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Pest & Crop Newsletter

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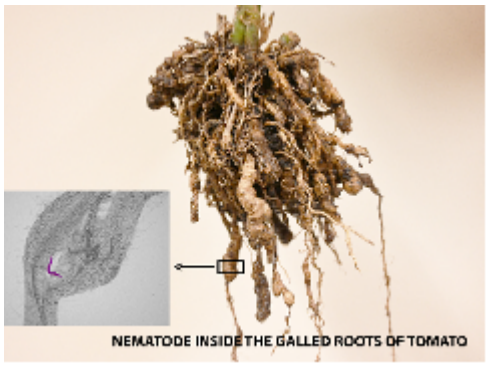
In This Issue

Unveiling Root-knot Nematodes And The Role Of Suppressive Soils In Vegetable Production

(Wenjing Guan) & (Lei Zhang)

Plant-parasitic nematodes (PPN) pose a hidden threat to vegetable production, with root-knot nematodes being among the most damaging soil-borne pests. These nematodes affect a wide range of crops and have caused significant yield reductions in Indiana, impacting both large-scale conventional vegetable production and small-scale diversified farms, particularly in high tunnel production. Despite their potential to cause severe yield loss, some soils in Indiana have been found to suppress the buildup of root-knot nematodes.

What symptoms you might see:
Root-knot nematodes cause swellings, known as galls, on the roots. These galled roots are less effective at taking up water and nutrients, which leads to unhealthy plants. Affected plants often exhibit aboveground symptoms resembling nutrient deficiencies, including stunted growth, yellowing leaves, and reduced vigor.



Indiana vegetable growers:

If you are interested in learning more about your soils, evaluating the risk of plant-parasitic nematodes in soil, and determining whether your soil is conducive or suppressive to root-knot nematodes, consider participating in this project led by the Purdue Nematology Lab. Our primary focus will be on

• Certified organic, or transitioning to organic vegetable farms or those managed using organic practices

• Vegetable farms that are suspected of experiencing root-knot nematode damageOur team will arrange a visit to your farm to collect soil samples and gain insights into your soil management practices. Following the visit, we will provide you with a comprehensive report that includes detailed soil test results. This report will cover plant-parasitic nematode populations, potential soil suppressiveness, soil texture, organic matter content, and basic chemical and biological information.

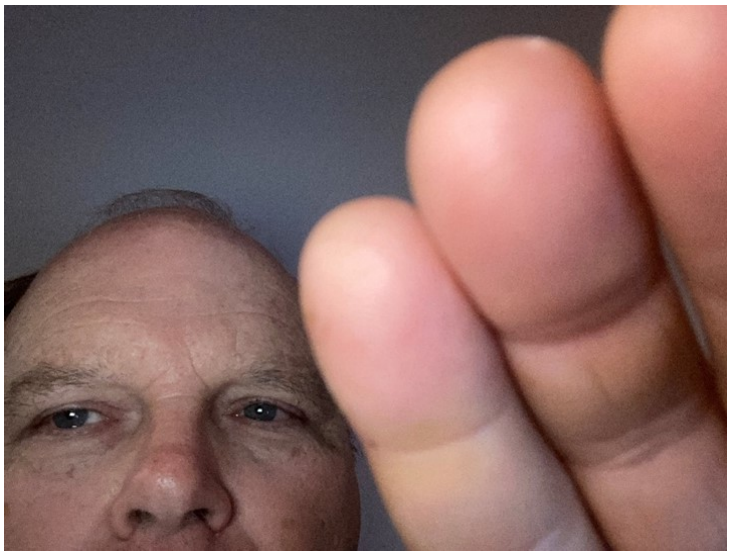
If you are interested in participating this project or want to learn more about it, please contactDr. Wenjing Guan at guan40@purdue.edu /352-870-4696 (text prefer)

Dr. Lei Zhang at leizhang@purdue.edu / 765-494-1933This project is financially supported by the USDA-NIFA Organic Transitions Program (ORG) [Grant no. 2024-51106-43054] and North Central SARE Research and Education Grant [Project Number LNC24-511].

Sheep Refusal To Eat Hay Emphasizes The Importance Of Using Your Senses To Evaluate Hay

(Keith Johnson)

I received a phone call from a shepherd many years ago. He was confused as to why his ewes refused to eat what appeared to be beautiful alfalfa hay. I asked the shepherd to send me a couple of representative flakes from the small square bales the ewes did not want to eat.



