Kentucky Field Crops News

Spanning 5 departments and 120 counties

January 2025, Volume 01, Issue 01

Martin-Gatton College of Agriculture, Food and Environment | Grain and Forage Center of Excellence

UK Wheat Science Group
UK Corn & Soybean Science Group

In this issue:

Soil Temperatures Remain Above Freezing Across Kentucky

Dr. Chad Lee, University of Kentucky

Soils at 2-inch depths are staying above freezing so far around the state. The Kentucky Mesonet records soil temperatures at certain locations. For the sites we checked, all the soils are still above 32 F. For wheat seeded at proper depths, the roots and growing points are insulated well and should not be damaged. The tillers and leaves above the soil surface have largely been protected by the snow cover. Tillers and leaves exposed to temperatures below 32 F may eventually display some freeze burn, but will not be severely damaged unless exposed to temperatures well below 32 F for several hours. The table we have used suggests that tillers need to be exposed to temperatures at or below 12 F for 2 hours or more before severe damage is expected. However, that table has not always predicted wheat response to freezing temperatures in Kentucky. No accurate assessments of wheat response can be made until the wheat experiences five to seven days of 40 F or more.

As snow has melted or will melt in some areas, and the cold snap is back in place for a few days, we will continue to monitor these soil temperatures, air temperatures and

Figure 1. Fulton County (HCKM) Soil Temperatures Jan 8 to Jan 14, 2025
The 2-inch soil depth temperature line is gray.
Accessed at: https://www.kymesonet.org/soil.html?county=HCKM on Jan 14, 2025

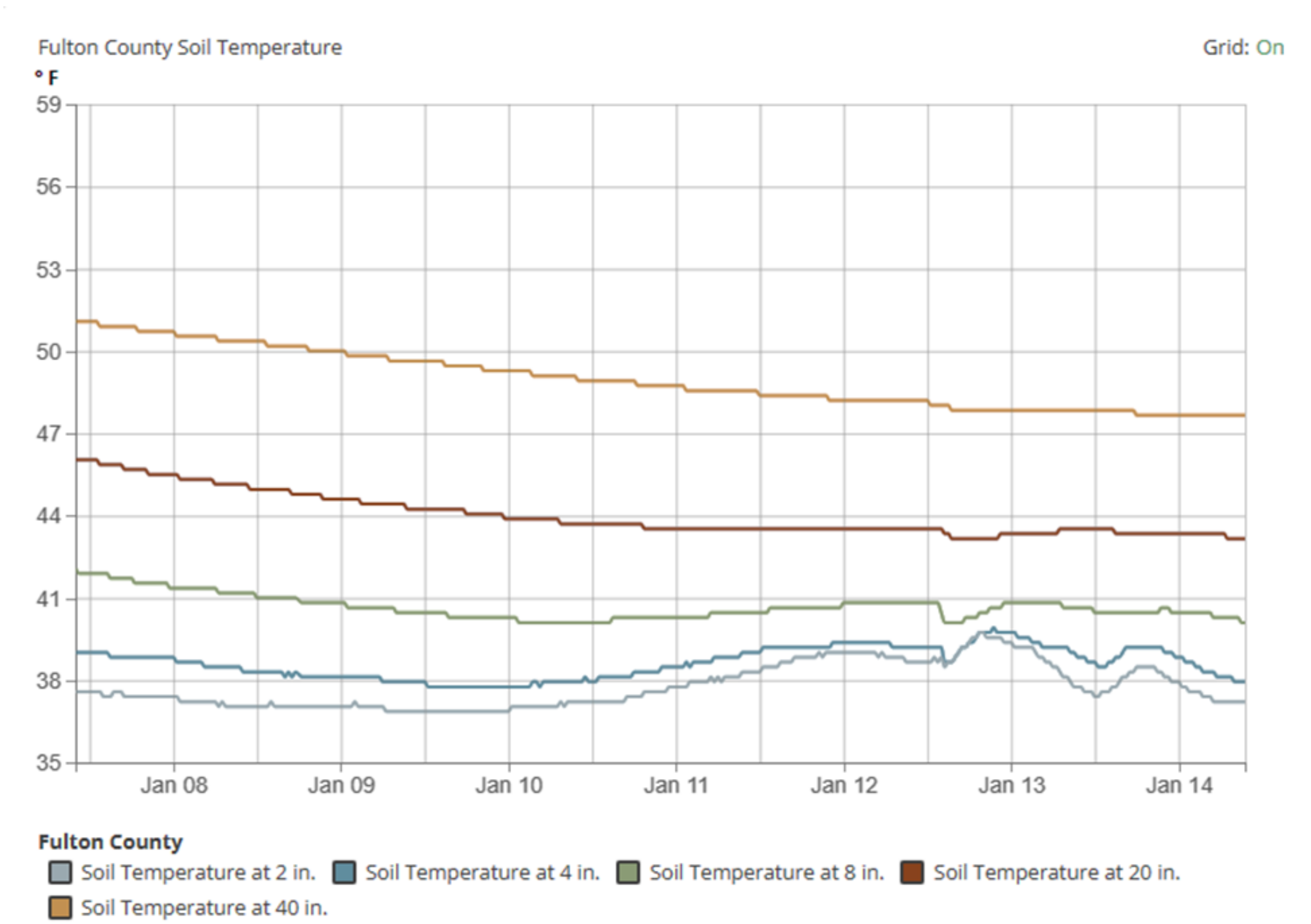


Figure 2. Soil Temperatures across Western Kentucky Jan 8 to Jan 14, 2025

The 2-inch soil depth temperature line is gray, which is usually the lowest line in each graph.

