

## Auglaize County OSU Extension Weekly Agriculture Newsletter – May 13, 2020

### Scouting and Latest Information



**The first 2020 corn plant!!**



**Wheat field**

Hello!! Good afternoon! I pray you are well.

Thank you to those individuals that participated in the eighth Auglaize County Farm Talk meeting on Tuesday. We had 9 people participate. Every Tuesday from 8:30 to 9:30 AM we will be hosting a virtual meeting via Zoom that can also act as a simple conference call for those of you not able to get online to view live. The meeting will be set up to discuss key, timely information for your operation and to open the floor for questions and sharing of information. You may propose topics for the next meeting at anytime during the week by e-mailing or calling me. **Next week's meeting will be the May Ag Breakfast. At this time weather and roundtable discussions are on the schedule for next week.** Please join use every Tuesday for Auglaize County Farm Talk.

If you want to contact Brigitte Moneymaker you may contact her at [moneymaker.4@osu.edu](mailto:moneymaker.4@osu.edu) or 434-962-3525.

If you are a buyer or seller of hay or straw, let me know and I can keep a list to share with others.

List of individuals searching for hay or straw: None

List of individuals selling hay or straw:

1. About 200 3' X 3' wheat straw bales for sale. This same individual is willing to sell his winter cover crops as forage to anyone interested.
2. At least 500 small square wheat straw bales for sale.

Call the OSU Extension office at 701-541-0043 or e-mail me at [stachler.1@osu.edu](mailto:stachler.1@osu.edu) to get the contact information.

## **Joke: What do farmers use to make crop circles??**

## **Agricultural Fun Fact: About 25% of all U.S. agriculture products by value are exported yearly!**

Rain fell 2 days this past week. Rainfall on Sunday, May 10<sup>th</sup> ranged from a 0.1" near Harris and St. Rt. 29 roads, Sommers and Minster-Ft. Recovery roads, County Road 66A and St. Rt. 66 roads, and St. Rt. 116 and Glynwood roads to 0.3" near Uniopolis. Rainfall on Monday ranged from 0" near Lowe's to 0.04" near Tri-Township and Lock 2 roads. Rainfall for the week ranged from 0.1" near Harris and St. Rt. 29 roads, Sommers and Minster-Ft. Recovery roads, County Road 66A and St. Rt. 66 roads, and St. Rt. 116 and Glynwood roads to 0.3" near Uniopolis. Rainfall for the week averaged 0.20", 0.1" less than last week. Rainfall for this week and early next week looks pretty wet which is good for what has been done.

The average high temperature now is 70 degrees F, two degrees more than last week. Temperatures were above normal for **0** days of the week and below normal for **7** days of the week. The range in high temperature for the week was 45 to 64 degrees F. The average high temperature for the week was 56 degrees F, which is 6.9 degrees F colder than last week and 14 degrees F below the current normal high temperature! Temperatures for the next 7 days will be slightly above normal. Hurray!! Finally!

## **Wheat**



**Flag leaf collar exposed (Feekes 9)**



**Some leaf tip burn and discoloration from Saturday**

Wheat development slowed drastically this past last week. The most advanced stage now is still flag leaf collar exposed (visible) (Feekes 9). I could find Feekes 9 plants in 50% of fields scouted on Sunday. This means the wheat is getting close to the boot stage. The wheat crop declined a little this past week. The current rating of the wheat crop is: 5% excellent, 33% good, 52% fair, 10% poor, and 0% very poor. Last week's rating was 5% excellent, 38% good, 48% fair, 9% poor, and 0% very poor. The only disease I can find is *Septoria tritici* leaf blotch. It did not progress much this past week, although one field had a good amount in the lower canopy. Therefore we will NOT need fungicide applications for leaf diseases before thinking about spraying for *Fusarium* head blight. Wheat likely will be heading in about 10 to 14 days! It will move quickly with the warm temperatures coming.

## **Alfalfa**





**Maximum height of alfalfa in a field**



**Alfalfa field**

Alfalfa grew a very little this past week compared to the week before. Alfalfa is now up to 14.5" in some fields with an average height of about 10".

## **Corn**



**Minor freeze damage to emerged corn**



**Root growth only after 1 week from planting**



The corn planted the previous week looks to be in good condition at this time. Corn planted two weeks ago is just emerging. Because of the slow emergence, it is quite nonuniform. This means we likely took out the maximum yield. Great planting progress this past week! I'm estimating that 54% of the corn was planted in the county as of Sunday. Last year at this time we had less than 3% of the corn planted in the county. We should be at 47% planted now in Ohio, so we are above average.

## Soybean

My estimate is that 44% of the soybeans have been planted in the county as of Sunday. We are making good progress. At this time last year no soybeans had been planted! We should be at 9% planted now in Ohio, so we are way ahead of planting history. I have seen only one field of soybeans emerged so far.

## Weeds



**Waterhemp and giant foxtail emerged**



**Giant ragweed getting larger**





**Cressleaf groundsel starting to flower**



**Patch of cressleaf groundsel**



**Yellow rocket in flower**

No real changes this past week other than more cressleaf groundsel is starting to flower more frequently and getting closer to producing viable seeds. Overall there is less cressleaf groundsel than the two previous years. This early planting should help reduce plants for next year because fewer will be going to seed. Cressleaf groundsel is a poisonous plant to animals and humans.

## Insects/other



Alfalfa weevil and damage



Alfalfa weevil and damage

The alfalfa weevil is still feeding. In one field at least 60% of plants showed feeding and one plant had at least two larvae. Scout fields often and carefully. Consider warming the plants before shaking them to help them come out of the plant since it is cold. The larvae are small yet but growing. I found one at instar 3. Since the alfalfa is small as well and the weather is cold for it to grow the alfalfa weevil may cause more damage than normal and require an insecticide treatment.

**There were changes to the FeXapan (<https://www.corteva.us/products-and-solutions/crop-protection/fexapan/tank-mix-partners.html>) label. There were NO changes to the XtendiMAX (<http://www.xtendimaxapplicationrequirements.com/Pages/default.aspx>), Engenia (<https://agro.basf.us/campaigns/engenia/tankmixselector/>) and Tavium (<http://www.syngenta-us.com/herbicides/tavium-tank-mixes>) labels this week.** The Engenia label still has the most approved products compared to XtendiMAX and FeXapan. No new herbicide was added to the XtendiMAX label this past week, which totals 252 herbicides. No new adjuvant was added the XtendiMAX label, now totaling 442. No new nozzles were added to the XtendiMAX label, which totals 44. No new Drift Reducing Adjuvant (DRA's) were added to the XtendiMAX label this week, making a total of 107 DRA's. No nutritional products were removed from the XtendiMAX label which totals 259. No new products were added to the Insecticides, Fungicides, Insecticides plus Fungicides, Plant Growth Regulator and Other group on the XtendiMAX label which totals 115. No new adjuvants were added to the Engenia label, which now totals 600. No new herbicides were added to the Engenia label, which brings the total herbicide count to 204. No



new products were added to the Other category (growth regulators and fungicides) on the Engenia label, which totals 37. No new insecticides were added to the Engenia label which currently has 49 products. No new Drift Reducing Adjuvants (DRA's) were added to the Engenia label, which totals 131. No new nozzles were added to the Engenia label, which totals 31. No new nutritional products were added to the Engenia label which totals 231 products. No new products was added to the pH Modifier group of the Engenia label which totals 17 products. The FeXapan label has many of same the products and nozzles as the XtendiMAX label, but NOT all are the same, so check the FeXapan label carefully. The FeXapan website has changed drastically! They now have DRA's listed for each product type that must be mixed with FeXapan. There are some products that need no DRA added! There are 13 glyphosate formulations, 229 herbicides, 41 insecticides, 17 fungicides, 96 DRA's, 317 adjuvants, 204 nutritionals, 30 plant growth regulators, 18 other products, and 46 nozzles that have been approved for the FeXapan label. There are 47 herbicides, 101 DRA's, 316 adjuvants, 96 nutritionals, 16, insecticides, 7 fungicides, 8 other products, and 41 nozzles approved for use with Tavium.

