Kentucky Field Crops News

Spanning 5 departments and 120 counties

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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

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Corn Surviving Freeze, Frost and Early Drought in 2026

Dr. Chad Lee, UK Extension Grain Crops Specialist

Corn in the central Kentucky region that emerged prior to April 20 and 21, 2026 experienced frost or freeze damage to plant tissue above the soil surface. The weather for the following four weeks slowed recovery of the corn plants, frustrating farmers, crop scouts, county agents and one Extension Agronomist. The rains on May 20 and 21 will finally help us identify which fields truly made it through.

Figure 1. Graduate student Emily Marsh is monitoring emergence of corn planted a day before the colder temperatures occurred.

On young corn seedlings, the growing point is below the soil surface. Even with some leaf damage from a frost or freeze, the growing point survived on most plants. Some of these damaged leaves were twisted into the whorls. When conditions immediately after the freeze event return to the 70s of 80s Farhenheit and there is adequate rainfall, corn will quickly recover from the freeze. However, in 2026, the frost and freeze events were followed by another couple of weeks of cooler weather. The cool weather at the end of April and first of May really slowed recovery of corn. Once temperatures started to heat up, no rain came with it adding more stress to the crop.

In fields that I scouted the couple of weeks after the freeze damaged, I counted 1% or less plant death. Those counts were in areas where 100% of the plants had freeze or frost damage. Corn in most of the fields was slowly improving but was in desperate need of rainfall. The rains on May 20 and 21 should solve that problem.

Expect that corn to grow much faster over the next month as projected temperatures are more favorable for corn growth and development. In most of those fields, 100% yield potential still remains.

In other fields in the central Kentucky region, corn was planted and then germinated in these cool or cold conditions. The sudden drop in air temperatures results in soils getting cooler near the surface than at the 2-inch depth. Germinating plants can become confused and start to grow downward, often leading to a corkscrew appearance. Some of those seedlings will die before reaching the surface. Others emerge but are too weak to survive. Some may make it. However, if emergence was delayed on these seedlings by several days relative to their neighbors, they could result in low-performing plants.

After these rains, scouting fields for stands and identifying healthy and damaged seedlings will be helpful in assessing the next steps in the fields.

In all cases, we are getting near the back end of the corn planting window for Kentucky (May 31) and deciding to replant probably needs to be focused on fields are areas of fields where final stands are less than 70% of targeted stands.

The infuriating challenge in these fields is that the symptoms often are sporadic across fields, where some areas may have 99% stands and other areas have 40%, none of which easily match up with a planter.

For most fields in western Kentucky, the stands are tremendous and the corn was in desperate need of rains. Again, the rainfall on May 19, 20 and 21 should be a tremendous help in those fields.

If you have questions about corn stands in your fields, reach out to your local county extension agent.

Figure 2. Damaged corn seedling. Photo by County ANR Agent Nick Roy.

Figure 3. Corkscrew corn that suffered from the soil surface cooling too much. Photo by County ANR Agent Nick Roy.

Figure 4. Assessing corn stands after cold temperatures. Photo by County ANR Agent Nick Roy.

Citation: Legleiter, T., 2026. Corn Surviving Freeze, Frost and Early Drought in 2026. Kentucky Field Crops News, Vol 2, Issue 05. University of Kentucky, May 22, 2026.

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Managing Italian Ryegrass Escapes in Corn

Dr. Travis Legleiter, UK Extension Weed Specialist

Italian ryegrass escapes are again occuring in Kentucky no-till corn fields. This scenario is unfortunately becoming more of a common sight in Kentucky. While the majority of ryegrass in our corn fields was controlled with fall and spring burndowns and residual applications, there seems to still be some "clumps" of ryegrass existing in a many fields. There are also some fields with overwhelming amounts of escapes.

