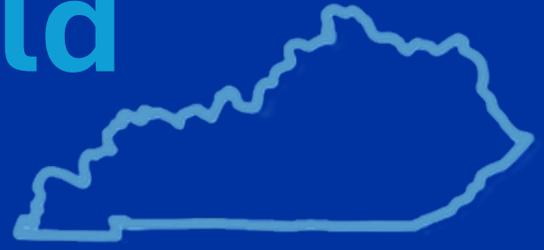


Kentucky Field Crops News



Spanning 5 departments and 120 counties

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Grain and Forage
Center of Excellence

UK Wheat Science Group
UK Corn & Soybean Science Group

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Phosphorus Management Decisions in a Low-Margin Environment

Dr. Ricardo Ribeiro, UK Extension Soil Specialist

With narrow profit margins expected to continue into 2026, driven by higher input costs and little improvement in grain prices, many producers are evaluating where adjustments can be made without sacrificing yield. Fertilizer often represents a substantial portion of crop production costs, making nutrient management a natural place to look for efficiency. University of Kentucky phosphorus (P) fertilizer recommendations are based on the probability of a yield response, which research has shown to decrease as soil test P increases. These recommendations are intended to build and maintain available nutrients at levels sufficient to support optimal crop yield under good management and favorable weather, while minimizing fertilizer applications that have a low likelihood of providing an economic benefit. Regular soil testing remains essential for identifying true nutrient needs and for determining where P inputs can be safely reduced.

Potential to Reduce P Rates

Fields that have built soil P over time can function as a short-term nutrient reserve. In soils testing in the medium to high range (soil test P above ~30 lb P/acre), crop uptake may be partially supported by previously applied P, which may allow for modest reductions in application rates one year without significant yield loss. This approach should be viewed as a temporary drawdown strategy, not a long-term solution, and should be paired with consistent soil testing to monitor changes in soil test P over time.

Fields testing low or very low in soil test P remain poor candidates for rate reductions, under broadcast applications. In these soils, early-season P stress can restrict root development and increase the risk of yield loss.

Placement Options When Rates Are Reduced

When total P rates are reduced, fertilizer placement becomes more important. Phosphorus is relatively immobile in soil and banded or in-furrow applications can improve fertilizer efficiency by concentrating nutrients near developing roots. This can help maintain yields at reduced rates, particularly in low-testing soils.

The University of Kentucky recommendations recognize this efficiency effect. When soil test P is low, guidelines indicate that one-third to one-half of the recommended P_2O_5 rates for corn may be sufficient when fertilizer is banded 2 to 4 inches from the row. This approach improves nutrient availability early in the season but should be used carefully and in conjunction with soil test information.

For example, a soil test P of 20 lb/acre is considered “Low” and calls for 90 lb P_2O_5 per acre. Two hundred pounds of DAP per acre would supply 92 lb P_2O_5 per acre. If banded, the farmer could cut that back to 66 to 100 lb DAP per acre. Those reduced rates would supply between 32 to 48 lb P_2O_5 per acre. If a planter is equipped with liquid banding equipment, then 10 gallons of 10-34-0 would supply about 37.7 lb P_2O_5 per acre.

Research across the Southeast and Midwest show that yield responses to P banding are highly variable. But generally, in soils testing in the medium to high range, banding rarely increases yield compared to broadcast applications. In low-testing soils, eroded areas, or systems that limit early root exploration, banded P can reduce fixation losses and help sustain yield at lower application rates.

Managing Low-Yielding Areas

Another option in a tight-margin year is to reconsider fertilizer investments on persistently low-yielding areas, such as flooded depressions, shaded field edges, compacted headlands, or poorly drained zones. These areas often receive the same fertilizer rates as productive portions of the field but rarely return that investment.

Temporarily taking these areas out of production, reducing fertilizer inputs, or managing them separately can lower costs while improving whole-field profitability. Yield maps and zone-based soil sampling can help identify areas where fertilizer dollars are unlikely to pay.

Final Considerations

Adjusting phosphorus management in 2026 should be approached as a field- and zone-specific decision, not a blanket recommendation. Soil testing remains the foundation for identifying real fertilizer needs, guiding rate reductions, and selecting placement strategies. The goal is not indiscriminate cost cutting but allocating fertilizer where it has the highest probability of protecting yield and profitability.

