Corn & Soybean News

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Corn and soybean plants "Standing Still"... for now

Corn and Soybean planting progress is ahead of schedule in Kentucky, according to the USDA NASS Crop Progress & Condition Reports. We normally think about that being a good occurrence. But many farmers and crop consultants have reported that the corn and soybeans appear to be standing still. The forecast suggests that will change in a few days.

Both April and May have been colder than normal for Kentucky. We have had dry windows for planting sporadically during both months. Some fields were even planted in the warm spell during March. Following nearly all these planting windows, the temperatures were cool (even freezing), cloudy, and wet. For periods of time, these seeds were trying to germinate, emerge and grow in refrigerator conditions. Those conditions favor extremely slow growth of the young plants.

For example, we planted soybeans on April 9 in Lexington, KY. As of May 17, they were just at the VC stage (unifoliates emerged). For over a week, they stayed at the VE (emergence, cotyledons open) stage. In Princeton, soybeans planted March 10 did not emerge until April 9 and have just now reached V3 (and are being mercilessly consumed by slugs and bean leaf beetles).

For plants that survive this long, slow growth, they will be fine. However, these slow-growing seedlings are sitting ducks for slugs and insects, especially bean leaf beetles in soybean. Farmers have asked if they can spray something that will help these plants grow faster. Nothing sprayed will overcome the cooler temperatures to help plants grow faster. For example, we planted corn and included nitrogen in the furrow.

Figure 1. Soybeans planted April 9, 2021 near Lexington, KY.

Figure 2. Corn planted April 28, 2021 with 3 lb N/acre in furrow near Lexington, KY. About 202 Growing Degree Days Accumulated between April 28 and May 17.

Normally, that in-furrow nitrogen will make for green seedlings. However, with this cold and cloudy weather, those poor corn seedlings are yellow and have taken several weeks to reach the V2 stage. You would never know we put anything in the furrow.

Farmers are doers. They want to do “something”. The best thing to do is to scout the fields, look for insects and spray a foliar insecticide if insects are at threshold populations. If there is insect activity, the insecticide will protect the young seedlings. If there are not insects, then do not apply the insecticide and simply wait for the warmer weather. That warmer weather is only a couple days away.

With the warm weather very close, the following is what I suspect will happen in many fields. Some farmers will spray “something” this week to try to get the plants to grow faster. Once the weather warms up, those plants will grow faster... but only after the weather warms up! The farmer is happy because he/she did “something and the plants are growing faster (with the warmer weather). The local sales team is happy because they sold “something”. The plants are happy because the weather is warmer, regardless of the “something” applied. So, everyone is happy.

Being happy is a good thing. 😀

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Watch for seedling diseases in corn

Weather this spring has challenged corn farmers in Kentucky. Temperature swings and frequent rainfall have led to a wide range of corn growth stages, with some corn in early vegetative stages and some corn still in the bag. The cool, wet conditions that have plagued planting progress recently have also increased the risk of seedling disease in Kentucky corn fields.

Seedling diseases are caused by several soil or seed-inhabiting fungi or fungal-like organisms which are favored by cool, wet soil conditions during and after planting. Cool, wet soils also slow plant growth and development and give pathogens more time to infect and damage the seedling. Standard corn fungicide seed treatments provide a short window of protection against seedling diseases. However, corn that was planted several (or more) weeks ago may also be at increased risk of seedling disease, since seed treatments typically protect seeds and seedlings only for a few weeks. Two of the most common seedling diseases of corn in Kentucky are caused by Pythium and Fusarium species, but other fungi can occasionally cause seed and seedling issues.

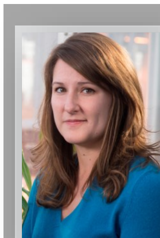
Symptoms of seedling diseases can be observed after emergence and in the early vegetative stages of growth. Farmers should look for areas in the field with poor emergence, patchy stands, and/or stunted plants (Figure 1). Often these symptoms are observed first in poorly drained or ponded areas of the field, and areas with heavy or compacted soils. Infected seeds may rot after germination, preventing emergence and leading to the patchy appearance of plants in a field. Infected plants that do emerge may be yellow, stunted, and have discolored roots. In severe cases, large areas of plants may die leading to reduced stand (Figure 2). It is very difficult to accurately determine the specific organism responsible for a suspected seedling disease issue in the field. Submitting samples through a County Agent to the University of Kentucky Plant Disease Diagnostic Laboratory can help with obtaining an accurate diagnosis.