Accessed at: https://www.kymesonet.org/ on Jan 14, 2025

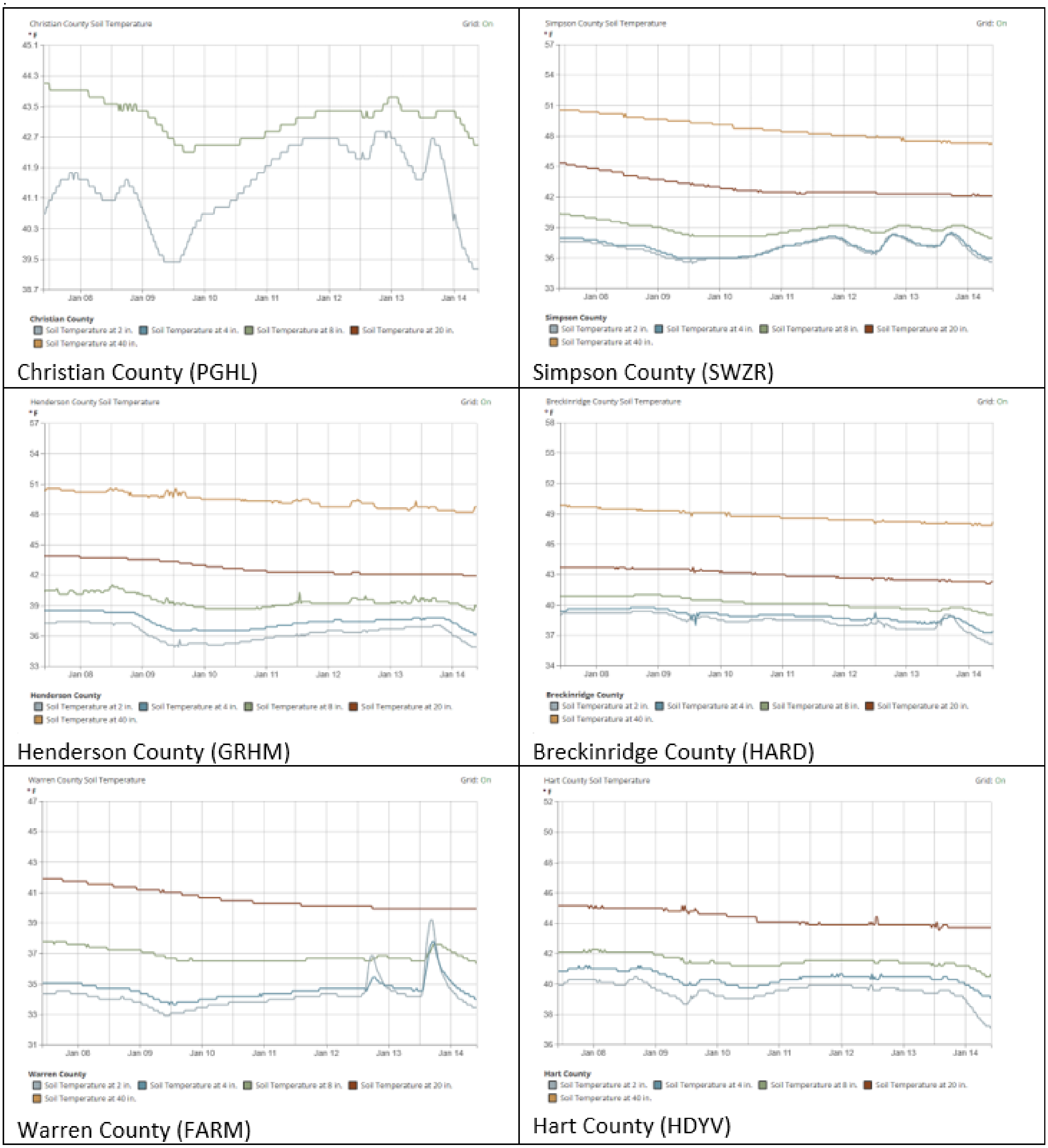
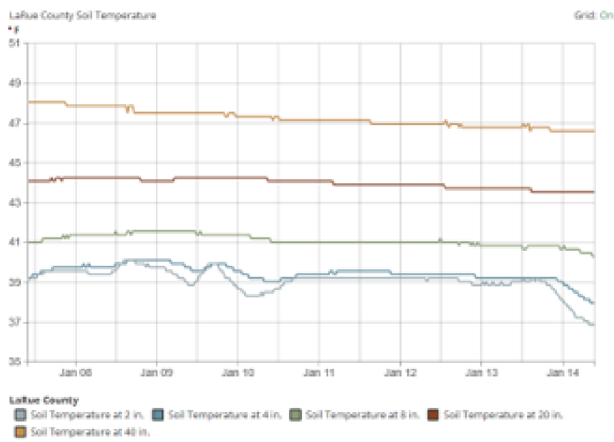
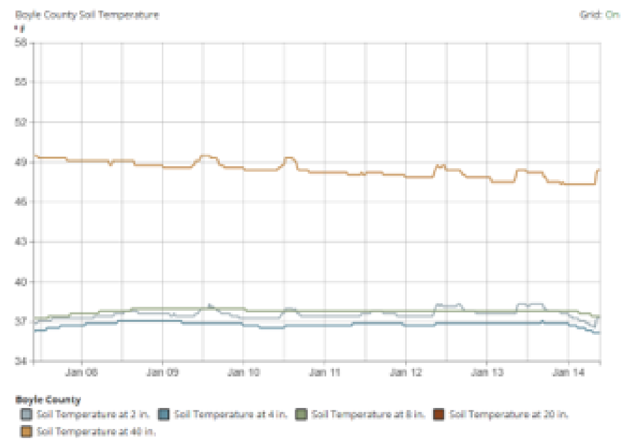
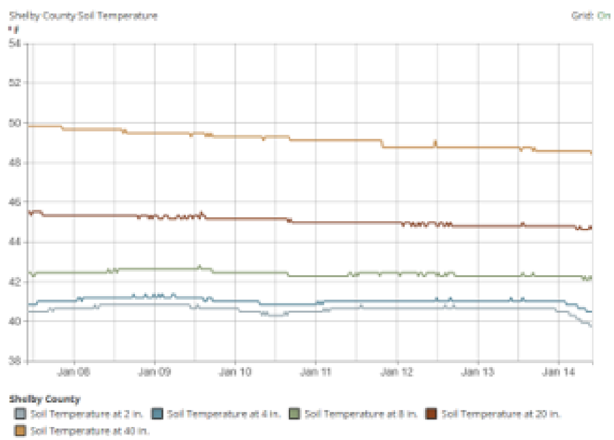
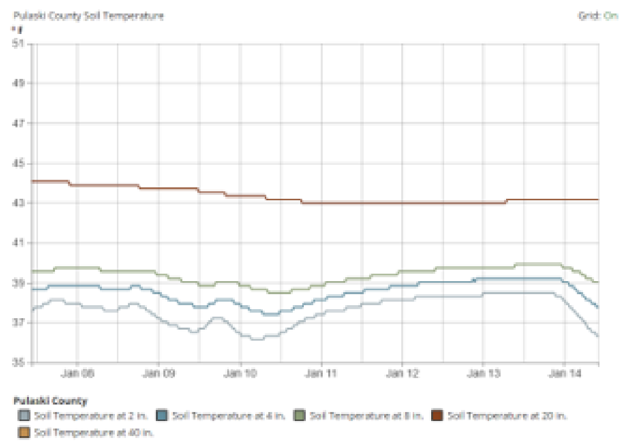
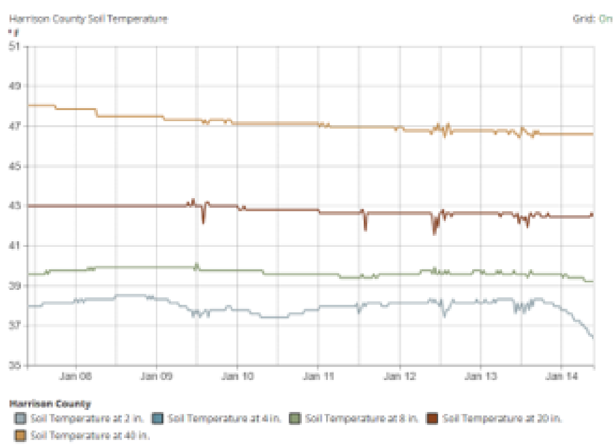
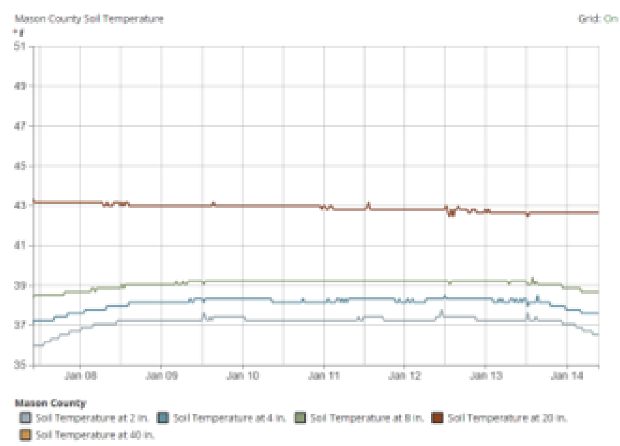


