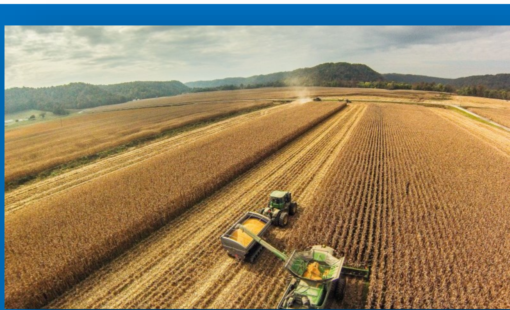

Photo credit: CAFE, UK Agricultural Communications Services

Corn & Soybean News

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2021 Corn Extended Growing Season in Kentucky

Note: the original article has errors regarding solar radiation for the past five years. That mistake was mine and not the source of the data. This revised article includes those corrections. The main point of 2021 being lower in solar radiation during key crop development stages is still correct.

Corn planting for 2021 was ahead of schedule, yet harvest and several other developmental stages were behind. Milk, dough and dent were all behind the 5-year average. (Thanks to USDA NASS for letting us use their graph. See Figure 1). Even with the slow emergence for some of the planted corn, these crop progress estimates suggest that the corn growing season was extended. An extension during seed fill often means higher yields and the projected yields for Kentucky are record level. That extension of the seed fill also pushed a lot of corn into a fall that has been cool, cloudy and wet.

Once corn reaches physiological maturity (black layer) the drydown of the grain is simple physics and depends on air temperature, relative humidity (RH), windspeed and sunlight. Higher temperatures, lower RH's, higher windspeeds and more sunlight all contribute to faster drydown of the grain. This fall was just the opposite of those. The cool, humid, calm and cloudy conditions made for a very prolonged drydown (Figure 2). Correction: Solar radiation was lower in June, July and August for 2021 than any of the four previous years (Figure 3). Solar radiation for September and October 2021 were about average.

Added to that delay in field drydown is larger kernel size. That extended seed fill period created some very deep kernels in some fields. Those deep kernels take longer to drydown (Figure 4).

Any farmer disappointed at how slow the corn dried down in the field SHOULD NOT BLAME THE HYBRID this year! The slow drydown of corn is a function of the timing of corn maturity and weather. That timing allowed for excellent yields and for very slow drydown.

Perhaps farmers should look to improving grain drying systems and grain storage systems. For the past five years, simply relying on timely field drydown of corn has not worked very well.