Figure 1. Corn plants affected by seedling disease may have poor emergence within a row or an area in the field. (Photo by Kiersten Wise, University of Kentucky)

Figure 2. Severe stand reduction due to seedling disease. (Photo by Kiersten Wise, University of Kentucky)

The risk of corn seedling disease decreases when corn is planted into dry soils with soil temperatures above 50 F. These conditions allow seeds and seedlings to germinate and emerge rapidly. However, it is often necessary to plant into less than ideal soil conditions, and diagnosing seedling disease issues if they occur can improve management in future years. Obtaining an accurate diagnosis is important because fungicide active ingredients work against specific organisms, and efficacy of a given product can vary for seedling blight organisms. Higher rates of specific products may be needed in fields that have a history of severe loss due to a specific seedling disease.

More information on corn seedling blights can be found in the University of Kentucky Extension Publication, "Seedling Diseases of Corn." https://plantpathology.ca.uky.edu/files/ppfs-ag-c-02.pdf



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Increased mollusk activity in corn and soybeans observed in Spring 2021

Current Situation in Field Crops

Rainy and cloudy days with soggy and cool nights are favorable for mollusk activity. These conditions describe the past 3 to 4 week's weather conditions in Kentucky, and the damages these organisms are causing to soybean seedlings. During the first week of May I heard reports from two County Extension Agents (Lyon and Daviess counties); as well as a report from an entomologist from the North Central Region on damages they have been observing in commercial soybean fields.

Key Features of Slugs and Snails

Slugs and snails are mollusks that do not have legs. In order to travel, they secrete a mucus from a gland located at the anterior part of their bodies. This mucus helps slugs and snails slide over surfaces, leaving a "slime trail" that indicates their presence. Slugs (Figure 1) do not have the protective outer shell that snails have (Figure 2). Both types of organisms have two pairs of retractable tentacles in their head; optical tentacles with eyes located in the upper part and sensory tentacles (tasting and smelling) in the lower position.

Figure 1. A pair of slugs on a soybean leaf and a zoom of pearl shaped slug eggs (red arrows) from a laboratory colony (Photos: Raul Villanueva, UK)

As described above, slugs and snails prefer cool, moist habitats and can be found under leftover organic matter left from the previous season, soil cracks or rocks in field crops. In gardens or urban areas slugs and snails are found in logs, under pots or any well shaded and moist corner. During the day, slugs move deep into the ground. At dusk, they become very active from sunset to sunrise. During this time, slugs rasp leaf surfaces, which may result in scars or holes in foliage or death of small seedlings.

Figure 2. Snail and the damage caused in soybean cotyledons (Photo: Raul Villanueva, UK)

Damage to Soybeans

Soybeans plants (V2 or older) are resilient and can support a great amount of foliage losses. They will recover if there is partial feeding on leaves or if the stems were not completely damaged. However, earlier stage (VE, VC, or V1) will not recover if the two cotyledons and apical bud are completely eaten. These damages may result in reduced planting density or produce empty spots in rows (Figure 3).