**Enlist One** and **Enlist Duo** for Enlist soybeans and corn also have approved tank-mix partners and nozzles like the dicamba products. The list of approved tank-mixtures for both of these products has been updated. Please follow these labels online at <https://www.enlist.com/en/herbicides.html> . There are 48 nozzles, 143 herbicides, 19 glyphosate formulations, 9 glufosinate formulations, 11 Dry AMS products, 85 insecticides, 30 fungicides, 21 plant growth regulators, 645 other products, and 315 fertilizers / nutrients labeled with Enlist One. There are 23 nozzles, 74 herbicides, 48 insecticides, 17 fungicides, 22 plant growth regulators, 8 Dry AMS products, 512 Other products, and 168 fertilizers / nutrients labeled with Enlist Duo.

Other information about the Enlist products include the following:

1. Enlist Duo rate is 4.75 pts/A which only has 1.0 lbs ae/A of glyphosate which is really not enough. You would think you could just add more glyphosate, but you CAN NOT add more glyphosate with Enlist Duo.
2. Enlist One can be mixes with ANY rate of glyphosate, glufosinate and 192 other herbicides.
3. Never use Ensit One alone on Enlist crops and always apply Enlist One at 2 pts/A/
4. You CAN NOT add glufosinate with Enlist Duo!
5. When adding a postemergence grass soybean herbicide like quizalofop, clethodim, sethoxydim, or fluazifop to Enlist One add 33% higher rate of these products to reduce the antagonism with grasses OR apply the postemergence grass herbicides 7 days after the Enlist One.

## Upcoming Meetings



1. **Auglaize County Ag Talk.** Every Tuesday from 8:30 to 9:30 AM we will have a virtual agricultural meeting. The third Tuesday will be the Ag Breakfast. Next week's topic is Weather by Aaron Wilson and Grain Market Update by David Bambauer. The link to get onto the meeting is as follows: <https://osu.zoom.us/j/2119847503>  
If you just want to call in the phone number and meeting code are as follows: 646-876-9923 2119847503#
2. **The OSU Farm Office is Open.** The OSU Extension Farm Office Team will open our offices online and offer weekly live office hours on Thursdays from **9:00-10:30 am EST**. Each office session is limited to 500 people and if you miss our office hours, we'll post recordings on [farmoffice.osu.edu](http://farmoffice.osu.edu) the following day. **Register at <https://go.osu.edu/farmofficelive>.**
3. **All OSU Extension face to face meetings have been cancelled or postponed through July 6<sup>th</sup>. Meetings after this date will go on as planned at least until further notice.**

**Answer to joke: A Pro-Tractor!!**

**What is that Yellow Flowering Weed?**



A weed by the name of cressleaf groundsel, also known as butterweed or yellowtop or golden ragwort, is showing up all over the county in home landscapes, road ditches, unplanted fields, wheat, hay, and pasture fields. The scientific name is *Packera glabella* (formerly *Senecio glabellus*).

Cressleaf groundsel is less prevalent this year compared to the last two springs. This is a good thing. In addition we are planting earlier than the last two years meaning fewer plants will be going to seed this spring and will hopefully help keep the population down for the next few years.

The plant is in the Aster family so the flower looks like a small sunflower head having yellow outside petals (ray flowers) and yellow disk (head) flowers. The flowers are produced at the ends of many branches coming from the terminal part of the plant and from nodal shoots at the base of the plant. The plant begins as a rosette with initial leaves being rounded and having no lobes. After about the fourth or fifth leaf opposite lobes appear on the leaf with one rounded lobe at the leaf tip. The leaves may have a purplish color to them in the fall. When the stem develops it is reddish to purplish in color, especially at the base and the stem is hollow and ridged. A very similar yellow flowering plant at this time in hay, pasture, and wheat fields is yellow rocket. Yellow rocket is a mustard species so it has four petals and is usually shorter than cressleaf groundsel. Cressleaf groundsel has a winter annual life cycle. That means the plant emerged starting in August and continued to emerge throughout the fall. It survived the winter in the rosette stage and resumed growth this spring.

The biggest reason that this weed can be found all across the county is that the seeds are small and light allowing the seeds to be picked up by wind currents and deposited anywhere down wind for a distance of up to maybe two miles.



The two biggest problems right now are the plants will be releasing seed in another week or so for this fall's germination and plants are present in wheat, hay, and pasture fields. The concern for the plants in the wheat, hay, and pasture fields is that the plant is poisonous to cattle, horses, goats, sheep, and humans. The toxin is still present in dried hay or straw. The plant is fairly toxic causing weight loss, unthriftiness, poor hair coat, anorexia, behavioral changes, sunscald, aimless walking, diarrhea, jaundice, liver damage, and possibly death. All parts of the plant are poisonous. I have seen some wheat fields that should not be harvested for straw due to the number of plants present. There are some questions that are unanswered such as will the animal pick out the plants and not eat them and how many plants do they need to consume to become sick. Chopping the hay for silage is the worst option because the animal will eat the plants since it is mixed in as small pieces. I'm unsure whether the ensiling process will reduce the toxicity of the plants, but I'm doubtful.

At this time nothing can be sprayed in wheat, hay or pasture fields to eliminate these plants other than hand weeding or mowing around the dense cressleaf groundsel patches and coming back and mowing these patches and chopping it back on the ground. Just mowing the weedy areas without chopping may allow the plants to be picked up when raking the second cutting. The time to mow off the cressleaf groundsel in hay fields is when the seeds of the earliest plant has started to blow away which will be at least a week from now. That way the plants are more likely to die and not regrow after mowing because the plant thinks it reached some amount of maturity. If they do not regrow then they will not be a problem in the second cutting. However, scout hay fields for re-growing plants in the second cutting.

For future reference apply herbicides in the fall in no-tillage, wheat, hay, and pasture fields. Herbicides can be applied in the spring on wheat, but must be done early when plants are small. Huskie and 2,4-D will effectively control cressleaf groundsel. For alfalfa apply Velpar or metribuzin after dormancy in the fall. In no-tillage fields a simple application of 2,4-D ester plus glyphosate in the fall will control cressleaf groundsel.

Let's eliminate as many plants as we can this spring before going to seed.

## **C.O.R.N. Newsletter**

<https://agcrops.osu.edu/newsletter/corn-newsletter>

## CFAES Ag Weather System Near-Surface Air and Soil Temperatures/Moisture



With the calendar now turning to mid-May and much warmer weather expected ahead, this will be the last edition of this year's soil temperature series in the C.O.R.N. Newsletter. Thanks especially to Elizabeth Hawkins and Sam Custer for persistently supplying daily soil temperatures records from their locations this spring.

Figure 1 shows that two- and four-inch soil temperatures cooled once again after spending the first part of May recovering from April's chill. Air temperatures were 8-12°F below average for the week which sent soil temperatures in the wrong direction. Generally, average soil temperatures are starting this week in the mid to upper 40s across northern Ohio (Northwestern, North Central, and Wooster) and in the mid-50s across the south (Piketon and Western). With a significant warm-up anticipated this weekend, with high temperatures into the 70s across the state, soil temperatures should respond nicely.