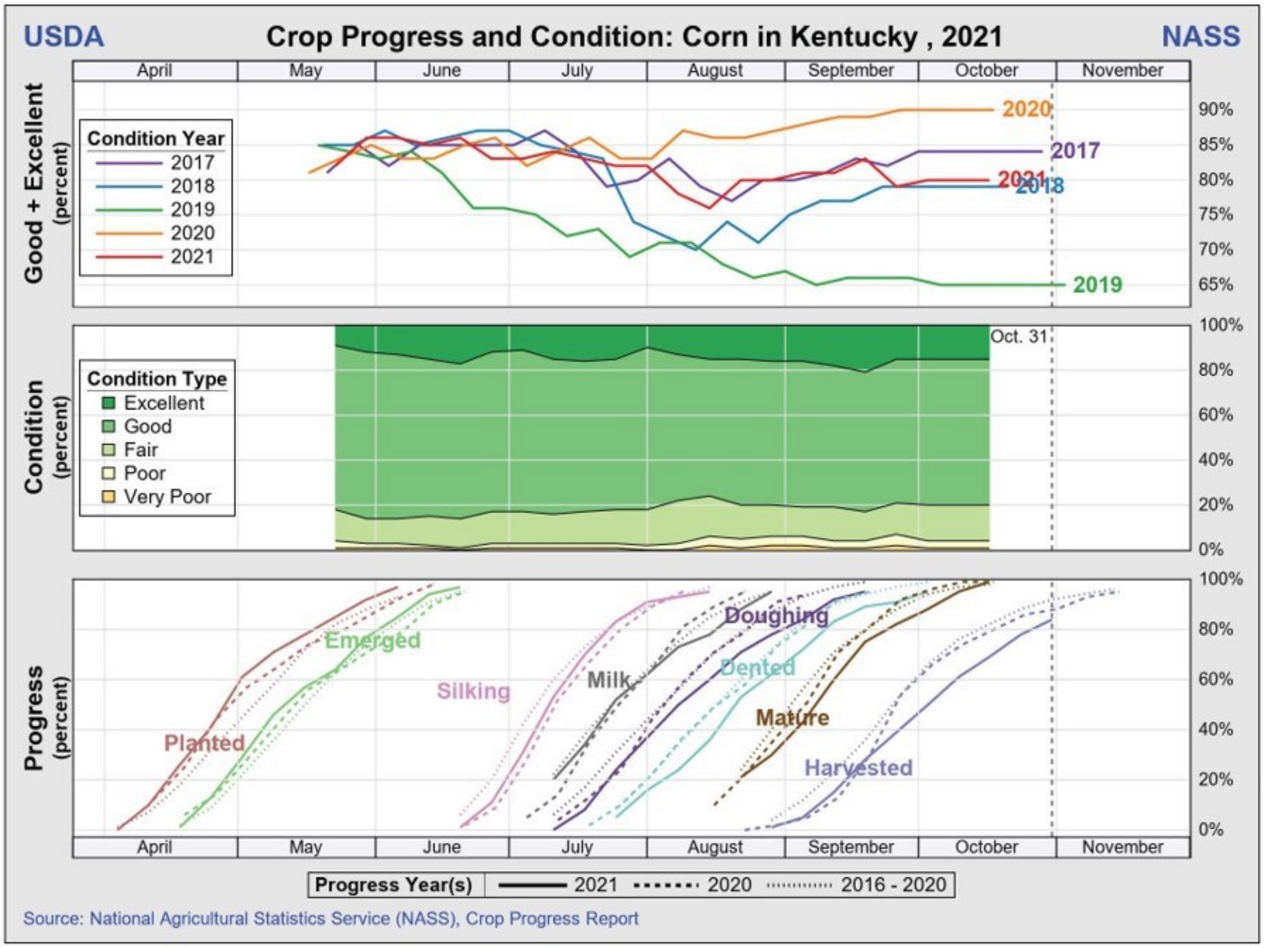


Figure 1. Corn crop progress for Kentucky in 2021. USDA-NASS allowed us to use their graph.

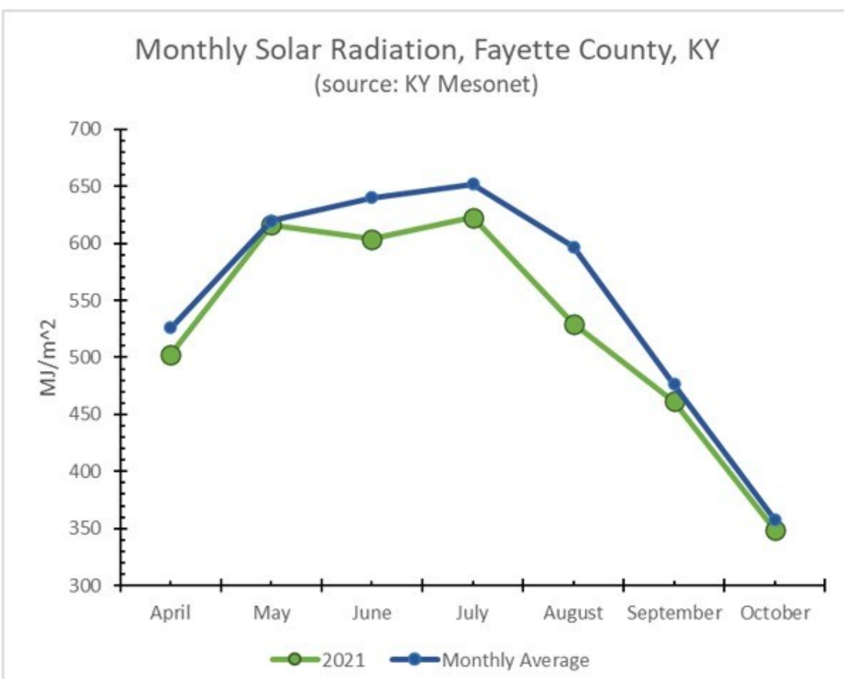


Figure 2. Corrected Nov. 22, 2011. Solar radiation for Fayette County, KY for 2021 (green) and the 11-year average (blue).