Figure 3. Soil Temperatures across Central and Eastern Kentucky Jan 8 to Jan 14, 2025

The 2-inch soil depth temperature line is gray.

Accessed at: https://www.kymesonet.org/ on Jan 14, 2025

 LaRue County (HDGV)	 Boyle County (DANV)
 Shelby County (WADD)	 Pulaski County (DABN)
 Harrison County (RBSN)	 Mason County (WSHT)

On the Kentucky Mesonet website, hover over “Data” and in the dropdown menu select “Soil”. On the left of the screen is another dropdown menu for “Site”. Select the site you want. Not all sites have soil temperatures. Then select “soil temperature”. You can also select the time interval, such as 1 week, 2 weeks, 1 month, 3 months or 6 months.

Citation: Lee C. 2025. Soil Temperatures Remain Above Freezing Across Kentucky. *Kentucky Field Crops News, Vol 1, Issue 1*. University of Kentucky, January 17, 2025.

Dr. Chad Lee,
Director- Grain & Forage Center of Excellence
UK Grain Crops Specialist
(859) 257-3203
Chad.Lee@uky.edu

2025 WINTER WHEAT MEETING

February 4, 2025
Bruce Convention Center
Hopkinsville, KY 42240
***9am-3pm** central*
Registration 8:30 ct

Educational Credits:
CCA : Integrated Pest Management: 1.5
Crop Management: 2
Pesticide Credits:
3 CEU's for Category 1a
1 CEU for Category 10

What are We Learning From YEN in KY? - Phil Needham

Herbicide Residual Application Timing for Ryegrass Control - Dr. Travis Legleiter

On-farm Grain Fumigation Options - Josh Wilhelm

Dealing with DON: Management of Fusarium Head Blight and DON in Wheat - Dr. Carl Bradley

How Nitrogen and Sulfur Fertility Influences Wheat Grain Yield and Protein Content - Dr. Edwin Ritchey

Current Wheat Crop Update - Dr. Chad Lee

Wheat Varieties Tolerance to Metribuzin and Opportunities to Improve Italian Ryegrass Management - Dr. Samuel Revolinski

Overview of Kentucky Wheat Yield Contest 2015-2024 - Dr. Mohammad Shamim

Martin-Gatton College of Agriculture, Food and Environment, University of Kentucky.

