# Kentucky Field Crops News

Spanning 5 departments and 120 counties

April 2025, Volume 01, Issue 04

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

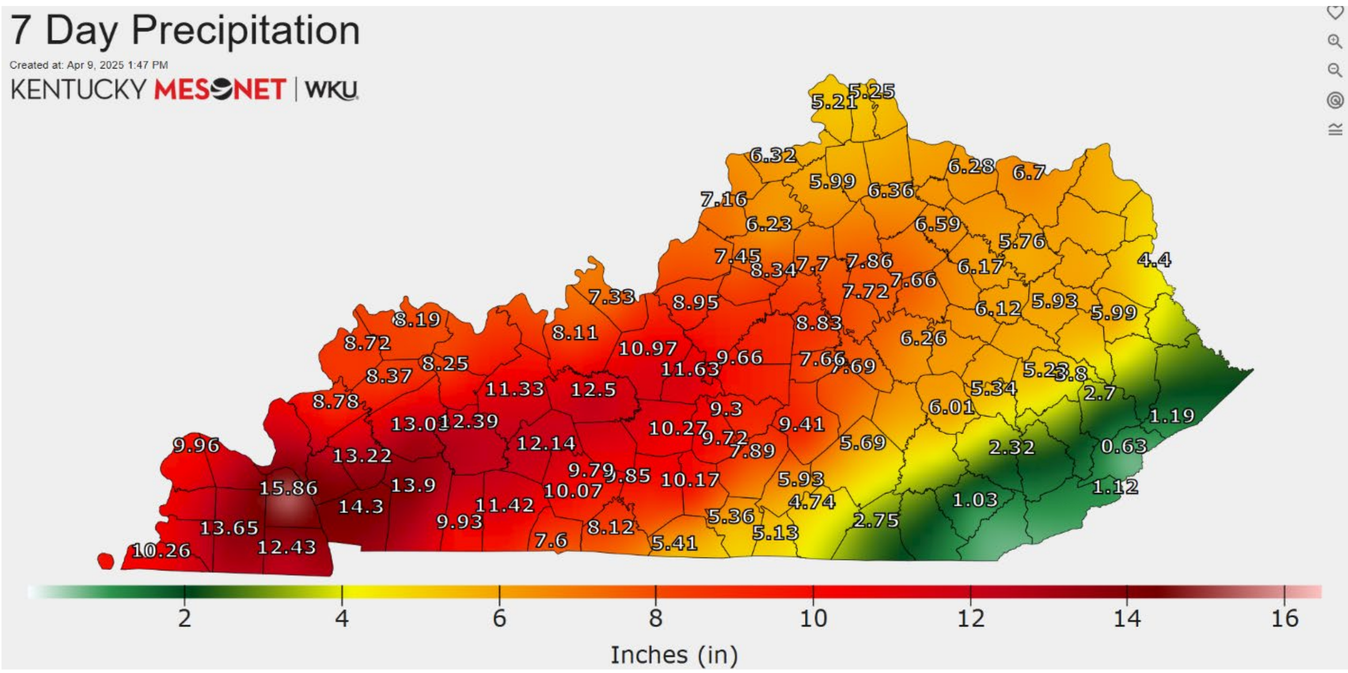
UK Wheat Science Group
UK Corn & Soybean Science Group

*In This Issue*

# A Soggy and Cool Start to Spring Planting 2025

**Matt Dixon, UK Senior Meteorologist**

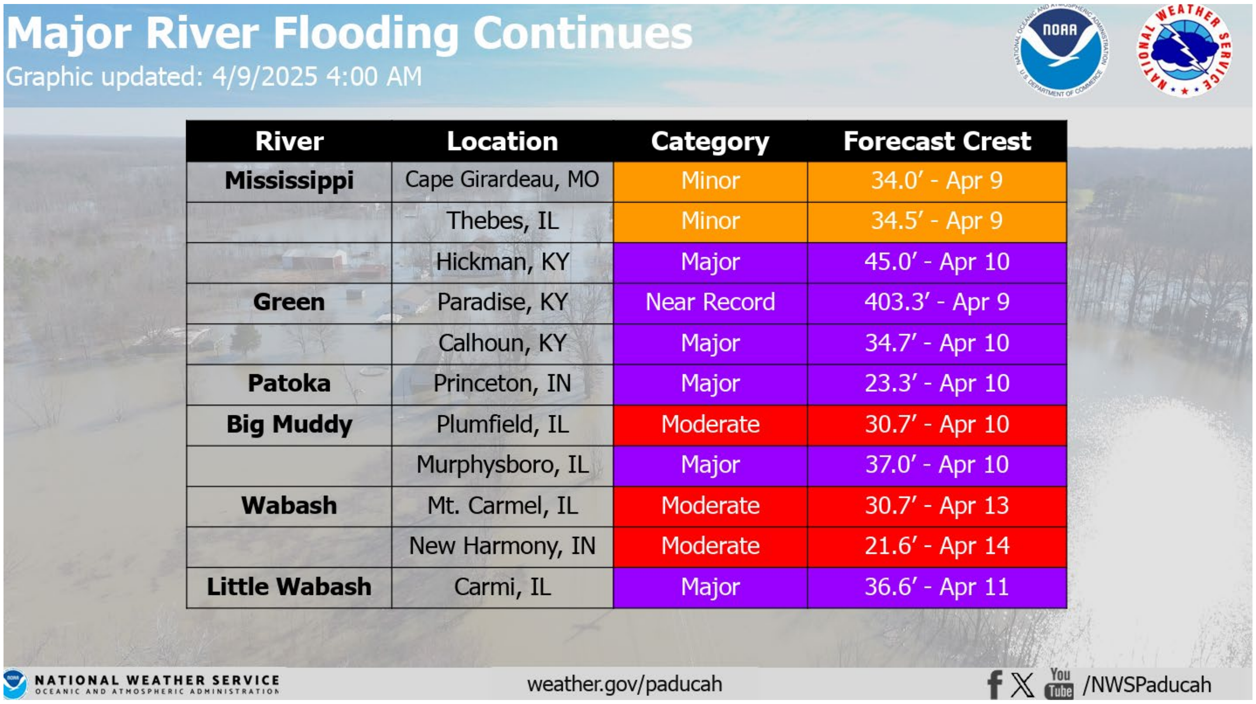
Between relentless rainfall and subfreezing temperatures, the start of this growing season has been anything but ideal. According to data from the Ag Weather Center, Kentucky averaged 7.56 inches of rain last week. However, rainfall totals varied widely across Kentucky, ranging from a staggering 15.87 inches at the Marshall County Mesonet station to a mere 0.63 inches in Letcher County. As shown in the map below, much of Western and Central Kentucky exceeded 10 inches of rainfall (map below, courtesy of the Kentucky Mesonet).