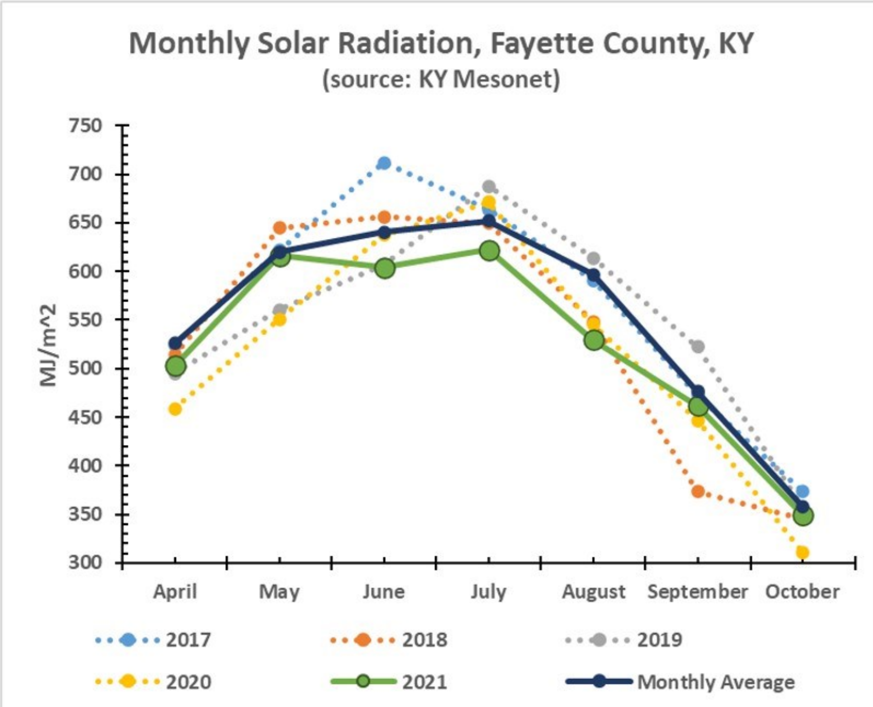
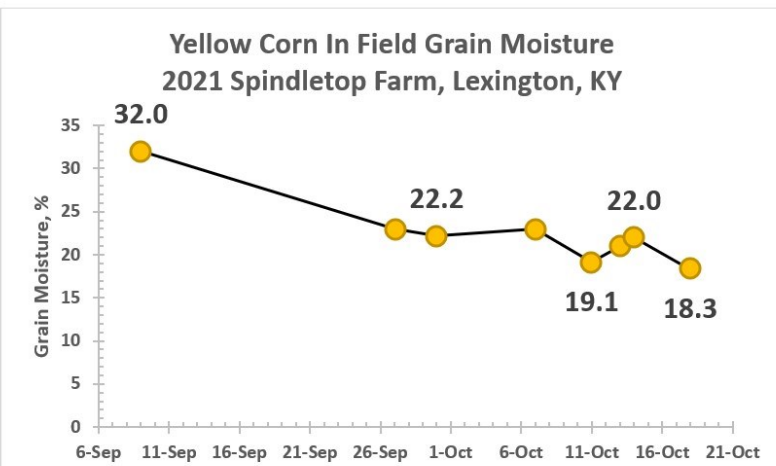


Figure 3. Corrected Nov. 22, 2011. Solar radiation for each of the past 5 years compared to the 11-year average for Fayette County, KY. Average (dark blue), 2021 (green), 2020 (gold), 2019 (gray), 2018 (orange), 2017 (light blue).



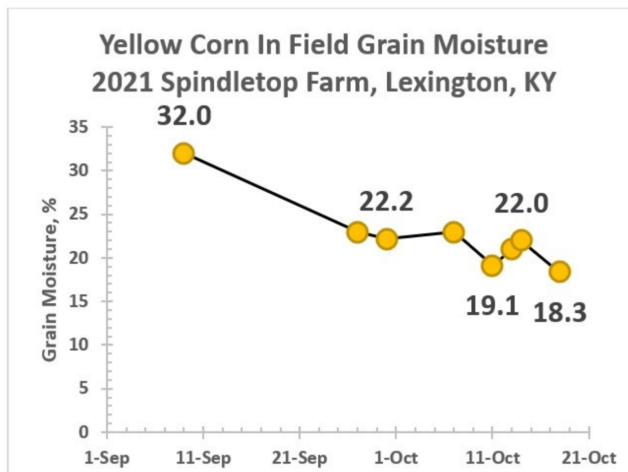
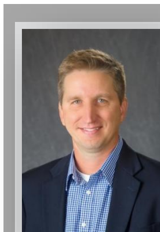


Figure 4. In field drydown of yellow corn at Spindletop Farm, Lexington, KY 2021.



