Corn & Soybean News

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Corn Drying Slowly in 2020

Image 1. Cool, cloudy days slow down grain drying in the field.

Warmer, drier air will dry corn grain faster than cooler and/or wetter air whether the corn is in the bin or still in the field. The past two seasons are demonstrating those extremes. In 2019, corn dried quickly in the field. In fact, it dried so quickly that most farmers did not need to run grain driers. In contrast, 2020 has been a very different season in that respect. Corn is drying slowly in fields across Kentucky this year.

Could it be Nitrogen or a Fungicide or Genetics?

Farmers are asking whether nitrogen application, foliar fungicide application, husk tightness and/or hybrid genetics are causing this corn to dry so slowly. While each of these could be factors, the overwhelming factor in corn drying this year is the weather. Once black layer or physiological maturity occurs, water loss occurs from evaporation through the kernels. So, simple physics dictates how quickly kernels will dry in the field. Warmer, drier air will help the kernels evaporate water more quickly. Bright sunshine and gentle winds further enhance field drying. The farmer uses the same principles when applying heated air for grain drying. That air is usually above 100°F, dry and blown at a high rate of fan capacity. We do not run cold, wet air through a grain drying system. The same relationship is true for mature corn in the field. The limits of drying in both situations is dictated by the equilibrium moisture content, which is shown for different temperature and relative humidity levels in Table 1.

Temp.	Relative Humidity (%)									
°F	30	40	50	55	60	65	70	75	80	90
	Equilibrium Corn Grain Moisture Content (%)									
35	10.3	11.8	13.3	14.0	14.8	15.7	16.6	17.6	18.7	21.7
40	9.9	11.5	12.9	13.7	14.5	15.3	16.2	17.2	18.3	21.3
50	9.4	10.9	12.3	13.1	13.8	14.7	15.5	16.5	17.6	20.5
60	8.9	10.3	11.8	12.5	13.3	14.1	15.0	15.9	17.0	19.9
70	8.4	9.9	11.3	12.0	12.8	13.6	14.4	15.4	16.4	19.4
80	8.0	9.4	10.8	11.6	12.3	13.1	14.0	14.9	16.0	18.8
90	7.7	9.1	10.5	11.2	11.9	12.7	13.5	14.5	15.5	18.4

Table 1. Equilibrium moisture content of yellow corn at various temperature and relative humidity conditions.

Blame it on the Rain … and the Cooler Weather and Cloudy Days

From September 1, 2019 to October 8, 2019 at Spindletop Farm in Lexington, Kentucky, there were 29 days where the maximum temperature was at or above 85◦F (Figure 1). This year, over that same time span, there were zero (0) days with a maximum temperature over 85! The contrast is even greater. In 2019, there were 10 days with a maximum temperature over 95◦F. In addition, in 2020, Spindletop Farm received almost 1.5 inches more rainfall. So, 2020 has been cooler AND wetter than 2019 … and the grain drying process reflects those differences.

At Spindletop Farm, we watched corn dry 0.7 points in one week (25.7 to 25.0% in seven days) because of the weather. Then, it dropped to 21.3% in four days because of warmer, drier weather. The following Monday, it was back up to 23.0% because of rainfall over the weekend. Corn grain moisture in the field can drop or rise depending on the weather. If humidity levels remain high (greater than 75%) for extended periods in October when the average temperature is 60, corn will not dry in the field or bin below 16% (Table 1).

Do We Harvest it Wet or Try to Wait for it to Dry?

Farmers face a challenge. Do we wait for this corn to dry in the field? Do we harvest now and spend more on drying the corn than we expected? If the bins are full, do we harvest now and take a price dockage at the grain buyer? If corn stalks are weak, then those fields should be harvested. If stalks are strong, then the question is harder to answer and depends on the farmer's risk tolerance. Are you willing to let it ride a few weeks and see if moisture drops? Then, leave it in the field. Would you rather get the corn harvested when you can and avoid the risk of more crop loss? Then, get it harvested.