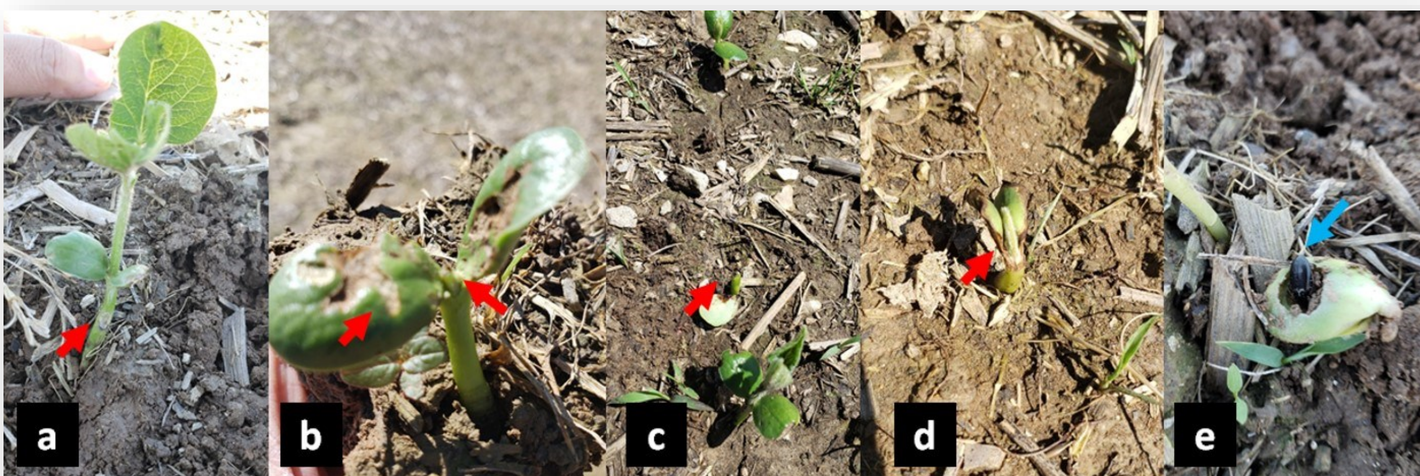

Figure 3. Illustrations of slug or snail damages in soybean (a) stem, (b) cotyledons, (c and d) entire plants damaged, and (e) carabid beetle (blue arrow) "inspecting" a fallen cotyledon caused by mollusk damage, some species on this group of beetles are being reported as predators of slugs (Photos: Raul Villanueva, UK)

Chemical Treatments

Two products are registered for control of slugs and snails in corn and soybeans in Kentucky, Dealline™ M-PS Mini-Pellets (metaldehyde) and Sluggo™ (iron phosphate); whereas for wheat only Sluggo™ is registered. The rates of these two products are provided in Table 1. The price of these products are somewhat prohibitive growers need to rethink based on price of the crop and also in the possibility of replanting.

At this time insecticides cannot be used for control of slugs. Some carbamates might be effective, but many of them have already been phased-out. For example, Sevin® (carbaryl) has been effective when formulated as a bait but is ineffective when applied as a spray; furthermore, it is not registered for this purpose. In addition, these insecticides can reduce populations of some species of carabid beetles considered predators of slugs.

Table 1. Rates of Dealline™ M-PS Mini-Pellets (metaldehyde) and Sluggo™ (iron phosphate) for different stages of growth for corn, soybeans, and wheat.

Products	Crop	Growth Stage	Max. single applic./ Acre	Total Nº of applic./ season	RAI	PHI	Type of application
Dealline™ M-PS Mini-Pellets	Field Corn	Up to V8	25 lbs/Acre	3	7 days	0 days	Broadcast or ground directed
		V8 to VT					
	Soybean	Up to V4	10 lbs/Acre				
		V4 to R1					
Sluggo™	Field Corn	Seedling or later stages	20 to 44 lbs/Acre	n/a	n/a	n/a	Broadcast or ground directed
	Soybean						
	Wheat	Seedling	10 to 44 lbs/Acre				

More information on Slugs of Kentucky

There is an online publication titled "A Field Guide to the Slugs of Kentucky" that provides useful information on the life cycle and habitat of slugs. This publication provides a detailed description of invasive species, given that they cause more damages on vegetable, ornamental and field crops. Among the invasive species described are the *Arion hortensis, Lehmannia valentiana, Arion intermedius, Limax flavus, Arion subfuscus, Limax maximus, Deroceras laeve, Milax gagates,* and *Deroceras reticulatum.* For information on the biology, ecology, and species description, the above publication should be consulted.

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Seedcorn maggots seen in abundant numbers in corn and soybeans

Seedcorn maggots in corn and soybeans have been seen during cool and damp seasons and organic rich soils (manured can be a source of this) or fields with reduced tillage, or decaying residue from the previous. This type of weather was observed recently in many areas of Kentucky as well as the emergent reports on the presence of seed corn maggots.

The seedcorn maggot is an immature form of a small fly (*Delia platura*). It feeds in decaying organic matter and seeds of many plants including many vegetables, corn or soybean seeds and seedlings. The maggot has a yellowish -white coloration (Figure 1) found burrowing into seeds or emerging seedlings (Figure 2). These maggots are legless, about 1/4 inch (6 mm) long, cylindrical, narrow, and tapered. Maggots lack heads and legs but have small black mouth hooks in front. Images from Figure 2 were received at the Research and Education Center dehydrated but the pupa (Figure 3) found in the samples help in the identification of the pest causing the damages. Brown pupal cases are oblong or football-shaped and are found in the soil near the roots.