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How do cover crops affect corn yield and optimum N fertilizer rates in rolling cropland?

The rolling landscapes of Kentucky lead to a complex flow of water over and in the soil, contributing to spatial variability in soil resources and crop yield. Plant-available N is very mobile in the soil and subject to leaching if in nitrate form. Cover crops can take up excess soil nitrate, storing it in their tissue and then releasing slowly as they decompose. Using cover crops could be an efficient management practice to reduce N losses in landscape positions more subjected to intensive leaching. The soil water tends to move from the top and side of the hill to the bottom of the hill so that retaining N in loss-prone positions, cover crops may reduce spatial variability in the optimum N fertilizer rate for a cash crop.

We conducted an on-farm study over two years to examine the interactive effects of cover crop practices and landscape topography on yield and the profit-maximizing N rate for corn. Two separate field trials were established in Hardin County KY during the 2019 and 2020 corn growing seasons. The fields had been in a long-term no-till corn, soybean, and wheat rotation. The dominant soil type in the study fields is Crider silt loam. Between March 1 and August 31, the fields received 28 and 27 inches of rain in 2019 and 2020, respectively. These rainfall totals were slightly above the 30-year average for this portion of the year (26 inches).

In mid-October of 2018 and 2019, we established three cover crop treatments: a cereal rye (Rye), a cereal rye/crimson clover mixture (Mix), and a winter fallow (Bare) as randomized strips throughout the field. Note that the winter fallow was not treated with herbicides in the fall, so winter weeds were present and produced biomass. We laid our plots in three contrasting landscape positions that included a hilltop (summit), hillside (backslope), and hill bottom (toeslope). The average topographic and soil properties of each landscape position are presented in Table 1. Following cover crop termination in mid -April, four N rates were established, which ranged from 0-240 lb N/acre. Nitrogen was applied as a split application of 32% UAN, with 37 lb N/acre applied at planting as a 2X2 (i.e., 2 inches to the side of the seed, and 2 inches below the seed), and the remainder surface applied at the V5 stage. The corn population were 31,000 plants/acre yield and the yield was determined by harvesting 92.5 ft^2 using a 2-row plot combine and yield was expressed at a 15.5% moisture basis.

Table 1. Topographic and soil properties of three landscape positions used in the on-farm cover crop research study. Soil texture and soil organic C percentages were analyzed for the surface 8 inches of soil.

Year	Position	Slope (degrees)	Elevation (ft above sea level)	Approximate soil Depth (ft)	Silt %	Clay %	Sand %	Soil organic C %
2019	Summit	2.68	2,192	2	68	16	16	1.09
	Backslope	5.13	2,169	1	64	16	20	1.11
	Toeslope	2.68	2,152	>3	72	12	16	1.25
2020	Summit	1.94	2,211	2	68	20	12	1.17
	Backslope	4.04	2,192	1	69	17	14	1.19
	Toeslope	1.65	2,178	>3	78	11	11	1.16

Averaged over both years and treatments, the cover crops produced approximately 1600 lb/acre of dry matter, which was (in most cases) nearly twice as much biomass as the winter weeds growing in the Bare treatment (Table 2). The Mix and Rye treatments produced similar amounts of biomass and had a similar concentration of N in its biomass. Across cover crop treatments, the toeslope position produced 40% greater cover crop biomass than the summit and backslope positions, averaged across winter cover treatments (Table 2).

Table 2. Biomass production of winter weeds and cover crops averaged across 2018-2019 and 2019-2020 seasons. Standard deviations are shown in parentheses. The average ratio of C concentration to N concentration in the biomass of the Mix and Rye treatments were 26:1 and 27:1, respectively.