Kentucky Small Grain Growers' Association

Cooperative Extension Service
Agriculture and Natural Resources
Family and Consumer Sciences
4-H Youth Development

MARTIN-GATTON COLLEGE OF AGRICULTURE, FOOD AND ENVIRONMENT

Yield Gaps, Potential Yield and Crop Productivity

Dr. Dennis B. Egli, University of Kentucky

Are there 'yield gaps' on your farm? Finding a yield gap suggests that your yields are less than they could be, so some combination of improved management practices will increase yield and reduce the yield gap. This seems like simple way to evaluate productivity. But, as usual, when dealing with a simple concept, the devil is in the details.

Yield gaps represent the difference between your yield and potential yield which was defined by a couple of Australian crop physiologists back in the 1990's as " the yield of a variety when grown in environments to which it is adapted; with nutrients and water not limiting and with pests, diseases, weeds, lodging and other stresses effectively controlled". Or, to put it another way, it's the yield when nothing – at least none of the factors we control growth - is limiting plant growth.

> The problem is - how do we estimate potential yield? Researchers have proposed a number of methods, but all have their weaknesses. Research plots managed to eliminate all stress, record yields, maximum farmer yields or yields from well-managed University experiments provide estimates of potential yield. Crop simulation models are a favorite tool of many scientists because they are not affected by diseases or other pests and water and nutrients can be 'supplied' in non-limiting amounts. Of course, their estimate is no better than the ability of the model to accurately mimic the growth of the crop.

A yield gap that depends on the technique used to estimate potential yield can send a misleading signal. A large yield gap, implying that there is plenty of opportunity to increase yield, is valid only if the estimate of potential yield is realistic. Responding to large yield gaps created by unrealistically high estimates of potential yield can result in wasting money on un-needed inputs in a futile attempt to close the yield gap.

A number of years ago I worked with an ex-student of mine (Dr. Jerry Hatfield, recently retired as the Director of the USDA-ARS National Laboratory for Agriculture and the Environment in Ames, Iowa) to look at potential soybean yields and yield gaps in Kentucky. We used the highest county yields reported by the National Agricultural Statistics Service over a 40-year period (1972-2011) as an estimate of potential yield (Fig. 1). We applied this analysis to all Kentucky counties that harvested more than 10,000 acres of soybean (32 counties). Fitting a regression curve to the high yields makes it possible to estimate potential yield and the yield gap for each of the 40 years.

These estimates of potential yields represent the collective efforts of the farmers in each county in years with exceptionally favorable weather conditions. These estimates of potential yield are not as high as the classic definition because all farmers may not correctly apply the best available technology (best variety, adequately control weeds and diseases).

Potential yield (dotted line in Fig. 1) increased from 1972 through 2011 in every county following the trend of county yields. This increase simply reflects the constant adoption of the latest high-yielding varieties and new improved management practices by the producers in each county.

The average relative yield gap [(potential yield – average county yield)/(potential yield) * 100] decreased as the average county yield increased (Fig. 2). The larger year-to-year variation in yield and yield gaps in the low-yield counties (Fig. 1) resulted in larger average relative yield gaps. Interestingly, there was a trend for counties with a high proportion of the soybean acres double cropped after wheat to have larger relative yield gaps than counties with little double cropping but the same yield (Fig. 2). Apparently, stresses associated with late planting in the double-crop system contributed to a larger relative yield gap.

The favorable weather conditions associated with the potential yield estimate did not increase the potential yield of the low-yield counties (e.g., McCrackin, Fig. 1) to equal the high-yielding counties (e.g., Henderson, Fig. 1). One might think that in years with the most favorable weather (probably above-average rainfall during the growing season) the yield of low-yield counties might equal high-yield counties; this did not happen, (see Fig. 1) potential yield in the low-yield counties was always less than the high-yield counties.

The year-to-year variation in the yield gap (potential yield -county yield, Fig. 1) was probably related to year-to-year variation in rainfall with the largest yield gaps occurring in dry years. The larger yield gaps in the lower-yielding counties no doubt reflects the lower soil moisture storage capacity of the soils in those counties.

Yield gaps might increase over time if climate change significantly increases stress levels, but there was little evidence of this, at least not through 2011, with only 4 of 32 counties showing a significant increase in relative yield gap over time.

The bottom line is that potential yield varied among counties and it’s reasonable to speculate that it also varied among soils within a county. The lower-yielding counties could not match the yield of the higher-yielding counties in the near-ideal weather conditions that occurred only 4 or 5 times in the 40-year period. It seems that even an all-out maximum effort to produce high yield (including irrigation) would not raise the yield of the lower-yielding counties to the levels in the highest-yielding counties.

Everyone wants to manage for high yield, but these results suggest that ‘high’ depends upon where you are. Location is important! Chasing high yields in a low yield county is not the best way to maximize your bottom line. Perhaps we should take the advice of a South Dakota farmer – “Farm the best and leave the rest” (Quoted in ‘Prairies Vanish in the US Push for Green Energy’ by Chet Brokaw and Jack Gillum, PHYS.ORG, 2013).

Adapted from: Egli, D.B. and J.L. Hatfield. 2014. Yield gaps and yield relationships in central US soybean production systems. Agron. J. 106: 560-566.

