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Too Much of a Good Thing: When Water Becomes the Enemy of Soybean

Dr. Mohammad Shamim, UK Extension Associate Grain Crops

Water is essential for crop growth, but like many things in nature, too much can be just as damaging as too little. Recently many areas in KY received excessive rainfall that left fields flooded. Understanding how soybean responds to flooding can help explain why two fields only a few miles apart may have very different yield potential this fall.

While drought restricts water uptake, flooding creates the opposite problem. Excess water fills soil pores that normally contain air, drastically reducing oxygen availability around the roots. Within hours, soybean roots experience oxygen deficiency (hypoxia), and prolonged flooding can lead to complete oxygen deprivation (anoxia). Without oxygen, roots cannot efficiently produce the energy (ATP) required for nutrient uptake, root growth, and maintenance, leading to impaired water absorption even though water is abundant (Kozlowski, 1997; Bailey-Serres and Voesenek, 2008).

Flooding affects soybean at every level of biological organization. At the molecular level, genes associated with anaerobic metabolism and stress responses are activated while photosynthesis-related genes are downregulated. Physiologically, stomatal conductance, chlorophyll content, nitrogen fixation, and photosynthetic rates decline. Morphologically, plants often become stunted, root systems deteriorate, nodules lose activity, leaves may yellow prematurely, and pod set is reduced. The situation is most severe if the whole plant is submerged. In this scenario, the whole photosynthetic machinery stops working, gas exchanges come to complete halt, growth ceases, and if flood water has soil particles on it, it will deposit on leaves surface and reduce both gas exchange and light capture.

Figure 1. Dead Soybean field in Daviess County after staying submerged in water.

The extent of yield loss due to flooding depends on several factors, including the soybean growth stage, flood duration, soil type, and how quickly excess water drains from the field. Research by Scott et al. (1989) and Oosterhuis et al. (1990) demonstrated that each additional day of flooding reduced soybean yield, with reproductive stages being considerably more sensitive than vegetative stages. Using two-day flooding as control, yield loss increased from approximately 1.8 bushels per acre per day of flooding in clay soil at the V4 stage to 2.3 bushels per acre per day at the R2 stage, representing about a 26% greater loss during early reproductive growth. In silt loam soils, yield loss increased from approximately 0.8 to 1.5 bushels per acre per day, nearly doubling the impact of flooding at R2 compared with V4. These findings emphasize that even relatively short flooding events can substantially reduce yield when they occur during flowering and early pod development, and that natural or artificial drainage can alter the severity of the damage.

Another weather event currently affecting Kentucky is a prolonged heat dome. Heat stress has adverse effects on soybean physiology. If occurred during the vegetative stages, reduced growth rate will occur due to limited photosynthesis. Consequential effects of heat stress could occur if soybean is at the reproductive stages (As most early planted soybean are in KY). Flower, pod, and seed abortion could occur in prolonged elevated temperatures. Given the high temperatures ahead for more than a week, it will likely cause some pod and seed setting issues. The recent rainfalls may temporarily buffer some fields from heat stress by replenishing soil moisture. However, root systems injured by flooding often become less efficient at extracting water, causing plants to develop drought stress sooner as soils dry.

The severity of flooding damage depends not only on how much rain falls, but also on when it occurs, how long the soil remains saturated, and how quickly fields can drain. Although growers cannot control rainfall, understanding these interactions can help prioritize post-flood scouting, assess the likelihood of crop recovery, identify fields where drainage improvements may provide long-term benefits, assess varieties with improved tolerance to poorly drained conditions, and set realistic yield expectations. It also helps explain why neighboring fields; or even different areas within the same field; can respond very differently to the same rainfall event.

So, what should you do?

- Once floodwaters recede, patience is often the best first management decision. Rather than evaluating fields immediately, growers should wait 3 to 7 days before scouting to allow surviving plants time to resume growth. Healthy plants will have firm, white to creamy-colored growing points, and new leaf development should become visible as recovery begins.
- Growers should also begin monitoring foliar disease development. If soybean is at R1–R3 (flowering to early pod set) and diseases such as frogeye leaf spot or brown spot are present in the middle canopy, a fungicide application may be justified. Economic benefit is most likely when disease pressure is active, and conditions favor further disease development.

- At R4 (full pod stage), fungicide applications may still provide some benefit under high disease pressure, primarily in protecting seed size and maintaining canopy health, although yield response is generally more variable. Beyond this stage (R5 and later), the likelihood of an economic return from foliar fungicide applications is typically reduced.
- Seed production fields often require more protective management due to strict quality standards. A seed producer may apply fungicides if soybean is at R1-R3. If the beans are at R4-R5 and earlier applications are not done, consider applying it as it will benefit the quality.
- Double-cropped soybean may be more vulnerable to certain soilborne diseases due to smaller root systems and reduced early vigor. Fields with a known history of diseases such as Phytophthora root and stem rot should be monitored closely after flooding, particularly in poorly drained areas, as saturated conditions can increase disease risk during recovery.
- Consult your pathologist and University of Kentucky guidelines on diseases and fungicide applications.

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July Corn Disease Update

Dr. Kiersten Wise, Extension Plant Pathologist

Frequent rainfall across Kentucky has increased concern about foliar diseases in corn, but the good news is that important diseases like Southern rust have not yet been confirmed in the state. Southern rust typically arrives in Kentucky in mid-July, and whether a fungicide will be needed to manage southern rust will depend on the crop growth stage at the time it is detected in an area. Fungicide applications may be needed to manage southern rust through the milk (R3) growth stage, **although if corn received a fungicide application at VT/R1, it is less likely to need additional applications if southern rust arrives after VT/R1.** Southern rust can be tracked on a map on the Crop Protection Network. On the map, red counties/parishes indicate that southern rust has been confirmed by university/Extension personnel. To date, southern rust has been slow to develop in states to our south, which has delayed its arrival in Kentucky. Most corn in the western part of Kentucky will likely be into R3 or beyond by the time southern rust arrives this year.

Tar spot was confirmed in Daviess County on July 14. Tar spot management is like southern rust management in that fungicide applications may be needed through R3 if the disease is confirmed in a field, and if a field has not already been sprayed at VT/R1. Most corn in Kentucky will be past the point of requiring management, but scouting should continue and fungicide application decisions made on a case-by-case basis.