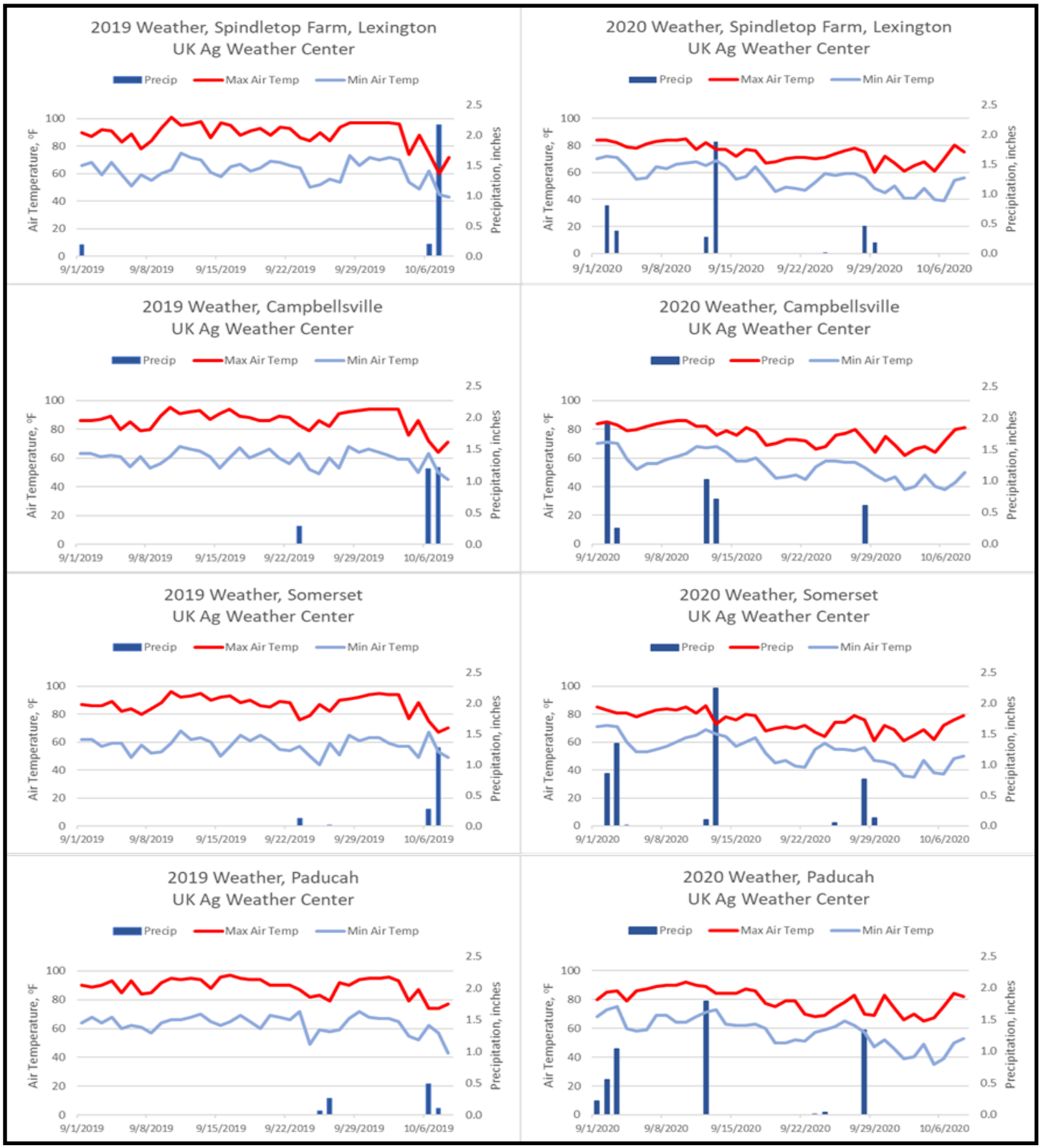

Figure 1. Comparing the weather from September 1 to October 8 in 2019 and 2020 at Lexington, KY, Campbellsville, KY, Somerset, KY, and Paducah, KY. The red line is the daily maximum air temperature, the light blue line is the minimum daily temperature (degrees on the left axis) and the dark blue bars are precipitation (inches on the right axis). Weather data obtained from UK Ag Weather Center. http://weather.uky.edu/ky/data.php#Spindletop_Farm_Data

Understand the Risks

Whatever your risk tolerance, make sure you know the risks. **Today is probably the best quality that mature corn will be.** Corn in the field will not improve in quality the longer it stays in the field. Alternating weather that dries grain and then adds water back to the grain usually results in lower test weights, more shattering and poorer grain quality. Temperatures are likely to progressively get cooler. While there are fluctuations in temperature day to day, historically, we are getting into cooler temperatures. In addition, daylength is getting shorter, so there will be less sun to help with the drying. Each day is trending towards slower and slower rates of grain drying in the field.