Using the senses of sight, smell, and touch along with chemical analysis determine forage quality. (*Photo Credit: Keith Johnson*)

Several days later, a sturdy brown box arrived from the shepherd. I opened the box and inside was some beautiful alfalfa hay; emerald green, late bud to early flower and great leaf retention. Very visually appealing hay. Why would any sheep refuse to eat such a fine specimen I asked myself as I moved my hand towards the hay in the box? Ouch! Within the beautiful smelling hay was a trace of Canada thistle, a very small trace, which was not visible to my eye. The spines on the thistle pierced my skin and several spines remained as I quickly withdrew my hand from the hay.

I called the shepherd back and told him what I had found in the hay. He said he would call me right back after he made a trip to the barn to inspect the mouths of his ewes. Within 30 minutes the shepherd called me back and reported that the mouths of the ewes were definitely irritated. If you can feel empathy for sheep, I was experiencing this emotion. I would refuse to eat this hay, too, even though a laboratory analysis would likely show that it had a protein content over 18 percent and a total digestible nutrient content in the mid 60's.

This reminded me of some research that had been done evaluating the nutritional quality of different weeds. Canada thistle was one of the weeds evaluated. Its nutrient profile was similar to alfalfa hay! Looking at a forage analysis wasn't going to tell me that Canada thistle was in this hay.

I truly believe that forage testing is a best management practice that all livestock owners should do. Laboratory results can be used to feed different hays in inventory in the right order as nutritional needs of cows, does, and ewes change as they go through their yearly cycle of maintenance, different months of gestation and lactation. A supplementation strategy can be developed, too. Excellent information about forage testing such as how to sample hay or silage, where to purchase hay probes and locations of certified laboratories can be found at the website *www.foragetesting.org*. Many Purdue Extension offices have a hay probe that can be loaned for use.

My experience with the shepherd and his ewe's refusal to eat high quality hay as detailed by the numbers on a laboratory report, reminded me of how important it is to use your senses to evaluate hay, too. Previous to this encounter of hand meeting thistle, I would have used the words "visual appraisal" as hay was being assessed. However, on this day I opted to change the physical evaluation of hay to sensory analysis.

Sight can tell us what species are found in the hay, maturity of the crop at harvest, leaf retention or loss during harvest, whether there is mold, and the presence of foreign objects. But it wasn't sight that first told me that this beautiful looking hay had a problem waiting for the ewes; it was touch. **Touch** can tell you whether the hay was made too moist and whether it is heating due to this excess moisture. Palatability can be reduced if hay is so coarse that it irritates the mouth of the consuming animal. **Smell** can determine whether hay is musty from the presence of molds that are not noticeable with the eyes. Hay that smells more like tobacco rather than hay is an indication that it heated during the curing process and likely has a high unavailable protein content. A vinegar smell is an indication that hay was recently baled with organic acid preservatives at baling to reduce the microorganism population that causes heating and molds to form. I haven't opted to use taste or hearing to evaluate forages, but rest assured your livestock have used taste to assess the feed source that you provide.

Additional thoughts – Throughout my career, I have heard concerns expressed about hay purchased not meeting the hay description expressed by the seller. This concern seems to be happening most often between first time buyers and sellers. If the hay being purchased is within a reasonable distance to your farm, I encourage you to go to the seller's farm and inspect several bales. Note plant species, maturity stage, presence of mold or a musty smell, leaf retention, and bale weight. Purchase by bale should be derived by evaluating value per ton as bale weight among farms is quite different. Also ask to inspect the field where the hay was made as it is much easier to note plant species when growing as compared to dried herbage in the bale. The time taken to do this should result in less discourse between buyer and seller.

For more information about sensory analysis of hay, Purdue Extension publication "Sensory Analysis of Hay Quality for the First Time Buyer" can be found at *https://www.extension.purdue.edu/extmedia/AY/AY-374-W.pdf*.

A small trace of Canada thistle spines found in alfalfa hay led to refusal of ewes consuming the hay. (*Photo Credit: Brooke Stefancik, Former Purdue University Sullivan Co. Extension Educator – Agriculture and. Natural Resources*)

Stalk And Ear Rots: Identify Them Now To Help With Harvest Decisions

(Darcy Telenko) & *(Dan Quinn)*

It is now time to evaluate fields for any stalk or ear rot symptoms. This will aid in making assessments about field harvest order and if there is a risk of mycotoxin contamination. There are many factors that can contribute to stalk decline. There are both plant pathogenic causes and abiotic stress factors that can play a role in reduced stalk integrity, such as drought and flooding. Either way, as stalk tissue becomes compromised below the main ear, the stalk may become brittle or weak

and be prone to lodging.