Curvularia leaf spot is also very common in Kentucky this year. This is a relatively new disease in Kentucky, caused by the fungus *Curvularia lunata*. Small, tan to pale yellow lesions can be observed on the leaf, and the lesions are often surrounded by a brown or tan halo (Fig. 1). Curvularia leaf spot has reduced yield in some states, including Kentucky, but widespread yield loss has not yet been observed. More information on Curvularia leaf spot can be found in the UK Extension publication PPA-51: *Curvularia leaf spot*.

Figure 1. Symptoms of Curvularia leaf spot on corn (photo by Kiersten Wise)

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Are KY Corn Producers Using the Latest, Updated, N Recommendations?

Dr. John H. Grove, Soil Science Research & Extension

UK Cooperative Extension has updated their corn N rate recommendations. [New AGR-1] (Ritchey and Grove, 2025) N rate recs are now based on over 150 site-year-management field trials done between 2013 and 2023. Many of these trials were on-farm, and all used newer hybrids. Are the N rate recs Kentucky corn growers used in 2026 based on recent, updated, N research information? Maybe. Maybe not.

The following two tables, including titles and footnotes, were taken directly from AGR-1.

Table 12a. Recommended nitrogen application rate (lb N/A) for dryland corn.[1]

Previous Crop	Tillage[3]	Soil Drainage Class[2]: Well and Moderately Well Drained[4]	Soil Drainage Class[2]: Somewhat Poorly and Poorly Drained
Corn, Sorghum	No-Till	160-190	175-205
	Tilled	150-180	165-195
Soybean, Small Grain, Fallow	No-Till	140-170	155-185
	Tilled	130-160	145-175
Grass, Grass-Legume (≤ 4 years), Winter Annual Legume Cover Crop	No-Till	110-140	125-155
	Tilled	85-115	100-130
Grass, Grass-Legume (≥ 5 years)	No-Till	85-115	100-130
	Tilled	60-90	75-105

[1] Assumes no cereal rye cover crop ahead of corn planting. Assumes no N loss inhibitor used.
[2] Soil drainage class examples are given on Page 2.
[3] No Till = no primary or secondary tillage, fall or spring, prior to planting the crop. Tilled = any primary or secondary tillage, fall or spring, prior to planting the crop.
[4] Somewhat poorly or poorly drained soils that have been tile drained should be considered moderately well drained soils.

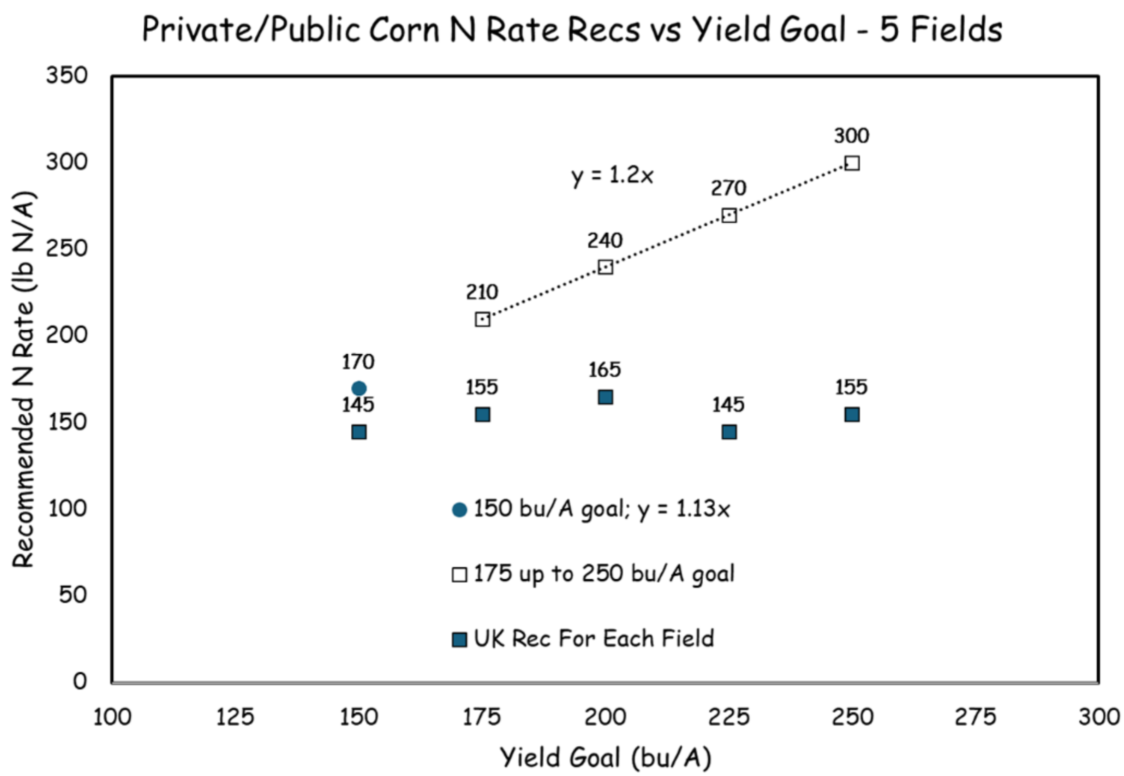
Table 12b. ***Cereal rye cover crop and/or urease inhibitor use:***[1] Recommended total nitrogen application rate (lb N/acre) for no-till dryland corn grown on well and moderately well drained soils and where two-thirds or more of the total N rate top/side-dressed with surface applied urea-containing fertilizer in the absence/presence of a cereal rye cover crop without/with use of a urease inhibitor.

Previous Crop	Cereal Rye Cover Crop[3]	Recommended Total N Rate (lb N/acre): No Inhibitor	Recommended Total N Rate (lb N/acre): With Inhibitor[2]
Corn, Sorghum	No	160-190	150-180
	Yes	185-215	165-195
Soybean, Small Grain, Fallow	No	140-170	135-165
	Yes	165-195	150-180

The N rate recommendations in these tables assume good to excellent crop management (plant population, other nutrition, pest control, etc.). The range in each N rate rec assumes that the N:corn price ratio is around 0.1 (e.g. $0.50/lb N and $5.00/bu corn or the equivalent). This year, that means those recs are overly generous – the 2026 N:corn price ratio was often 0.15, 50% greater ($0.75/lb N and $5.00/bu corn), or even higher. The new N rate recs (first table) consider crop rotation, tillage, and soil drainage (wet-natured soils tend to have more N loss). The recs (second table) also consider, for the first time, whether a no-till corn field contained a cereal cover crop and/or a volatilization loss inhibitor was used with surface-applied urea-based N fertilizer.