To put these figures into perspective, areas receiving more than 10 inches of rain accumulated over 20% of their annual average in just four days. Kentucky typically only averages 4.73 inches of rain for the ENTIRE month of April. Preliminary data indicates that this month's average of 7.56 inches would rank as the fourth wettest April in state history—with more than half the month remaining. The record, set in 2011, stands at 12.07 inches.

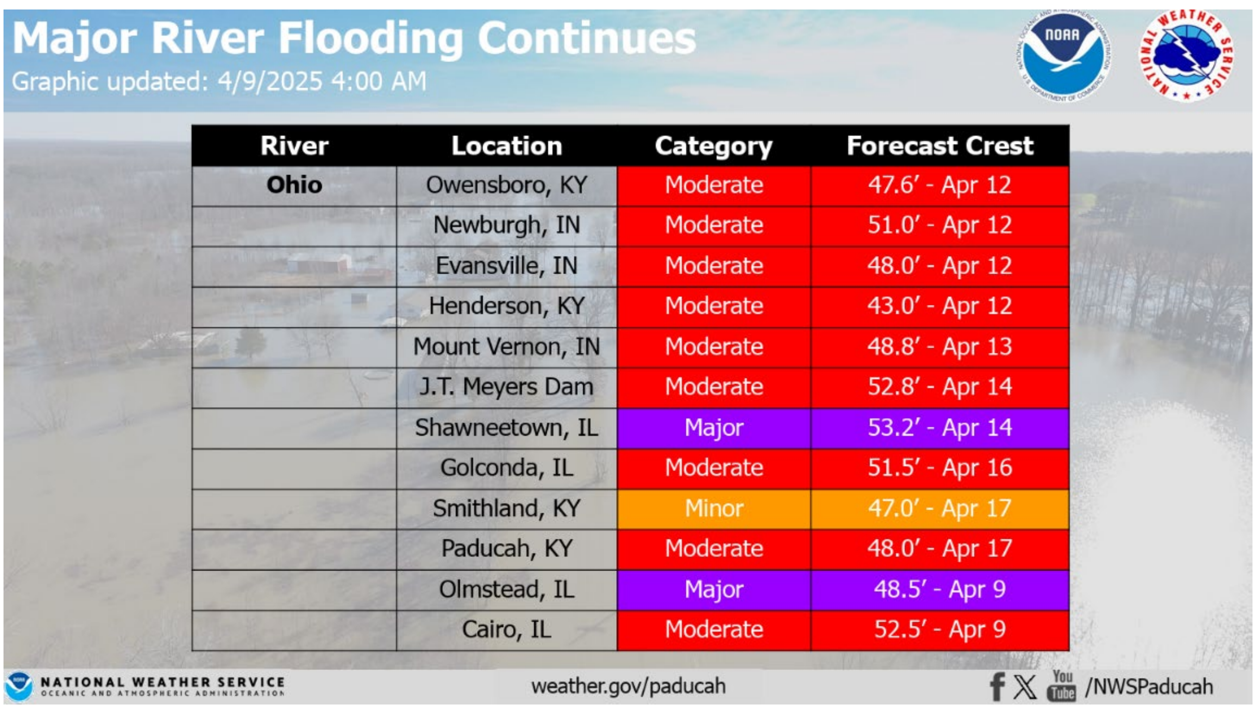
The recent rainfall has been truly historic, resulting in extensive flooding across Kentucky, with impacts expected to persist in the weeks ahead. Major and moderate river flooding remains a concern at numerous locations statewide. For detailed information specific to your area, follow this link to access a clickable map featuring river gauges across Kentucky, including observed and forecast flood stages.

Looking at the data, most rivers in Central Kentucky have already reached their crest and are beginning to recede, while many Western Kentucky are projected to crest within the next week. The graphic below from the National Weather Service in Paducah provides an excellent summary of this information.