Figure 1. Seedcorn maggots on broccoli seedling and their damage (at left) and a close up of larva. (Photos by Ric Bessin and Brenda Kennedy)

There are no rescue treatments for control of seedcorn maggots. Replanting can be an option. However, the decision to replant should be based on plant population densities in the field, the date of occurrence and yield expectation.

Figure 2. Dehydrated soybean samples showing damage caused by seedcorn maggots (Photo by Raul Villanueva)

Figure 3. Pupae of seedcorn maggots approximately 5-mm long and close up of single pupa (Photos by Raul Villanueva and Brenda Kennedy)

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Sulfur for Soybean in Kentucky: An Update

Some years have gone by since I summarized UK research about soybean yield response to sulfur (S) here in Kentucky. The objective of this article is to update my previous summary, a meta-analysis which included research work done between 2007 and 2012, reported in 2013. The intent of these irregularly timed summaries is to determine whether there is evidence of: a) a need for more S nutrition research to develop an S fertilizer recommendation; or b) continued vigilance via crop plant tissue surveys. I thank, at the outset, Drs. Edwin Ritchey, Chad Lee, and Carrie Knott for their contributions to this new data set; and Dr. Eugenia M. Pena-Yewtukhiw for assistance with the meta-analysis. Financial support from the Kentucky Soybean Board and Mosaic Fertilizer is also acknowledged. The interpretation of the results/meta-analysis is entirely mine.

In the 2013 report, there were 23 valid (three or more replications of each treatment) comparisons involving a no-sulfur (-S) treatment and a sulfur-added (+S) treatment (first data column in Table 1), and for the 2013 to 2020 growing seasons, there were 25 such comparisons (third data column in Table 1). In the earlier report, individual studies were sited in three counties (Russell-11, Caldwell/UKREC-11, and Fayette/Spindletop-1). For this report (Table 1), the trials were in two counties (Caldwell/UKREC-21 and Fayette/Spindletop-4). I also developed a separate set of the data from 2007-2012 with the 12 comparisons done in Caldwell/UKREC and Fayette/Spindletop (second data column in Table 1).

The later, 2013-2020, trials did not always have S nutrition as the primary, or only, study objective, but particular treatment combinations permitted an evaluation of the benefit of added S to soybean yield. Added S rates ranged from 10 to 800 lb S/acre, with the high rate resulting from a trial where the impact of high rates of gypsum on crop use of subsoil water was being evaluated. The soybean variety was appropriate to the area and all sites were planted without prior tillage (NT). Sulfur addition was accomplished with gypsum; ammonium sulfate; potassium sulfate; or sul-po-mag (K-Mag; potassium magnesium sulfate). Other fertilizer nutrients were applied according to experimental protocols. Grain yield was determined by small plot combine harvest. The mean -S treatment yield ranged from nearly 45 to nearly 85 bushels/acre.

After grouping, the meta-analyses of the populations of soybean yield responses to S addition (+S) was summarized both numerically and graphically. The numerical parameter summaries for the three populations (2007-2012/all; 2007-2012/research farm only; and 2013-2020/all) in soybean yield response are found in Table 1. The graphical demonstration of the cumulative frequency distribution in the two larger data sets is shown in Figure 1.

In the numerical summary shown in Table 1, the 2007-2012 data sets, the means were not different from zero, indicating that, on average, there was no benefit to S addition to soybean. That is not the case with the 2013-2020 data set, whose mean is both positive and significantly different from zero. Interestingly, there has been a large shift in the average response seen on the two research farms, from -1.95% to +2.60%, a shift of +4.55%.

Table 1: Statistical summaries for the different populations of soybean yield response to S addition.