As the corn plant loses photosynthetic leaf area due to different stresses such as foliar disease and hot and dry conditions, the amount of carbohydrates available for dry matter deposition into the kernels is also decreased. Therefore, plants respond by remobilizing non-structural carbohydrates from the lower portion of the stalk to supply the demand required by the developing kernels on the ear. This response causes stalk strength and integrity to decrease, and increases a corn plant's risk of lodging and infection from pathogens that cause stalk rot. Fields with large ear sizes and strong kernel set, which have a high kernel fill demand, may also be at the greatest risk.

Stalk rots

There are a number of plant pathogens that can cause stalk rot including, Anthracnose, Bacteria, Charcoal, Diplodia, Fusarium, Gibberella, and Pythium. Some of these stalk rots have very characteristic symptoms that can help identify the specific problem, while others may require laboratory diagnosis (Table 1). The Purdue Extension Publication Corn Diseases: Stalk Rot has good images to help identify the major stalk rot diseases we see in Indiana (https://www.extension.purdue.edu/extmedia/BP/BP-89-W.pdf).

It is time to check stalk integrity – check field by using the **Push** or **Pinch Test** by evaluating 20 plants in at least five random areas in a field.

- Pinch Test – grab the stalk somewhere between the lowest two internodes and pinch between your fingers to see if the stalk is strong enough to handle the force – if the stalk collapses, it fails.
- Push Test – push the stalk to a 30-degree angle – if it pops back up when released, it passes the test, if not it fails.

Threshold: 10% or more of the stalks fail then consider field for early harvesting to avoid risk for lodging.

What can you do in the future – management options will depend on the specific disease (see table 1). Production practices that promote good plant health including balanced fertilization, appropriate plant populations, and good water management can reduce stresses that might predispose corn to stalk rot. In addition, these key management tools can help mitigate future stalk rot issues.

1. **Properly diagnosis the stalk rot pathogen.** (Samples can be submitted to the Purdue Plant and Pest Diagnostic Lab)
2. **Select hybrids with resistance** if available.
3. **Crop Rotation** – rotating to non-host crop will help reduce stalk rot potential in a field. Note that Charcoal rot and Gibberella stalk rot can infect other rotational crops in Indiana
4. **Tillage –** burying infected crop residue will encourage more rapid desiccation and help reduces risk of overwintering in crop residue.
5. **Good soil drainage and reduced compaction**.
6. **Foliar Fungicides** – applying foliar fungicides can help protect crop from foliar diseases that could predispose plant to stalk rot when present, but devoid of foliar disease pressure fungicides applications have not consistently been found to help reduce stalk rot.

Table 1. Stalk rot pathogens, identifying characteristics, and management options.

			Management options [2]			
Stalk rot	**Image**	**Characteristics**	**Resistance**	**Rotation**	**Tillage**	**Other**
Anthracnose		Distinctive blackening of the stalk rind, loss of pith leads to shredded interior	x	x	x	Strong stalks, reduced susceptibility to foliar diseases, and production practices that promote good plant health may reduce potential for lodging
Bacteria		Slimy, water soaked outer rind and pith			Fall	Good drainage and plant health practices
Charcoal		Silver grey rind, peppered with microsclerotia – grainy, gray in color	x			Many hosts. Rotation not as effective since microsclerotia can survive for many years
Diplodia		Many small, black pycnidia embedded in rind of lower internode- that cannot be scrapped off with thumbnail, white mold might appear in wet conditions, shredded pith	x	x	x	Strong stalks, reduced susceptibility to foliar diseases, and production practices that promote good plant health may reduce potential for lodging
Fusarium		Dark lesions, external brown streaks on lower internode, internal shredding, sometimes a pale-pink to salmon color on rotted tissue	x	x	x	Strong stalks, reduced susceptibility to foliar diseases, and production practices that promote good plant health may reduce potential for lodging
Gibberella		Small, black spots (perithecia) on internodes and nodes – these can be scrapped off with thumbnail, pink discoloration and shredding in pith	x	x	x	Strong stalks, reduced susceptibility to foliar diseases, and production practices that promote good plant health may reduce potential for lodging
Physoderma		Infected nodes will snap when pushed, node is black and rotten.		Maybe	Maybe	Strong stalks, reduced susceptibility to foliar diseases, and production practices that promote good plant health may reduce potential for lodging
Pythium		Decay of first internode about soil – soft, brown, water-soaked pith. Stalk may twist. Typically no odor.				Strong stalks, reduced susceptibility to foliar diseases, and production practices that promote good plant health may reduce potential for lodging

Reference: Freije and Wise. Stalk rots. Purdue Extension BP-89-W. https://www.extension.purdue.edu/extmedia/BP/BP-89-W.pdf

Image sources: D. Telenko, Purdue PPDL, and K. Wise. [2] Management options that could be considered for future crops. Resistance may be available in some hybrids for the specific disease. Rotation and tillage can reduce inoculum potential in the field.