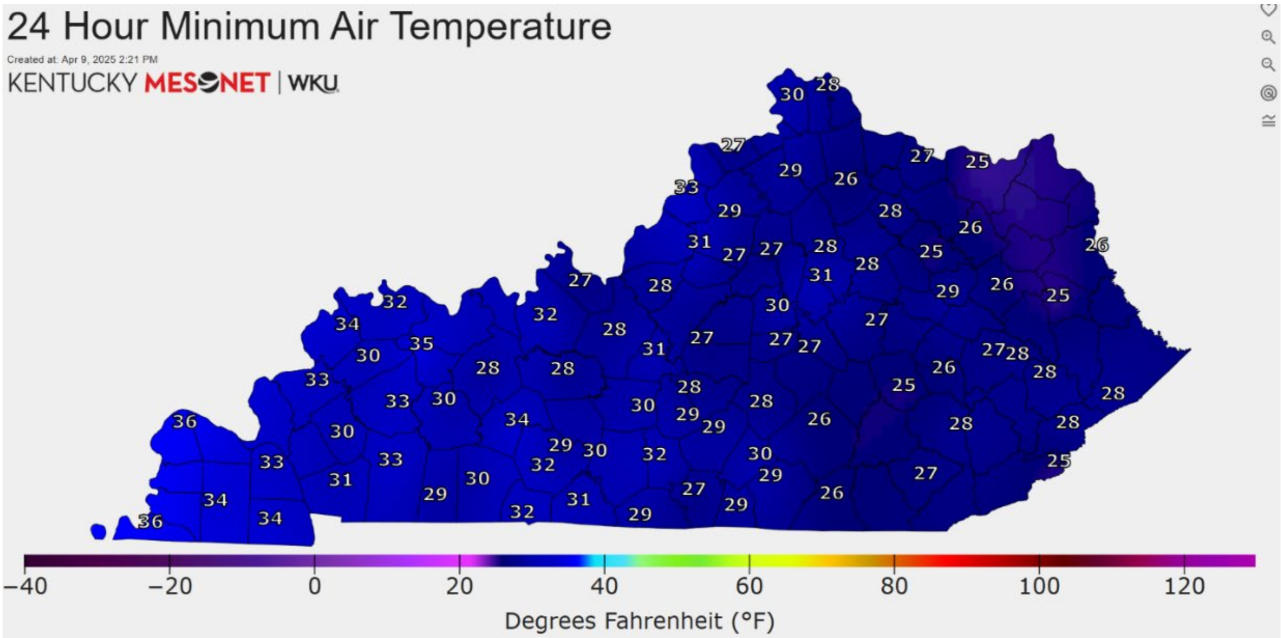

| River | Location | Category | Forecast Crest |
|---|---|---|---|
| Mississippi | Cape Girardeau, MO | Minor | 34.0' - Apr 9 |
| | Thebes, IL | Minor | 34.5' - Apr 9 |
| | Hickman, KY | Major | 45.0' - Apr 10 |
| Green | Paradise, KY | Near Record | 403.3' - Apr 9 |
| | Calhoun, KY | Major | 34.7' - Apr 10 |
| Patoka | Princeton, IN | Major | 23.3' - Apr 10 |
| Big Muddy | Plumfield, IL | Moderate | 30.7' - Apr 10 |
| | Murphysboro, IL | Major | 37.0' - Apr 10 |
| Wabash | Mt. Carmel, IL | Moderate | 30.7' - Apr 13 |
| | New Harmony, IN | Moderate | 21.6' - Apr 14 |
| Little Wabash | Carmi, IL | Major | 36.6' - Apr 11 |

However, it's important to note that these are forecasted crests—it will take time for the rivers to fully recede. In the Purchase area, current forecasts indicate the Ohio River at Cairo and Mississippi River at Hickman will remain in moderate flood stage through April 22$^{nd}$.




| River | Location | Category | Forecast Crest |
|---|---|---|---|
| Ohio | Owensboro, KY | Moderate | 47.6' - Apr 12 |
| | Newburgh, IN | Moderate | 51.0' - Apr 12 |
| | Evansville, IN | Moderate | 48.0' - Apr 12 |
| | Henderson, KY | Moderate | 43.0' - Apr 12 |
| | Mount Vernon, IN | Moderate | 48.8' - Apr 13 |
| | J.T. Meyers Dam | Moderate | 52.8' - Apr 14 |
| | Shawneetown, IL | Major | 53.2' - Apr 14 |
| | Golconda, IL | Moderate | 51.5' - Apr 16 |
| | Smithland, KY | Minor | 47.0' - Apr 17 |
| | Paducah, KY | Moderate | 48.0' - Apr 17 |
| | Olmstead, IL | Major | 48.5' - Apr 9 |
| | Cairo, IL | Moderate | 52.5' - Apr 9 |

Adding to the challenges posed by excessive rainfall, temperatures plummeted over the past couple of nights. With agriculture becoming increasingly vulnerable, the National Weather Service issued the first freeze warnings of the spring season. The Kentucky Mesonet recorded low temperatures on the morning of April 9$^{th}$ in the mid-20s to mid-30s (map below).




Typically, low temperatures for this time of year range in the low to mid-40s, making these readings significantly below normal—though not entirely unusual.

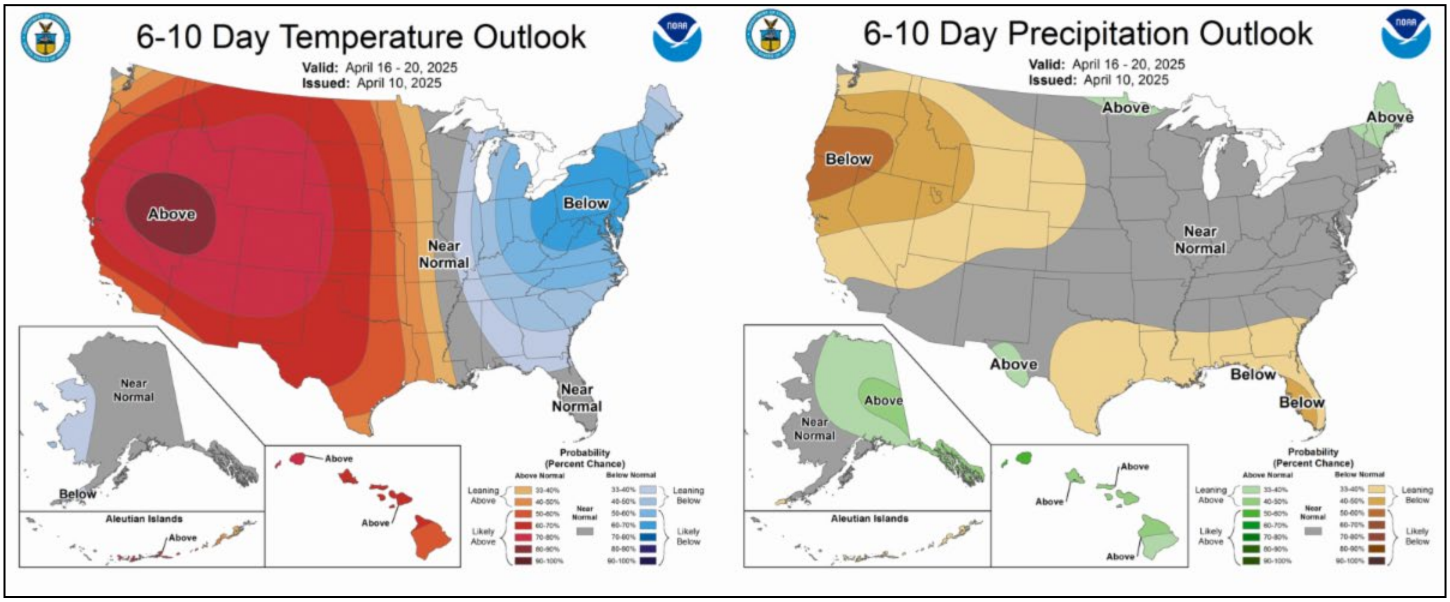
For additional context, I've included a table showing the average last freeze dates for various locations across Kentucky. While much of Western Kentucky has already passed this point, Central and Eastern Kentucky are still roughly a week or two away.