Citation: Ribeiro, R., 2026. Phosphorus Management Decisions in a Low-Margin Environment. Kentucky Field Crops News, Vol 2, Issue 02. University of Kentucky, February 13, 2026.

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Corn Populations for 2026 in Kentucky

Dr. Chad Lee, UK Extension Grain Crops Specialist

Corn seeding rates need to be adequate for excellent yield opportunities, but can be adjusted downward in 2026 to shave a few dollars off seed costs.

Corn yields in Kentucky are heavily dependent on available water in the soil during seed fill. Seeding rates are adjusted based on the risk of soils running short of water during that seed fill stage. The following seeding rates are suggested for the soil categories below.

- **Low Productivity Soils 24,000 to 26,000 seeds per acre.** (Low productivity soils are shallow, often eroded slopes, or very heavy clay slopes):
- **Medium Productivity Soils 26,000 to 30,000 seeds per acre.** (Medium productivity soils often contain about three feet of water-holding capacity; examples include Crider and Pembroke):
- **High Productivity Soils 32,000 to 36,000 seeds per acre.** (High productivity soils are deep river bottoms, non-irrigated):
- **Irrigated Soils: 32,000 to 42,000 seeds per acre.**

These seeding rates assume 95% emergence. In each of these categories for non-irrigated fields, farmers could choose the bottom range of populations and probably go a little lower on the Low Productivity Soils. Shaving seeding rates to the bottom of these ranges should not hinder yield potential in the field, if the field gets the intended stands of corn.

These seeding rates for Kentucky are different than what is being recommended in the I-states directly north of us where the soils are much deeper and they have a much better buffer against dry weather during seed fill. See Dr. Egli's article in this newsletter for more details.

Ideally, corn would be planted into good conditions, such that emergence is uniform and rapid. Those conditions include soil temperature between about 70 to 75 F, soils with adequate moisture and favorable forecasts for a few days after planting.

Corn should be planted at a uniform depth between 1.5 to 2.0 inches deep. Either starter N or a 2x2 application of N helps with yield increases. That N should be deducted from the total N applied. Other products that could be considered during planting include Zinc, depending on soil tests and P or K, depending on soil tests. With very tight budgets this year, these are the only fertilizer products that should be considered in Kentucky fields at planting. Another article will address banding considerations.

Make sure planters are working well. Complete a thorough check of all planters and replace worn and aging parts. Run planters in the fields on a day when the weather allows before planting season starts. Make your neighbors talk a little.

The last two years across many fields in Kentucky had soils that stayed cool and wet during much of the planting season and never provided ideal conditions. So, planting corn into good conditions is not always an option. If it can be done, it will improve the chances of maximizing your return on your investment.

Citation: Lee, C., 2026. Corn Populations for 2026 in Kentucky. Kentucky Field Crops News, Vol 2, Issue 02. University of Kentucky, February 13, 2026.

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Fall Armyworm Outbreak in Central Kentucky Wheat Fields

Dr. Felipe C. Batista, UK Entomology Postdoctoral Scholar
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Figure 1. Wheat field damaged by fall armyworms, with part of the field completely destroyed. (Photo: Felipe Batista, UK Entomology Post-Doctoral Scholar.)

Current Situation

We visited a wheat field in Simpson County that experienced a fall armyworm (*Spodoptera frugiperda*) outbreak in mid-October 2025 (Figure 1). Most larvae were in the 4th to 6th instars, and large areas of the field were completely defoliated (Figures 1–3). Bifenthrin was applied on the day of our visit. To evaluate how effective the treatment was, we collected 90 caterpillars before spraying and 50 afterwards. Twenty-four hours after the application, 54% of the caterpillars collected after spraying had died. The remaining 46% developed slowly, taking 10–13 days to pupate, and only 42% of the caterpillars survived to become adults. In contrast, all caterpillars that were not sprayed pupated within one week and showed 100% survival, becoming adults.