Population Parameter	Soybean Yield Data Population		
	2007-2012 all	2007-2012 research farm	2013-2020 all‡
n	23	12	25
Maximum (%)†	18.3	3.4	13.6
Minimum (%)†	-11.9	-11.9	-6.00
Range (%)†	30.3	15.3	19.6
Mean (%)†	0.54	-1.95	2.60
Mean Different From 0?	**no**	**no**	**yes**
Median (%)†	0.82	-1.83	2.00
Median Different From 0?	**no**	**no**	**no**
Standard Deviation (%)†	6.99	4.22	4.02
Skew	0.60	-1.14	0.54
Kurtosis	1.35	1.92	1.84
Normal Distribution?	**yes**	**no**	**yes**

†Refers to the soybean yield increase as a percentage of the -S treatment.
‡All 2013-2020 research sites on research farms at the UKREC or Spindletop.

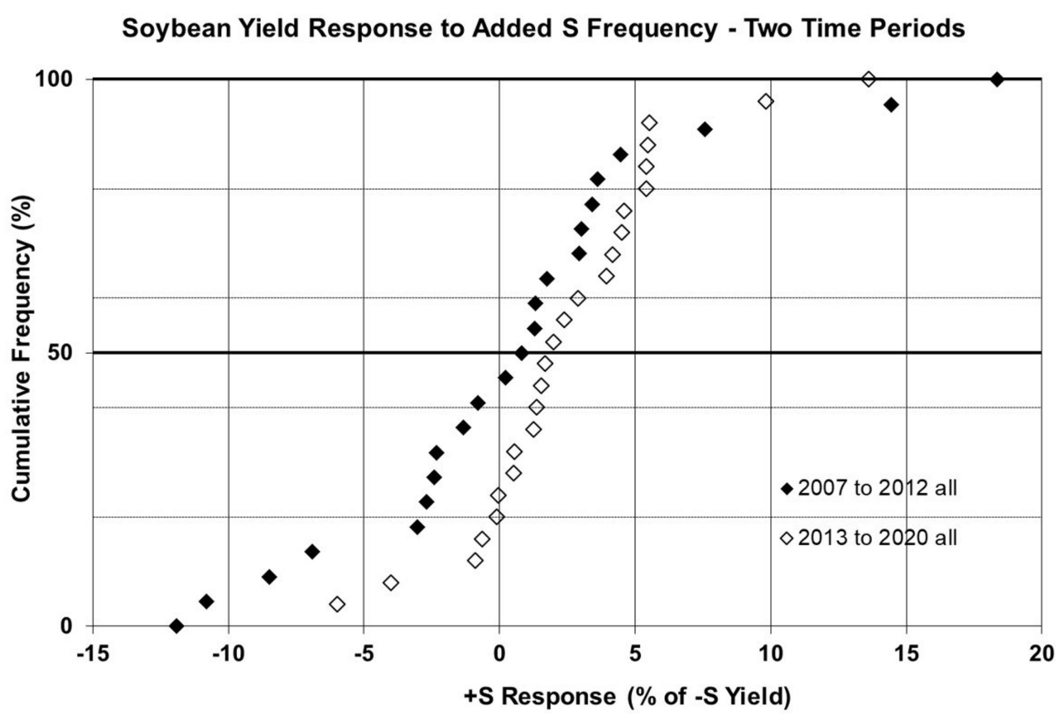

Figure 1.

The cumulative frequency distributions in Figure 1 are distinctly different. The 2013-2020 data exhibit less 'spread' that the 2007-2012 data. The newer data are shifted to the right, indicating a shift to a greater probability of a positive soybean yield response to added S. In the 2007-2012 data set there were only 3 of 23 comparisons where the yield response to S addition was greater than 5% (my personal criterion for a likely net economic benefit). However, in the 2013-2020 data set there were 6 out of 25 such outcomes with a yield response above +5% and 13 of 23 comparisons where the response fell between 0 and +5%. There were fewer negative yield responses in the later data, and most of those fell between -5% and 0.

The shift in the pattern of soybean yield response to added S may have several connected causes. First, the 2013-2020 data come from a more spatially limited set of study locations – locations that do not routinely receive S fertilizer but are experiencing less S deposition from the atmosphere. The fields at the research station farms may have suffered less erosion, resulting in greater topsoil thickness and soil organic matter stocks that reduce the yield response to added S. In the 2007-2012 data set, sulfur fertilizer comparisons from trials conducted on research station farms were much less positive that those conducted elsewhere in Kentucky.