| **Average Date of Last Spring Freeze (1991-2020 Normals)** | | | |
|---|---|---|---|
| ASHLAND, KY US | 4/22 | LEITCHFIELD 2 N, KY US | 4/26 |
| BARBOURVILLE, KY US | 4/19 | LEXINGTON BLUEGRASS AP, KY US | 4/13 |
| BARDSTOWN 5E, KY US | 4/13 | LONDON CORBIN AP, KY US | 4/15 |
| BARREN RVR LAKE, KY US | 4/12 | LOUISVILLE INTL AP, KY US | 3/31 |
| BEATTYVILLE 4N, KY US | 4/12 | MADISONVILLE, KY US | 4/02 |
| BOWLING GREEN WARREN CO AP, KY US | 4/05 | MAMMOTH CAVE, KY US | 4/09 |
| CINCINNATI NORTHERN KY AP, KY US | 4/18 | MAYSVILLE WWTP, KY US | 4/18 |
| CYNTHIANA, KY US | 4/18 | MONTICELLO 3 NE, KY US | 4/18 |
| DIX DAM, KY US | 4/07 | MT STERLING, KY US | 4/24 |
| ELIZABETHTOWN WP CS, KY US | 4/16 | MT VERNON, KY US | 4/18 |
| FRANKFORT CAPITAL CITY AP, KY US | 4/15 | MURRAY, KY US | 4/05 |
| GLASGOW, KY US | 4/09 | NOLIN RVR LAKE, KY US | 4/22 |
| GRAYSON 2 E, KY US | 4/27 | PADUCAH, KY US | 4/05 |
| GREENSBURG, KY US | 4/15 | PAINTSVILLE 1E, KY US | 4/19 |
| HENDERSON 8 SSW, KY US | 4/04 | PRINCETON 1 SE, KY US | 4/11 |
| HODGENVILLE LINCOLN P, KY US | 4/16 | QUICKSAND, KY US | 4/19 |
| HOPKINSVILLE, KY US | 4/04 | SOMERSET 2 N, KY US | 4/05 |
| JACKSON, KY US | 4/06 | WILLIAMSTOWN, KY US | 4/11 |

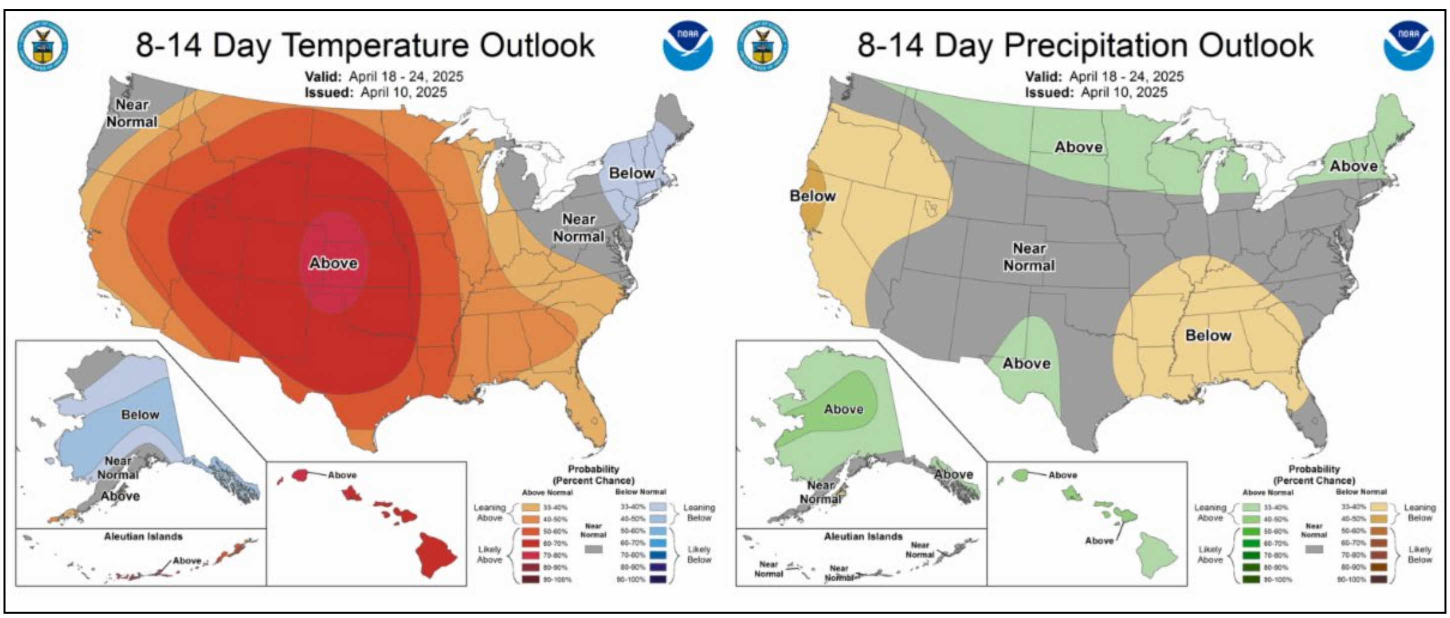
**Data Courtesy**: National Centers of Environmental Information, https://www.ncei.noaa.gov/access/search/data-search/normals-annualseasonal-1991-2020

Looking ahead, outside of some light rain accumulations on Monday (April 14th), we're mostly dry until later next workweek. Looking at temperatures, frosty mornings are possible on Saturday and Sunday, but temperatures should rebound nicely, with highs climbing into the 60s and 70s by Sunday. As is often the case during spring, the lingering question remains: how long will the warmth stick around?

Shifting focus to the long-term outlooks, the forecasts are looking more promising compared to the past couple days! For April 16-20, the 6-10 day outlook predicts below-normal temperatures with near-normal precipitation.




Moving into the 8-14 day outlook (April 18-24), there's a higher likelihood of above-normal temperatures making a return, paired with below-normal precipitation.




Looking even further ahead to the 3-4 week outlook (April 19-May 2), above-normal precipitation is expected, while temperature trends remain uncertain. What does this mean for planting in 2025? While it's been a slow start, a "glass half full" approach reveals encouraging signs: no indications of severe cold air outbreaks or heavy rainfall events ahead.

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**Matthew Dixon, UK Senior Meteorologist**
(859) 568-1301 matt.dixon@uky.edu

## Kentucky Weather Alert App

This ad-free app from the UK Ag Weather Center is an excellent resource for staying safe and informed. It provides daily and hourly forecasts, high-resolution radar, National Weather Service alerts sent directly to your phone, and a link to this update. Without any distracting ads, this app can act as another reliable warning source during tonight's severe weather. Be sure to check it out by scanning or clicking the QR codes below to download the app on both iOS and Google Play platforms

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# After a Big Rain:
# N Loss, Erosion, and Other Things

John Grove, Chris Teutsch, Edwin Ritchey, Brad Lee, and Glynn Beck

As we write this article, it is still raining – towards an unknown but large amount of rainfall (Fig.1). Credit for stimulating this piece goes to Andy Mills (Meade County ANR agent) and Chris Teutsch, who started the conversation around Andy's question about potential loss of fertilizer nitrogen (N) from recently fertilized hay and pasture fields. We hope to help folks understand what we do and don't know about what happens in these unusual situations. Three basic scenarios; fertilized grass (hay and pasture), fertilized wheat, and fertilized fields intended for corn are discussed. The story has been expanded a bit to cover some other questions that are asked after events like this.