Pest&Crop 2024 Survey

(John Obermeyer)

Dear Pest&Crop Readers:

Hope you have enjoyed the Pest&Crop newsletter this year. The following is a link to a simple, short online survey. Please consider doing this right now, as we need your evaluation of this newsletter. Too, we need to show our funding agencies whether or not this information from Purdue specialists throughout the season is meaningful to you and the industry. Thanks in advance for your support!

https://purdue.ca1.qualtrics.com/jfe/form/SV_aVSHsox5SftHt9I

Drought Continues And Intensifies Across Indiana

(Beth Hall)

There was a brief period where forecast models were thinking that the remnants of Hurricane Francine might make its way far enough north to provide sufficient moisture to improve drought conditions across the Indiana. As the forecast lead time shortened to only a day or two out, sadly the models had the rain just grazing the southern counties and amounts were hardly enough to make a dent in the rainfall deficits that have been accumulating. Figure 1 shows that over the past 30 days (August 20 through September 18), the entire state is in a precipitation deficit of anywhere from one to four inches. It will take quite a few rain events to make up that gap! Additionally, with the warmer-than-normal temperatures and clear skies, evapotranspiration rates have been relatively high for this time of year. This further exacerbates drought impacts such as vegetation stress, lower surface water levels, and cracked soils.

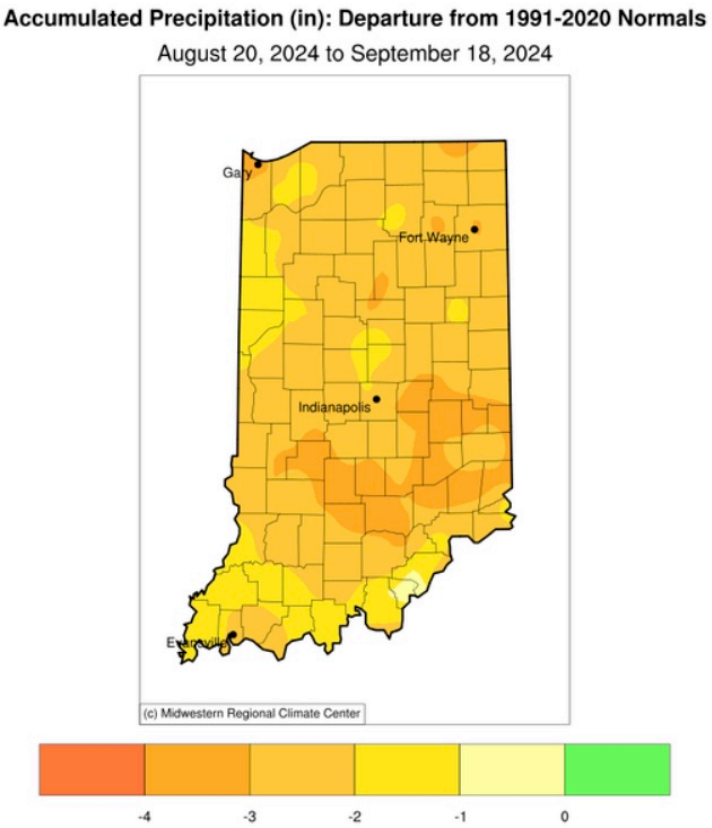


Figure 1. Accumulated precipitation (in inches) presented as the departure from normal amounts that fell from August 20 through September 18. The climatological normal period is from 1991-2020.

There are several products that puts this current deficit into perspective. The first is from the Midwestern Regional Climate Center that shows the number of days since the last precipitation event of a particular threshold (https://mrcc.purdue.edu/climate_watch/special_topics/drought/dwop-maps). Figure 2 shows the number of days since locations have had at least a quarter inch (0.25") of precipitation. Notice that across most of the state, except for the southern counties that were grazed by Francine, it has been up to 3 weeks with several areas in eastern Indiana not seeing that much daily rainfall in up to 7 weeks! This tool allows users to choose thresholds of 0.01", 0.10", 0.25", 0.50", and 1.00" in a 24-hour period.