## CFAES Near-surface Air and Soil Temperatures

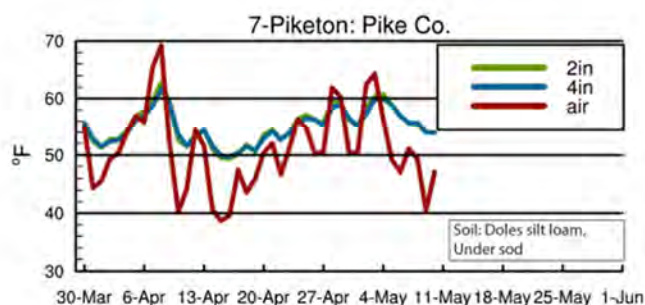
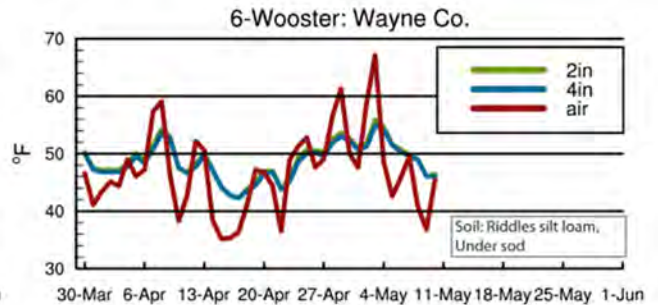
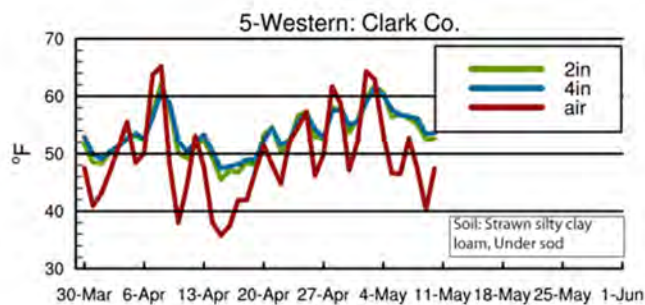
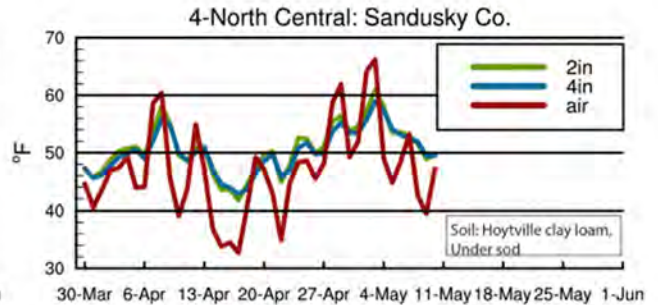
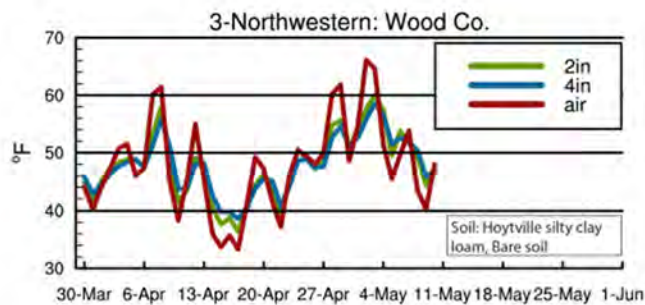
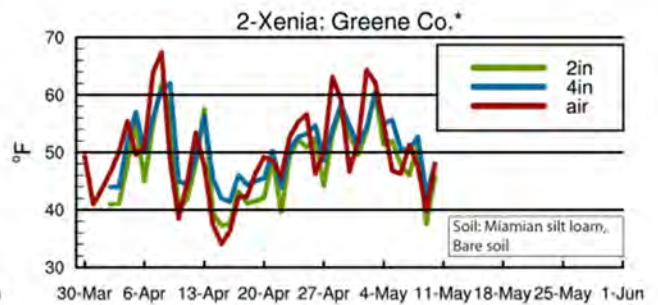
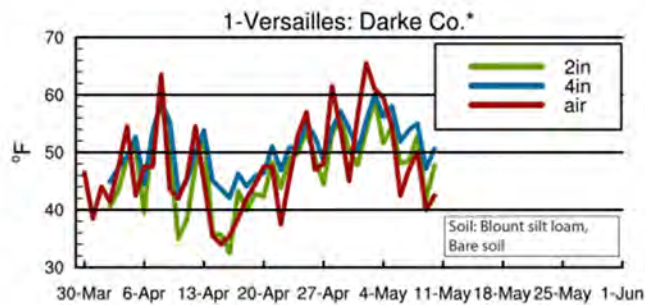


Figure 1: Average daily air temperature (red), two-inch (green) and four-inch (blue) soil temperatures for spring 2020. Soil type and placement are provided for each location. Map of locations provided in the bottom right. Soil temperatures are minimum temperatures for Versailles and Xenia and daily average for other sites.

Figure 2 (left) shows another week of light precipitation across northwest Ohio, where most counties picked up less than 0.50". Slightly heavier precipitation, up to 1 inch, fell across the rest of the state. This was generally 50-95 percent of normal for this time of the year. With persistent drier conditions in the west and northwest, the area of soil moisture in the 30-70<sup>th</sup> percentile range has expanded (Figure 2 – right). Very wet soil conditions remain across the east and south.

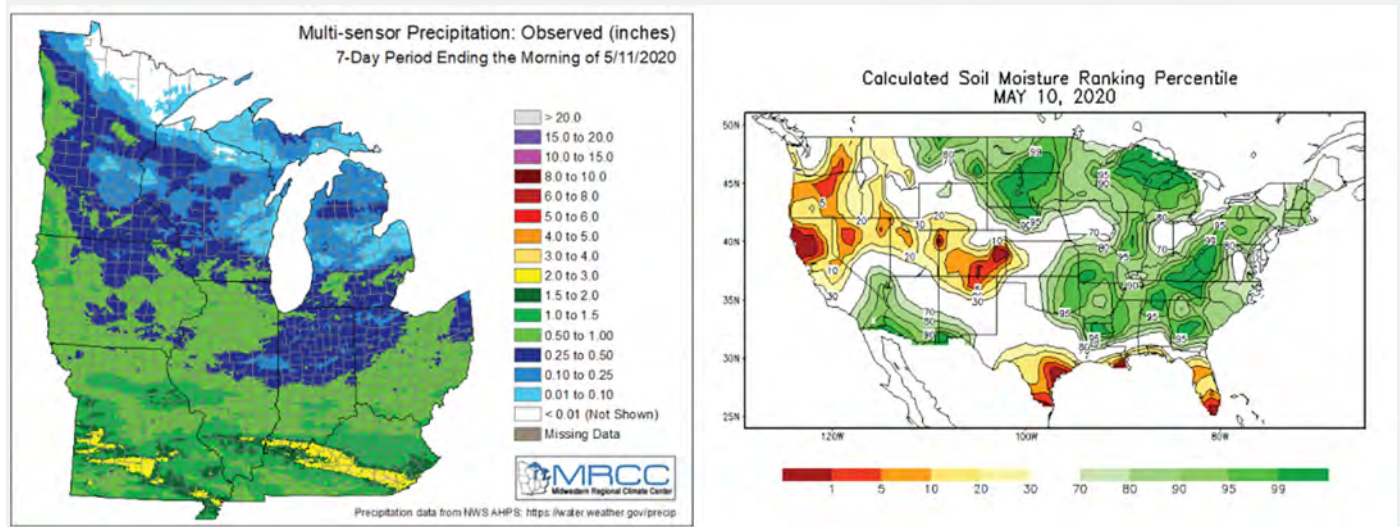


Figure 2: (Left) Precipitation estimates for the last 7 days ending on 05/11/2020. Figure provided by the Midwest Regional Climate Center (<https://www.mrcc.illinois.edu>). (Right) Calculated soil moisture ranking percentile for May 10, 2020 provided by NOAA's Climate Prediction Center (<https://www.cpc.noaa.gov/>). For more complete weather records for CFAES research stations, including temperature, precipitation, growing degree days, and other useful weather observations, please visit <https://www.oardc.ohio-state.edu/weather1/>. For a weekly climate assessment, visit <https://climate.osu.edu>.