Figure 2. Fall armyworm larvae in the 4th to 6th instars feeding on wheat seedlings in Simpson County, KY (Photo: Felipe Batista, UK Post-Doctoral Scholar)



Figure 3. A closeup of fall armyworm larvae (4th to 6th instars) feeding on wheat seedling in Simpson Co. KY (Photo: Felipe Batista, UK Entomology Post-Doctoral Scholar)

Management and Discussion

To achieve better results with insecticide applications, it is important to spray when caterpillars are still in the early stages (1st to 3rd instars) of development, as they are more susceptible to insecticides. More advanced insect developmental stages (4th to 6th instars) are more difficult to control with insecticides due to morphological and physiological changes. In addition, high caterpillar defoliation usually occurs as they

grow. Therefore, regular monitoring is a key step in the success of most pest management strategies. Monitoring enables early pest detection and timely intervention, increasing the likelihood of successful control and yield loss prevention.

The choice of insecticide is also a key factor for effective control. In October 2024, we received similar FAW attack reports from Daviess Co. We determined that the efficacy of control was low in this case, even though insecticides were applied during the early stages of pest development. Our laboratory tests indicated that the local FAW population was resistant to most of the pyrethroids evaluated, except bifenthrin. In contrast, chlorantraniliprole and indoxacarb provided excellent control; however, these are higher-cost options. Rotating insecticides with different modes of action is essential to delay resistance development and preserve the efficacy of more affordable products over time ([Insecticide resistance management](#)).

More Information

- Kentucky Pest News: [2024 Outbreak of Fall Armyworm in wheat in Central KY](#)
- Kentucky Pest News: [Insecticide resistance management](#)

Citation: Batista, F., Villanueva, R., 2026. Fall Armyworm Outbreak in Central Kentucky Wheat Fields. Kentucky Field Crops News, Vol 2, Issue 02. University of Kentucky, February 13, 2026.

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Has the Corn Population Treadmill Ended?

Dr. Dennis B. Egli, UK Professor Emeritus

Have corn populations reached a plateau? They increased steadily from 4000 to 8000 plants per acre when producers were growing open-pollinated varieties to around 29,000 to 32,000 plants per acre today. Yield contest winners report populations as high as 50,000 plants per acre. Corn producers were on a treadmill – always wondering if their populations were high enough for maximum yield.

Populations in the heart of the corn belt, however, haven't increased since 2015, plateauing at 29,000 to 32,000 plants per acre (Fig. 1), according to the National Agriculture Statistics Service. This plateau was also observed in field trials in Illinois (Dr. Emerson Nafziger) and Indiana (Dr. Dan Quinn). Yields in 2025 were 25 bu/acre higher than the 2014 – 2016 average with no increase in population. This plateau is a drastic change from the treadmill we were on for the past 60-some years.