The forecast this week involves some temperatures above 70°F, but the odds of getting days above 70 in future weeks are less and less. Perhaps farmers give corn a few more days this week to dry and then harvest as many acres as possible before the next rounds of rain. Waiting for all the acres of corn to reach 16% moisture or less is probably not likely to occur without severe degradation of grain quality.

Resources:

Martinez-Feria, R., M. Licht and S. Archontoulis. 2017. Corn Grain Dry Down in Field from Maturity to Harvest. Iowa State University. https://crops.extension.iastate.edu/cropnews/2017/09/corn-grain-dry-down-field-maturity-harvest

Nielsen, R.L. 2018. Field Drydown of Mature Corn Grain. Purdue University. https://www.agry.purdue.edu/ext/corn/news/timeless/GrainDrying.html

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Management of Soybean Cyst Nematode Starts with Soil Sampling this Fall or Spring

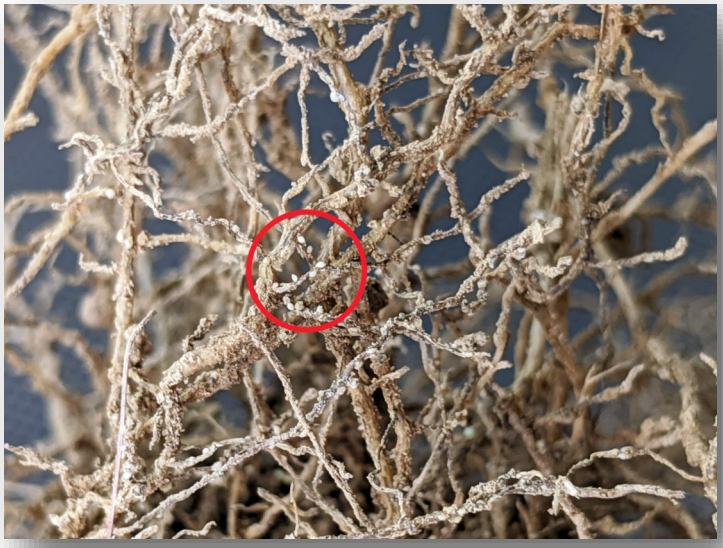

Figure 1. Females of the soybean cyst nematode (white colored lemon-shaped objects attached to roots in a red circle) infecting soybean roots. (Photo by Carl Bradley).

The soybean cyst nematode (SCN) (Figure 1) causes greater annual yield losses in Kentucky than any other pathogen of soybean. The last time a formal survey was conducted by the University of Kentucky in 2006 and 2007, approximately 76% of soybean fields in the state were infested with SCN. Preliminary results from a new on-going SCN survey initiated in 2019 show that 84% of Kentucky fields are infested with SCN. Although above-ground symptoms (stunting and yellowing) caused by SCN can occasionally be observed, affected soybean plants generally appear to be healthy. Unfortunately, "healthy-looking" soybean plants that are infected by SCN can still have up to a 30% yield reduction.

Management of SCN has gotten much more complex in the last few years, since SCN populations have adapted to the use of SCN-resistant soybean varieties. The primary source of SCN resistance used by commercial soybean breeding programs came from a soybean germplasm line known as "PI 88788". This source of resistance was highly effective in managing SCN for several years, but prolific use of soybean varieties with the PI 88788 background has selected for SCN populations that are able to overcome this source of resistance. In the 2006-2007 University of Kentucky SCN survey, the PI 88788 source of SCN resistance was not very effective against approximately 60% of the SCN populations in Kentucky, making management of this pathogen much more complex than before.

As complex as it is, management of SCN is still doable, and is important for maintaining and increasing soybean yields. Below are the main steps for managing SCN:

- **Test your fields to know the number of SCN eggs in your field**. The best times to sample for SCN in your fields is in the Fall or in the Spring (before planting). A Fact Sheet on sampling for SCN is available here: https://plantpathology.ca.uky.edu/files/ppfs-ag-s-09.pdf. Although the University of Kentucky does not currently have an active SCN Laboratory, samples can be sent to either the University of Illinois Plant Clinic (https://web.extension.illinois.edu/plantclinic/) or the University of Missouri SCN Diagnostics Lab (https://scndiagnostics.com/). Similar to this past season, the Kentucky Soybean Board is continuing to sponsor free SCN testing for Kentucky farmers. With this program, a limited number of samples for each county can be tested for free. Please check with your local County Extension Office for more information about the limited free SCN testing program.