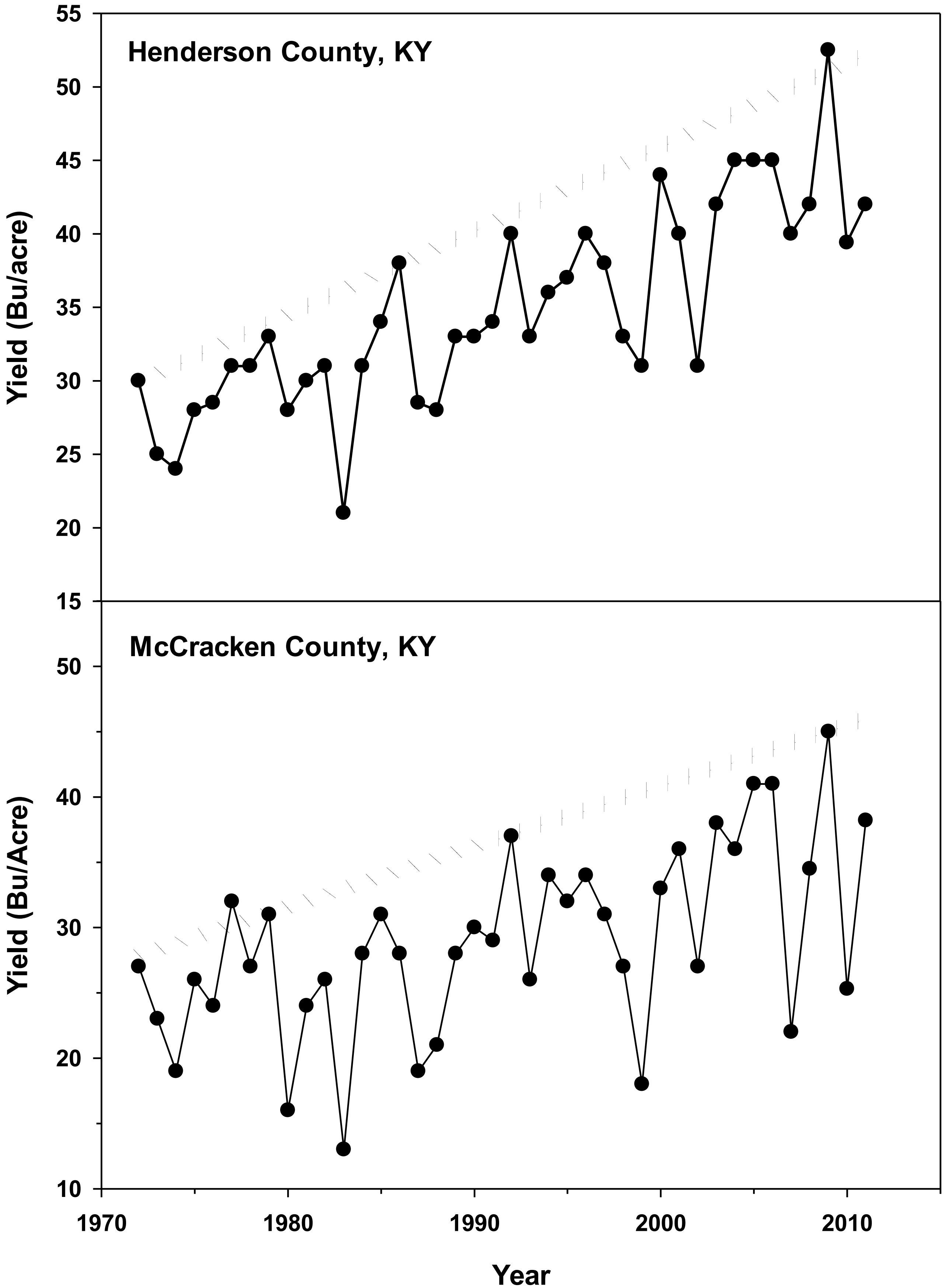


Fig. 1. County and estimated potential yields for Henderson and McCracken Counties. The average yield (1972 – 2011) of Henderson County ranked fourth and McCracken County ranked 29th among the 32 counties. The dotted line represents the potential yield.

