Hello Northeast Ohio Counties!

We had a lot of progress planting in the last week throughout the region. Generally, conditions have been favorable for crops with warmer soil temps, decent moisture, and warmer nights. We should start seeing rows of corn popping up later this week, and definitely by next week with temps forecasted in the 80s.

We are continuing to telework during the Stay Safe Ohio order but as always, we are here to assist you.

Have a great week!

Lee Beers  Andrew Holden  Angie Arnold
Trumbull County  Ashtabula County  Portage County
Extension Educator  Extension Educator  Extension Educator
**Warmer Weather, Finally!**

By: Aaron Wilson  
Source: [https://agcrops.osu.edu/newsletter/corn-newsletter/2020-14/warmer-weather-finally](https://agcrops.osu.edu/newsletter/corn-newsletter/2020-14/warmer-weather-finally)

As recently as last Wednesday and Thursday (May 13-14), some locations across Ohio had morning lows dipping down to near or below freezing (Figure 1). This follows numerous frost and freeze events since mid-April that led to reports of damage to vegetables, tree fruit, and certain grape varieties, and some minor leaf-tip damage to wheat and alfalfa. For more information on recent climate conditions, check out the weekly Hydro-Climate Assessment from the [State Climate Office of Ohio](https://agcrops.osu.edu/newsletter/corn-newsletter/2020-14/warmer-weather-finally).

![Figure 1: Morning lows on left) May 13, 2020 and right) May 14, 2020. Figures courtesy of the Midwest Regional Climate Center](https://mrcc.illinois.edu).

But it seems as though we have turned a corner on this cool weather; after all, June is fast approaching and there is still some work to be done. Will the weather cooperate? Unfortunately, we have a slow-moving system and weak cold front this week that is already providing a focal point for numerous showers and storms across the state. Tropical Storm Arthur, moving up the U.S. east coast, is slowing the progression of this
system, with expected lingering showers throughout the week across the region. Heavy rain and some flooding are possible, especially over portions of western and southern Ohio, where 2-4 inches of rain are expected with locally heavier amounts (Figure 2). This is well above the 1 inch per week we typically see this time of year. Lighter amounts are forecast for northeast Ohio.

Temperatures are likely to cool a bit behind the cold front on Tuesday and Wednesday, with highs below average in the 50s and 60s. A moderating trend in temperatures is likely by the weekend, with highs returning to the 70s and 80s. This may also bring some scattered thunderstorm activity.

The latest NOAA/NWS/Climate Prediction Center outlook for the 6-10 day period (May 24-28) shows a strong likelihood for above average temperatures with slightly elevated probability for above average precipitation (Figure 3). Normal highs during the period should be in the low to mid-70s (north to south) with overnight lows in the upper 40s to mid-50s and about 0.9-1.10” of precipitation per week. The 16-Day Rainfall Outlook from NOAA/NWS/Ohio River Forecast Center reflects well above average precipitation over the next couple of weeks, largely a reflection of this week’s wet weather.
Figure 3: Climate Prediction Center 6-10 Day Outlook valid for May 24-28, 2020 for left) temperatures and right) precipitation. Colors represent the probability of below, normal, or above normal conditions.

**USDA Coronavirus Food Assistance Program**

By Chris Zoller, Extension Educator, ANR, Tuscarawas County & Mike Estadt, Extension Educator, ANR, Pickaway County  
Source: https://u.osu.edu/ohioagmanager/2020/05/15/usda-coronavirus-food-assistance-program/

The United States Department of Agriculture (USDA) Coronavirus Food Assistance Program (CFAP) is part of the Coronavirus Aid, Relief, and Economic Security Act, the Families First Coronavirus Response Act, and other USDA authorities to provide $16 billion in support to farmers impacted by the coronavirus pandemic. The program is available to all farmers, regardless of size, who suffered an eligible loss. Included in the program is $3 billion that will go toward purchases of commodities for distribution by food banks and faith-based programs through the Farmers to Families Food Box Program. USDA announced $1.2 billion in contracts for that program last week.