Figure 1. Ponded water in a Caldwell County wheat field. Photo courtesy of Edwin Ritchey.

***Factors impacting N loss in grasslands.*** With heavy rain like this, fertilizer N loss from fertilized grass sods depends on several factors: 1) the length of time between the rainfall event and the fertilization event; 2) the ability of the sod to take up the applied N (is sod actively growing and dense enough both above and belowground (and rooted deep enough belowground); and 3) the amount of N applied. The Kentucky grasslands that have been fertilized are made up of cool-season grasses that take up nutrients at air/soil temps above 40 $^oF$ and are actively growing at 55 $^oF$. Stronger (thicker, denser, and deep rooted) sods took up more fertilizer N each day before this heavy rain began. That said, there will be a larger amount of unused fertilizer N when the number of days between fertilization and rainfall were fewer and/or with a larger rate of N application relative to N uptake by the grass. More N will be lost when 80 lb N/acre was applied 4 days before this rainy period to an overgrazed pasture that is thin above ground and not deeply rooted than when 50 lb N/acre was applied 12 days ago to a hay field with a thick stand and well-developed root system. As the crop is perennial, a grassland field's N nutritional status can be adjusted later in the season, in anticipation of future harvests.

***Factors impacting N loss in wheat fields.*** Kentucky wheat fields are actively growing, and most have received the full amount of fertilizer N intended for this season. The same three factors: length of time between rainfall and N fertilization; ability of the growing wheat to take up the N fertilizer; and the amount of N applied all impact N loss. Whether the N was applied in a single dose or split applied is another factor. Wheat has been growing for the past 6 to 7 weeks, taking up both soil and fertilizer N. Better stands with more tillers and more tiller development will have acquired more N – especially if planted earlier and fertilizer N was split into two applications. Fertility programs were essentially complete by 15 March in many Kentucky wheat fields. Still, more N probably remains in the soil, and N loss potential is greater, when 120 lb N/acre was applied on 15 March to a wheat field planted on 15 November than when 60 lb N/acre was applied on both 20 February and 15 March to a wheat field planted on 15 October. The latter likely had greater tiller numbers, tiller growth and rooting depth. At this stage of Kentucky wheat crop growth and development, much of any yield loss will be due to the duration of saturated soil conditions/ponding (low oxygen) and not due to low soil N status. Wheat has taken up much of the fertilizer N (that it could take up). A yield benefit to additional N is less likely. Additional N applied as these soil conditions improve to support field traffic is more likely to improve grain protein levels than yield.

***Factors impacting N loss in fields intended for corn.*** At this time, N losses are probably more important in N fertilized fields intended for corn than in wheat, hay or pasture fields. Very little corn has been planted. There may be some living plant cover (either weeds or cover crops) that could take up fertilizer N in these fields, and the same considerations as indicated for a living grass sod would apply, though the root system under most winter weeds and cover crops tends to be less extensive/deep. However, in western Kentucky many weeds and cover crops have already been terminated and pre-plant N fertilization rates can be large (Fig. 2). The terminated plant cover remains important to controlling another big driver of N loss from these corn fields – soil erosion. Any surface tillage, even vertical tillage, loosens the soil, breaks up residues and accelerates both soil erosion and crusting (which causes even lower infiltration and more runoff). Even if surface applied fertilizer has dissolved and moved into soil aggregates, out of the reach of leaching and before denitrification has started, heavy rainfall can exceed soil infiltration rates, causing runoff to erode nutrient-rich topsoil.

Figure 2. Ponded water in a Caldwell County row-crop field where the cover crop has been terminated. Photo courtesy of Edwin Ritchey.

***Runoff and erosion drive N losses in fields intended for corn.*** At present, runoff and eroded soil nutrient losses are less likely in grassland and wheat fields because the soil is covered with living plants. Runoff water from small watersheds located in Kentucky row-crop farm fields is being collected and analyzed for nutrient amounts and forms (Table 1). The particulate/organic forms of these nutrients are entirely due to erosion of mineral particles and organic matter while the dissolved nutrients are more directly derived from fertilizers. From 40 to 50% of runoff-borne N and phosphorus (P) results from erosion. Potassium (K) loss patterns would likely be similar.

Table 1. Nitrogen (N) and phosphorus (P) losses over one crop cycle (2 years) from small watersheds under corn/full season soybean or corn/wheat/double crop soybean rotations.[3]

| Cropping System | Monitoring Stations | Nutrient | Total Loss | Particulate or Organic | Dissolved Inorganic |
|---|---|---|---|---|---|
| | | | lb/acre | --- % of Total Loss --- | |
| Corn – Soybean | 10 | N | 38 ± 19 | 53 | 47 |
| | | P | 9 ± 4 | 44 | 56 |
| Corn – Wheat – Soybean | 8 | N | 36 ± 21 | 41 | 59 |
| | | P | 6 ± 2 | 49 | 51 |

[3]Blue Water Farms on-farm project research results. Supported by five anonymous row-crop landowners/producers; USDA-NRCS-EQIP program; Kentucky Soybean Promotion Board; Kentucky Agricultural Development Board; University of Kentucky Agricultural Experiment Station; and Kentucky Geological Survey.

***Remaining fertilizer N is susceptible to leaching and denitrification***. The fertilizer N that remains is vulnerable to either leaching or denitrification. Those two modes of N loss are driven by other factors. These include the: 1) amount and rate of rainfall; 2) soil infiltration rate and duration; 3) soil drainage; 4) soil texture and structure; and again 5) length of time between the rainfall and fertilization events. Nitrogen fertilizers are very soluble and quickly dissolve into the pore water contained in moist soils - at this time of the year all Kentucky soils are moist. The dissolved N, whether urea (urea is soluble in water – is used in UAN: urea-ammonium nitrate solutions) or nitrate-N, diffuses throughout the pore water found both in and outside soil aggregates. The longer between N application and heavy rainfall, the more time for diffusion to carry dissolved N into aggregates.

***Leaching losses of N.*** When the soil infiltration rate is above average and the rainfall rate and/or rainfall quantity are high, the moving percolating water strips away (leaches) dissolved N that lies in pore water outside the soil aggregates. The percolating water moves especially well through larger pores (macropores) in well and moderately well drained soils. But the pore water found inside the aggregates is 'bypassed' by the macropore flow and the dissolved N therein is not leached. Tile drainage can increase macropore flow, soil water percolation rate and nitrate-N leaching, especially when fertilizer N application was only a few days before the heavy rain.