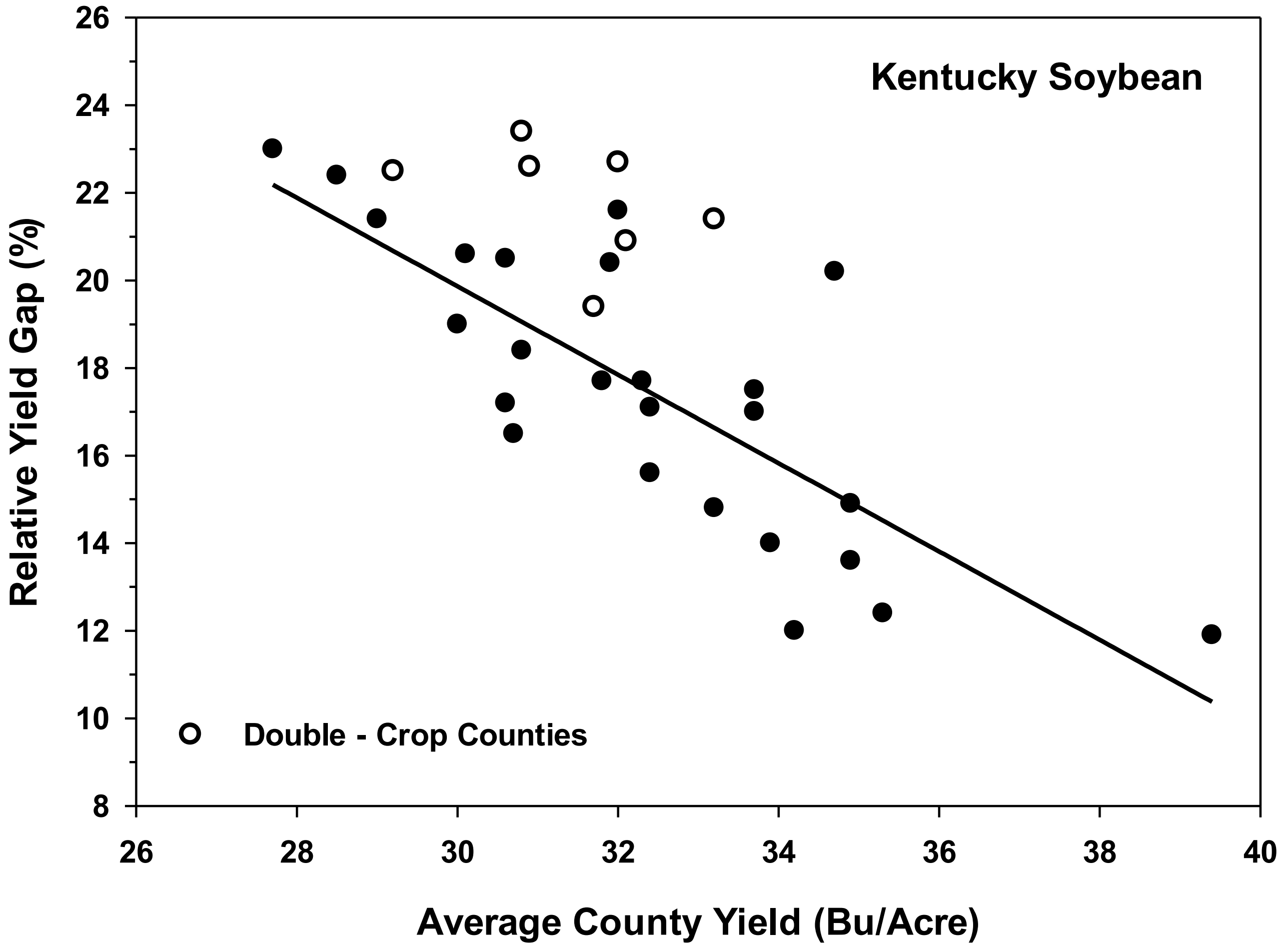


Fig. 2. Relationship between relative yield gap (expressed as a percentage of the potential yield) and the average county yield (1972 – 2011). The regression analysis (Y = 50,155 – 1.01X, r^2 = 0.62***, N = 27) does not include the double-crop counties (counties with more than 50% of the soybean grown after winter wheat).

Citation: Egli, D. 2025. Yield Gaps, Potential Yield and Crop Productivity. *Kentucky Field Crops News, Vol 1, Issue 1*. University of Kentucky, January 17, 2025.

Dr. Dennis Egli

UK Professor Emeritus

(859) 218-0753

degli@uly.edu

Kentucky Agriculture Training School 2025 Schedule

March 20: Drone Sprayer Training

This class is designed for agricultural professionals and producers to learn about dispensing fungicides with drone sprayers, nozzle selection and droplet sizes, and information for certified commercial/non-commercial and private applicators.

April 10: Soil Properties Workshop (Richmond, KY)

We will examine soil pits with distinctly different profile properties to discuss how they will influence water and nutrient retention and delivery.

May 15: Crop Scouting Workshop

Training is comprised of individual scouting sessions in the areas of disease, growth staging, weed identification, and soil nutrition. This is a beneficial workshop for new and experienced producers, agriculture interns as well as a great refresher for others.

June (TBD): Planter Clinic

Review and identify consequences on plant performance that resulted from improper planter settings.

July 24: KY High School Crop Scouting Competition

Teams of 4-6 students will compete in hands-on, interactive field scouting exercises related to corn, soybean and tobacco rotating through various stations.

August 28: Field Crop Pest Management and Spray Clinic

A hands-on workshop that will cover spray technology, fungicide application, herbicide symptomology, and more.

For information and registration for KATS Workshops visit kats.ca.uky.edu or contact Lori Rogers lori.rogers@uky.edu 270-365-7541 ext 21317.

Biochar

Dr. John Grove, University of Kentucky & Dr. Eugenia Pena-Yewtukhiw, West Virginia University.

We're getting more questions about biochar (any char made from non-fossil biomass. Can biochar application: a) result in greater carbon (C) sequestration; b) improve soil resilience; c) raise crop yield? Biochar research has been going on for a decade. This is not our first rodeo about biochar as a soil amendment. There were many reports regarding "terra preta", black soil areas in the Amazon region containing large amounts of char, between 1995 and 2000 (Sombroek, 2003). Biochar is formed by heating/burning organic materials under low oxygen conditions. This is a form of stabilization, chemically similar to composting – easily decomposable/oxidized component compounds are lost or transformed into more stable, recalcitrant constituents.

The general characteristics of biochar vary with feedstock choice (grass, wood, poultry litter, horse muck) and pyrolysis conditions (especially temperature). Feedstock composition can determine differences in biochar surface area/porosity and salt and ash levels (Nagel et al., 2019). Generally, animal waste chars have greater ash/salt concentrations. Higher pyrolysis temperatures can result in char with greater aromatic C content; with greater resistance to mineralization (carbon dioxide release; Zimmerman et al., 2011)) and greater hydrophobicity after soil application (Oginni, 2018). Typically, biochar has a low density (can float away in moving water).

Reported biochar application rates range quite widely, between 0.5 and 20 tons/acre. Impacts on soil properties are expected and variable in nature. Ash, if present (is sometimes removed) can increase salt load, raise soil pH, and increase soil nutrient levels (primarily calcium, potassium, magnesium). In sandy soils, biochar sometimes increases water retention and in some cases it improves aggregate stability in silty and clayey soils (Nobert et al. 2016).