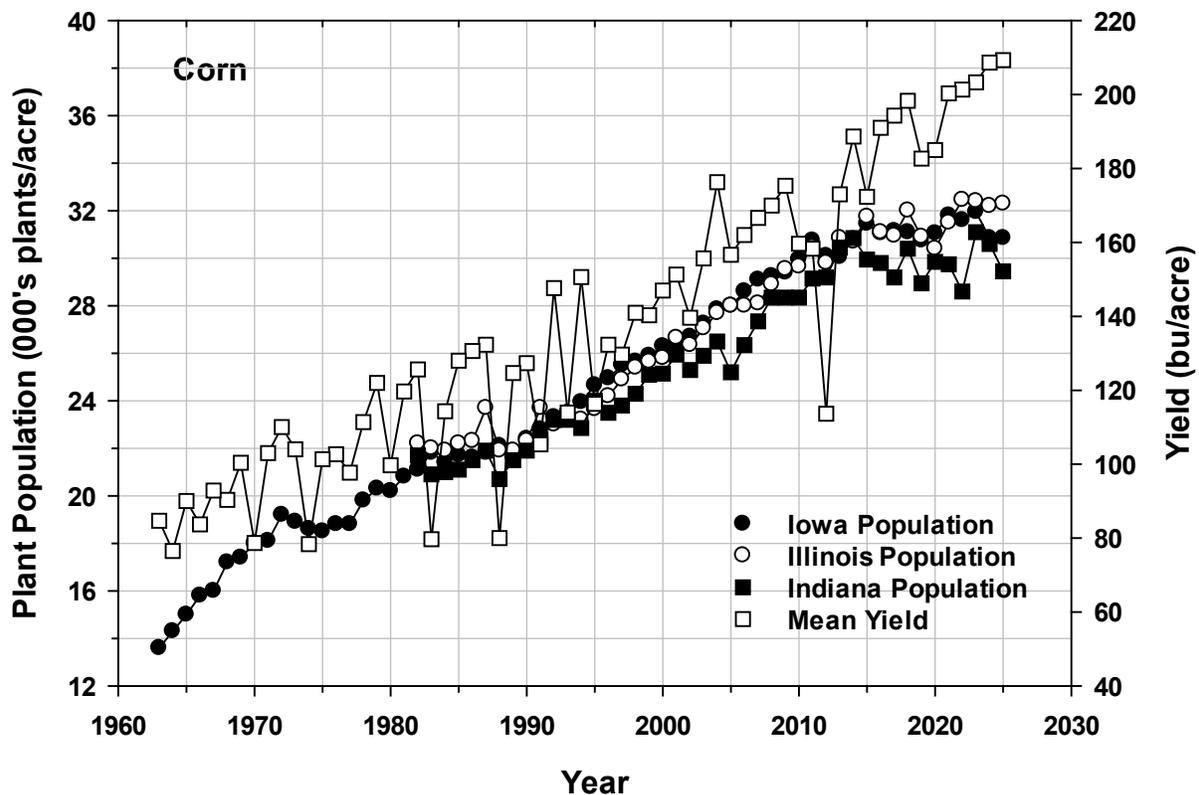


Fig. 1. Plant population and mean corn yield, 1963 to 2025. Data from the National Agricultural Statistics Service, USDA.

What's going on? How can yield increase without an increase in population? One way to address this question is to ask - why was it necessary to increase population in the past to get higher yield?

The increases in yield that started with the introduction of hybrid corn in the 1930s and 1940s were associated with more kernels per acre. Since yield equals kernels/acre x weight per kernel, higher yields must come from more kernels and/or larger kernels, there is no other option. As U.S. plant breeders increased yield over time, ear size (maximum kernels per ear) did not increase, so population (ears per acre) had to increase to supply enough kernels to support higher yields. The productivity of the crop increased (better hybrids and/or improved management) until all the flowers on the ear developed into

kernels and then higher populations (more ears and kernels) were needed to produce the extra kernels need for higher yield.

The fundamental basis for the population treadmill was inflexibility of the corn plant. Its ability to increase the number of kernels per plant in response to higher productivity was limited. The original corn plants were flexible, they could produce tillers that bore ears or several ears per plant, but historically, corn breeders selected against these characteristics. This forced producers to ‘create’ flexibility by increasing population to increase kernels per acre. While kernels per acre were increasing there was very little change in weight per kernel (kernel size).

Thinking about the response of soybean to population helps us understand the corn response. Soybean, a very flexible species, can increase seeds per plant in response to higher plant growth rates by increasing pods per node or increasing nodes by branching. Consequently, soybean produces the same yield over a wide range of populations and populations remained the same or declined as historical yields increased. The opposite response to that exhibited by the inflexible corn plant.

The key point to understanding the population plateau is that increasing corn yield doesn’t absolutely require higher populations and more kernels per acre – there are other options. Increasing ear size or ears per plant (both are heritable characteristics) would increase kernels per acre. Another option is to increase the length of the kernel-filling period. If the kernel grows for a longer time, it will be larger, and yield will increase without any change in population. Kernel-filling period is also a heritable characteristic and there are research results showing that higher yields can be a result of longer kernel-growth periods.

Eliminating the need for ever higher populations to get higher yields solves one of the problems that would face producers if populations continued to increase. There are only so many plants that you can jam into a 30-inch row, so continually increasing population would eventually require narrow rows or a twin-row system and expensive equipment changes.

The plateaus in population (Fig. 1) suggest that modern hybrids are using different strategies to produce higher yield. So far, these new strategies (larger ears, longer-kernel filling periods) have successfully continued the increase in yield we are used to (Fig. 1). We will have to wait and see how far into the future these new strategies will be successful.

Citation: Egli, D., 2026. Has the Corn Population Treadmill Ended? Kentucky Field Crops News, Vol 2, Issue 02. University of Kentucky, February 13, 2026.

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Canola Productivity and Profitability in Midwest Cropping Systems: Insights from Crop Simulation Model in Illinois

Dr. Mohammad Shamim, UK Extension Associate Grain Crops

Winter canola is rapidly gaining interest across the Midwest. In Kentucky and Tennessee alone, canola was planted in 35,000 acres, which is an estimated 500% increase from 2024 to 2025, with further expansion to 120,000 acres in southern states in 2026. Growers who followed university and industry guidelines reported strong returns, in many cases exceeding wheat. Furthermore, the overall confidence in canola profitability remains high among experienced growers and industry partners.