The current question is what do we do now? Especially in most cases where the corn is already emerged and ryegrass plants well on their way to reproduction. Unfortunately, once corn emerges our options become very limited. The first thing a grower or consultant must know is what herbicide tolerance traits are in the corn hybrid planted. Below are recommendations for managing ryegrass escapes based on the herbicide tolerance traits in the corn hybrid. These recommendations are based on research conducted at the University of Ketucky Research and Education Center in 2022 on ryegrass escapes that ranged from 12 to 52 inches in height with an average height of 31inches (Data available in Figure 1).

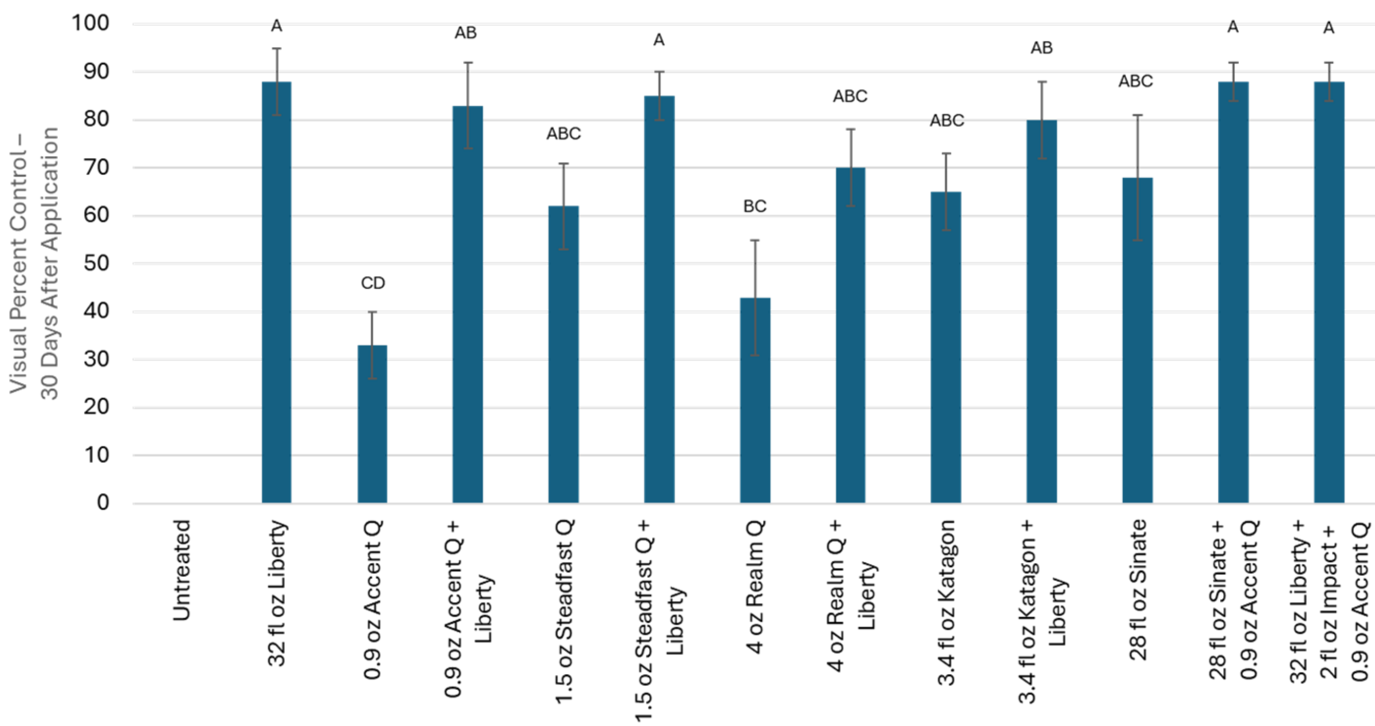

Figure 1. Italian ryegrass visual control 30 days after application. Application applied to Italian ryegrass with an average height of 31 inches, maximum height of 52 inches, and minimum height of 12 inches. Bars with a different letter are significantly different utilizing Tukey HSD (α=0.05)

Roundup Ready Hybrids

Nicosulfuron is about the only option in this scenario. We found in our 2022 study that the addition of rimsulfuron or an HPPD inhibitor such as topyralate provided marginal increases in control. Unfortunately, in this scenario, suppression rather than control should be the expectation.