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## How Cold is Too Cold for Wheat at Feekes 8 and Feekes 10.5.1 Growth Stages?



Every year presents a different set of challenges for agricultural production across Ohio. Last year, northwest and west central Ohio could not escape the rain. This year, Ohio cannot seem to shake the chill. An unusual weather pattern set up across the Midwest and Northeast U.S. late last week and into the weekend that led to some snow in spots and record or near-record lows across the state (Figure 1). Overnight lows for a few locations in Ohio on Saturday May 9, 2020 include 26°F outside of Toledo, 27° in Lancaster and Youngstown, and 28°F in Dayton, Cincinnati, and New Philadelphia. Many areas spent more than eight hours below 32°F with about 4 hours spent below 30°F. Naturally, this would raise questions concerning potential wheat damage.

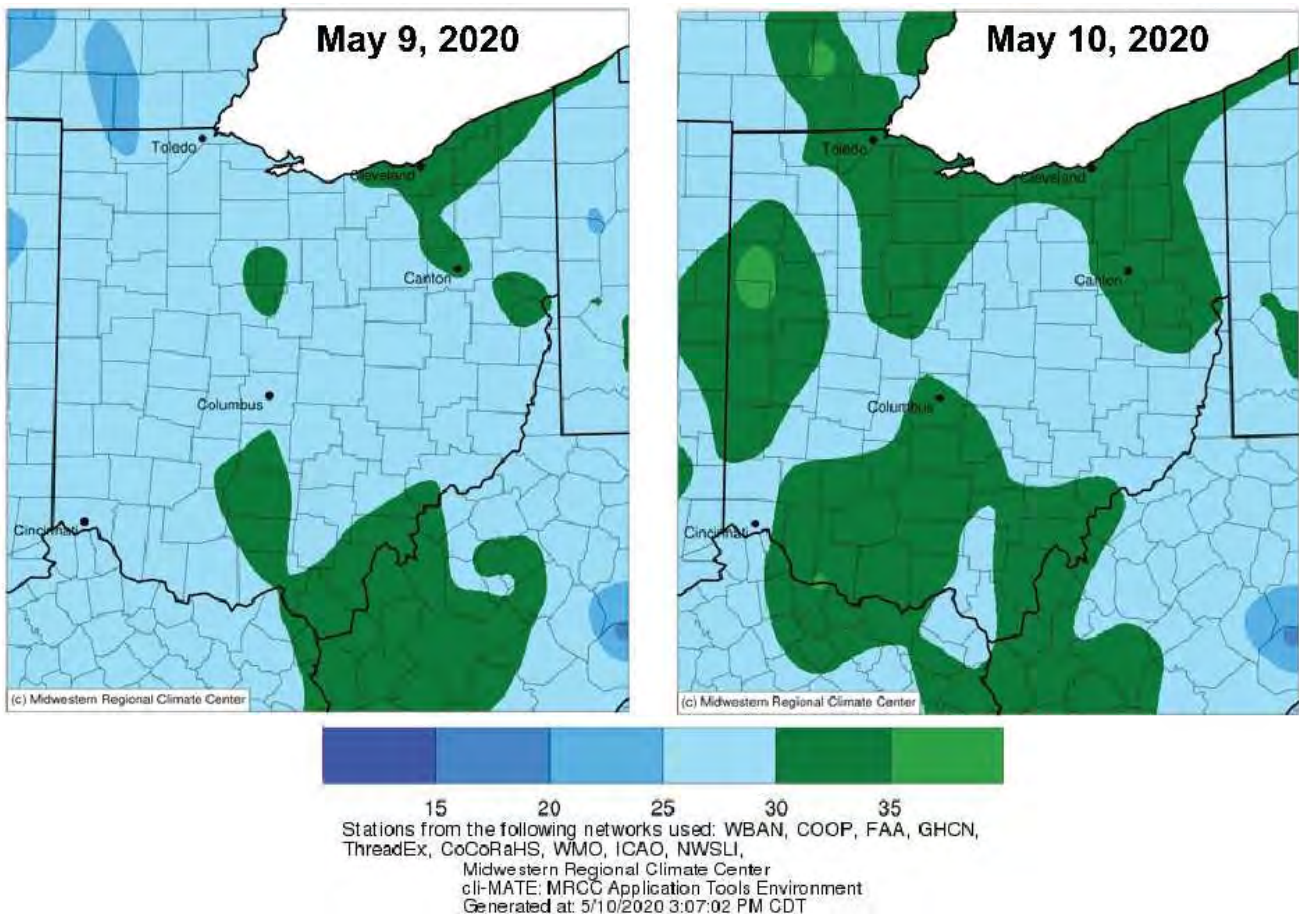


Figure 1. Daily overnight lows based on station observations for May 9-10, 2020. Figures generated at Midwest Regional Climate Center.

Injury to winter wheat depends primarily on three factors: 1) growth stage, 2) how cold, and 3) duration of cold temperature. Differences in freeze injury among cultivars can usually be attributed to slight differences in growth stage.

**At Feekes 8 growth stage (flag leaf visible, but still rolled up)**, the growing point is above the soil surface, but still protected within the crop canopy. Freeze damage at Feekes 8 growth stage can injure developing heads and damage the flag leaf. Symptoms of freeze damage include yellowing or browning (necrosis) of leaves. Once wheat enters Feekes 9 growth stage (ligule of flag leaf visible), the flag leaf may appear twisted (Figure 2). As the wheat head emerges, it can get stuck in the leaf sheath, causing a crooked appearance at heading (Figure 3). In our research, wheat grain yield was reduced, when the temperature

dropped below 25°F for 15 minutes. According to research from Kansas State University, 28°F for two hours can cause moderate to severe reduction in wheat grain yield.



*Figure 2. Twisting or spiral appearance of the flag leaf can be a symptom of damage from low temperatures.*





*Figure 3. Freeze damage may include browning or yellowing of the flag leaf. The wheat head may get stuck in the leaf sheath causing a crooked appearance at heading.*

**At Feekes 10.5.1 growth stage (beginning flowering)**, wheat heads are above the plant canopy, resulting in heads and anthers that are exposed with limited protection from the crop canopy. Freeze injury at Feekes 10.5.1 can cause sterility, embryo death, or complete loss of the spike. At Feekes 10.5.1, spikelets and awns may appear white or bleached in color as a result of cold temperatures (Figure 4). In our research, wheat grain yield was reduced, when the temperature dropped below 28°F for 15 minutes. According to research conducted at Kansas State University, at 30°F for two hours, winter wheat grain yield can be severely reduced.