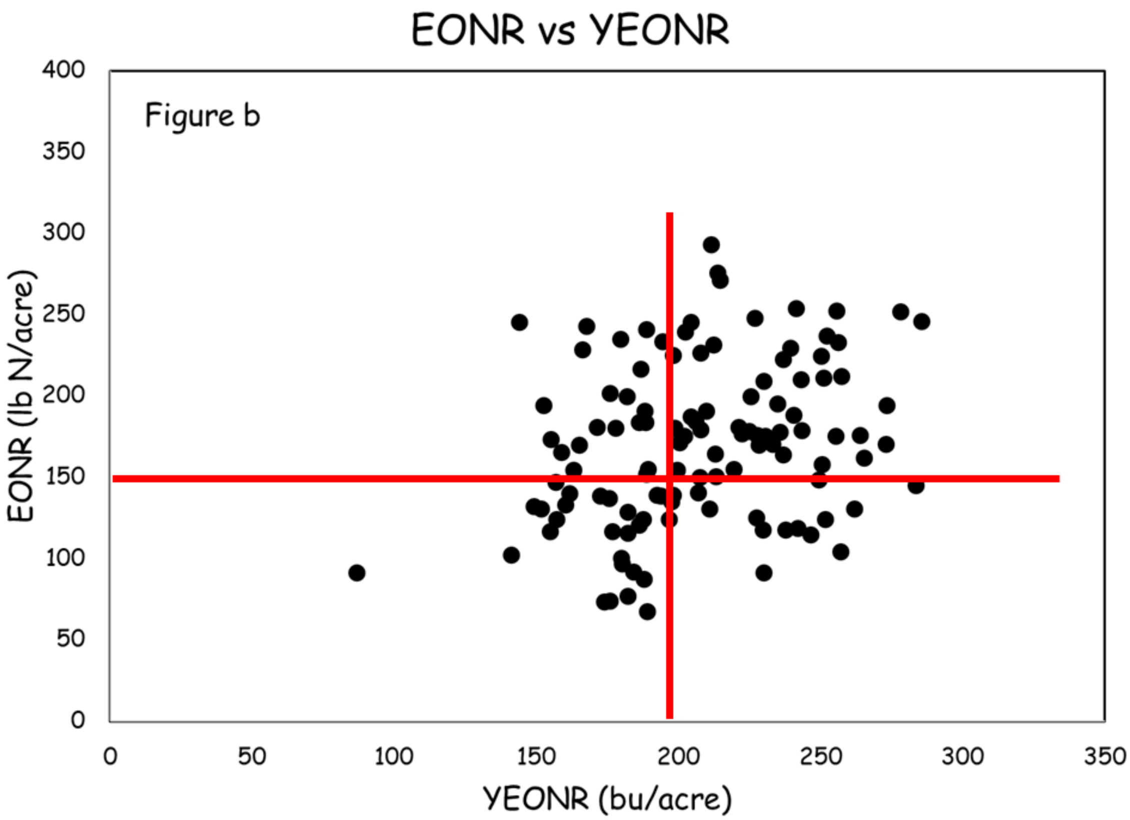
But how do the new N rate recs compare with those from private labs? I have 5 on-farm trials this year. I sent soil samples from those 5 sites to a popular private lab. This lab requires that the grower (me) provide a "yield goal" for each field. I provided 5 different yield goals, ranging from 150 to 250 bu/acre. I chose these randomly – I had no idea what kind of corn growing season 2026 would bring at each site (still don't – has gone from very dry to very moist – so far).

The figure below shows the corn N rate recs from AGR-1 and the private lab, as a function of the yield goal I specified to the private lab.



AGR-1 N rate recs range from 145 to 165 lb N/acre. Some of these fields were tilled prior to planting and one had a rye cover crop that was killed prior to planting. All were to be fertilized 4 to 6 weeks after planting with a urea-based fertilizer containing a volatilization loss inhibitor. The private lab N rate recs range from 170 to 300 lb N/acre. With the exception of the field where I specified a yield goal of 150 bu/acre, in all other fields the yield goal value was simply multiplied by 1.2 lb N/acre per bu/acre of yield goal. This is the essence of the 'yield goal approach'. The dryland corn grower sets a yield goal, and this lab (among others) multiplies that goal value by 1.2 to get the corn N rate rec. No consideration is given to other soil, field or N management factors. In the eastern US, those adjustments (including any N credits) have to come from the grower's previous experience (including their own on-farm research), a private consultant, or an industry agronomist.

The AGR-1 N rate recommendation is based in the 'sufficiency' (sufficient level of available nutrition) approach, modified to take N cost and corn value (N:corn price ratio) into account. Yield goal is not considered because research information indicates that the optimal corn yield is generally unrelated to the optimal N rate – as shown in the figure just below.



In the figure above, the economically optimal N rate (EONR) was plotted against the yield observed at that N rate (YEONR) in each of many Kentucky field corn trials. The resulting 'shotgun blast' of points reinforces the fact that there is no relationship between a field's optimal N rate and its optimal yield (yield goal). The horizontal line shows that an EONR of 150 lb N/acre was associated with YEONR values ranging from around 150 to 275 bu/acre. Conversely, the vertical line illustrates that a YEONR of about 200 bu/acre was achieved with EONR values as little as about 75 lb N/acre but ranging up to around 250 lb N/acre. For dryland (rain fed) corn, there is much research reinforcing this result, more recently reported from Mississippi (Oglesby et al., 2022) and Ohio (Fulford et al., 2025).

The yield goal 'model', where the N rate rec (lb N/acre) = (1.2 x yield goal) – any N credits, originated with Stanford (1973), who used (perhaps selectively) corn N research trial data from the 1950s, 60s and early 70s. The original and related yield goal models have "led to two generations of public and private crop management advisors telling farmers, '1.2 is the best you can do'" (Rodriguez et al., 2019). After a detailed reevaluation, Rodriguez et al. (2019) called Stanford's work, and the resulting model, into question – at several levels. So, if the producer thinks university corn fertilizer recs are ‘too old’, then why would a corn grower desire a corn N rec based on the Stanford (1973) model? Why not use university N rate recommendations based on research results found in a modern corn management (genetics, row spacing, seeding rates, pest control, and current N management options) environment?