Recommendation:

- 1.5 oz Steadfast Q
  or
- 3.4 fl oz Katagon

Roundup Ready & Liberty Link Hybrids

Glufosinate does surprisingly well on large ryegrass plants and appears to be one of the better options for ryegrass escapes if you have a Liberty Link corn hybrid. The addition of nicosulfuron (Accent Q) and/or an HPPD inhibitor (topramezone or tolpyralate) did not necessarily increase control but may be included to provide an additional site of action.

Recommendation:

- 21 fl oz Liberty Ultra
  or
- 32 fl oz generic glufosinate (Interline, Cheetah, Forfeit, Surmise, etc.)

  Optional tank mix partners*
- Accent Q (nicosulfuron)
- Steadfast Q (nicosulfuron + rimsulfuron)
- Impact (topramezone)
- Shieldex (tolpyralate)

*Products such as Katagon (nicosulfuron + tolpyralate) and Sinate (glufosinate + topramezone) offer convenient premixes. See figure 1 for performance of these products.

Enlist Corn Hybrids

Enlist corn hybrids offer not only glyphosate and glufosinate tolerance, but also tolerance to quizalofop (Assure II) offering an additional option for ryegrass control. If you have an Enlist corn hybrid we would recommend the use of Assure II at 12 fl oz/A plus glufosinate and/or nicosulfuron at the rates mentioned in the above sections.

Photo 1. Italian ryegrass escapes in a Kentucky no-till corn field.

Citation: Legleiter, T., 2026. Managing Italian Ryegrass Escapes in Corn. Kentucky Field Crops News, Vol 2, Issue 05. University of Kentucky, May 22, 2026.

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Cold Stress Slows Emergence and Injures Soybean Seedlings

Dr. Mohammad Shamim, UK Extension Associate

The relatively dry conditions in March this year provided an extended window of opportunity for growers to plant corn and soybean. As a result, most growers had completed planting by mid-April. However, early planting, typically favored for its high yield potential, came with two major challenges.

One key concern, likely resolved by the time you read this, was whether the seeds had lost their ability to germinate. Due to the lack of rainfall, soils remained dry, delaying emergence as seeds lacked sufficient moisture to imbibe (absorb water) and initiate germination. This concern arose because some growers hesitated to plant soybeans deeper, fearing that subsequent rainfall could create crusted or muddy soil conditions that would hinder seedling emergence. In addition, uneven emergence across fields led to speculation among some growers that germination itself might be compromised.

To investigate this, I collected soybean seeds that had remained in the field for approximately two weeks and tested their viability using a paper towel germination method. Within just two days, over 85% of these seeds germinated (though this does not directly reflect field emergence). This result suggests that the uneven emergence observed in the field was more likely due to planting depth and/or soil moisture conditions and that seed remained viable despite a long rest in the soils.

Figure 1. Soybean collected from farmers field were placed in wet paper towel to assess germination

The second major concern, which has become more apparent recently, is the impact of freezing temperatures on germinating soybean seeds and young seedlings. Recent rainfalls have come with some chilly weather. Low temperature is one of the most important factors limiting soybean productivity. Soybeans planted after mid-April often remained in the soil without emerging or emerged very slowly following rainfall events, leaving newly germinated seeds and seedlings exposed to cold stress.

When temperatures decline gradually, plants can sometimes adjust and partially acclimate to freezing and dehydration stress. However, soybean is a warm-season crop, and spring frost events are often sudden, giving plants little or no time to adapt. As a result, these conditions can quickly lead to injury or plant death.

Research has shown that short periods of cold exposure during the imbibition stage (when seeds first absorb water) usually have limited effects on soybean germination, with germination rates remaining above 85% after 10 days of exposure. In more detailed studies comparing temperature and soil moisture conditions, cooler day/night temperatures (around 50/50°F) still allowed germination above 60%, although emergence was delayed by four weeks. That said, the germination was still lower by 38% compared to 68/57°F with normal soil moisture.