CFAP will provide direct support based on actual losses where markets & supply chains have been impacted. The program is also designed to assist farmers with additional adjustment and marketing costs from lost demand and short-term oversupply for the 2020 marketing year caused by COVID-19.
• Although sign-up has not started, there are a few things you can do now to be ready, including:
  Gathering documentation of recent sales and inventories
• Having your Tax Identification Number (TIN)
• Determining your operating structure (sole proprietor, LLC, etc.)
• A record of your Adjusted Gross Income (AGI)

An additional article on CFAP can be accessed at: https://u.osu.edu/ohioagmanager/2020/04/21/usda-announces-coronavirus-food-assistance-program-cfap/  

Your local Farm Service Agency office will be handling the application process and all interested farmers are encouraged to call to schedule an appointment and have questions answered. Additional CFAP information is available at https://www.farmers.gov/cfap

Field Estimations of Alfalfa Fiber Content

By: Angela Arnold, Mark Sulc, Jeff Stachler, Will Hamman, Dean Kreager
Source: https://agcrops.osu.edu/newsletter/corn-newsletter/2020-14/field-estimations-alfalfa-fiber-content

Ohio has seen its 5th warmest winter on record but spring temperatures across the state have consistently been 2-6° F below long-term averages. Climatic variations every year make it difficult to know the exact date to determine harvest of our first alfalfa crop. Research has shown % Neutral Detergent Fiber (NDF) can vary up to 10 units on the same calendar day from one year to the next, therefore making harvest decisions based on calendar date is unreliable. Many producers also base harvest decisions primarily on alfalfa maturity. Variable weather conditions affect the rate of bud and flower development in alfalfa, thus relying solely on maturity can be misleading.

The best method to determine alfalfa (NDF) is by traditional wet chemistry analysis; however, these traditional methods for determining %NDF are often too time consuming when a rapid estimation of NDF is needed for making harvest decisions. In the spring, average alfalfa NDF increases about 5 percentage units each week. Years ago, the University of Wisconsin developed a method to estimate %NDF in the field. This method is referred to as PEAQ, Predicative Equations for Alfalfa Quality. This
method uses alfalfa height and maturity to estimate NDF of a standing alfalfa crop. Instructions on how to estimate NDF in pure alfalfa stands can be found here: https://forages.osu.edu/sites/forages/files/imce/Estimate%20Alfalfa%20NDF.pdf. Here is a short video describing the method:

PEAQ was developed for clean pure alfalfa stands. Using this method to estimate NDF of weedy alfalfa or grass-alfalfa stands, will be inaccurate. Cornell University has developed a method to estimate forage NDF for grass-alfalfa mixtures. This method is described here http://blogs.cornell.edu/ccefieldcropnews/2016/05/10/new-alfalfa-grass-ndf-estimation-tool-for-smart-phones/.

Ohio’s cold spring affected alfalfa development across the state. Alfalfa NDF is approximately 4.3 to 10 percentage units behind where development was last year. Over the next few weeks we will be monitoring and reporting alfalfa %NDF across the state.

Even though it is typical to see alfalfa jump 5 NDF units in a week’s time during spring development, the last two weeks across Ohio has shown a change of only 0.8 to 3.4 units of NDF. Below are NDF estimates from last two weeks.

Table 1. Alfalfa Average % NDF for Three Counties in Ohio (Second Week of May)

<table>
<thead>
<tr>
<th>Date</th>
<th>Location</th>
<th>Average % NDF</th>
<th>Stage</th>
</tr>
</thead>
<tbody>
<tr>
<td>5/13/20</td>
<td>Clark County</td>
<td>30.9</td>
<td>Vegetative</td>
</tr>
<tr>
<td>5/7/20</td>
<td>Pike County</td>
<td>31.2</td>
<td>Vegetative</td>
</tr>
<tr>
<td>5/13/20</td>
<td>Stark County</td>
<td>30.3</td>
<td>Vegetative</td>
</tr>
</tbody>
</table>

Table 2. Alfalfa Average %NDF for Five Counties in Ohio (Third Week of May)

<table>
<thead>
<tr>
<th>Date</th>
<th>Location</th>
<th>Average % NDF</th>
<th>Stage</th>
</tr>
</thead>
<tbody>
<tr>
<td>5/17/20</td>
<td>Auglaize</td>
<td>29.6</td>
<td>Vegetative</td>
</tr>
<tr>
<td>5/18/20</td>
<td>Clark County</td>
<td>34.3</td>
<td>Vegetative/ Early bud</td>
</tr>
<tr>
<td>5/18/20</td>
<td>Licking</td>
<td>34</td>
<td>Vegetative</td>
</tr>
<tr>
<td>5/15/20</td>
<td>Pike County</td>
<td>32</td>
<td>Vegetative</td>
</tr>
<tr>
<td>5/18/20</td>
<td>Stark County</td>
<td>31.3</td>
<td>Vegetative</td>
</tr>
</tbody>
</table>