To better understand how canola fits into Midwest cropping systems, researchers from the Department of Crop Sciences at the University of Illinois used the DayCent crop model, a process-based simulation tool that estimates crop yield, greenhouse gas emissions, soil carbon dynamics, and economic returns under different management scenarios. The study compared a traditional corn–soybean (CS) rotation with a corn–canola–soybean (CCS) rotation under multiple nitrogen (N) fertilizer strategies.

Simulated Nitrogen Management Scenarios

Scenario	Rotation	Corn N rate (lb/ac)	Canola N rate (lb/ac)	Fall-applied N to canola (lb/ac)	Soybean N rate
S0	CS	137	–	–	0
S1	CCS	137	0	0	0
S2	CCS	137	100	Split (fall + spring)	0
S3	CCS	137	125	25	0
S4	CCS	137	150	50	0

CS; Corn-soybean rotation, CCS; Corn-Canola-Soybean rotation. Fall N rates in canola are part of the total N.

Yield and Biomass Outcomes

The simulations indicated modest yield penalties following canola inclusion in the cropping system. Corn yields declined by 3–5%, while soybean yields were reduced by 11–19%. These reductions were largely attributed to shorter growing seasons for corn and soybean to accommodate timely fall planting of winter canola. Despite this, total system grain yield (corn + canola + soybean) was higher in the CCS rotation than in the CS system.

The CCS system also produced substantially more system biomass. Although greenhouse gas emissions increased under CCS, the higher biomass resulted in a greater net ecosystem carbon balance (NECB), indicating increased carbon sequestration relative to the corn–soybean rotation.

Economic Performance

Across most years, the CCS rotation generated higher economic returns than the CS system. Profitability generally increased as nitrogen rates applied to canola increased. In the 2019–2020 season, only the highest N rate (S4) improved profitability due to higher input costs and limited yield response at lower N rates. However, during the 2021–2022 and 2023–2024 seasons, all CCS scenarios outperformed the CS rotation.

On average, Scenario S4 increased profits by approximately \$100 per acre compared with the traditional

corn–soybean system. Importantly, even when no nitrogen fertilizer was applied to canola (S1), the CCS system remained more profitable than the CS rotation.

Key Limitations to Consider

While this study was conducted for soils in Illinois, replicating this for Kentucky may have two limitations that should be noted. First, corn nitrogen rates used in the simulations were lower than current AGR-1 (University of Kentucky) fertilizer recommendations and even those of University of Illinois, which may partially explain the yield reductions observed in corn. Second, the highest canola N rate included a relatively large amount of fall-applied nitrogen, which may not reflect best management practices across all environments. AGR-1 of University of Kentucky recommends no more than 30 units of N application in fall.

Take-Home Message for Growers

Despite modest yield penalties in corn and soybean, simulation results suggest that including winter canola in Midwest corn–soybean systems can increase whole-system productivity, enhance soil carbon sequestration, and improve profitability. When managed properly, canola represents a promising rotational crop for growers seeking economic and environmental benefits beyond traditional systems. These results are consistent with my observations of canola in Kentucky and the farmers that I interviewed.

Nevertheless, some growers in Kentucky have taken a 'back seat' approach, opting out of canola for the 2025-2026 season. In many cases, the hurdle wasn't the crop itself, but rather the heavy losses from seed shattering caused by desiccation mismanagement. To avoid these pitfalls, a critical rule of thumb is: Never desiccate more acres than you can realistically harvest in a single day. I will dive deeper into the mechanics of proper desiccation in an upcoming article. Stay tuned!"