Compiling crop response studies, Spokas et al. (2012) found that 20, 30 and 50 percent of the studies reported negative, neutral and positive yield responses to biochar, respectively. One common generalization was that positive responses were more likely on poor, degraded soils and neutral/negative responses were more probable on average/good agricultural soils. In Kentucky, the crop response data are limited, but do support the common belief. Table 1 is taken from work done by the USDA-ARS research group at Western Kentucky University (Sistani et al., 2019).

Table 1. Three years of no-till corn grain yield from a biochar study near Bowling Green, Kentucky.

	2010			2011			2013		
	no char	with char	fertility ave.	no char	with char	fertility ave.	no char	with char	fertility ave.
	——bu/acre——								
control	103a*	90ab	96	115a	106a	110	143bc	128c	135
fertilizer	86ab	75b	80	96a	86a	91	201a	187ab	194
litter	80b	75b	78	112a	100a	106	210a	209a	209
char ave.	90	80		108	97		185	175	

*Within any one production year, yield values followed by the same letter are not significantly different at the 95% level of confidence.

Sistani et al. (2019) grew no-till corn for grain was grown on a Crider silt loam. The mixed hardwood biochar was applied once, in the spring of 2010, at a rate of 9.5 ton/acre. The poultry litter was applied annually to provide 200 lb N/acre. The fertilizer treatment consisted of annual applications of 200 lb N/acre plus additional phosphate and potash according to soil test based fertilizer recommendations (Sistani et al., 2019). The 2010 and 2011 production seasons were dry and there was little response to any of the individual treatments (Table 1). The 2013 year was much better and there was a large response to both fertilizer and poultry litter addition. Biochar addition resulted in a consistent 10 to 11 bu/acre yield reduction, regardless of the seasonal weather. Biochar did not appear to have increased soil or crop resilience on this productive soil (Table 1).

In West Virginia, poultry litter biochar was added at a rate of 14 ton/acre to two reclaimed mine land sites and two marginal agricultural farm sites (Nobert et al. 2016). Six cultivars of a biofuel feedstock species, willow, were grown. Plant growth (height) and dry matter accumulation were measured. Young plant growth in the first year was strongly positively influenced by biochar application, averaging 9.4 inches greater height regardless of the site type. Corresponding dry matter accumulation was 72% greater. Such a large beneficial response on more marginal soils is also in accord with the current general understanding.

These examples illustrate the range in plant response that might be observed with biochar amendment and should serve to caution those who expect positive benefits under all soil conditions. The range in biochar properties, combined with the range in chosen application rates, will also probably cause a range in the numerical value of any soil biological, chemical and physical property response. This will make the prediction of soil health benefit magnitude from biochar addition difficult.

References

Oginni, O.J. 2018. Characteristics of Activated Carbons Produced from Herbaceous Biomass Feedstock. Ph.D. Dissertation. West Virginia University.

Nagel, K., N.O. Hoilett, M.A. Mottaleb, M.J. Meziani, J. Wistrom and M. Bellamy. 2019. Physicochemical characteristics of biochars derived from corn, hardwood, miscanthus, and horse manure biomasses. Commun. Soil Sci. Plant Anal. https://doi.org/10.1080/00103624.2019.1594881

Nobert, H.A., D.W. McGill, S.T. Grushecky, J.G. Skousen and J.L Schuler. 2016. Salix spp. as a biomass crop: Investigating its potential on mined lands and the use of biochar as a soil amendment. JASMR. 5:58-76. DOI: 10.21000/JASMR16020058

Sistani, K.R., J.R. Simmons, M. Jn-Baptiste and J.M. Novak. 2019. Poultry litter, biochar, and fertilizer effect on corn yield, nutrient uptake, N_2O and CO_2 emissions. Environments 6 (55) doi:10.3390/environments6050055

Sombroek, W. 2003. Foreword. In: Amazonian Dark Earths: Origin, Properties, Management. Lehman, J., D.C. Kern, B. Glaser and W.I. Woods (eds.). Kluwer Academic. New York.

Spokas, K.A., K.B. Cantrell, J.M. Novak, D.W. Archer, J.A. Ippolito, H.P. Collins, A.A. Boateng, I.M.

Lima, M.C. Lamb, A.J. McAloon, R.D. Lentz and K.A. Nichols. 2012. Biochar: A synthesis of its agronomic impact beyond carbon sequestration. J. Environ. Qual. 41:973-989.

Zimmerman, A.R., B. Gao and M. Ahn. 2011. Positive and negative carbon mineralization priming effects among a variety of biochar-amended soils. Soil Biol. Biochem. 43:1169.

Citation: Grove, J., 2025. Pena-Yewtukhiw, E., 2025. Biochar. *Kentucky Field Crops News, Vol 1, Issue 1*. University of Kentucky, January 17, 2025.

Dr. John Grove

UK Plant and Soil Sciences

Soils Research & Extension

(859) 568-1301

jgrove@uky.edu

Eugenia Pena-Yewtukhiw

Director, Soil Testing Laboratory

Assoc. Professor, Soil Physics and Management,

West Virginia University.

Abundance of the Silver-Spotted Skipper in Soybeans in Kentucky in 2024

Dr. Felipe Batista and Raul Villanueva, University of Kentucky, Princeton

Background and Description of Silver-spotted skipper

The silver-spotted skipper, *Epargyreus clarus* (Lepidoptera: Hesperiidae), is a widely distributed species throughout the United States. This species sometimes reaches high population levels in Louisiana or other states around the Gulf of Mexico that require the application of insecticides. In Kentucky, silver-spotted skipper caterpillars can be observed in soybean fields. We observed higher populations and leaf injuries of this species in soybean fields in central Kentucky during the season of 2024 than in previous years.

