties tested. Varieties are rated for the level of disease susceptibility or resistance based on visual observation of prevalent diseases at two non-fungicide test locations. For the past three years, FHB has been prevalent at one or both test locations and disease ratings have been made.

It is important to note that no variety is fully resistant to FHB, but in recent years, some new varieties have shown better resistance than in years past. For a number of years, only a couple of Missouri public varieties (Truman and Bess) consistently showed some level of FHB resistance under field conditions. But these varieties only have average yield

potential and seed has not been readily available for Kentucky growers. This scenario is slightly better for varieties developed by private companies, but there, too, varieties only have moderate levels of FHB resistance. In recent years, breeders have been more focused on releasing varieties with FHB resistance. The utilization of new molecular marker technologies has accelerated the screening process for FHB-resistance genes and increased the potential for releasing varieties with FHB resistance. The 2010 wheat variety test results, for example, had several new varieties from seed companies with FHB-resistance levels comparable to or better than Bess. The 2011 test results indicate that this trend is continuing with more high yielding varieties showing decent FHB-resistance.

Growers can minimize risks by planting several varieties with good yield and test weight potential that complement one another for disease resistance and maturity.

Selecting varieties differing in maturity is important to insure that the varieties are actually different and not the same line licensed under different brand names, as well as to complement planting dates and spread out harvest dates. But maturity is also important when considering disease, and FHB is no exception. In years when FHB is a problem, early flowering varieties may be hit hard, while later flowering types often face less pressure, or vice versa.

As previously mentioned these varieties are not truly FHB-resistant and under heavy disease pressure will still be affected by FHB. But when utilized with the right fungicide at the proper time, FHB damage can be greatly reduced under heavy disease pressure and almost entirely eliminated under low to moderate pressure. Disease reaction, like other varietal characteristics (test weight, height, maturity, & obviously yield potential) is important component of the variety selection decision. Though multiple characteristics need to be considered, variety selection is widely recognized as the simplest and most cost effective way to maximize production profitability.

*Paul, P. A., Lipps, P. E., Hershman, D. E., McMullen, M. P., Draper, M. A., and Madden, L. V. 2008. Efficacy of triazole-based fungicides for Fusarium head blight and deoxynivalenol control in wheat: a multivariate meta-analysis. *Phytopathology* 98:999-1011.

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Kentucky Wheat Yield Contest Winners Announced

The University of Kentucky has announced the winners of the 2011 Kentucky Wheat Yield Contest. The top wheat yield in Kentucky, 112.07 bu/A, was achieved by Double P Farms in Todd County. Double P Farms planted AgriPro Coker Branson seed in 7.5-inch rows in mid October and used conventional tillage practices.

The top no-till yield was 107.53 bushels per acre submitted by Duncan Gillum, also of Todd County. Gillum planted AgriPro Coker Branson in 7.5-inch rows as well.

Full results of the contest entries are below. Additional herbicide, fungicide, and insecticide information can be found at <http://graincrops.blogspot.com/2011/10/2011-wheat-yield-contest-winners.html>.

Congratulations to these farmers! They will be recognized at the Kentucky Commodity Conference on January 20, 2012 in Bowling Green, Kentucky.



Winner	County	Area	Division	Variety	Yield	Planting Date	Row Width	Fall N	Fall P2O5	Fall K2O	Winter N	Spring N	Total N
State Awards													
Double P Farms	Todd	1	Tillage	AgriPro Coker Branson	112.07	10/15	7.5	18	46	60	60	60	138
Duncan Gillum	Todd	1	No-Till	AgriPro Coker Branson	107.53	10/01	7.5	27	68	60	50	50	127
Area Awards													
Floyd Henry	Todd	1	No-Till	AgriPro Coker Branson	106.60	10/12	7.5	18	46		50	60	128
Neil Rudy Farms	Daviess	2	No-Till	AgriPro Coker Branson	105.82	10/15	15	27	69	90	60	40	127
Randy Mann	Simpson	3	Tillage	AgriPro Coker Branson	98.53	10/08	7.5	25	75	75	45	40	110
Homestead Family Farms	Nelson	4	No-Till	Pioneer 25R78	98.79	10/21	7.5	30	67	64	54	66	150