Nitrogen is an important corn input, accounting for a considerable fraction of production costs. The Kentucky N rate recommendation needs to be optimized, considering other N management tools (N source, timing, placement) that one might use, for field soil properties (especially those that drive N loss in many KY soils, like drainage), crop rotation, and tillage management. AGR-1 corn N rate recommendations do that. Does a one-size-fits-all model that’s 50-60 years old do that for the grower? Does the corn producer get good value, a good ROI, from the yield goal approach to their corn fertilizer N rate recommendations?

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Thrips in Corn and Soybean: Identification, Risk, and Management

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Dr. Felipe C. Batista, UK Postdoctoral Fellow
Dr. Ric Bessin, UK Entomology Extension Specialist

We have been observing high numbers of thrips in both corn and soybean fields during our monitoring surveys from western to central Kentucky. As double-crop soybean fields emerge and corn enters the ear formation stage, these are critical growth stages when thrips may deserve closer attention in both crops.

Thrips feeding on corn seedlings usually has little direct impact on corn growth or grain yield. However, their greatest impact is often indirect because feeding may increase plant susceptibility to pathogen infections, particularly during ear formation. In soybean, thrips can also vector Soybean Vein Necrosis Virus.

Although thrips can sometimes cause severe leaf injury when combined with other stressful conditions, such as drought or herbicide injury, they are generally considered occasional pests in both corn and soybean and rarely require an insecticide application.

How to recognize thrips in corn and soybean fields?

Thrips are small insects (about 1/16 inch long) with piercing-sucking mouthparts. Immature stages are wingless and yellow, while adults are yellow or dark (depending on the species) and have two fringed wings (Figure 1).

Figure 1. Close-up of one of the thrips species found in soybean fields, Caldwell County, 2026. Photo: Felipe C. Batista.

Because of their small size, thrips can be difficult to find in the field (Figure 2). The easiest way to identify their presence is by the silver-gray discoloration and black specks (fecal spots) on leaves (Figure 2). Damaged leaves may also roll and twist.

Thrips are more common during drought periods because dry conditions and high temperatures favor their development, allowing populations to increase. In corn, thrips can be found in whorls, tassels, ears, or between undeveloped leaves. In soybeans, they are usually found on young leaves.

Figure 2. Silver-gray feeding scars ("silvering") on corn (left) and soybean (right) leaves caused by thrips (yellow and red circles). Photos: Felipe C. Batista.

How to manage thrips corn and soybean crops?

Regular field scouting is the most important practice for effective thrips management.

There is no established economic threshold for thrips in corn, and the crop usually outgrows the injury caused by this pest. An insecticide application may be warranted only during severe outbreaks affecting corn seedlings or during ear formation when accompanied by prolonged drought or other stressful conditions. Under prolonged drought, heavily infested seedlings may become grayish and wilt. If injury occurs during ear formation, feeding wounds may provide an entry point for kernel pathogens.

In soybean, thrips also rarely cause economically significant damage. However, yield losses may occur when thrips infestations coincide with other stressful conditions. Some extension publications recommend considering treatment when more than 75% of sampled leaves show thrips injury and an average of eight thrips per leaf is present.

Under normal conditions, even a heavy rainfall can help suppress thrips populations in both soybean and corn fields. If an insecticide application is necessary, consult your local Extension agent for recommendations. Whenever possible, avoid broad-spectrum insecticides because, even when targeting other pests, they can disrupt beneficial insect populations and favor outbreaks of secondary pests such as thrips.

More Information

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New Resource on Foliar Fungicide Applications with Spray Drones

Dr. Kiersten Wise, UK Extension Plant Pathologist

Unmanned Aerial Vehicles (UAVs) or spray drones are now widely used in Kentucky to apply foliar fungicides in corn. Research conducted at the University of Kentucky has found that fungicide applications occurring by drone can be as effective as ground and manned aerial applications, if applicators pay careful attention to spray parameters. Research results for these trials, funded in part by the Kentucky Corn Growers Association, can be found in the University of Kentucky Corn Research Reports and in the Plant Pathology journal *Phytofrontiers*. These results have now been combined with results from other experiments from around the United States and summarized in a new user-friendly extension resource on the Crop Protection Network. The publication, Best Practices for Foliar Fungicide Applications with Spray Drones, is now available to aid applicators and farmers in understanding how to optimize drone fungicide applications. Calculating swath width of individual drones is of utmost importance, and this article provides information on swath width testing and how to reduce swath width to achieve optimal results with spray drone applications.

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Assessing Flood-Damaged Corn in 2026

Dr. Chad Lee, UK Extension Grain Crops Specialist

Figure 1 This flooded corn will not survive.

Recent rains and flooding across the region have left many farmers questioning the survival of their corn. Seeing water in cornfields is disheartening. Understanding the biological response of corn to excess water can help in making informed management decisions.

Full or Partial Submersion

For corn that was fully submerged in July 2026 for more than 24 hours, most likely will not survive.

If a field is flooded more for than 48 hours, even if the plants are not fully submerged, those plants are likely to die.

If the corn ears were covered for more than 24 hours, those ears most likely will rot. If those ears had grain developing, USDA considers that grain contaminated and not suitable for sale. If farmers are considering feeding the corn to cattle, that corn should be tested for toxins before feeding.

The most immediate effect of flooding is the disruption of nutrient and water uptake. Water saturating the soils displaces oxygen out of the soil. That lack of oxygen causes root hairs to begin to die within just one hour of flooding. If root hairs are dead, the plant cannot take up water or nutrients. Even though the stalks and leaves are conducting photosynthesis, the plant cannot access additional water or nutrients that it needs to fuel photosynthesis. This disruption during pollination can inhibit pollination or lead to kernel abortion. If this disruption occurs during seed fill, the plant will pull from leaves and stalks to fuel seed development. Stalks will be weakened, and photosynthate will run short.

For corn that was flooded briefly and looks fine from the windshield, assessing damage is more challenging and could require 14 days or more before symptoms are fully observable. Cut ear shanks and cornstalks to expose potential rots. Gray and or flaccid regions indicate compromised stalks or ear shanks, and those plants are lost.