*Figure 4. Wheat spikelets and awns may appear white or bleached in color as a result of cold temperatures at Feekes 10.5.1 growth stage*

**Assessing damage.** In the above map (Figure 1), temperatures dropped between 25 to 30°F between May 9 and 10. At these temperatures, wheat between the Feekes 8 and Feekes 10.5.1 growth stage may have freeze injury. It is important to assess fields for damage as damage may be more or less extreme depending on the growing environment (landscape features, soil moisture, wind speed, overall condition of the field, etc). We suggest waiting about a week to walk fields and look for symptoms of damage similar to what we have pictured here.

**References:**

Alt, D.S., A.J. Lindsey, R.M. Sulc, and L.E. Lindsey. 2020. Effect of temperature on survival and yield components of field-acclimated soft red winter wheat. *Crop Sci.* 60:475-484. <https://access.onlinelibrary.wiley.com/doi/full/10.1002/csc2.20087>

Shroyer, J., M. Mikesell, and G. Paulsen. 1995. Spring freeze injury to Kansas wheat. *Kansas State Univ. Ext. Serv.* <https://bookstore.ksre.ksu.edu/pubs/c646.pdf>

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## Cold Weather Impact on Corn and Soybean



In Ohio, between May 9 and 10, temperatures were as low as 26°F with some areas even receiving snow. The effect on corn and soybean depends on both temperature, duration of low temperature, and growth stage of the plant. The soil can provide some temperature buffering capacity, especially if soil is wet. Water

is approximately 4x more resistant to temperature changes than air or dry soil, and thus will buffer the soil from experiencing large temperature changes as air temperatures drop. Deeper planted seeds may also be more resistant to large temperature swings.

**Imbibitional chilling.** Imbibitional chilling may occur in corn and soybean seeds if the soil temperature is below 50°F when the seed imbibes (rapidly takes up water from the soil, usually 24 hours after planting). Imbibitional chilling can cause reductions in stand and seedling vigor. If seeds were planted into soil at least 50°F (and have imbibed), the drop in temperature is not likely a problem if the plants have not yet emerged from the soil.

**Corn after germination.** The growing point of corn is below the soil surface until the V6 growth stage, and therefore is protected from low temperatures to some extent. However, if the soil temperature falls below 28°F, this can be lethal to corn. Temperatures between 28 to 32°F may result in frost damage, and both the temperature and duration will affect the severity of damage. Between May 9 and May 10, the minimum soil temperature at a 2-inch depth was 38°F at the Northwest Agricultural Research Station in Wood County, 44°F at the Ohio Agricultural Research and Development Center in Wayne County, and 58°F at the Western Agricultural Research Station in Clark County.





**Soybean after germination.** The growing point of soybean is above the ground when the cotyledons are above the soil surface. If damage occurs above the cotyledons, the plant will likely recover. If damage occurs below the cotyledons, the plant will die. Look for a discolored hypocotyl (the “crook” of the soybean that first emerges from the ground), which indicates that damage occurred below the cotyledons.

**Assessing your fields.** It is best to assess damage to plants or seeds 48 to 96 hours after the drop in temperatures, as symptoms may take a few days to appear. Additionally, cold temperatures slow GDD accumulation and may further delay crop emergence. For corn, recent work suggests 50% emergence can be expected following accumulation of 130-170 soil GDDs (using soil temperature to calculate GDD rather than air temperatures) from planting, which may take 5-7 days to accumulate under normal weather conditions.

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## Managing Head Scab with Fungicides Q&A



Most of the wheat in the northern half of the state is still between Feekes growth stage 8 (early flag leaf emergence) and 9 (full flag leaf emergence), but in the southern half of the state, wheat is much further along. Malting barley is even further along than wheat, and will soon be approaching the heading growth stage. Understandably, given the wet weather we have had so far this season, folks are asking questions about head scab and vomitoxin. Based on some of the questions I have been asked over the years, here are a few things to remember and consider as you make your head scab management decision.

Question?	Answer - Wheat	Answer - Barley
What should I apply for head scab and vomitoxin control?	Prosaro, Caramba, or Miravis Ace. In my experience, they are just as effective when applied at the correct growth stage.	
What is the correct growth stage for applying a fungicide to control vomitoxin and head scab?	The best results are seen when the application is made <b>at or shortly after early anthesis (Feekes 10.5.1)</b> .	For barley, the best results are seen when the treatment is <b>applied at or shortly after heading (Feekes 10.5)</b> .
How do I know that the crop is at the right growth stage for scab control with a fungicide?	Anthesis – fresh anthers are seen sticking out of the central portion of the head.	Heading – heads are fully out of the boot, i.e., out of the leaf sheath of the flag leaf.
How do I make an application decision when some of the heads are at the right growth stage while other heads are not?	Unfortunately, wheat growth is never uniform, that is why we recommend 50% anthesis as a guide for apply a fungicide for scab control.	The growth of barley tends to be even more uneven than wheat. That is why we usually recommend 50% heading as a guide for apply a fungicide.
Does 50% mean half of the head is out or at anthesis, or half of all the heads/tillers I examine?	<b>It means half of all the heads you examine.</b> If you select 20 heads, and 10 of them have anthers sticking out of the central part of the head, you are at 50% anthesis.	<b>It means half of all the tillers you examine.</b> For barley, if you examine 20 tillers, and 10 of them have the head fully emerged, you are at 50% heading.
	However, you will need to examine way more than 20 heads/tillers to get a good estimate. In fact, you should examine multiple sets of 20 heads at multiple locations (50 to 60) across the field – the larger the field and the more variable the field, the more heads/tillers you should examine. <b>And focus your attention on the primary tillers.</b>	

<p>What if I miss the 50% growth stage, is the fungicide still going to work?</p>	<p>YES, once it is applied within the first 4-6 days after 50% anthesis. A “late” application often do just as well as the 50% anthesis application. However, the later you wait, the greater the risk of missing the application window, if it rains and you cannot get into the field.</p>	<p>YES, once it is applied within the first 4-6 days after 50% heading. Quite often, waiting until 75+% of the heads are fully out do just as well. However, the later you wait, the greater the risk of missing the application window, if it rains and you cannot get into the field.</p>
<p>What if I apply early (to beat the rain), say, before 50% early anthesis or heading?</p>	<p>You are still going to get some scab and vomitoxin control, but not as good as if you apply at or shortly after 50% early anthesis.</p>	<p>You are still going to see some scab and vomitoxin control, but not as good as if you apply at or shortly after 50% heading.</p>
<p>I follow all the guidelines but still get scab. Why is that?</p>	<p>Unfortunately, none of the fungicides are 100% effective. That is why we often say scab <i>suppression</i> – the word control can be misleading. <b>You will see the best results if the fungicide is applied to a moderately resistant variety than to a susceptible variety.</b></p>	
<p>I follow all the guidelines, get good scab control, but still get vomitoxin. Why is that?</p>	<p>Quite often, good scab control comes with good vomitoxin reduction. But in some years, particularly when cool, wet, rainy conditions occur between head and harvest, vomitoxin levels may increase, even if scab levels remain low and unchanged.</p>	
<p>Would I see better results in terms of scab and vomitoxin control if I make two applications?</p>	<p>Based on a <b>limited number of experiments with <u>wheat</u></b>, better scab and vomitoxin control was seen when Miravis Ace was applied at 50% anthesis followed by Caramba, Prosaro or tebuconazole 4-6 days after than when a single application was made at 50% anthesis. <b><u>Less information is available on two-treatment programs on barley.</u></b></p>	



<p>It is cold, should I even be concerned about scab and vomitoxin?</p>	<p>Scab develops best under warm, humid, or rainy conditions. Cold or cool weather <b>close to heading</b> definitely reduces the risk of scab. For those fields at Feekes 8-9, continue to monitor the progress of the crop – there is a lot of moisture in the air and warm weather is in the forecast. Also, keep your eyes on the scab forecasting system at <a href="http://www.wheatcab.psu.edu/">http://www.wheatcab.psu.edu/</a>. Contact your county, field, or state (me at <a href="mailto:paul.661@osu.edu">paul.661@osu.edu</a>) extension specialists for guidance.</p>
<p>Read more about head scab at: <a href="https://ohioline.osu.edu/factsheet/plpath-cer-06">https://ohioline.osu.edu/factsheet/plpath-cer-06</a></p>	

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## Potential for Toxic Nitrate Levels in Forages



The recent cold and cloudy weather has raised the concern for higher nitrate levels in forages that could potentially be toxic to animals consuming those forages. It is true that any stress condition that slows plant growth and metabolism can increase the risk of higher plant nitrate levels. This article discusses factors to consider, especially given the recent cold weather we have been experiencing in Ohio and surrounding regions.