	Dry matter production (lb/acre)		
Position	**Bare (winter weeds)**	**Rye/Crimson Clover Mix**	**Rye Cover Crop**
Summit	952 (±301)	1559 (±553)	1785 (±503)
Backslope	630 (±461)	1302 (±627)	968 (±386)
Toeslope	1105 (±367)	2050 (±1014)	1838 (±789)

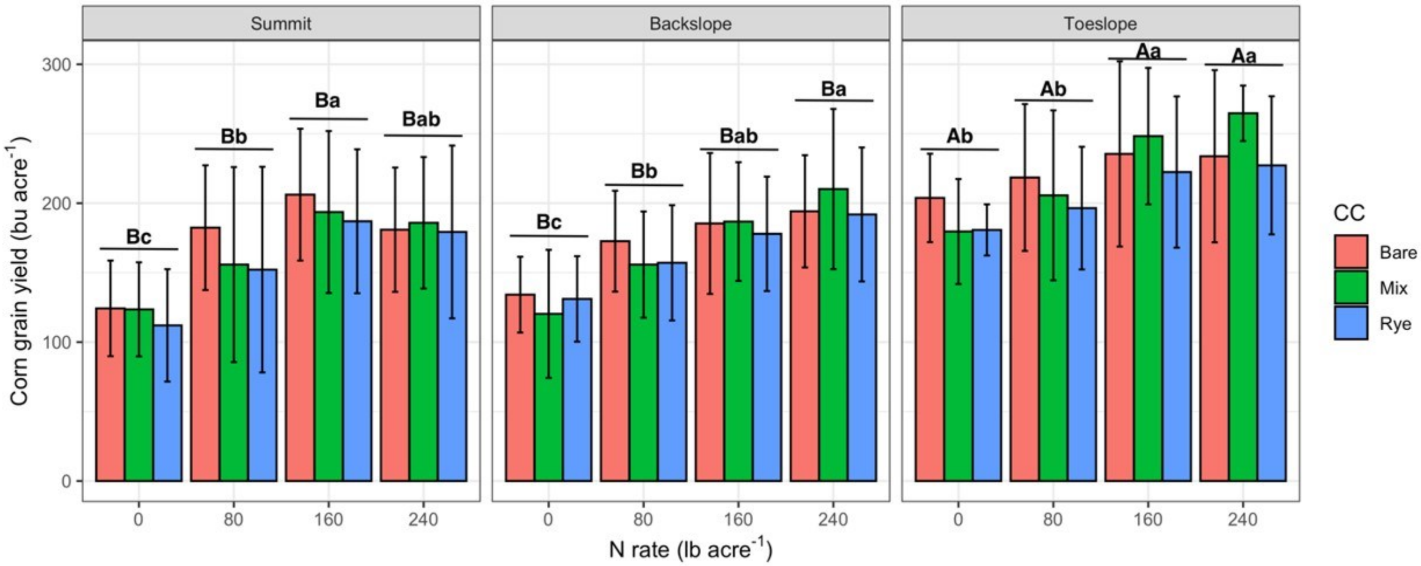

Figure 1. Corn grain yield as affected by N rates (0, 80, 160, 240 lb N/acre) and three soil covers (Bare representing the winter fallow, Mix representing the mixture of Clover and Rye, and Rye representing the Rye monoculture) across three landscape position (summit, backslope and toeslope). The yield data were averaged across 2019 and 2020. The capital letters represent the landscape effect within each N rate and averaging soil cover while lowercase letters represent the N effects within landscape position averaging different soil covers. There was no effect of the cover within N rates and landscape positions on the grain yield. Error bars represent the standard errors.

Figure 1 shows the corn yield response to the landscape position across different N rates (0, 80, 160 and 240 lb N/acre) under three soil cover treatments (Bare, Mix and Rye). We observed that the toeslope had higher yields than the summit and backslope positions across all N rates and soil cover treatments (differences represented by the capital letters). At 0 lb N/acre the toeslope had 51% higher yield than the other landscape positions, regardless of the soil cover. For the other N rates, the increases in grain yield on the toeslope relative to other positions ranged from 24 to 27%. We did not observe any significant cover crop effect on grain yield when comparing the three different cover crops under same N rate at the same landscape position. We calculated the difference in corn yield between the highest N treatment and the zero N treatment in each landscape position and cover crop treatment. This was similar in most cases – 60 bu/acre – suggesting that corn responded equally to N addition across cover crops and landscape.

We determined the economic optimum N rate (EONR) for each treatment assuming three different price scenarios: 0.10, 0.15 and 0.20 price ratio of N fertilizer price to corn grain price (that is, the price of N fertilizer is 0.51, 0.77 and 1.02 \$/lb and the corn price is 5.10 \$/bu). Increasing fertilizer prices led to a lower EONR when the price of corn was held constant. The EONR increased in the order of summit < toeslope < backslope, but more site-years are needed to determine the consistency of this spatial pattern. The Mix and Rye treatments tended to increase the EONR in all positions relative to the Bare treatment. The highest net income considering the grain yield at the EONR and the price paid for the fertilizer N was generated on the toeslope (Table 4).