***Denitrification N loss is more important than leaching N loss in Kentucky***. Denitrification is the biological conversion of nitrate-N to dinitrogen ($N_2$) or nitrous oxide ($N_2O$), both gases. Although leaching is more immediate than denitrification because the latter is biologically driven and takes 2-3 days to get going, in Kentucky, denitrification N losses are more important because of the large number of acres with restrictive layers (e.g. fragipans) and poor drainage (both somewhat poorly and poorly drained) that impede water percolation, causing soil saturation and water ponding.

***Nitrogen source can impact N loss.*** Fertilizer N source can impact N loss potential after heavy rain (Table 2). Both leaching and denitrification losses start with nitrate-N. Applied UAN and ammonium nitrate are 25 and 50% nitrate-N at the outset, respectively, and losses can be more immediate than if urea was used. Injected anhydrous ammonia suppresses soil biology and biological N transformation in the injection volume for a time, remaining longer as ammonium-N. Use of a nitrification inhibitor (nitrapyrin/N Serve©, dicyandiamide/DCD or pronitridine/Centuro©) further delays nitrate-N formation and N loss. Well and moderately well drained (including tile drained) upland soils wet from a series of rains probably are more likely to have some leaching loss - will not experience much denitrification prior to draining. Soil in lower landscape positions that stays saturated longer will likely lose N to denitrification. Losses can be calculated by estimating 3 to 4 percent loss of fertilizer NO3-N for each day of saturation.

Table 2. Proportion of applied fertilizer N converted to nitrate-N at 0, 3 and 6 weeks after application.[4]

| Fertilizer N Source | --------Weeks After Fertilizer N Application-------- | | |
|---|---|---|---|
| | 0 | 3 | 6 |
| | ------------% of fertilizer N as nitrate-N-------------- | | |
| Anhydrous ammonia (AA, 82-0-0) | 0 | 20 | 65 |
| AA with nitrification inhibitor | 0 | 10 | 50 |
| Urea (46-0-0) | 0 | 50 | 75 |
| Urea with nitrification inhibitor | 0 | 30 | 70 |
| UAN[5] (28, 30, 32-0-0) | 25 | 60 | 80 |
| Ammonium Nitrate (34-0-0) | 50 | 80 | 90 |

[4]Table data compiled by Lloyd Murdock.
[5]UAN = urea-ammonium nitrate solutions.

*An example situation:* Farmer has applied 200 lb N/acre as urea to an 'intended for corn' field made up of somewhat poorly drained soils 3 weeks before the rain began. Because of the series of heavy rains, the field was saturated for ten days. How much N was lost? *Note: It is common that only portions of the field are saturated, and that the ponded field area decreases with time. This means that this calculation could be done to represent the best case, average, or worst case for the field.*

Step 1: Calculate the amount of applied N that was in the nitrate-N form when saturation began. According to Table 2, 50% of the urea-N was in the nitrate-N form three weeks after application and:

200 lb fertilizer N/acre x (50%/100%) = 100 lb nitrate-N/acre.

Step 2: Calculate the amount of fertilizer N loss. Pessimistically, only two days are needed for soil biology to begin the denitrification process, so the field denitrification losses occurred over the remaining eight days of saturation. Again, pessimistically, assume 4% was lost each of the eight days, so:

10 days of saturated soil – 2 days for microbes to start denitrification = 8 days of denitrification

4% of nitrate-N lost per day x 8 days = 32% of the nitrate-N calculated in Step 1 was lost

32% x 100 lb nitrate-N/acre = 32 lb of nitrate-N/acre lost

200 lb fertilizer N/acre – 32 lb nitrate-N/acre lost = 168 lb fertilizer N/acre remaining

*The N loss calculated in this example is not as high as many people would assume.*

***Soil nitrate testing.*** A soil nitrate-N test can help verify the calculated estimate of nitrate-N remaining in the field. Each soil sample should consist of about 15 cores taken to a depth of 12 inches, hand crushed and well mixed before filling a soil sample bag with the appropriate amount of soil and shipping immediately to a soil test lab (several labs, including Waters Ag Labs in Owensboro and Waypoint Analytical in Memphis, perform the test). Separate samples should be taken for upper and lower landscape positions, for well, moderately well, somewhat poorly and poorly drained soils, for fragipan and no-fragipan soils; and/or for undrained and tile drained field areas. Test results can be used to decide whether more N, and if yes, how much, is needed.

***Other things of note.*** Unattached crop residue tends to float, and wind will push it across ponded waters, leaving piles of residue at the water's edge as it drains away. Minimize loose residue with appropriate combine operation during harvest and by avoiding post-harvest residue mowing or tillage. Implementing these BMPs helps maintain a larger proportion of soil-attached residues that serve to limit floating residue movement and piling if ponded water is shallow. Figure 3 illustrates the consequences of depending on loose crop residue for erosion control.

Figure 3. Soil erosion in a no-till field covered with residue but lacking a good cover crop. Photo courtesy of Brad Lee.

Ending on the positive, soil compaction due to the weight of water over soil during ponding is truly not a problem. Soil scientists get asked about this regularly. Soil pores are filled with water (soil air is expelled) as ponding begins and water-filled soil can't be further compressed by the weight of water above.

Citation: Grove, J., Teutsch, C., Ritchey, E., Lee, B., Beck, G., 2025. After a Big Rain: N Loss, Erosion, and Other Things. *Kentucky Field Crops News*, Vol 1, Issue 4. University of Kentucky, April 11, 2025.

**Dr. John Grove,** **UK Soils Research & Extension**
(859) 568-1301 jgrove@uky.edu

**Dr. Chris Teutsch, UK Extension Forage Specialist**
(859) 562-1334 chris.teutsch@uky.edu

**Dr. Edwin Ritchey, UK Extension Soil Specialist**
(859) 562-1331 edwin.ritchey@uky.edu

**Dr. Brad Lee, UK Extension Water Quality Specialist**
(859) 257-0156 brad.lee@uky.edu

**Glynn Beck, UK-KGS Hydrogeologist**
(270) 827-3414 ext. 23 ebeck@uky.edu

# Flooding and Freezing Effects on Wheat and Corn

**Chad Lee, UK Extension Grain Crops Specialist**

Articles in this newsletter address the rainfall totals received since the first of April and the expected nitrogen losses from those conditions. There are other concerns about how the wheat crop will recover from the excessive rains. The following are some expectations and assumptions. Be cautious with these. Scouting fields around 7 to 14 days after the heavy rains (or after water recedes) will provide much better answers than the assumptions that follow.

Figure 1. Standing water in a wheat field in Central Kentucky.