Plants readily take up nitrates from the soil, even under colder conditions, and especially since we have plentiful soil moisture to facilitate uptake. Once in the plant, nitrate is converted to nitrite, then ammonia, and finally into amino acids and plant protein. Any environmental stress that significantly slows down plant photosynthesis and metabolism can lead to excessive nitrate levels in the plant because the nitrate uptake from the soil will be faster than its metabolism into plant protein. Such stresses include frost, extended cold weather, cloudy conditions, hail damage, or drought. We have had all those conditions recently, except drought.

When ruminants consume excessive levels of nitrate in the diet, the nitrate is converted to nitrite by rumen microbes faster than it can be converted to ammonia, amino acids, and eventually to protein. Accumulated nitrite in the rumen is then absorbed into the bloodstream where it prevents oxygen transport, which leads to death. Livestock sensitivity to nitrates ranked from highest to lowest is: pigs > cattle > sheep > horses. Older or sick animals are generally more sensitive than young healthy animals. The fetus in pregnant animals is very sensitive to high nitrates ingested in the diet.

Below are factors to consider regarding the potential for high nitrate levels in forages, in the context of our situation this spring:

- Forage growth has been significantly slowed due to extended cold nights, cloudy weather, several hard frost events, and even hail damage in some areas. All these stresses can lead to higher nitrate levels in plants. Warmer temperatures later this week will help reduce the plant nitrate levels as plants gain active growth again.
- Nitrogen fertilizer or manure applications made to forages this spring definitely increase the risk for higher nitrate levels in plant tissue, especially where forage growth is slow.
- Nitrate accumulation is possible in many forage species, including all cool-season perennial forage grasses, alfalfa, all cereal forages (oat, rye, triticale, wheat, barley, spelt, etc.), and brassicas (might be present in cover crop mixes). Nitrates can also accumulate in corn and sorghum species, but those are not an issue for harvest at this time in Ohio.
- Several weed species are heavy nitrate accumulators, including lambsquarter, pigweed, dock, some mustard species, horse nettle, nightshade, quackgrass, and jimsonweed. Heavy infestations of those weeds when harvested with the forage will increase risk of nitrate toxicity.
- Nitrate levels are generally higher in younger than more mature growth. Delaying cereal forage harvest to dough stage and other forages to flowering/heading stages can significantly reduce nitrate levels.
- Nitrates accumulate in the lower one-third of plants more than in the upper two-thirds.
- Plant nitrate concentrations are higher in the morning than later in the day (plant metabolism during daylight drives the conversion of nitrate to plant protein).

- Risk of nitrate toxicity is highest with grazing, especially where nitrogen or manure applications were made this spring.
- Making dry hay does not appreciably reduce nitrate levels in the forage.
- The ensiling can reduce nitrate levels from 10 to 60% provided fermentation is good. But if the forage is initially very high in nitrates, the silage could yet contain toxic nitrate levels, so this is not an automatic fail-safe option.
- Nitrate levels can vary across a field, so the harvested forage can be quite variable in nitrate concentration.

The bottom line is that if you suspect the forage could be high in nitrate levels, the safest thing to do is to sample the forage and have it tested before it is harvested, because if levels are high you can delay harvest to reduce the levels. You should certainly sample the stored forage before feeding it if you suspect higher levels! Call your forage lab and follow their guidelines closely for sampling the forage, packaging, and shipping the sample to them. It might be a good idea to delay harvest until we get warmer weather, more sunshine, and a little more maturity on those forages that are known to be nitrate accumulators, especially where several of the risk factors listed above are present.

For more details, see the following references:

Drewnoski et al., Nitrates in livestock feeding. University of Nebraska Extension NebGuide G1779.

Available at <http://extensionpublications.unl.edu/assets/pdf/g1779.pdf>.

Adams et al., Prevention and control of nitrate toxicity in cattle. PennState Extension. Available at <https://extension.psu.edu/prevention-and-control-of-nitrate-toxicity-in-cattle>.

Glunk, E. Nitrate toxicity of Montana forages. Montana State University Extension MontGuide MT2002205AG. Available

at <http://www.animalrangeextension.montana.edu/forage/documents/Nitrate%20Toxicity%20MontGuide.pdf>.

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## Burndown and Residual Herbicide Issues





Depending upon where you are in the state, it's possible right now to be experiencing delays in getting anything done, progress in planting but delays in herbicide application, weather too dry to activate residual herbicides, and/or reduced burndown herbicide effectiveness on big weeds due to cold weather. What's become a typical Ohio spring. Some information relative to questions that OSU Extension educators have passed on to us:

1. Residual herbicides and rainfall. Residual herbicides do vary in the relative amounts of rain needed for "activation", or adequate movement into the soil to reach germinating seeds. Most growers are applying mixtures or premixes of several products, so we're not sure these differences are as important as the overriding principle here. Residual herbicide treatments need to receive a half to one inch of rain within a week or so after tillage or an effective burndown treatment, to control weeds that can will start to emerge at that time. This varies with timing of application and weather. Summer annual weeds are the target here, and their emergence ramps up in early May, although cold weather can slow this down. So residual herbicides applied in mid-April, prior to most of the summer annual weed emergence, may not need rain as soon after application, compared with herbicides applied in May. Aside from this, residual herbicide activity is not really dependent upon soil reaching a certain temperature. Under more marginal rainfall conditions, it's possible that herbicides may control the small-seeded weeds that emerge at or just below the soil surface, but be less effective on larger-seeded weeds that can emerge from deeper. In a tilled situation, a timely rotary hoe can be used to remove some of the weeds that are about to emerge (the "white stage") and buy some time for rain. The good news here is that we have effective POST herbicides to remedy many situations where the residual herbicides are not completely effective.

2. Residual herbicides and crop injury. The concerns here seem to be more about soybean herbicides, which may partly reflect the overall greater safety of residual corn herbicides. Several residual soybean herbicides can cause injury, depending upon when they are applied relative to planting, rainfall, soil type, seeding depth, etc. These include products that contain metribuzin, sulfentrazone, flumioxazin, and chlorimuron. One of the things that has reduced our risk of injury from all of these herbicides is that in no-

till soybeans they have usually been applied a week or more prior to planting to accommodate restrictions on 2,4-D ester and dicamba. Application at or after planting increases the risk of injury, as does use in tilled situations. We have increased metribuzin use substantially over the past decade, but injury has been extremely rare due to application prior to planting and use of relatively low rates in combination with other products. We hear more about injury or suspected injury from flumioxazin and sulfentrazone when wet weather delays planting and forces application of residual herbicides after planting. It's worth noting here also that the Xtend and Enlist soybean systems do away with the wait to plant soybeans for dicamba and 2,4-D, respectively, and more growers may be waiting until after planting to apply burndown/residual herbicides.