Table 3. Economic optimum N rate (EONR) calculated for three different fertilizer price scenarios (*A:* 0.51 $/lb, *B:* 0.77$/lb, and *C:* 1.02 $/lb) for corn at 5.10 $/bu following three soil covers (Bare, Mix, and Rye) at different landscape positions.

Landscape position	Cover crop treatments								
	Bare	**Mix**	**Rye**	**Bare**	**Mix**	**Rye**	**Bare**	**Mix**	**Rye**
	Price scenario *A* ***$0.51/lb N; corn $5:10/bu***			**Price scenario *B*** ***$0.77/lb N; corn $5:10/bu***			**Price scenario *C*** ***$1.02/lb N; corn $5:10/bu***		
	Economic Optimum N Rate lb N/acre (from this study)								
Summit	122	183	175	116	168	162	110	152	149
Backslope	178	240	240	159	240	240	140	240	192
Toeslope	153	240	240	115	240	199	78	240	144

Table 4. Partial Net return of using the EONR for three different fertilizer price scenario (*A*: 0.51 $/lb, *B*: 0.77$/lb, and *C*: 1.02 $/lb) for corn at 5.10 $/bu following three soil covers (Bare, Mix, and Rye) at different landscape positions.

Landscape position	Cover crop treatments								
	Bare	**Mix**	**Rye**	**Bare**	**Mix**	**Rye**	**Bare**	**Mix**	**Rye**
	Price scenario *A* ***$0.51/lb N; corn $5:10/bu***			**Price scenario *B*** ***$0.77/lb N; corn $5:10/bu***			**Price scenario *C*** ***$1.02/lb N; corn $5:10/bu***		
	Partial Net Return ($/acre) Using the EONR from Table 3								
Summit	985	923	893	952	874	846	920	830	803
Backslope	941	1,013	912	895	944	843	854	875	787
Toeslope	1,178	1,322	1,113	1,143	1,253	1,052	1,119	1,184	1,009

Because this research was done in a limited number of site-years with a limited number of N rates, the EONRs should not be taken as N rate recommendations. However, our results suggest that the EONR can vary due to topography and that applying N at a uniform rate may lead to an excess of N at the summit positions. Corn yield as well as the net return was greater on the toeslope relative to upslope positions. The use of a Rye or Mix cover crop did not significantly affect corn yield at any landscape position but increased the EONR at all landscape positions. Nevertheless, net returns were numerically highest with the Mix treatment on the toeslope in this study. Previous research suggests that corn yield may respond to changes in soil properties that take longer to manifest, so additional research into the long-term cover crop benefits is needed.

Acknowledgements

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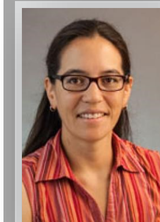

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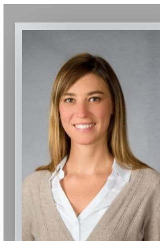

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This article was lead-authored by Dr. Lucas Pecci Canisares and the study was part of Sam Leuthold's graduate research.

Useful Resources

KyGRAINS.info

College of Agriculture, Food and Environment
WHEAT SCIENCE GROUP
http://wheatscience.ca.uky.edu/home

Kentucky Pest News
Entomology · Plant Pathology · Weed Science
http://kentuckypestnews.wordpress.com/

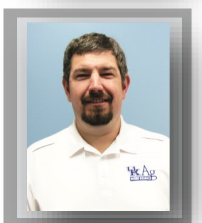
COLLEGE OF AGRICULTURE, FOOD AND ENVIRONMENT
Grain and Forage Center of Excellence

Announcing the University of Kentucky 2021 Fall Crop Protection Webinar Series

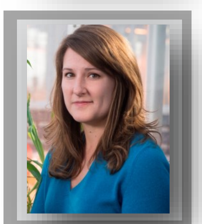
The University of Kentucky has organized five webinars on field crop protection topics that will be hosted through the Southern Integrated Pest Management Center starting on November 11. These weekly webinars will cover topics such as new research on foliar corn disease management, soybean disease identification and management, updates on fall armyworm, guidelines for choosing herbicide options and herbicide-tolerant crop traits, and recommendations for control of weeds like Palmer amaranth, waterhemp, marestail (horseweed), annual ryegrass, and Johnsongrass. Kentucky pesticide applicator credits and Certified Crop Advisor continuing education credits have been applied for. **Pre-registration for the meetings is required through the registration URL provided**. Dates, speakers and presentation registration links are listed below:

All webinars will start at 9:00 AM Central/10:00 AM Eastern

Date: November 11, 2021
Speaker: ***Dr. Carl Bradley***
Title: Spots, Rots, and Syndromes: Managing Challenging Soybean Diseases
Registration URL: https://zoom.us/webinar/register/WN_9fde3p9mSe-SSUdatGHjHQ



Date: November 18, 2021
Speaker: ***Dr. Travis Legleiter***
Title: Re-setting the Defense for Control of Problematic Weeds
Registration URL: https://zoom.us/webinar/register/WN_NcCn1dgjQ0C8fbvXHDMggw



Date: December 2, 2021
Speaker: ***Dr. Kiersten Wise***
Title: What We Learned About Corn Fungicide Applications in 2021
Registration URL: https://zoom.us/webinar/register/WN_zd9vPB1mQEiG_VW83piXug

Date: December 9, 2021
Speaker: ***Dr. JD Green***
Title: A Resurgence of Other Weeds from the Past
Registration URL: https://zoom.us/webinar/register/WN_0eljDlYARfe5m26zWJmRNg

Date: December 16, 2021
Speaker: ***Dr. Raul Villanueva***
Title: Studies on the management of bean leaf beetle, three cornered alfalfa hoppers and the fall armyworm outbreak in soybeans
Registration URL: https://zoom.us/webinar/register/WN_Aqq56bqkSX-bix-uZLT3Pg

The Ragweed Weevil, a Harmless Visitor of Soybean Fields in Kentucky

Figure 1. Ragweed weevil *Lixus scrobicollis* (Photo: Raul T. Villanueva)

Figure 2. Rostrum and elbowed and capitate antenna of the ragweed weevil (Photo by Raul T. Villanueva)

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Description

During the last five years, I found a brownish weevil in the soybeans research plots at the University of Kentucky's Research and Education Center at Princeton and in commercial soybean fields. These encounters occurred while I was scouting for insects.

This insect is known as the ragweed weevil *Lixus scrobicollis* (Coleoptera: Curculionidae) (Figure 1). This species is found in most areas of North America and is associated with giant ragweed, *Ambrosia trifida*. This noxious weed is the main host of this insect. Ragweed weevils live and feed on this plant and tunnel into stems. It lays eggs on stalks and may overwinter in the tunnels in the stems. There is not much information on this insect. It has a brownish to dark brown coloration, 1.5 cm-long (0.6 in) from the tip of the rostrum to the end of abdomen. It has an elbowed antennae and robust rostrum (snout) (Figure 2).

The findings of these weevils were sporadic (3 to 5 specimens/year). I might notice this weevil because the entomology research plots are adjacent to weed science fields. In this site, studies with giant ragweed had been conducted during past growing seasons.

The ragweed weevil was reported as a pest of beets. However, it does not represent a major concern in soybeans, and its feeding was not reported anywhere else.

Drone Pilot Certification Workshop

An intensive prep course to obtain a drone pilot license

Course:

Dec 20 and 21, 2021

9 am- 4 pm each day

(Lunch will be provided both days)

University of KY Research and Education Center, Princeton KY

Course: $400

Exam:

The exam takes approximately 2 hours and appointments will be scheduled on Dec 22 and 23rd.

Exam: $175

For more information and to register contact:

Lori Rogers

270-365-7541 ext 21317

Lori.Rogers@uky.edu

CCA: 12 CEUs

Class size is limited!

KATS Kentucky Agriculture Training School

Course will be taught by Mandy Briggs, Certified Flight Instructor

Upcoming Events

Date	Event
December 20-21	KATS Training: Drone Pilot Certification Workshop
January 4	Winter Wheat Meeting
January 13	Kentucky Commodity Conference
January 26	Owensboro Ag Expo
March 9	IPM Training School
May 10	Wheat Field Day
June 30	Pest Management Field Day
July 21 or 26	Corn, Soybean & Tobacco Field Day
July 28 (tentative)	High School Crop Scouting Competition