Be Ready for the "Yellow Flash"

- Flooded corn often turns yellow or stunted. This is due to an inability to take up nitrogen and other nutrients under saturated conditions, rather than a lack of nitrogen in the soil. The nutrients are in the soil. The plant cannot access them until it develops new root hairs.
- The yellow flash usually occurs a few days after flood events. It usually is not subtle, and the corn plants seem to go from green to yellow "overnight". (Not every field will have a yellow flash.)
- The "yellow flash" triggers a reflex in nearly every farmer and crop scout to want to apply more nitrogen fertilizer. Resist that reflex. Fungicide will not fix this. Nitrogen fertilizer most likely will not fix this and is even less likely to be economical.

Fungicides should not be used to help plants recover from water stress. They should only be considered if the remaining yield potential is high enough to justify the investment for specific disease control.

Long-Term Consequences and Harvest

Even if the corn survives, growers should prepare for long-term complications:

- Weak Stalks: As the plant prioritizes grain development over stalk integrity after a flood, stalks may become weak and prone to lodging.
- Mud and Photosynthesis: Mud left on leaves blocks photosynthesis and can carry pathogens.
- Harvest Strategy: Fields that were flooded but are still salvageable should be harvested as soon as possible for silage or grain to avoid losses from stalk failure.

On corn that was fully submerged, the evidence of survival should be clear in about 3 days after the flooding event. For corn that was partially flooded or in saturated fields, it may take 14 days or longer to identify if corn will survive. Avoid using nitrogen fertilizer or fungicides to try to rescue the crop. Neither one will.

Figure 2 Flooded corn with mud on the leaves and up to the ear.

Figure 3 Mud fully covering this leaf blocking photosynthesis. Photo submitted by a crop scout.

Resources

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Chicken Litter and Preplant Fertilizer Application Uniformity Matters

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Chicken litter is a nutrient source that many growers in western Kentucky use to fertilize their crops. According to the University of Kentucky AGR-168 publication, a ton of broiler litter can contain up to 60 lb each of nitrogen (N), phosphate (P_2O_5), and potash (K_2O), in addition to secondary and micronutrients such as calcium (Ca), sulfur (S), zinc (Zn), boron (B), and chloride (Cl). Although only a portion of these nutrients become available to the crop during the first growing season, an application of 2 tons per acre can still supply a substantial share of a crop's nutrient requirements.

That said, crop response to chicken litter depends on many factors, including soil conditions, nutrient availability, and application uniformity. This year a grower applied 3 tons per acre of chicken litter to a field that had recently undergone drainage tile installation and extensive dozer work. To determine whether additional fertilizer would provide a benefit, the grower also applied preplant ammonium sulfate (AMS) and diammonium phosphate (DAP) in strips across the field.

The imagery was retrieved on May 24, 2026, and the Triangular Greenness Index (TGI; visible-spectrum vegetation index derived from red, green, and blue reflectance values and designed to estimate canopy greenness and relative chlorophyll content. Higher TGI values generally indicate greater vegetation vigor and photosynthetic activity) was calculated using the QGIS package. Results revealed noticeably greater crop vigor in areas that received supplemental fertilizer compared with areas fertilized solely with chicken litter. While this response may indicate that additional nutrients benefited the crop, several factors could have contributed to the observed differences. Recently disturbed soils often experience changes in soil structure, organic matter distribution, microbial activity, and nutrient cycling, potentially changing crop's response.

The most striking observation, however, was another pattern of crop growth across the field. As shown in the figure below, distinct vertical and horizontal bands of varying crop vigor closely matched the apparent spread pattern of the chicken litter application. Green bands indicate the center of the spread swath, whereas the whitish-yellow bands represent the lateral edges of the spread swath. Large red areas indicate locations where the soil surface was disturbed by bulldozer activity. This pattern suggests that application uniformity may have been a major factor influencing crop performance. Uneven distribution of litter can create areas with substantially different nutrient availability, resulting in non-uniform crop growth and development throughout the season.

Another important consideration is the variability in nutrient availability from poultry litter. Unlike commercial fertilizers, which provide nutrients in a more predictable form, nutrient release from chicken litter depends on environmental conditions, microbial activity, litter composition, and storage practices. Consequently, portions of the field receiving lower litter rates may have experienced greater nutrient limitations than areas receiving heavier applications.

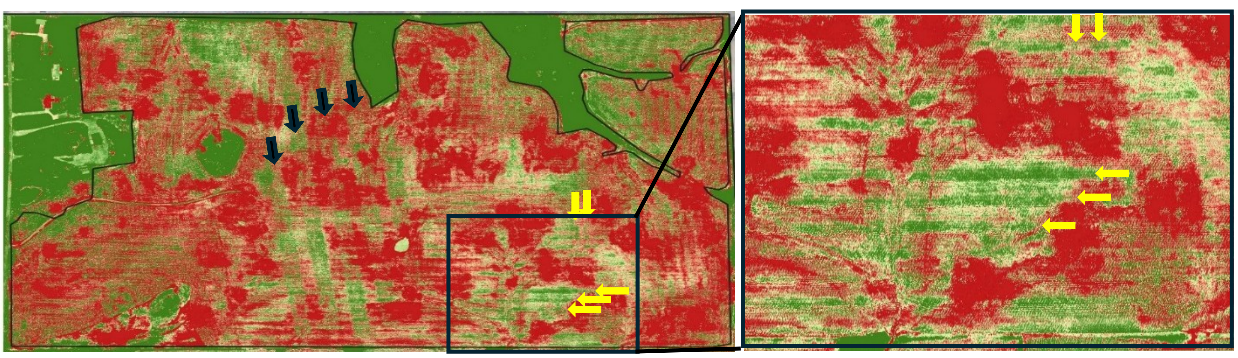
The condition of the litter prior to spreading may have further contributed to the uneven pattern observed in the field. The grower based the application rate on the expected dry weight of the litter; however, the litter had been stockpiled outdoors and exposed to rainfall before application. The absorbed moisture likely increased the weight of the litter and may have altered its flowability and spreading characteristics. Wet litter often spreads less uniformly than dry litter, potentially reducing effective swath width and creating streaks of over- and under-application across the field. The banding pattern visible in the imagery is consistent with this possibility.