Warmer weather and moisture will continue to move alfalfa NDF along quickly. Alfalfa producers in southern regions of Ohio should start thinking about harvesting alfalfa stands soon if the goal is to hit a forage NDF of 40% for high quality alf.
COVID-19 has created an unusual situation that has negatively affected crop prices and lowered certain crop input costs. Many inputs for the 2020 production year were purchased or the prices or costs were locked in prior to the spread of this novel coronavirus. Some costs have been recently affected or may yet be affected. Lower fuel costs may allow for lower costs for some compared to what current budgets indicate.

Production costs for Ohio field crops are forecast to be largely unchanged from last year with lower fertilizer expenses offset by slight increases in some other costs. Variable costs for corn in Ohio for 2020 are projected to range from $359 to $452 per acre depending on land productivity. Variable costs for 2020 Ohio soybeans are projected to range from $201 to $223 per acre. Wheat variable expenses for 2020 are projected to range from $162 to $198 per acre.

Returns will likely be low to negative for many producers depending on price movement throughout the rest of the year. Grain prices used as assumptions in the 2020 crop enterprise budgets are $3.20/bushel for corn, $8.30/bushel for soybeans and $5.10/bushel for wheat. Projected returns above variable costs (contribution margin) range from $109 to $240 per acre for corn and $179 to $337 per acre for soybeans. Projected returns above variable costs for wheat range from $152 to $262 per acre.

"Return to land" is a measure calculated to assist in land rental and purchase decision making. The measure is calculated by starting with total receipts or revenue from the crop and subtracting all expenses except the land expense. Returns to land for Ohio corn (total receipts minus total costs except land cost) are projected to range from -$48 to $72 per acre in 2020 depending on land production capabilities. Returns to land for Ohio soybeans are expected to range from $65 to $214 per acre depending on land production capabilities. Returns to land for wheat (not including straw or double-crop returns) are projected to range from $70 per acre to $173 per acre.
Total costs projected for trend line corn production in Ohio are estimated to be $759 per acre. This includes all variable costs as well as fixed costs (or overhead if you prefer) including machinery, labor, management and land costs. Fixed machinery costs of $75 per acre include depreciation, interest, insurance and housing. A land charge of $187 per acre is based on data from the Western Ohio Cropland Values and Cash Rents Survey Summary. Labor and management costs combined are calculated at $67 per acre. Details of budget assumptions and numbers can be found in footnotes included in each budget.

Total costs projected for trend line soybean production in Ohio are estimated to be $517 per acre. (Fixed machinery costs: $59 per acre, land charge: $187 per acre, labor and management costs combined: $46 per acre.)

Total costs projected for trend line wheat production in Ohio are estimated to be $452 per acre. (Fixed machinery costs: $34 per acre, land charge: $187 per acre, labor and management costs combined: $41 per acre.)

Current budget analysis shows favorable returns for soybeans compared to corn but crop price change and harvest yields may change this outcome.

These projections are based on OSU Extension Ohio Crop Enterprise Budgets. Newly updated Enterprise Budgets for 2020 have been completed and posted to the Farm Office website here:  https://farmoffice.osu.edu/farm-mgt-tools/farm-budgets.

**Potential for Toxic Nitrate Levels in Forages**

By Mark Sulc
Source: https://agcrops.osu.edu/newsletter/corn-newsletter/2020-13/potential-toxic-nitrate-levels-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.
- 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:
Warming Midwest conditions may result in corn, soybean production moving north

By Jeff Mulhollem
Source: https://news.psu.edu/story/617946/2020/05/04/research/warming-midwest-conditions-may-result-corn-soybean-production

UNIVERSITY PARK, Pa. — If warming continues unabated in the Midwest, in 50 years we can expect the best conditions for corn and soybean production to have shifted from Iowa and Illinois to Minnesota and the Dakotas, according to Penn State researchers.

Using machine learning — a form of artificial intelligence that enables a computer system to learn from data — the team considered more than three decades of county-level, crop-yield data from the U.S. Department of Agriculture’s National Agricultural Statistics Service for 18 states in the central region of the United States. That area produces the majority of these crops.

The researchers evaluated crop yields along with weather data. They considered fundamental climate variables to find yield predictors specific to each of the crop-growing phases. The study also analyzed the relationships between climate and corn, sorghum and soybean grain yield from 1980 to 2016.