## Wheat

Wheat fully underwater for several days most likely will not survive. In corn and soybeans, we expect 24 hours of submersion at air temperatures above 70 F to cause plant death. The weather was much cooler for wheat during this flooding and we do not have the same estimates on plant survival. Scouting 7 to 14 days after the water recedes will better identify if wheat will survive.

Wheat covered in mud from receding flood waters will have a poor chance of survival. Another rain event that washes the mud off the plants could help, but it is not likely.

Wheat on saturated soil but not submerged will be the hardest to scout. Again, waiting 7 to 14 days will help. The following is an expected order of events. Expected not predicted. Saturated soils are those where water has pushed all air out of the soil. The plant roots need oxygen in the root zone to survive. The lack of oxygen in the root zone will kill the root hairs quickly, preventing the plant from taking up nutrients. Once oxygen re-enters to the root zone, another three days or so are needed for new root hairs to grow and start taking up nutrients.

Meanwhile, the shoots are still conducting photosynthesis and the plants are attempting to grow. It is very common to see a corn or soybean field flash yellow after being saturated for a while. We should expect wheat fields to do the same after several days of good growing conditions. That yellow flash has more to do with dead root hairs than a lack of nitrogen in the root zone.

Most of the wheat across the state is in the jointing stages. During these stages, the plants are developing the heads that will eventually produce seeds. Nutrition disruptions during these stages could reduce head size which could lead to reduced yields. A newsletter article from Minnesota summarizing research papers suggests that wheat in saturated conditions for more than 10 days could result in yield losses of 20 to 50% (Wiersma 2024).

On top of the flooding, most of Kentucky experienced freezing temperatures one or two nights. Those freezing temperatures likely were not cold enough to result in damage to the wheat at the current growth stages. The colder weather bracketing the freezing temperatures may have helped the wheat survive the flooding a little longer.

## Corn

For corn planted just before the flooding, those seeds most likely are germinating. Four days of saturated soils likely will kill germinating corn seeds (Brehl et al. 2024). Soils saturated for one to six days could result in 6 to 61% yield loss.

Expect corn emergence to be slowed, which could cause more uneven stands. Corn needs about 115 Growing Degree Days (GDD's or Heat Units) to emerge. If air temperatures are less than 50 F, then no GDD's are accumulating. If each day's temperatures averaged 35 and 55 F for low and high air temperatures, respectively, then corn would take 20 days to emerge.

Scouting corn emergence 10 to 14 days after these flooding and saturation events will provide much better clarity on corn stands.

**References**

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Citation: Lee, C.D. 2025. Flooding and Freeze Effects on Wheat and Corn. *Kentucky Field Crops News*. Vol. 1 Issue 04. University of Kentucky, April 11, 2025.

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

# The Role of Phosphorus in Agricultural Development in Kentucky: A Story of the Haves and the Have-Nots

**John Ragland, Dennis B. Egli, Katsutoshi Mizuta, Stephen Greb, and Jeffrey E. Levy**

Early agricultural development in Kentucky was a matter of the Haves and the Have-Nots. Farmers in the central Bluegrass region (the Haves) produced bumper crops that formed the basis for a thriving, wealthy, prosperous society. Most of the rest of Kentucky was characterized by low-yield subsistence farming (the Have-Nots).

A member of Daniel Boone's party wrote in his travel journal after reaching central Kentucky in March of 1775 - "So rich a soil we had never seen before; covered with clover in full bloom, the woods abounding with wild game – turkeys so numerous that it might be said they appeared as one flock, universally scattered in the woods. It appeared that nature, in the profusion of her bounty, had spread a feast for all that lives, both for the animals and rational world" (Clark, 1977).

Soil fertility research in the central Kentucky area, conducted by George Roberts (the UK Agronomy Department's first head) and co-workers in the early 1900's (Roberts and Ewan, 1920; Roberts and Kinney, 1932), identified the basis for the 'feast' by demonstrating that corn yield did not respond to any fertilizer and lime treatments. The native fertility was enough to produce maximum yields (55 to 60 Bu/Acre). These yields were nearly twice that in Kentucky counties outside the central Bluegrass (Fig. 1). The 'feast' had its origin in the high levels of phosphorus in the soils in the central Bluegrass.

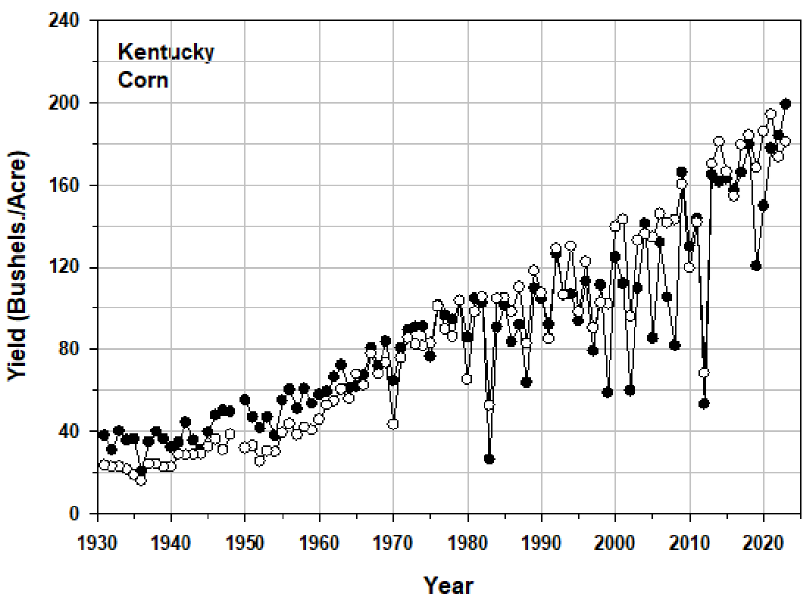


Fig. 1. Average corn yield for five counties in the central Bluegrass and Western Kentucky, 1931 – 2023. Data from the National Agricultural Statistics Service.

- ● Bluegrass Counties (Bourbon, Boyle, Fayette, Jessamine, Woodford)
- ○ Western KY Counties (Davies, Livingston, Muhlenberg, Ohio,

These soils developed from parent material, the Lexington Limestone, which had an unusually high phosphorus content. Natural phosphatic minerals in the limestone weathered into the high phosphorus soils of Central Kentucky. Originally, the soils were so high in phosphorus that rock phosphate was mined in Woodford County near Wallace Station from 1905 to 1937.