These observations highlight several important management considerations. Poultry litter remains an excellent and generally economical nutrient source, but its effectiveness depends on more than simply applying the correct rate. The following are critical to maximize nutrient use efficiency and achieve uniform crop growth:

1. Proper storage to minimize exposure to rainfall,
2. careful calibration of spreading equipment,
3. verification of actual litter moisture content, and
4. attention to spread uniformity

Additional evaluation, including yield monitor data and post-harvest nutrient assessments, would help determine the extent to which the observed differences in crop vigor translated into differences in grain yield and economic return.

Figure 1. Left): Triangular Greenness Index (TGI) map of a 175-acre field illustrating the spatial patterns associated with preplant fertilizer and chicken litter application in early April. Imagery was acquired on May 24, 2026. Black arrows indicate preplant fertilizer application tracks and direction. Yellow arrows show the crisscross application of chicken letter. Red areas represent zones of



reduced crop vigor and growth, including locations where the soil surface was disturbed by bulldozer activity (large red patches). Green areas indicate greater crop vigor and growth, while the large green region corresponds to a wooded thicket adjacent to the field. Right): Zoomed-in area of the left map.

Another notable feature revealed by the TGI imagery (as well as RGB) is the spatial pattern associated with preplant fertilizer application. As shown in the figure below, distinct green bands corresponding to fertilizer application passes are clearly visible, while adjacent areas exhibit lower TGI values. This pattern suggests potential variability in fertilizer distribution and indicates that the fertilizer truck swath width and overlap settings may warrant further evaluation to improve field uniformity.

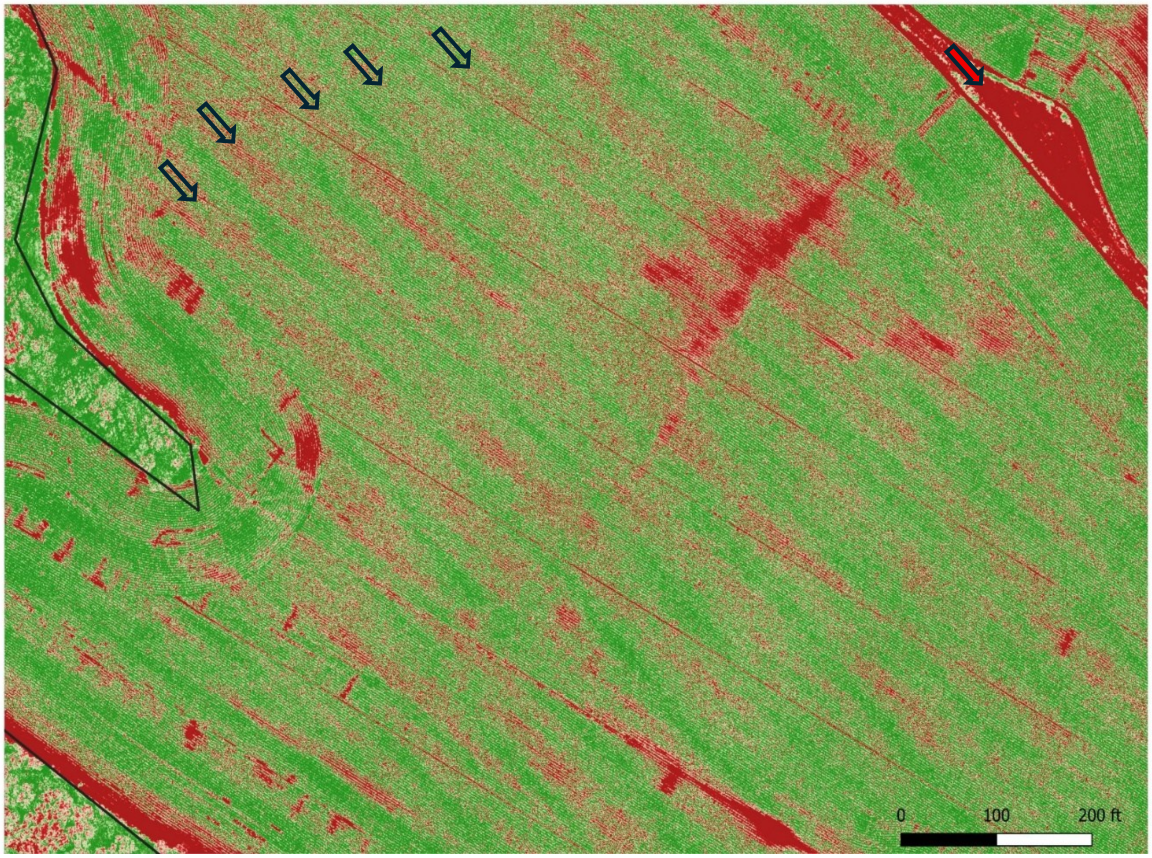


Figure 2. Triangular Greenness Index (TGI) map illustrating fertilizer application swath patterns and spatial variability in crop vigor in a different field. The field is zoomed in for better visibility of the fertilizer truck swath width. Green bands (black arrows) correspond to the center of the fertilizer spread swath and are associated with greater crop vigor, whereas red bands (areas between black arrows) indicate areas with lower TGI values, suggesting reduced crop vigor and potentially lower fertilizer coverage.

The aerial imagery collected on May 29 and June 12 clearly reveals a persistent striping pattern across multiple fields, characterized by alternating dark green and light green bands aligned with the direction of fertilizer application. The darker bands indicate areas of greater crop vigor and likely higher nutrient availability, whereas the lighter bands suggest zones of nutrient deficiency. The consistency of these patterns over time, as well as their occurrence across different fields and equipment setups, strongly indicates a systemic issue with dry fertilizer distribution rather than localized soil variability or short-term environmental effects. The regular spacing and sharp contrast between bands are typical of uneven lateral spreading associated with improper calibration, incorrect swath width, or product segregation in blended fertilizers such as AMS and DAP. Although some variability in application rate is expected at the field scale, the magnitude observed in these images suggests substantial over- and under-application, leading to reduced fertilizer use efficiency and likely economic loss. This highlights the importance of accurate spreader calibration and validation of distribution patterns to ensure uniform nutrient application and optimize crop productivity.