To conclude, I note that many of our yield responses to S addition have shifted to the positive but remain rather small and are likely uneconomical. However, that general shift is based in research applicable to a small portion of Kentucky's soybean field space. A greater portion of that space needs to be evaluated as regards the need for S fertilization of soybean.

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Mark your calendars:

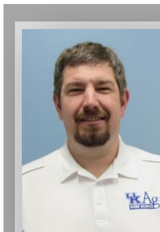
University of Kentucky Pest Management Field Day set for June 29, 2021

The University of Kentucky Weed Science Program will be hosting a field day at the UKREC in Princeton, Kentucky in 2021. The Pest Management Field Day will be a half day event held on the morning of June 29, 2021. The field day will include plot tours of weed science research in corn and soybean, plot tours of waterhemp and Palmer amaranth control research, as well as research updates from University of Kentucky plant pathology and entomology specialists.

The details of the field day are still being planned with consideration of the COVID-19 safety guidelines. Further details and pre-registration requirements will be posted in future newsletters as well as on the University of Kentucky Weed Science website. You can also follow @TravisLegleiter on Twitter for further updates on the field day.

CCA CEU credits and PAT credits will be requested.

Any questions can be directed to Dr. Travis Legleiter (Travis.Legleiter@uky.edu).



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Carbon Markets 101

The development of agricultural ecosystem credit markets, specifically carbon markets, is a hot topic in the popular press and Washington, DC. The United States Environmental Protection Agency (EPA) estimates that 10% of carbon dioxide, a primary greenhouse gas, is emitted by the agricultural sector. While this is relatively a small portion of overall carbon dioxide emissions by the economic sector, agriculture has received a lot of attention in reducing overall GHG emissions recently. The ag sector is viewing carbon markets as an opportunity to attract additional revenue while adopting production practices to reduce greenhouse gas (GHG) emissions, improving soil health and yields, and potentially reducing input use. Various forms of carbon markets are being developed across the nation as companies attempt to reduce their own carbon footprint by offering payments to farmers to offset their own carbon emissions and to attract environmentally conscious consumers and investors.

In addition to activity within the private sector, there is much debate about the role of government in carbon markets. The Biden administration has clearly made this a priority in their agricultural policy agenda calling for a significant increase in federal funding and programs to help develop these markets and assist market participants. Consequently, farm organizations and major food and agribusiness groups have been heavily involved in the debate. A coalition of representing farmers, forest owners, the food sector, state governments, and environmental advocates have formed the **Food and Agriculture Climate Alliance** (FACA). Click **here** to see FACA members, which includes the American Farm Bureau Federation (including the Kentucky Farm Bureau), National Farmers Union, National Association of State Departments of Agriculture, the National Corn Growers Association, and the National Cattlemen's Beef Association.

FACA's policy recommendations include:

• Providing voluntary, incentive-based tools for farmers, ranchers and forest owners to maximize the sequestration of carbon and the reduction of other GHG emissions, as well as increase the resilience of the land.

• Supporting the development and oversight of private sector markets for GHG credits.

• Promoting public and private sector tools to incentivize farmers, ranchers, and forest owners to prioritize and scale climate-smart practices.

• Offering incentives for farmers to reduce energy consumption, increase the use of on-farm renewable energy, and make continued progress toward reducing the lifecycle GHG emissions of agriculture- and forestry-based renewable energy.

• Streamlining consumer-facing packaging and implementing a public-private-partnership to reduce the GHG impact of food waste and loss within the food value chain.

• Increasing federal investment in agriculture, forestry, and food-related research substantially and continuously.

Recently, over 300 U.S. corporations, including some industry giants in the agriculture and food industry submitted a **letter** to President Biden supporting reducing GHG emissions by at least 50% by 2030. The current Chairs of the U.S. Senate and House Ag Committee have prioritized this issue in the current session of Congress with various hearings being planned and bills being drafted. In addition, the newly appointed U.S. Trade Representative has indicated that environmental issues are going to play a bigger role in future U.S. trade policy.

Given the onslaught of activity surrounding this emerging issue, what are some of the basic characteristics of a carbon market you should know? What key questions should you be asking? What issues currently exist in developing a market for carbon? How will policy affect the development of these markets?