However, problems become more severe when day/night fluctuations (around 68/57°F) occur together with excessive soil moisture. Under these conditions, germination can drop by 80%. In spring, cold conditions are often accompanied by rainfall, making excess moisture a common co-stress factor. In such situations, soybean emergence can be affected considerably, and the seedlings would die. The recent extended cold spells appear to have gone beyond these typical stress conditions and have resulted in visible frost injury in newly emerged seedlings. That said, the pattern and severity of injury appear to be limited to certain areas of the state. While scouting fields across several counties in western Kentucky, I observed symptoms of cold stress in soybean plants. Although this type of stress differs from permanent frost injury and will likely slow early growth, many plants are expected to recover once temperatures return to normal growing conditions.

Figure 2. Soybean seedlings following a spring frost event. Both the growing points and cotyledons appear to be dead, indicating the plants are unlikely to recover. Photo credit: Celeste Nye, University of Kentucky Research Farm, Spindletop, Lexington, KY

When soybean plants are exposed to freezing temperatures, several physiological processes are disrupted, leading to the accumulation of reactive oxygen species (ROS), such as superoxide radicals, hydrogen peroxide, and hydroxyl radicals. These compounds damage cellular structures; particularly lipid membranes; causing leakage of cell contents and ultimately cell death.

The extent of injury in seemingly healthy plants can be assessed in laboratory settings by measuring malondialdehyde (MDA) content. MDA is a byproduct of lipid peroxidation and serves as an indicator of membrane damage and oxidative stress. In this method, cold-exposed plant tissue is collected, flash-frozen in liquid nitrogen, and ground into a fine powder. A small subsample (typically around 0.2 g) is then processed and analyzed using a spectrophotometer. This approach is particularly useful for evaluating cold tolerance among soybean cultivars. However, when injury is as severe as what is observed in the field (as shown in the photos), laboratory analysis is often unnecessary to confirm damage.

The key question then becomes: what happens next, and what can farmers do to mitigate potential stand and yield losses? Research shows that even when plants appear relatively unaffected during cold conditions, survival cannot be accurately assessed until temperatures return to levels favorable for soybean growth. This delay occurs because plants must first detoxify accumulated ROS before normal physiological processes can resume.

The most important step is to wait before making any replant decisions. Soybean response to cold injury is not always immediate, and it may take 3–5 days of warm weather before you can accurately assess plant survival. Plants that appear damaged right after a frost may still recover if the growing point remains intact.

Once temperatures return to normal, evaluate fields by:

- ✓ **Checking the growing point**: For emerged soybeans, survival depends on whether the growing point (located above the cotyledons) is still alive. If alive and green, the plant can recover, though the growth will be slow.
- ✓ **Assessing stand uniformity**: Count plants across multiple areas of the field rather than focusing on the worst spots. A uniform stand count of 80,000–100,000 is sufficient for competitive yield.
- ✓ **Looking for new growth**: Surviving plants should begin to show regrowth within a few days under favorable conditions.
- ✓ **Replanting Decision**: Replanting may be justified only in areas with severely reduced or highly uneven stands.
- ✓ **Finally**, avoid making decisions based solely on initial visual injury. What looks severe immediately after a frost does not always translate into stand loss. Give the crop time to respond before taking action.

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Do Larger Seeds Mean Higher Grain Yield?

Dr. Dennis Egli, UK Professor Emeritus

Will increasing seed size (weight per seed) increase yield? The universal yield equation [yield = (seeds/acre)(weight per seed)] suggests that it will. This equation seems to indicate that the larger the seed, the higher the yield. But it's not that simple.

To understand seed size – yield relationships we first have to ask - are the differences in seed size under genetic control or are they a result of the environment?

There are large differences in seed size among species. Canola seeds, for example, are tiny (43,560 seeds per pound) relative to corn seeds (approximately 1,574 seeds per pound).

Genetic differences in seed size within a species are also common. Generally speaking, these genetic differences in size are **not** related to yield. Wheat, for example, produces very high yields with a relatively small seed (11,340 seeds per pound).