- **Rotate resistant varieties**. If varieties are available that utilize sources of SCN resistance other than PI 88788 (such as Peking or Hartwig), then rotate the source of resistance every time you plant soybeans in a field. Unfortunately, most of the soybean varieties adapted for planting in Kentucky utilize only the PI 88788 source of resistance. However, it is still important to rotate to different resistant soybean varieties, even though they are utilizing the same source of resistance. SCN is good at adaptation, so switching soybean varieties will help.
- **Rotate to non-host crops**. Rotating fields to a non-host crop, such as corn or grain sorghum, will help reduce SCN populations in a field. Wheat is another non-host crop that may help lower SCN populations by having it in the rotation. Several years ago, Dr. Don Hershman with the University of Kentucky evaluated the effect of wheat residue on SCN populations. His research found that planting soybeans into fields with standing wheat stubble reduced SCN populations at the end of the growing season. More information about that research can be found here: https://plantpathology.ca.uky.edu/files/ppfs-ag-s-08.pdf
- **Consider using a nematode-protectant seed treatment**. Several nematode-protectant seed treatment products are now available on the market. Although the effects of these seed treatments have not always been consistent in field research trials, they are additional tools that can be used along with resistant varieties and crop rotation to help manage this important pathogen.

A multi-state initiative funded by the Soybean Checkoff Program known as the SCN Coalition is helping to promote awareness of the damage caused by SCN and the importance in managing this pathogen. More information about the SCN Coalition is available on their website at: https://www.thescncoalition.com/. Be on the lookout for information from the SCN Coalition about this important pathogen.

References

Hershman, D. E., and Bachi, P. R. 1995. Effect of wheat residue and tillage on *Heterodera glycines* and yield of doublecrop soybean in Kentucky. Plant Disease 79:631-633. https://www.apsnet.org/publications/PlantDisease/BackIssues/Documents/1995Articles/PlantDisease79n06_631.PDF

Hershman, D. E., Heinz, R. D., and Kennedy, B. S. 2008. Soybean cyst nematode, *Heterodera glycines*, populations adapting to resistant soybean cultivars in Kentucky. Plant Disease 92:1775. https://doi.org/10.1094/PDIS-92-10-1475B

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Your UK Soil Test Report: Use and Interpretation

My objective here is to help the reader understand what I look at, and why, when I get a soil test report to review. There is always a personal bias in things like this, but it is important for grain producers to understand why a soils extension specialist asks the questions they ask when reviewing one of these documents.

First, always check the top of the form (see next page) to make sure that the report received is for a sample you submitted. A number of situations have resolved themselves with that first check. Sometimes, mistakes happen. Second, reacquaint yourself, mentally, with the area that was sampled. I have gotten off on the wrong foot by misaligning the sample with the area the sample came from. Verify the information provided with the sample (primary crop, primary management, previous crop, previous management, etc.). Remember, the "Comments" section located in the report's bottom half will contain several paragraphs specific to the 'primary crop'. If you plant a different crop you will need to consult with your county extension agent to get appropriate information.

Moving down on the report, and starting on the left, you find the numerical lab results for extractable phosphorus (P), potassium (K), calcium (Ca), magnesium (Mg) and zinc (Zn), as well as the soil pH and buffer pH. Verify the units (UK reports extractable units in lb/acre, while some other labs report in ppm, causing the latter values to be half as large). As I look at these numbers, I do not place equal **information** value on each of them. In my experience, certain soil test report numbers are very valuable and some have little value.

Most valuable to me is soil pH. Soil pH impacts a host of soil health processes, nutrient (especially micronutrient) availability and the activity of certain herbicides. Knowing the pH range that your grain crop species need, you can quickly find a problem if your soil sample pH falls outside, especially below (too acid), that range. The farther outside the range, the bigger the problem. The bigger the problem, the more lime (and time) will be needed. The need for more time to neutralize a higher level of soil acidity is another reason soil pH has great value. Buffer pH and soil pH are used to generate the lime rate recommendation on the UK soil test report.