Two types of carbon markets that are driving demand today, compliance markets based on governmentally imposed limits on GHG emissions (e.g., California's Cap and Trade Program) and voluntary markets (e.g., corporate sustainability reporting). Today, most carbon markets are voluntary, incentive-based markets where companies are linking buyers and sellers of carbon credits. The sellers, typically farmers, are paid for generating carbon credits by adopting management practices that meet specific beneficial ecosystem criteria. The most common practices include no-till/reduced-till, cover crops, crop rotation, and buffer strips that sequester carbon. Farmers are typically paid based on the amount of carbon sequestered, either on a per-acre basis or per ton of carbon sequestered. Once the carbon credit is generated, it enters the market where buyers can purchase those credits to meet their sustainability goals (e.g., carbon neutral by 2040). Today, most transactions occur through a third-party entity (aggregator), which links sellers (farmers) to buyers (corporations). Since carbon markets are still developing, price discovering is occurring, and payments for carbon credits may not cover the cost and risk of implementing new management practices. Early pricing ranges in value, but $15-$20 per ton of carbon sequestered is common. However, the amount of carbon sequestered and practice(s) adopted will vary by individual farm. Therefore, it is critical to understand the costs and risks of implementing new practices before enrolling in carbon market programs and the farmer's responsibilities over the life of the agreement.

One key characteristic surrounding a carbon market is the concept of additionality. Some companies will only pay for new (post-enrollment in a carbon program) carbon-sequestering practices, whereas other companies will pay for practices previously adopted on the farm, but only for a limited number of years. As Kentucky is the home of no-till farming, those interested in carbon markets should seek opportunities from programs that pay for previously adopted carbon-sequestering practices. As carbon markets evolve, more companies may offer programs that pay early adopters of conservation practices; however, there are strong opinions on both sides of the argument.

Third-party aggregators are currently enrolling farmers across the country in their carbon market programs. Each program will differ in required criteria to enroll, such as minimum acre requirements, payment structure, participation length, etc. Therefore, it is critical that you ask questions, read the fine print, and seek legal advice before entering any contractual arrangement. Our colleagues at the University of Illinois put together an article publication titled **"What questions should farmers ask about selling carbon credits?"** along with offering a table to review potential breakeven prices for various production practices.

While carbon markets in agriculture are in the developmental stage, numerous issues have surfaced which could prevent such markets from flourishing. Quality control and verification are vital and must be solved to ensure the buyer receives a high-quality carbon credit. The process of determining what constitutes “high-quality” is still in the developmental stage. Other issues include documentation, data privacy, and access to rural broadband to allow for technology adoption that measures reduced GHG emissions. Will there be enough demand for carbon credits to drive prices where carbon sequestration practices are adopted throughout all of agriculture? Could agriculture oversupply market demand lead to depressed prices? What changes in agricultural production practices will qualify for credit and how long must they be in existence? How and when the baseline is established so additional carbon sequestered is measured and compensated accurately? How are early adopters incentivized to enter carbon market programs? We will continue to monitor these issues, markets, and policy development in future newsletter articles. Additional resources providing more background information can be found by reviewing the videos from **Agri Pulse's Ag and Food Policy Summit** or from American Farm Bureau’s five-part series on **Agricultural Ecosystem Credit Markets**.

Shockley, J. and W. Snell. "**Carbon Markets 101**." *Economic and Policy Update* (21):4, Department of Agricultural Economics, University of Kentucky, April 29, 2021.

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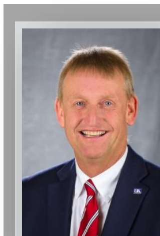

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Useful Resources

KyGRAINS.info

College of Agriculture, Food and Environment

WHEAT SCIENCE GROUP

http://wheatscience.ca.uky.edu/home

Kentucky Pest News

Entomology · Plant Pathology · Weed Science

http://kentuckypestnews.wordpress.com/

KATS

Kentucky Agriculture Training School

2021 Upcoming Events

Date	Event
June 15	KATS – Forage Workshop
June 29	Pest Management Field Day
July 15	KATS –Spray Clinic
July 22	UK 2021 High School Crop Scouting Competition
July 27	**2021 Corn, Soybean and Tobacco Field Day**
TBD	KATS – Developing Management Zones for Soil Sampling (online, interactive)
TBD	KATS – Self-Led Educational Plot Tour (in person)