This surprising result occurs because most genetic differences in size are a result of variation in seed-growth rate. Big seeds grow fast, small seeds grow slow. When seeds grow fast, the number of seeds per acre is reduced and there is no effect on yield. Smaller seeds result in more seeds and again the same yield. Selecting a variety that has large seeds will not result in higher yields.

But, of course, there are exceptions to this rule. If seeds are large because they grow for a longer time – have a longer seed-filling period - the large seeds will result in higher yields. Most of the time, large seeds are a result of higher seed-growth rates, but there are exceptions where large seeds are a result of a long seed-filling period. These exceptions will result in higher yields.

Seed size is also affected by environmental conditions during the growth of the crop and these effects usually translate into changes in yield. These effects occur during seed filling, the last stage of the yield production process. The number of seeds the crop produces is determined first, before seed filling so, most of the environmental effects on yield are a result of variation in seeds /acre. Seed size responds to the environment during seed filling, after seeds/acre is fixed.

If environmental conditions improve after seed number is fixed (starts to rain again, for example), seed size and yield will increase. Stress during seed filling will reduce seed size and yield. Unfortunately, as in many situations in life, the downside opportunities are much greater than the upside. It's more likely that stress during seed filling will decrease seed size than for good conditions to increase seed size.

One reason for the limited upside is that the adjustment of seeds per acre to environmental conditions has already accounted for most of the environmental effects on yield. Seed size can only respond to the changes in the environment after seed per acre is fixed. A constant environment (good or bad) should produce a normal sized seed.

Secondly, there are physical restrictions (set by pod size in soybean or the packing of corn seed on the cob) on how large the seed can be (You can't fit a golf ball in a soybean pod!) limiting the potential increase in seed size and yield. There are no limits to how small it can be. Many producers, unfortunately, have experienced the year when it quit raining during seed filling and seed size and yield took a big hit.

It doesn't take a severe drought during seed filling to reduce seed size and yield. We found in greenhouse experiments with soybean that only three days of water stress during seed filling accelerated leaf senescence, shortened seed filling, and reduced seed size (13%) and yield (17%) averaged across two experiments. We may not notice just three days of stress, but it can have an effect on seed size and yield.

The bottom line is that yield is not made until physiological maturity (growth stage R7 in soybean and black layer in corn), so stress during seed filling (water stress, diseases stress, high temperatures) has the potential to shorten the seed filling period, reduce seed size and yield. Improvement in growing conditions during seed filling can increase seed size and yield.

Seed size – yield relationships are complicated in all grain crops. A lot of the obvious differences in size are under genetic control and are not related to yield. Environmental conditions during seed filling can affect seed size and yield. The key question always is - what caused the differences in size – genetics or the environment?

Aways remember – "There are, in fact, two things: science and opinion. The former begats knowledge, the latter ignorance" Hippocrates , Greek physician, and philosopher. (460 – 370 BC).

Citation: Egli, D., 2026. Do larger Seeds Mean Higher Grain Yield? Kentucky Field Crops News, Vol 2, Issue 05. University of Kentucky, May 22, 2026.

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Tribute to Dr. Raul Villanueva

On February 14, 2026, we lost a colleague and friend. Dr. Raul Villanueva, University of Kentucky Extension Entomologist, passed away after a courageous two-year battle with bile duct cancer.

Dr. Villanueva joined the University of Kentucky in 2016 and devoted his research and Extension efforts to improving pest management in wheat, corn, and soybeans, later expanding his work to include alfalfa and hemp. His work was guided by a simple principle: science only matters if it reaches the people who need it. For Raul, that meant farmers, consultants, and Extension agents across Kentucky. Dr. Villanueva was committed to delivering clear, science-based information, and his weekly updates in *Kentucky Pest News* became an essential source of seasonal crop pest alerts for Kentucky and neighboring states.

Caldwell County farmer Milton Cook reflected on Raul's contributions, saying: "Raul was not only an academic, but he was a practical problem solver, he sincerely cared about helping farmers manage pests. Raul was extremely passionate in his pursuits to evaluate new products and practices coming to the marketplace."