UK uses the Mehlich III extraction procedure to estimate 'plant available' soil nutrient levels. **The numbers are less important than the estimated "Level of Adequacy"** shown by the graphed horizontal lines (>>>>>>>) to the right of the "Lab Results". Remember, these numbers are mere estimates/indexes of plant available soil nutrition, not the absolute amount of a nutrient (e.g. lb P/acre) that the soil will deliver to the crop. This sample exhibits low, medium and high levels of available nutrient adequacy for K, P and Mg, respectively. This means that this soil test report 'predicts' that fertilizer dollars invested in K, P or Mg have good, minimal, or little 'probability' of positive economic return, respectively. We say 'probability' because seasonal weather makes nutrient adequacy predictions a bit of a crap shoot.

Further, **the value of the numbers/estimated levels of adequacy is not equal for each of the**

From:
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UK COOPERATIVE EXTENSION SERVICE
University of Kentucky – College of Agriculture

Soil Test Report
Lexington 859-257-2785
Princeton 270-365-7541
www.rs.uky.edu/soils

COUNTY SAMPLE NO.: 1036

REPORT FORM: A

To:
Farms,
, KY

Dr. Edwin Ritchey 270-365-7541
Extension Specialist for Soils

Date	Owner Sample ID	Owner ID	County Code	UK Lab NO.
9/20/2011		6	6	72093

Nutrient	Lab Results	Level of Adequacy
Phosphorus (P)	46	>>>>>>>>>>>>>>>>>>>>>>>>>>>>
Potassium (K)	189	>>>>>>>>>>>>>>>>>
Soil pH	6.5	
Buffer pH	6.9	
Calcium (Ca)	3350	
Magnesium (Mg)	160	>>
Zinc (Zn)	4.0	
Other Test		

Level of Adequacy: Very Low | Low | Medium | High | Very High

Calculated CEC Data

CEC (meg/100g):	13
%Base Sat.:	61
%K:	2
%Ca:	55
%Mg:	4
%H:	39

Acres	Primary Crop	Primary Management	Primary Use	Previous Crop	Previous Management	Previous Use	Crop 2 Years Ago Tobacco	Soil Drainage
	Wheat/Soybeans	Doublecrop-No Till	Grain-Grain (double crop)	Corn	No Tillage	Grain		

RECOMMENDATIONS:	N	P2O5	K2O	LIME	Mg	Zn
	see comments below	40 lb/ac	70 lb/ac	None	None	None

Boron: 0.44 lb/ac, Meh3-Cu: 5.78 lb/ac, Meh3-Mn: 268 lb/ac, Meh3-Fe: 510 lb/ac

COMMENTS:

Mehlich III used for P, K, Ca, Mg, and Zn (lbs/acre). Crop response is highly probable with Very Low or Low soil levels, slight with Medium, and not likely with High or Very High. N, P2O5, K2O, Mg, and Zn recommendations are based on lbs of the nutrient. Fertilizer needed will depend on nutrient content in the fertilizer. Soil pH is calculated from 1 M KCl soil pH using: 0.91 x 1 M KCl soil pH + 1.34. 1 M KCl soil pH and Sikora II buffer pH are used for determining lime needs based on 100% effective lime. Lime quality in KY is defined by relative neutralizing value (RNV). RNVs for ag lime are determined by the KY Dept of Ag and are on the internet (publications at soils.rs.uky.edu).

FOR THE SMALL GRAIN CROP: FALL NITROGEN APPLICATION is not needed in fields following tobacco, soybeans, or well-fertilized corn or if litte growth of small grains is expected. For situations where little N carryover is expected, up to 40 lbs/acre of nitrogen is adequate for getting the small grain crop started. SPRING NITROGEN APPLICATION should be 60 to 90 lbs N/acre for a tilled seedbed or 90 to 120 lbs N/acre for a no-till seedbed. Application should occur between late February to early April. Where excessive rainfall occurs in late winter or early spring, split applications of nitrogen may be justified

FOR THE SOYBEAN CROP: No nitrogen is recommended in SPRING for soybeans.

Any P2O5 or K2O that is recommended can be applied in the fall before seeding the small grains as long as nitrogen application does not exceed 40 lb/ac. Small grains need very little nitrogen for fall growth.

different nutrient elements, depending upon what/how much we know. For Kentucky, I would say that we know most about extractable P, somewhat less about extractable K and Zn, even less about extractable Mg, and least about extractable Ca. The reasons for this are several, but most important is simply that we haven't seen yield responses to nutrients like Mg and Ca – UK can't provide an interpretation if the response patterns (critical soil test values for which crops, which soils, and for which environmental conditions) are not known/understood (mapped out).