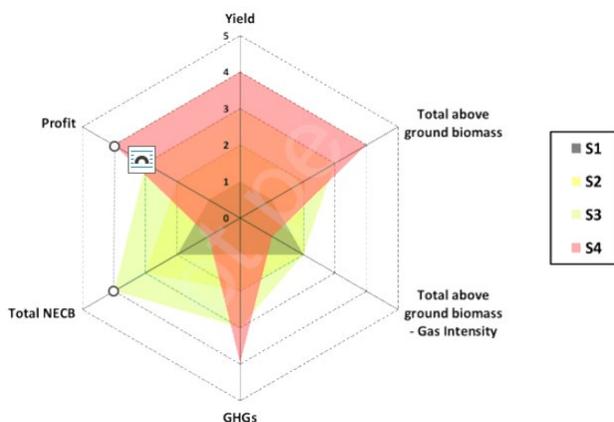


Figure 1: comparison of cropping system scenarios over the six-year simulation period. Source: Arshat et al., (preprint). We can see that S4 has higher aboveground biomass, yield and profit, but comes with higher GHGs and lower total NECB. However, the higher biomass compensates for higher GHGs emissions, therefore, the net NECB is much higher in S4 (not shown in the figure above).

Source

Arshad, M.U., Hwang, S, Jang, C., Jeon, H., and Lee, D. (Preprint). Winter canola integration improves carbon balance, biomass, and profitability in Illinois corn-soybean systems.

Citation: Shamim M.J., 2026. Canola Productivity and Profitability in Midwest Cropping Systems: Insights from Crop Simulation Model in Illinois. Kentucky Field Crops News, Vol 2, Issue 02. University of Kentucky, February 13, 2026.

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Hendricks Farms receives 2026 University of Kentucky Grain Crops Science Service Award

Jordan Strickler, M-G CAFE Marketing and Communications



Adam Hendricks (right) accepted the Grain Crops Science Service Award for Hendricks Farms. Photo by Jennifer Elwell

Hendricks Farms, an eighth-generation family farm in Logan County, received the 2026 University of Kentucky Grain Crops Science Service Award during this year's UK Winter Wheat Meeting. The award recognizes Hendricks Farms for their work assisting the Martin-Gatton College of Agriculture, Food and Environment's Weed Science Program.

The UK Grain Crops Science Service Award honors those who help the UK Grain Crops Science Group (GCSG) carry out research that supports the state's farmers. Each year, the award highlights cooperation that gives researchers a real-world place to test ideas, collect data and move work from a plan on paper to results in the field.

For the past four crop years, Hendricks Farms has served as a working site for the Weed Science Program as it studies harvest weed seed control for Italian ryegrass in wheat. Hendricks Farms and Martin-Gatton CAFE specialists installed and studied a Redekop Seed Control Unit on the farm's combine to see how it affects ryegrass seed survival at wheat harvest.

"I've always felt like we can't keep doing the same thing and expect different results," said Adam Hendricks. "Italian ryegrass is a real issue in our wheat rotation, so I was interested in anything that might help. If nobody steps up and tries something new, then we'll never really know what works."

Hendricks Farms also agreed to give up multiple acres each season so Italian ryegrass can remain in a designated area of a field. That sacrifice allows GCSG researchers to test equipment and methods under real conditions. The work required Hendricks to also volunteer hours during harvest so the equipment could be used and evaluated in a way that produces reliable data.

"The Hendricks family sacrifices multiple acres each year for our research," said associate Extension professor of weed science Travis Legleiter. "Additionally, they provide their precious hours during wheat harvest to allow this work to be conducted. Without their help, the Weed Science program would not have been able to conduct this valuable non-chemical weed control research."

This is not the first time that the family has been rewarded for their work. In 2018, they were given the honor of Farm of the Year from the Logan County Farm Bureau. Additionally, Adam, his brother Jason and cousin Harry were given Young Farmer of Excellence awards. In 2024, the Logan County Conservation District awarded the farm the Master Conservationist Award.

"On our farm, you can't just pause harvest and come back later when it's convenient," Hendricks said. "So when Travis and his team need time to run the equipment and collect data, we build that into the day. We're proud to give them a real-world setting to test it, because that's how you get answers that actually apply. It takes patience, but it's worth it."

Jordan Strickler, M-G CAFE Marketing and Communications

2026 Southern Cover Crops Conference



2026 Southern Cover Crops Conference



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Upcoming Events

February 26, 2026, Pattern Drone Testing, Princeton, KY

May 12, 2026, UK Wheat Field Day, Princeton, KY

May 28, 2026, Crop Scouting Clinic, Princeton, KY

June 25, 2026, Pest Management Field Day, Princeton, KY

July 21, 2026, UK Corn, Soybean and Tobacco Field Day, Princeton, KY

July 23, 2026, High School Crop Scouting Competition, Princeton, KY

TBA 2026, Drone Pilot Certification Workshop, Madisonville, KY

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