In brief, symptoms of these are as follows: chlorimuron – slowed development, stunting, yellowing; flumioxazin and sulfentrazone – necrosis on young leaves and stem, stunting; metribuzin – usually delayed until first trifoliolate, yellowing and possibly necrosis on margins of older leaves. Cloransulam, imazethapyr, and imazaquin are generally safer on soybeans than chlorimuron, in situations where injury is a concern. Activity of metribuzin varies considerably with soil texture and organic matter content, so using the labeled rate for soil type is important. Injury from any of these may be more likely when herbicide application is delayed for several days after planting, followed by substantial rain as the soybeans are about to emerge. Labels for products containing flumioxazin state that soybeans should be planted 1 ½ inches deep and herbicide should be applied no later than three days after planting, in an attempt to avoid this situation (does not always work). The good news here is that early injury to soybeans usually does not reduce stand, but may slow early growth and rate of crop canopy development and leave soybeans open to the effect of other stresses. In some of these situations, it can be difficult to sort out how much of the damage is due to herbicide and how much is due to other factors. Yield loss is probably infrequent based on the soybean plant's ability to compensate for these types of factors.

3. Cold weather and burndown herbicides. We had a fairly warm winter and early spring, followed by the recent month of colder than normal weather. The net result of this is large winter annual weeds, and weather that is currently not terribly conducive for burndown activity. There is not much specific guidance on herbicide labels about cold weather, just general statements about how effectiveness can be reduced under adverse conditions that include cold weather. We expect many experienced applicators may have their own set of rough guidelines on this, or at least gut feelings. Under cold conditions, the rate of herbicide activity declines and also the overall effectiveness. It's more difficult to define the weather conditions when herbicide should not be applied. These would certainly include periods when frost or freeze is occurring overnight and daytime weather is cool and cloudy (less than about 50). One night of frost followed by a warm sunny day may still allow for decent herbicide activity, if weeds appear sufficiently recovered from the frost. Aside from this we could make a general recommendation to keep applying as long as night and day temperatures are at least 40 and 60 to 70, respectively, although this is still not ideal compared with day temperatures higher than 70 with sun. One way of dealing with this problem is to just wait for a return to warm, sunny weather before applying burndown herbicides. Another is to increase herbicide rates and use a more comprehensive herbicide mixture. For example, adding

Sharpen to a mixture of glyphosate plus 2,4-D or dicamba. As with the less than effective residual herbicides under dry weather, burndown herbicide problems can sometimes be resolved with an effective POST treatment of glyphosate, 2,4-D, or dicamba, depending upon the trait system.

4. Reminder about the value of fall herbicides. Fall herbicides are an essential tool for marestail management, but given our current situation of dense, big weeds in no-till fields and potential problems with burndown herbicide effectiveness, it's worth reminding all of us why fall herbicides started being used in the first place. In the late 1990's, growers were experiencing problems with dense stands of winter annual weeds such as chickweed that interfered with tillage and planting. One contributor to this was the occasional reduced activity of spring-applied burndown herbicides in cool weather, which resulted in too slow death and dry down of weeds to prevent the problems the weeds caused. Fall-applied herbicides became a solution to this, since they result in almost weedfree spring seedbeds up until the point when giant ragweed and other summer annuals emerge (early May for most of these). As anyone knows who has used fall herbicides, their effectiveness reduces the overall importance of the spring-applied burndown, since it does not have to control a mess of large, overwintered weeds. It's all just way easier. And issues with cold weather and spring-applied burndown herbicides are therefore less important. For as little as \$6 worth of fall-applied herbicide. Something to think about moving forward.

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**Meet Your Neighbors on the Agronomy and Farm  
Management Podcast**





New episodes of the Agronomy and Farm Management podcast are available and feature interviews with farmers around Ohio. Meet Aaron Overholser from Darke Co. in episode 48 and learn why he conducts on-farm research. Episode 49 features Geoff Mavis from Fayette Co. and his thoughts on farmland preservation and transitioning his farm. Upcoming episodes 50 and 51 will introduce you to Gene Baumgardner, Fayette Co. farmer, who shares his experiences working with the Corn and Wheat Growers Association and Brian Case, first generation farmer from Champaign Co, who shares how he maximizes his returns through an equipment sharing agreement. Listen and subscribe at [go.osu.edu/AFM](http://go.osu.edu/AFM)

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**Watch for Cereal Leaf Beetles in Wheat, Barley and Other Grains**



Around this time in May, we may see increases of cereal leaf beetle in wheat and other small grains. In fact, a few adults have already been spotted in a few fields. Adults are not the most damaging stage, but they will lay eggs which will hatch into the hungrier and more damaging larvae in the next few weeks. Look for adult beetles which are metallic blue and orange.

Larvae are small, grey and have a moist appearance (the moistness comes from their feces that they place on their back for protection). It is difficult to predict which fields may have cereal leaf beetles so scouting is very important to know if your field is at risk. Heavily infested fields will have frosted appearance and the larvae feed and strip foliage tissue. Our economic threshold is 1 cereal leaf beetle larvae per stem, and many insecticides provide effective control. More information can be found at <https://ohioline.osu.edu/factsheet/ENT-38>



*cereal leaf beetle larvae*

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When Can Unlicensed Applicators Spray on the Farm?





Many are asking who can legally apply pesticides on the farm since ODA postponed pesticide license testing. Ohio law requires a private pesticide license to use **restricted use pesticides** in agricultural production on the applicator's property, the employer's property or rented land. Restricted use pesticides are labeled as such, and cannot be purchased without a license. No license is needed for application of general use pesticides in agricultural production on the applicator's property, the employer's property or rented land.

Non-licensed family members or subordinate employees can apply restricted use pesticides under the direct supervision of the licensed private applicator under certain circumstances, as long as the pesticide label does not prohibit it. The private applicator's responsibilities are outlined below.

What does the licensed private applicator need to provide to those working under direct supervision?

- The licensed applicator does not have to be present, but must be available if needed during the application
- Pesticide labels must be at the worksite if licensed applicator not present
- Personal Protective equipment as required by label

What are the age requirements for unlicensed applicators working under direct supervision of a private applicator?

- If a family member, the only restriction is for Pesticides with Danger – Poison Signal word – the family member must be 18
- If an employee – they must be 18 (a Worker Protection Standard (WPS) requirement)

What are the training requirements for unlicensed applicators?

- Subordinate employees must receive WPS handler training annually

- Family members are exempt from annual WPS handler training, except when respirators are required on the label. In this case there are requirements under WPS for annual respirator training.

Which pesticides do NOT allow direct supervision (may only be applied by the licensed private applicator)?

- Paraquat dichloride
- Dicamba formulations used over the top of soybeans – Xtendimax, Engenia, FeXapan, and Tavium.
- Any other pesticide that restricts use to certified (licensed) applicators

Also see: <https://u.osu.edu/psep/2020/05/07/who-can-legally-spray-for-the-farm-nursery-or-greenhouse/>

Note: requirements for making applications under supervision of a commercial applicator are different. For these see:

<https://u.osu.edu/psep/2020/04/23/what-is-a-trained-serviceperson-and-can-they-legally-apply-pesticides-in-ohio/>

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## Other Articles

### Global trade in soy has major implications for climate

Study examines carbon emissions from Brazilian soy exports with unprecedented accuracy

Date: May 7, 2020

Source: University of Bonn

Source: <https://www.sciencedaily.com/releases/2020/05/200507104446.htm>

The extent to which Brazilian soy production and trade contribute to climate change depends largely on the location where soybeans are grown. This is shown by a recent study conducted by the University of Bonn together with partners from Spain, Belgium and Sweden. In some municipalities, CO<sub>2</sub> emissions resulting from the export of soybean and derivatives are more than 200 times higher than in others. Between 2010 and 2015,

the EU imported soy primarily from locations where large forest and savannah areas had previously been converted into agricultural land. The analysis is published in the journal *Global Environmental Change*.