Sunset over a northern Illinois cornfield... The shift doesn’t mean that Iowa and Illinois will stop producing crops, but it might mean that farmers in those states will adapt to a warmer climate producing two crops in a year or a different mix of crops instead of the dominant corn-soybean rotation. The changes are likely to be gradual, the researchers say, and farmers and the supply chain should be able to adapt.
“This kind of research was impossible before the era of big data we are living in now, and of course, it can be done only by using the powerful computing capacity that we can access at Penn State,” said researcher Armen Kemanian, associate professor of production systems and modeling in the College of Agricultural Sciences. “This study is important because in a climate that is changing relatively quickly, these techniques allow us to foresee what may happen.”

The findings, published in Environmental Research Letters, do not necessarily mean that the shift north and west in corn and soybean production will occur, said lead researcher Alexis Hoffman, who earned her doctoral degree in meteorology at Penn State in 2018. But, based on the data, researchers conclude that such a shift is in progress, and there is a strong probability it will continue.

“We are not suggesting that such a shift would be a catastrophe,” Kemanian said. “It doesn’t mean that Iowa will stop producing crops, but it might mean that Iowa farmers adapt to a warmer climate producing two crops in a year or a different mix of crops instead of the dominant corn-soybean rotation. The changes are likely to be gradual, and farmers and the supply chain should be able to adapt. But things will change.”

The three crops in the study have distinct responses to humidity and temperature, one of the most revealing results of the study, noted Hoffman. In general, corn needs more humidity, sorghum tolerates higher temperatures and soybean is somewhere in between.

In the study, corn exhibited a uniquely strong response of increased yield to increasing atmospheric humidity during its critical phase, from before to after flowering, as well as a strong sensitivity to exposure to extreme temperatures.

For each year during the study period, researchers estimated planting dates for every county, based on

The graphic shows the overlay of precipitation and temperature color coded to represent the best locations for corn in 2016 and in a climate scenario representative of 2064 if emissions are not curtailed. The darkest shade of purple is where temperature and precipitation align to provide the best weather for corn — for example, from northern Ohio all the way west through parts of Indiana, Michigan, Illinois and Iowa, among other states. In the projected 2060 panel, the best combination of precipitation and temperature become narrower and move north from current conditions.
Northeast Ohio Agriculture  OHIO STATE UNIVERSITY EXTENSION
Ashtabula, Portage and Trumbull Counties

county-level temperatures to simulate farmer adaptation to cold or warm years, she said. They estimated that planting occurs once the 21-day moving average rises to a crop-specific threshold temperature. Planting temperatures for corn, sorghum and soybean were 50, 59, and 53.6 degrees Fahrenheit, respectively.

Corn exhibited a uniquely strong response of increased yield to increasing atmospheric humidity during its critical phase, from before to after flowering, as well as a strong sensitivity to exposure to extreme temperatures, Hoffman explained.

“Humidity is a factor for all crops studied, but what the data are telling us is that it is more of a factor for corn than it is for soybean or sorghum, and in a very narrow time window,” she said. “And by humidity, we mean that soils might be moist, but the data is showing that moisture in the air matters, regardless. That wasn’t known before.”

However, soybean has a strong response to both maximum and minimum temperatures, she said. “All crops had threshold-like responses to high temperature, though we documented a comparatively greater tolerance to high temperature for sorghum at 90.5 F versus a range of 84.2 to 86 F for corn and soybean. We did not describe that response — machine learning revealed it for us.”

The research may have implications for companies selling crop insurance, Kemanian suggests.

“High-temperature swings are damaging. Learning when and by how much for both corn and soybean is critically important,” he said. “Crop insurance companies have an interest in this because they need to assess the risk of a given stress happening and how much they will pay as a result.”

Chris Forest, professor of climate dynamics in the College of Earth and Mineral Sciences, and Hoffman’s doctoral degree adviser, was involved in the research. This research builds on earlier work done by Hoffman and the team in sub-Saharan Africa.
The Network for Sustainable Climate Risk Management at Penn State, under a cooperative agreement with the National Science Foundation, and the U.S. Department of Agriculture’s National Institute of Food and Agriculture supported this research.

Soybeans, like those in the fields shown, have been produced in the lower Midwest because the soils and climate supported their production. An infrastructure has been developed to handle the crop, some of it shown in this photo. If the crops shift northward because of climate change, the infrastructure will have to follow.