A series of long-term soil fertility plots, funded by a special appropriation from the Kentucky General Assembly in 1926, were established to determine why yields were so low in counties outside of the Bluegrass region. Applying either superphosphate or finely ground rock phosphate doubled corn yields from 25 to 50 bushels per acre (Karraker and Miller, 1958). Corn yields in most of Kentucky outside the Bluegrass were limited by phosphorus.

The Tennessee Valley Authority (TVA) was established by the Federal Government in 1931 to cope with the chronic flooding of the Tennessee River and to generate hydroelectric power to help develop the distressed economies of the thirteen valley states. A strong emphasis on fertilizer development and manufacturing was included in TVA's mandate. These efforts lead to production and distribution of large amounts of phosphorus fertilizers. President Franklin D. Roosevelt's New Deal program made these fertilizers available to farmers at little or no cost through the USDA's Agricultural Stabilization and Conservation Service (ASCS). The widespread use of phosphate fertilizers increased corn yields in the counties outside the Bluegrass until they were essentially equal to those in the central Bluegrass (Fig. 1).

It may be surprising to many of us, especially if we are not soil scientists, that the characteristics of the soil could play such an important role in the development of a region. The high phosphorus soils in the central Bluegrass gave it an early advantage. The rest of the state didn't catch up until technology made large amounts of phosphorus fertilizers available. The availability of super phosphate worked a miracle and turned the Have-Nots into Haves. As Franklin D. Roosevelt so aptly put it in 1938 "we observe a world of great opportunities disguised as insoluble problems" (Franklin Delano Roosevelt. U.S. President,1933-1945).

Adapted from John Ragland. Dennis B. Egli, Katsutosi Mizuta, Steven Greb and Jeffery E. Levy.  2025. The Role of Phosphorus in the Agricultural Development in Kentucky: A Story of the Haves and the Have-Nots. Kentucky Ag. Experiment Station, University of Kentucky (In Press).

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Citation: Ragland, J., Egli, D., Mizuta, K., Greb, S., Levy, J.E., 2025.  The Role of Phosphorus in Agricultural Development in Kentucky: A Story of the Haves and the Have-Nots.  *Kentucky Field Crops News*, Vol 1, Issue 4. University of Kentucky, April 11, 2025.

**Dr. John Ragland, UK Professor Emeritus**
**Dr. Dennis Egli, UK Professor Emeritus**
(859) 218-0753    degli@uky.edu

**Dr. Katsutoshi Mizuta, UK Assistant Professor**
(859) 257-2715    toshi.m@uky.edu

**Dr. Stephen Greb, Kentucky Geological Survey**
**Jeffrey E. Levy, GIS Program Coordinator, Dept. of Geography**

# 2025 WHEAT FIELD DAY

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

## MAY 13, 2025

**TOPICS INCLUDE:**

**CURRENT WHEAT CROP UPDATE**
Dr. Chad Lee & Dr. Mohammad Shamim

**SULFUR FOR WHEAT: PAST, PRESENT & FUTURE**
Dr. Edwin Ritchey

**OPTIMAL N FOR 2025** - Dr. John Grove

**2025/26 WHEAT OUTLOOK** - Dr. Grant Gardner

**RESIDUAL HERBICIDES FOR MANAGEMENT OF FALL AND SPRING EMERGING ITALIAN RYEGRASS**
Dr. Travis Legleiter

**MANAGEMENT OF IMPORTANT WHEAT DISEASES**
Dr. Heather Kelly (University of Tennessee)

**UPDATES ON OCCURRENCES OF APHIDS, HESSIAN FLIES, AND FALL ARMYWORMS IN 2024-25**
Dr. Raul Villanueva

**BREEDING FOR SCAB RESISTANCE IN SOFT RED WINTER WHEAT**
Dr. Dave Van Sanford & Maggie Gillum

**VARIETY TRIAL WALK THROUGH**

**UKREC Farm**
**1205 Hopkinsville St.,**
**Princeton KY 42445**

**9:00am - 12:00pm CT**
**Registration 8:30 am**

LUNCH SPONSORED BY

KENTUCKY Small Grain GROWERS' ASSOCIATION

**EDUCATIONAL CREDITS:**

CCA Credits:
IPM: 1 HR
Crop Mgmt: 1.5 HR

PESTICIDE CREDITS:
1 CEU for Cat 1a
1 CEU for Cat 10

KATS
Kentucky Agriculture Training School

# 2025 CROP SCOUTING CLINIC

**IDEAL FOR AGRICULTURE INTERNS, NEW AND EXPERIENCED PRODUCERS, AS WELL AS A GREAT REFRESHER FOR OTHERS**

- Corn and soybean diseases and growth staging
- Scouting for insect pests of corn and soybeans
- Weed ID
- Soil nutrients and their influence on crop growth

## MAY 15, 2025

**8:30AM TO 3:30 PM**

**UK RESEARCH AND EDUCATION CENTER PRINCETON, KY**

## PRE-REGISTRATION IS REQUIRED AT

**2025KATSCROPSCOUTINGCLINIC.EVENTBRITE.COM**

**For More Information contact Lori Rogers**
**270-365-7541 lori.rogers@uky.edu**

CCA: 6.5 CEUs
PAT: 5 CUEs cat. 1A,
1 CEU cat. 10

# SAVE THE DATE

## *Pest Management Field Day*

## *June 26, 2025*

**Participants will meet at the Christian Life Center of the First Baptist Church in Princeton at 300 W. Main St. A caravan will then proceed to the UKREC field plots.**

Registration is free—Lunch will be provided
Continuing Education Units will be available.

**Register by scanning QR Code or at:**
**https://tinyurl.com/3k466rxr**

Cooperative Extension Service

Agriculture and Natural Resources
Family and Consumer Sciences
4-H Youth Development
Community and Economic Development

MARTIN-GATTON COLLEGE OF AGRICULTURE, FOOD AND ENVIRONMENT



Disabilities accommodated with prior notification.

# UPCOMING EVENTS

| | |
|---|---|
| **WHEAT FIELD DAY (UKREC)** | **May 13th** |
| **KATS Crop Scouting Workshop (UKREC)** | May 15th |
| **KATS Planter Clinic (UKREC)** | June (TBD): |
| **KATS Drone Pilot Certification Exam (Madisonville)** | June 16- 17th |
| **Pest Management Field Day** | June 26th |
| **CORN, SOYBEAN & TOBACCO FIELD DAY** | **July 22nd** |
| **KY High School Crop Scouting Competition** | July 24th |
| **KATS Field Crop Pest Management & Spray Clinic** | August 28th |

To sign up & receive the **Kentucky Field Crops News**, click the link: KFC NEWSLETTER or scan the QR code.