Early instar Silver-spotted skipper caterpillars cut and fold sections of leaves around their bodies, forming a shelter to protect them from predators (Figure 1), and later instar caterpillars build their shelters by silking several leaves together. Thus, the easier way to detect them in the field is looking for leaves with borders cut and folded (Figure 1) and for groups of leaves silked together.

Figure 1. Injuries caused by silver-spotted skipper caterpillars. Edges of leaves are folded to build a sheltered space (Photo: Raul Villanueva, UK).

The caterpillar has a reddish-brown head with two eyelike yellow or orange spots. The head is wider than the prothorax; this latter characteristic makes it look like it has a “neck” (Figure 2).

Figure 2. Early instar of Silver-spotted skipper caterpillar sheltering on soybean leaf. Detail of constriction like “neck” on pronotum and orange eyes (Photo: Felipe Colares, UK).

The body is light green with darker transverse stripes with reddish legs and yellowish-orange abdominal “prolegs,” and late instar larvae can reach up to 2 inches in length (Figure 3).

Figure 3. Ventral view of late instar of Silver-spotted skipper caterpillar. Detail of reddish legs and yellowish-orange abdominal pro-legs (Photo: Felipe Colares, UK).

Adult silver-spotted skippers are relatively larger compared with other skipper species, with a wing-span ranging from 1.75 to 2.5 inches. The wings are brownish with a row of orange spots that are visible from both the under and the upper sides of the forewing (Figure 4a). The hind wing has a distinct silver-whitish spot on the underside, which is visible in a resting position and gives it the common name of silver-spotted skipper (Figure 4b).

Figure 4. Adults of Silver-spotted skipper (Photo: David Cappaert, Bugwood.org).

Management

The larvae of the silver-spotted skipper feed on several plant species of the family Fabaceae, including soybeans; however, there are no records of significant losses caused by this species in soybean fields in Kentucky. Despite the shelter, biological control by parasitoids, predators, and entomopathogens such as baculovirus are known to have an impact on the caterpillars; thus, it is unlikely that an intervention would be necessary to avoid losses by the silver-spotted skipper in soybean crops in central Kentucky.

Optional Citation: Batista , F.. Villanueva R. 2025. Abundance of the Silver-Spotted Skipper in Soybeans in Kentucky in 2024. *Kentucky Field Crops News, Vol 1, Issue 1*. University of Kentucky, January 17, 2025.

Dr. Felipe C. Batista
UK Entomology Postdoctoral Scholar

Dr. Raul Villanueva
UK Extension Entomologist
(859) 562-1335
raul.villanueva@uky.edu

KCHC
Kentucky Crop Health Conference

9 a.m. to 3 p.m. CST, Feb. 6, 2025 - National Corvette Museum - Bowling Green, Ky.

Wade Webster
North Dakota State University

Topic: Fueling the Future: Driving Predictive Models for Tar Spot

Alyssa Essman
Ohio State University

Topic: Planting green and the influence of cover crop termination timing on weed management

Justin McMechan
University of Nebraska–Lincoln

Topic: Unraveling emerging insect issues in agriculture: Impacts, challenges, and management tactics

Kiersten Wise
University of Kentucky

Topic: Stay one step ahead: Tracking corn diseases in Kentucky

Raul Villanueva
University of Kentucky

Topic: Management of slugs and snails through field efficacy tests in soybeans

Carl Bradley
University of Kentucky

Topic: Research update on Red Crown Rot of Soybean

Travis Legleiter
University of Kentucky

Topic: The fight against Italian Ryegrass in Kentucky:
A persistent challenge

Ticket sales close Jan. 30, 2025 - breakfast and lunch included
Conference sign-in begins at 8 a.m. CST

Scan QR Code or visit: https://kchc2025.eventbrite.com
Tickets non-refundable after January 30, 2025

Credits: CCA: 4.5 CEUs in IPM;
KY Pesticide Applicator: 3 CEUs for Category 1A & 1 CEU for Category 10

Italian Ryegrass Control Field Tour

Thursday, March 27, 2025

9 a.m. to 11:30 a.m. CDT

Please meet at the Caldwell County Extension Office

1025 U.S. Highway 62 West, Princeton, KY

Sign-in begins at 8:30 a.m. CDT

A caravan will proceed to the UKREC in Princeton for plot tours of Italian ryegrass research.

Click link or scan QR Code to register

https://uky.az1.qualtrics.com/jfe/form/SV_2c6KX2NmiqEp1TE

Presented by Dr. Travis Legleiter, UK Extension Associate Professor - Weed Science, this field tour will highlight the options available to Kentucky farmers for maximum control of this problematic weed in the fall and spring prior to corn and soybean planting. For more information about the field tour call (859) 562-2569.

Educational credits available:

CCA: 3 CEUs in IPM;

KY Applicator Credits: 3 CEUs for Category 1A (Ag Plant)

UPCOMING EVENTS

Winter Wheat Meeting
February 4, 2025

2025 Kentucky Crop Health Conference
February 6, 2025

Drone Sprayer Training
March 20, 2025

Italian Ryegrass Control Field Tour
March 27, 2025

Soil Properties Workshop (Richmond, KY)
April 10, 2025

Wheat Field Day
May 13, 2025

Crop Scouting Workshop
May 15, 2025

Planter Clinic
June (TBD):

Pest Management Field Day
June 26, 2025

Corn, Soybean & Tobacco Field Day
July 22 or July 29, 2025

KY High School Crop Scouting Competition
July 24, 2025

Field Crop Pest Management and Spray Clinic
August 28, 2025

TO SIGN UP AND RECEIVE OUR LATEST NEWSLETTER(S) CLICK THE LINK: NEWSLETTER