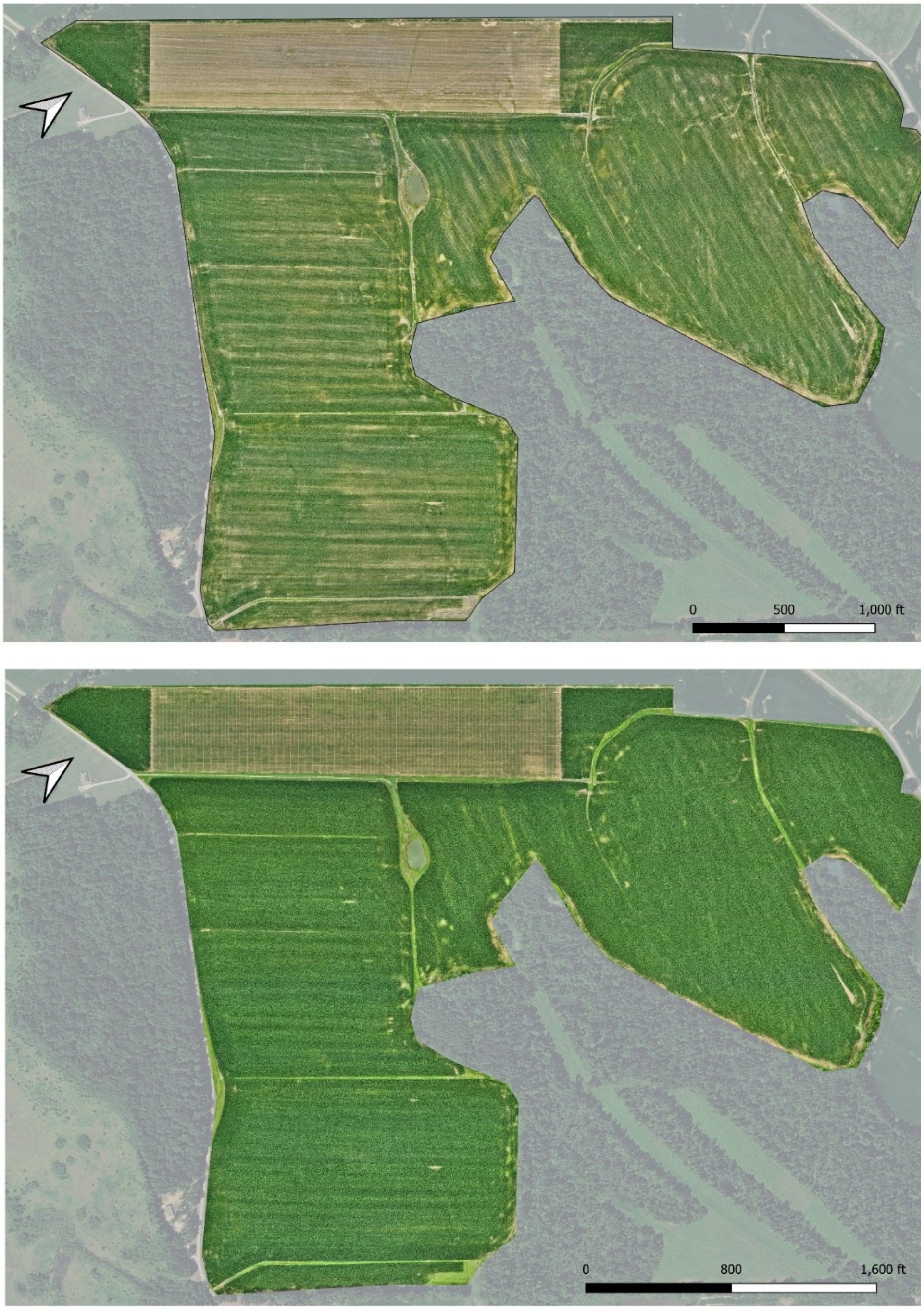


Figure 3: Aerial imagery of agricultural fields on May 29 (top) and June 12 (bottom) showing pronounced striping patterns following AMS and DAP application. Alternating dark green and light green bands indicate substantial variability in fertilizer distribution, with darker bands reflecting higher crop vigor and nutrient availability, and lighter bands indicating deficiency.

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Canola Shattering Causes Harvest Losses and Weeds in Double-Crop Soybean

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Canola acreage continues to expand across western Kentucky because it offers an attractive alternative to wheat in the current production systems. Strong market prices and good returns have encouraged more growers to include canola in their rotations. However, the way canola is harvested can have important consequences for the crop that follows; double-crop soybean.

Unlike wheat, canola is highly susceptible to harvest losses because its small seed can shatter easily when pods are disturbed by the combine. During this year's harvest, I visited fields from Christian County throughout the broader Purchase Area in western Kentucky to observe harvest operations and evaluate where seed losses occurred. Environmental shattering before harvest was generally negligible, even in the more shatter-prone variety PT-303.

Although some seed loss at the header is unavoidable, combine operation had a large influence on the amount of seed left in the field. Higher travel speeds and excessive fan speeds increased harvest losses, whereas operating at approximately 2–3 mph with properly adjusted combine settings reduced the amount of shattered seed. Although PT-303 had better resistance to white mold, lodging, aphids, and spring frost which yielded higher than PT-314, the latter shattered less during harvest. Because canola seed is extremely small, even seemingly minor losses can be significant. Approximately 115 seeds per square foot represents a loss of about one bushel per acre, illustrating how quickly harvest losses can accumulate.

Figure 1. Shattered canola seeds in PT-314 (left) and PT-303 (right). Keep in mind it was not harvested by the same combine. One of the three combines operated a little aggressively.

Figure 2: Canola harvest loss. The photo was taken directly behind the combine.

Figure 3: Varietal difference of canola. PT-314 had darker stems at harvest and lodged due to stem splitting and other fungal disease (left) whereas stems in PT-303 were still green with no lodging.

While these losses directly reduce canola yield, they may create an even greater challenge for the following soybean crop. Canola seed remaining on the soil surface readily germinates after rainfall, often emerging at the same time as double-crop soybean. In addition, canola plants cut during harvest may regrow from surviving stems, creating another source of volunteer plants.

Volunteer canola competes with soybean for sunlight, water, and nutrients during early establishment and can complicate weed management throughout the season. Depending on the herbicide program and canola hybrid, additional POST herbicide applications may be needed to achieve satisfactory control, which increases production costs while adding another management decision during an already busy season.