Raul's research and outreach continued even through the challenges of the COVID-19 pandemic and the destruction of the research station in 2021. He led studies that contributed to the registration of molluscicide baits for managing destructive slug and snail pests in soybeans and corn, as well as work addressing corn earworm management in hemp. With the help of graduate students, he built an extension program designed to meet the specific agricultural needs of the underserved Cerulean Amish Community. This included adjusting field day formats and times outside of normal work hours to ensure that the community received the messaging.

Farmer Neil Denton captured Raul's impact well, noting:

"Raul's dedication to Kentucky farms over the years shouldn't go unnoticed. His knowledge, professionalism, and dedication to his field helped farmers better understand pest management practices and techniques, saving countless dollars and protecting our bottom line. He went where the pests were causing problems and helped mitigate them."

Beyond his research, Raul was a passionate educator and mentor. He had a love for the diverse field of entomology, and he enjoyed sharing that with others. He inspired students from elementary classrooms to graduate programs, generously sharing his insect collection, enthusiasm, and time. He was a familiar face at outreach events across Kentucky, and his commitment to community extended well beyond the research station. Raul was a longtime volunteer at the Woodlands Nature Station at Land Between the Lakes, where he contributed annually to the Hummingbird Festival and Cool Critters Day. His joy in sharing the natural world was evident to everyone who met him.

Dr. Reddy Palli, Chair of the Department of Entomology, reflected on Raul's legacy:

"Raul was not only an exceptional scientist but also a deeply valued colleague and friend whose generosity and integrity left a lasting impression on everyone who had the privilege of working with him. I will always remember his thoughtful approach to science, his willingness to mentor and support students and postdocs, and his genuine passion for advancing entomology. His legacy will continue to inspire both the work we do and the people he touched throughout his career."

Today, members of his team—Dr. Z. Viloria and Dr. F. Colares—continue visiting Kentucky fields and carrying forward the work he began, ensuring continuity of service until a new faculty member is hired. Their efforts honor the standard Raul set through his dedication, compassion, and commitment to Kentucky agriculture.

Dr. Villanueva's contributions to entomology, Extension, and the people of Kentucky will have a lasting impact. He is deeply missed by colleagues, students, growers, and friends alike.

2026 KATS Crop Scouting Clinic

The Kentucky Agriculture Training School will hold an Interactive Crop Scouting Clinic next month. Held on May 28, 2026, in Princeton, KY, the clinic runs from 8:30 AM to 3:30 PM (CST) and includes lunch. This workshop will include topics such as corn and soybean diseases and growth staging, scouting for insect pests, weed Id and soil nutrition. This is a hands-on workshop that is ideal for agriculture interns, new and experienced producers, ag agents, as well as others looking to sharpen their skills. Pre-registration is required and space is limited. The cost is $105 and CEU credits are offered.

For more information contact Lori Rogers (lori.rogers@uky.edu) or visit https://2026KATSCropScoutingClinic.eventbrite.com.

2027 NATIONAL AG AI CONFERENCE

Save the Date!

Date: March 30 -April 1, 2027
Location: Lexington, KY

To receive additional information via email use the link below:
https://uky.az1.qualtrics.com/jfe/form/SV_5jXRASz24K5iRbo

Save the Date - June 25, 2026

Pest Management Field Day

8:30 a.m. to 12:30 p.m. CDT

Sign-in will begin at 8 a.m. inside
the UKREC Siemer Milling Conference Center
located at 348 University Drive - Princeton, Ky. 42445

Registration is free – A complimentary lunch will be provided

Pre-registration is highly recommended by June 18, 2026, at https://shorturl.at/PnAjl or scan the QR Code, or contact the UKREC at (270) 365-7541.

Continuing Education Units will be available

Upcoming Events

2026

Crop Scouting Clinic, Princeton, KY
May 28, 2026

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

Drone Pilot Certification Workshop, Madisonville, KY
July 8 & 9, 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