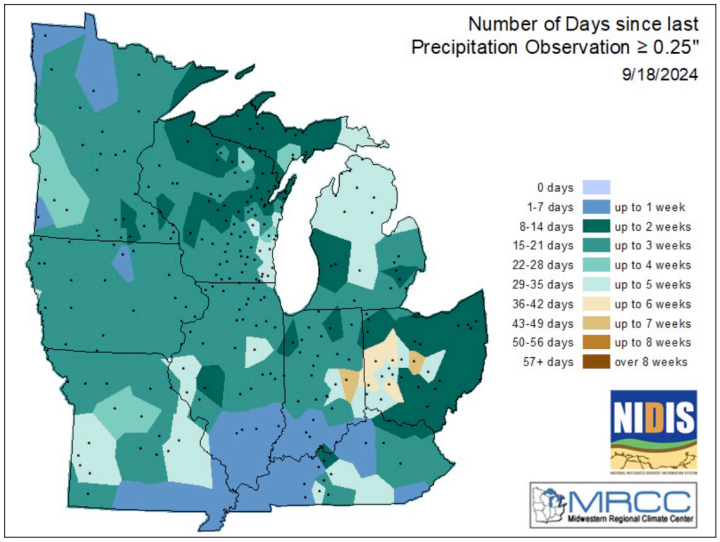


Figure 2. Number of days since 0.25" of rain fell. Days are approximately from 8am the previous day to 8am the current day due to the timing of manual observation collection.

The other product is the national Climate Prediction Center's map (https://www.cpc.ncep.noaa.gov/products/analysis_monitoring/regional_monitoring/addpcp.gif) showing how much additional precipitation would be needed over the next four weeks to return conditions to near normal. Figure 3 shows that as of September 14th, most climate divisions in Indiana would need 6-9 inches of precipitation with the south-central climate divisions needing 9-12 inches and the west-central and east-central climate divisions needing 12-15 inches! Why are these amounts so much greater than the raw precipitation deficit values shown in Figure 1? Figure 1 is just presenting deficits over the recent 30-day period whereas Figure 3 considers a much longer period. Additionally, Figure 3 is utilizing the Palmer Drought Index that considers soil types, temperature, precipitation, and other environmental conditions that more adequately represent environmental moisture rather than simply how much precipitation fell.

Figure 3. Estimated amount of precipitation needed to return conditions to their normal levels as defined by the Palmer Drought Index. Shaded areas represent climate divisions.

Climate outlooks are strongly favoring above-normal temperatures to continue through the end of September. Outlooks for September 24-27 are slightly favoring above normal precipitation across Indiana with near-normal precipitation expected after that and into early October. Therefore, it is highly likely that drought conditions will continue if not intensify further. Figure 4 shows the most recent U.S. Drought Monitor map that considers conditions through Tuesday, September 17th. The entire state is now categorized as at least Abnormally Dry (D0) with around 66% of the state in Moderate Drought (D1) and 6% in Severe Drought (D2). This has led to burn bans in more than half the counties, so please be aware of the risk of wildfires under these conditions!

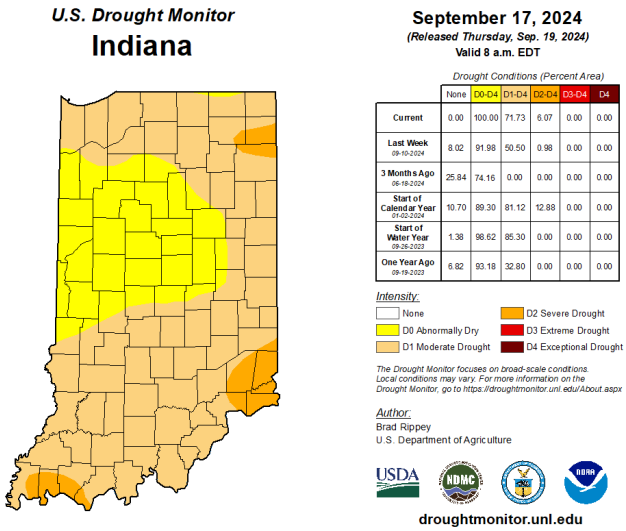


Figure 4. U.S. Drought Monitor for conditions through September 19, 2024.

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