As double-crop soybean acreage continues to increase in Kentucky, minimizing volunteer canola should begin before soybean is planted, during canola harvest. Reducing harvest losses through proper combine adjustment, moderate harvest speeds, and timely harvest not only protects canola yield but also reduces volunteer pressure in the following soybean crop. While breeding shatter resistance in canola hybrids requires time and industry innovation, desiccating canola at a proper stage and following harvest guidelines can greatly alleviate the problem. Furthermore, a few minutes spent optimizing combine settings can save both bushels of canola and dollars spent managing volunteer plants in soybean.

Figure 4: Volunteer canola in double crop soybean and secondary growth of canola (left). Double crops soybean sprayed with Liberty and Sequence killing volunteer canola.

Figure 5: Canola regrowth at the plant base competes with double-crop soybeans and requires active management

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Remembering Dr. Bob Pearce

Tobacco and hemp growers and the University of Kentucky lost a dedicated extension specialist, colleague, and friend when Dr. Bob Pearce passed away on May 22, 2026, after a short but courageous fight with cancer. Bob Pearce began his career as a Tobacco Extension Specialist at the University of Kentucky in 1994, contributing over 32 years of extension and academic service. In 2019, he expanded his leadership by becoming the director of the Hemp Research and Extension program. Highly respected as a researcher and extension specialist, Bob became a trusted, sought-after source of unbiased research-based information on all aspects of tobacco and hemp production. Known for his unwavering availability for growers, he never left a call unanswered. This strong commitment was deeply appreciated by the agricultural community, which placed its lasting trust and respect in his technical support and expertise.

Bob was an international authority on conservation tillage and no-till tobacco production. Bob was a firm believer in showing growers how a concept could work on their farm. Bob spent hundreds of hours and drove thousands of miles hauling no-till tobacco setters around Kentucky to tobacco farms to help growers learn how no-till tobacco production could be successful on their farms and be more environmentally sustainable than their current intensive tillage practices. When Bob Pearce showed up on their farm, these growers not only got the free use of a no-till tobacco setter, but more importantly got the one-on-one expertise of one of the foremost authorities in the world on no-till tobacco. Over his 32-year career, Bob conducted over 200 on-farm research trials in growers' fields across Kentucky on conservation tillage, variety testing, topping and grading, tobacco fertility, disease control, and countless other topics. County grower meetings where extension specialist share and interpret research information to make it most understandable and impactful to growers are the trademark of a good extension program. Bob Pearce was a master at interpreting research results to make it not only understandable to growers, but impactful enough where many would try a new practice themselves the following year. Tobacco growers had absolute trust in all information that Bob Pearce had to share.

Bob's contributions to extension were well recognized by the tobacco industry. He received the Outstanding Extension Specialist Award from the Kentucky Association of County Extension Agents in 2013, and the Leadership Award from the Burley Tobacco Growers Cooperative in 2014. A natural leader, he chaired the Tobacco Workers Conference twice (2010 and 2020) and headed the Tobacco Science Research Conference in 2025. Bob served as editor for Tobacco Science journal for the last 10 years and held the prestigious title of Philip Morris Endowed Professor from 2018 to 2024.

Recognizing hemp's potential as a viable alternative for tobacco growers looking to apply their existing expertise, Bob began conducting isolated field trials with hemp in 2016. By 2019, he stepped into the role of director of the UK Hemp Research and Extension program. His program embodied this synergy, targeting immediate questions that growers and processors needed answers to, including seeding protocols, germination studies, seed quality, and comprehensive pest management evaluations. Locally, he provided extensive support to several colleagues and laboratories interested in hemp research, which led to numerous peer-reviewed publications and extension materials.

Deeply committed to his community and the new generations coming behind him, he also led the Kentucky 4-H Agricultural Land Judging and Homesite Evaluation, as well as the State Fair Tobacco Judging and Exhibits, even developing extension publications to aid students in land judging. Over the course of his career, he took great pride in mentoring 17 MS and PhD students as their advisor or co-advisor, guiding their research in tobacco and hemp.

Bob's collaborative and extension spirit reflected his kindness and passion for agriculture. Working directly with him was a true opportunity to learn about leadership and teamwork. Always open to listening and receptive to different points of view, he created a consistently respectful educational and professional environment. A true advisor and mentor, he served others until his final days.

University of Kentucky
Corn, Soybean & Tobacco Field Day

July 21, 2026

UKREC 300 Extension Rd., Princeton KY
8:00 am – 12:00 pm central time

*Register for free click link **2026 Corn, Soybean & Tobacco Field Day** or scan QR Code*

Topics include:

- 2026 Corn Disease Update - Kiersten Wise
- Managing the silent yield robber: soybean cyst nematode – Carl Bradley
- Row Crop Edge-of-Field Water Quality Monitoring in Kentucky - Brad Lee
- Stink Bug Management in Soybeans and Corn Leafhopper Updates in Kentucky – Felipe Batista
- 2026 Weed Control Update – Travis Legleiter
- Soil fertility update – John Grove
- Corn Emergence Uniformity Affected by Tillage and Cover Crop Management – Chad Lee & Emily Marsh
- 2026/27 Corn and Soybean Outlook – Grant Gardner
- Pre-purchasing input strategies for 2027 – Jordan Shockley
- Dark Tobacco Update: Dark Air-cured Tobacco Production for Nicotine Extraction – Andy Bailey
- Burley Tobacco Update: Burley Plant Population Effects and Stand Loss Thresholds – Mitchell Richmond
- Long-Term Effects of Crop Rotation and Tillage on Burley Tobacco Yield - Shelby Spiggle

EDUCATIONAL CREDITS:

<u>CCA</u>	Grain Crops IPM Tour: integrated Pest Management (1.0) Grain Crops Agronomic/ Economics Tour: Soil & Water Mgmt (1.0), CM (0.5) Tobacco Tour: Crop Mgmt (1.5)
<u>Pesticide</u>	Grain Crops IPM Tour: (1hr. Cat 1A,1 hr. Cat 10) Grain Crops Agronomic and Economic Tour: (1 hr. Cat 1A, 1 hr. Cat 10) Tobacco Tour: (1 hr. Cat 1A, 1 hr. Cat 10)

KYCORN

Kentucky Soybean Board

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Upcoming Events

2026

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

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

2027

Kentucky Crop Health Conference, Bowling Green, KY
Feb 4, 2027