This report contains numerical soil test results for boron (B), copper (Cu), manganese (Mn) and iron (Fe) just below the 'Soil Test Report' box, but above the 'Comments' section, because these 'special' tests were requested. We know a bit about, and can sometimes interpret, hot water extractable soil test B values. However, the Mehlich III Cu, Mn and Fe numbers have little to no value because we don't know very much about crop response to these nutrient elements in Kentucky. And by the way, **getting those same soil tests from another laboratory does not change the interpretive value of the numbers**.

Last, I draw your attention to the box of "Calculated CEC Data" found on the right-hand side of the report box. The value for cation exchange capacity (CEC) is calculated from Mehlich III extractable cations (K, Ca and Mg) and an estimate of exchangeable hydrogen (H) from the buffer pH. Then, the 'saturation' of the CEC by those same cations as a percentage (and summed together to give the percent 'base' saturation) is also calculated. I don't find much value in calculated CEC values. Soil CEC is influenced primarily by the amount of clay (soil texture), the amount of soil organic matter, and the different mineral types found in the soil clay. Most Kentucky surface soils are silt loam to silty clay loam in texture, so differences in these calculated CEC values are driven by differences in soil organic matter (easy to measure) or clay mineralogy (difficult to measure). The different reasons for different test report CEC values means that their interpretive value is pretty limited without other information (texture/organic matter/mineralogy). **In Kentucky, we have not found one situation where knowing the CEC has an interpretive consequence (causes modification of a nutrient recommendation).** The same is true for the percent saturation numbers – you don't need to know the percent K saturation – you only need to know that your soil test K value is associated with a medium-high level of adequacy for the K nutrition of your primary crop.

I hope this article helps the reader to understand the strengths and limitations to the soil test report – from UK or any other laboratory. Have a question? Don't hesitate to email me (jgrove@uky.edu).

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Announcing the University of Kentucky 2020 Fall Crop Protection Webinar Series

The University of Kentucky has organized five webinars on field crop protection topics that will be hosted through the Southern Integrated Pest Management Center starting on November 10. These weekly webinars will cover topics such as new research on foliar corn disease management, sudden death syndrome and soybean cyst nematode management, updates on the brown marmorated stink bug, guidelines for choosing herbicide options and herbicide-tolerant crop traits, and recommendations for control of weeds like Palmer amaranth, waterhemp, marestail (horseweed), annual ryegrass, and Johnsongrass. Kentucky pesticide applicator credits and Certified Crop Advisor continuing education credits have been applied for.

Pre-registration for the meetings is required through the registration URL provided. Dates, speakers and presentation registration links are listed below:

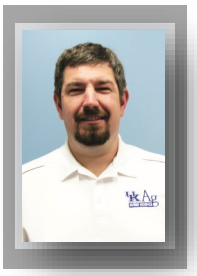
Date: November 10, 2020
Speaker: Dr. Kiersten Wise
Title: New ways to manage old diseases in corn
Registration URL: https://zoom.us/webinar/register/WN_NW-sKREuSIyCbydQMOeMrA

Date: November 17, 2020
Speaker: Dr. Carl Bradley
Title: What lies beneath: management of sudden death syndrome and soybean cyst nematode

Registration URL: https://zoom.us/webinar/register/WN_TCs0n7gnSsKio3NkjuXOZg

Date: December 1, 2020
Speaker: Dr. Raul T. Villanueva and Zenaida Viloria
Title: Geographic expansion of the brown marmorated stink bug in Kentucky
Registration URL: https://zoom.us/webinar/register/WN_e4B0cF92RPard4WNgo5ZdQ

Date: December 8, 2020
Speaker: Dr. JD Green
Title: Selecting the right herbicide tolerant crop traits and the right herbicides applied at the right time
Registration URL: https://zoom.us/webinar/register/WN_KGyyEeg_SvaI0dvXNO_K9A



Date: December 15, 2020
Speaker: Dr. Travis Legleiter
Title: Tackling top 5 weeds of the Mid-South
Registration URL: https://zoom.us/webinar/register/WN_IlBk2VqaS5aA_mWWkjjdUQ

Useful Resources

KyGRAINS.info

Crops Marketing and Management Update

College of Agriculture, Food and Environment

WHEAT SCIENCE GROUP

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Kentucky Pest News

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