Global soy trade is a major source of greenhouse gas emissions for multiple reasons. The conversion of natural vegetation into arable land is probably the most important cause, since the latter generally binds considerably less CO<sub>2</sub> than the original ecosystems. Greenhouse gases are also released during the harvesting of soybeans and processing into derived products, the subsequent transport to ports of export and shipment.

To estimate the carbon footprint embodied in Brazil's soy exports, researchers used the Life Cycle Assessment (LCA) methodology. This allows quantifying the environmental footprint of a product, from its production until it is delivered to the importer. The researchers from the Institute for Food and Resource Economics (ILR) of the University of Bonn have performed this analysis for almost 90,000 supply chains that were identified in total soy exports from Brazil in the period 2010-2015. "Each of these 90,000 individual trade flows represents a specific combination of the producing municipality in Brazil, the location in which the soy was stored and pre-processed, the respective export and import ports, and, where applicable, the country where further processing takes place," explains the ILR researcher Dr Neus Escobar. "Put more simply, we have calculated the quantity of carbon dioxide released per tonne of soy exported through each of these supply chains."

### **Around 90,000 soy trade flows analysed**

For this purpose, the researchers used a database developed at the Stockholm Environment Institute. It traces the trade routes of agricultural commodity exports from the production region to the importer in detail. "The database also contains spatially-explicit information on the deforestation associated with the soy cultivation in the production region," says Escobar. "We supplemented it with additional data, for instance, on means of transport involved in the corresponding export route, as well as their CO<sub>2</sub> emission intensity. This enabled us to make a very detailed assessment of the impact of soy cultivation in Brazil and subsequent transport on global greenhouse gas emissions." Interestingly, results show that: "The resulting greenhouse gas emissions vary considerably from municipality to municipality, depending on underlying deforestation, cultivation practices and freight logistics," emphasizes Escobar. "The carbon footprint of some municipalities is more than 200 times larger than others. The variability is therefore much higher than so far reported in scientific literature."

The greatest CO<sub>2</sub> emissions arise from the so-called MATOPIBA region in the northeast of the country. This region still has large areas covered with natural vegetation, particularly forests and savannahs, which have however been increasingly lost to agriculture in recent years. Furthermore, soy exports from municipalities in this region usually entail long transport distances to the ports of export, which are mostly covered by trucks due to the relatively poor infrastructure. Thus, greenhouse gas emissions from transport can be substantial and even surpass the effects of deforestation.

The researchers also investigated which countries generate particularly large quantities of greenhouse gas emissions by importing soy. First and foremost, the world's largest importer is China, however, the European Union does not fall far behind. "Although European countries imported considerably smaller amounts of soy, between 2010 and 2015, this came primarily from areas where sizeable deforestation took place," notes Escobar.



"Regional factors can have a significant influence on the environmental impacts embodied in global agricultural trade," explains the researcher. "Our study helps to shed light on such relationships." Policymakers urgently need such information: It can help to design low-carbon supply chains, for instance with improvements in the transport infrastructure or more effective forest conservation policies. Furthermore, it can also inform consumers about the environmental implications of high meat consumption, such as in many EU countries: A large proportion of the soy imported by Europe is used as animal feed.

University of Bonn. "Global trade in soy has major implications for climate: Study examines carbon emissions from Brazilian soy exports with unprecedented accuracy." ScienceDaily. ScienceDaily, 7 May 2020. <[www.sciencedaily.com/releases/2020/05/200507104446.htm](http://www.sciencedaily.com/releases/2020/05/200507104446.htm)>.

## Scientists take a step closer to heat-tolerant wheat

Date: May 4, 2020

Source: Lancaster University

Source: <https://www.sciencedaily.com/releases/2020/05/200504074720.htm>

Researchers working on molecular-level responses in crops have taken a step closer to their goal of producing heat-tolerant wheat.

Smart thermostats tell air conditioners to switch on when the sun is bearing down in the summer and when to shut down to conserve energy. Similarly, plants have Rubisco activase, or Rca for short, that tells the plant's energy-producing enzyme (Rubisco) to kick on when the sun is shining and signals it to stop when the leaf is deprived of light to conserve energy.

Today, a team from Lancaster University reports in *The Plant Journal* that swapping just one molecular building block out of 380 that make up an Rca in wheat enables it to activate Rubisco faster in hotter temperatures, suggesting an opportunity to help protect crops from rising temperatures.

"We took a wheat Rca (2 $\beta$ ) that was already pretty good at activating Rubisco in lower temperatures and swapped out just one of its amino acids with one found in another wheat Rca (1 $\beta$ ) that works pretty well in higher temperatures but is rubbish at activating Rubisco -- and the result is a new form of 2 $\beta$  Rca that is the best of both worlds," said Elizabete Carmo-Silva, a senior lecturer at the Lancaster Environment Centre who oversaw this work for a research project called Realizing Increased Photosynthetic Efficiency (RIPE).

RIPE is engineering crops to be more productive by improving photosynthesis, the natural process all plants use to convert sunlight into energy and yields. RIPE is supported by the Bill & Melinda Gates Foundation, the U.S. Foundation for Food and Agriculture Research (FFAR), and the U.K. Government's Department for International Development (DFID).

Here's the breakdown: naturally occurring wheat Rca 1 $\beta$  has an isoleucine amino acid, works up to 39 degrees Celcius, but isn't great at activating Rubisco, whereas the naturally occurring 2 $\beta$  has a methionine amino acid,

works up to about 30 degrees Celcius, and is good at activating Rubisco. Here the team has created a new version of 2 $\beta$  with an isoleucine amino acid that works up to 35 degrees Celcius and is quite good at activating Rubisco.

"Essentially, 1 $\beta$  is a rubbish enzyme and 2 $\beta$  is sensitive to higher temperatures," Carmo-Silva said. "The cool thing here is that we have shown how this one amino acid swap can make Rca active at higher temperatures without really affecting its efficiency to activate Rubisco, which could help crops kickstart photosynthesis under temperature stress to churn out higher yields."

This work was carried out in vitro in E. coli, supported by a Ph.D. studentship by the Lancaster Environment Centre to first author Gustaf Degen. Importantly, these findings will support RIPE's efforts to characterise and improve the Rca of other food crops such as cowpea and soybean, each with multiple different forms of Rca.

"When looking at cowpea growing regions in Africa, it goes all the way from South Africa with an average around 22 degrees Celcius to Nigeria at about 30, and areas further north get to 38," Carmo-Silva said. "If we can help Rubisco activate more efficiently across these temperatures, that is really powerful and could help us close the gap between yield potential and the reality for farmers who depend on these crops for their sustenance and livelihoods."

Lancaster University. "Scientists take a step closer to heat-tolerant wheat." ScienceDaily. ScienceDaily, 4 May 2020. <[www.sciencedaily.com/releases/2020/05/200504074720.htm](http://www.sciencedaily.com/releases/2020/05/200504074720.htm)>.

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