Hello Northeast Ohio Counties!

The planters are rolling in NE Ohio this week with our unusually dry weather. The warm weather today and in the next couple of days, coupled with some rain will help get those crops started.

There is a chance for another cool down next week, so check out the couple of weather articles we have for you this week to help you plan for not only planting season, but the summer as well.

Have a great week!

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Cold Weather Impact on Corn and Soybean
By: Laura Lindsey, Alexander Lindsey
Source: https://agcrops.osu.edu/newsletter/corn-newsletter/11-2021/cold-weather-impact-corn-and-soybean

Imbibitional chilling may occur in corn and soybean seeds if the soil temperature is below 50°F when the seed imbibes (when seed rapidly takes up water from the soil, usually within 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 already imbibed), the drop in temperature is not likely a problem if the plants have not yet emerged from the soil. This year, the concern is for seed planted into dry soil that imbibed due to the recent snow melt.

If your corn and soybean plants were emerged at the time of the cold temperatures last week, fields should be assessed this week as the temperature warms up. 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. For soybean, the growing point is above the ground when the cotyledons are above the soil surface. If damage occurs below the cotyledons, the plant will die.

Figure 1. Soybean plants seeded at 100,000, 140,000, and 180,000 plants per acre. Photo credit: Will Hamman.

If your corn and soybean plants were not yet emerged at the time of the cold temperatures last week, you may need to wait longer to assess potential damage. Checking the seeds now may be hard to tell if imbibitional chilling occurred because affected seeds that won’t complete the germination process will still absorb water. As the temperatures warm up, corn and soybean seeds should begin to germinate and emerge from the soil. We suggest assessing corn and soybean stand as plants emerge.
For soybeans planted in April or May, a stand as low as 100,000 plants per acre can still produce maximum yield. However, we do not recommend replanting until the soybean stand is less than 50,000 plants per acre. At low plant populations, soybean plants can compensate through increased branching (Figure 1). In our research, going from 100,000 plants per acre to 50,000 plants per acre resulted in a 9 to 14% reduction in yield.

Final stands for corn should be between 24,000 and 26,000 plants per acre in lower yielding environments to optimize yield, though some higher yielding environments maximize yield at stands that exceed 34,000 plants per acre. Early planting dates with lower stands can still produce exceptional yield. For example, in past research, a stand of 20,000 plants per acre planted on April 20 yielded 90% of the optimum. If stands are 15,000 plants per acre or fewer, a replant may be warranted as the yield gained from a higher seeding rate planted in early to mid-May can exceed the yield from corn with a low stand planted in mid-April.

**Challenges Ahead**

By: Jim Noel
Source: [https://agcrops.osu.edu/newsletter/corn-newsletter/11-2021/challenges-ahead](https://agcrops.osu.edu/newsletter/corn-newsletter/11-2021/challenges-ahead)

There are challenges ahead so we will break them into short-term and long-term.

**Short-term**
The recent snow was a rare event for the amount that fell across Ohio. However, the minimum temperatures in the 20s and 30s was not that far off of normal for last freeze conditions for Ohio.

The strongest typhoon ever in the northern hemisphere occurred east of the Philippines last week and this energy will come across parts of North America over the next week. When that happens weather model performance often drops. Hence, if you see more bouncing around of forecasts the next 10-15 days that may be one reason why.

We have a big warm-up the first half of this week ahead of a strong storm that will move through Ohio the second half of the week with wind and rain. We could see anywhere from 0.50 inches to over 2 inches across Ohio later this week but placement is not certain and seems to favor central and southern Ohio with the highest amounts. Expect most places to see an inch or less given recent track record of events coming in lighter. Once the storm passes colder air will push in and some frost will be possible this weekend with lows in the 30s.
The rainfall the next 30-days is critical for the growing season as moderate drought over northern Ohio already has soil conditions in a shortage.

The latest drought monitor can be found here:
https://droughtmonitor.unl.edu

Also, some of the greatest evaporative demand in the country has been in parts of northern Ohio the last 30+ days and can be monitored as a leading indicator for drought development at this webpage via NOAA:
https://psl.noaa.gov/eddi/realtime_maps/images/latest.trim.png

You can keep up on the Ohio River Forecast Center's Water Resources Outlooks at:
https://www.weather.gov/ohrfc/WRO

**Long-term**

May appears will see periods of well above and below normal temperatures but will average out close to normal or just slightly above normal. Precipitation continues to trend at or below normal but models suggest a normal May for precipitation. If we get timely rains that will help soil conditions for summer. If we miss critical rains in May, this could lead to summer issues.

The latest rainfall outlook for the next 16-days is viewable in the attached image. Normal rainfall is nearing 2 inches for the next 16-days. We expect 1-3 inches for most areas.

For summer, most climate models indicate above normal temperatures and medium to high confidence of above normal temperatures during typical peak temperatures from mid-June to mid-August. We will need to monitor this. Confidence in summer rainfall is low. Most outlooks and models suggest not too far from normal rainfall but the reality is since 30-50% of summer rainfall comes from local soils, the next 30-days will be a big player in our summer rainfall outcome.

**Federal bills target carbon reduction practices on farms and forests**

By: Peggy Kirk Hall, Associate Professor, Agricultural & Resource Law
Source: https://farmoffice.osu.edu/blog/thu-04222021-625pm/federal-bills-target-carbon-reduction-practices-farms-and-forests

President Biden announced a major goal this week--for the U.S. to reduce greenhouse gas emissions by half over the next decade as compared to 2005 levels. Agriculture will play a key role in that reduction by “deploying cutting-edge tools to make the soil of our
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“heartland the next frontier in carbon innovation,” according to President Biden. Several bills introduced in Congress recently could help agriculture fulfill that key role. The proposals offer incentives and assistance for farmers, ranchers, and forest owners to engage in carbon sequestration practices.

Here’s a summary of the bills that are receiving the most attention.

**Growing Climate Solutions Act, S. 1251.** The Senate Agriculture, Nutrition and Forestry Committee passed S. 1251 today. The bipartisan proposal led by sponsors Sen. Mike Braun (R-IN), Sen. Debbie Stabenow (D-MI), Sen. Lindsey Graham (R-SC) and Sen. Sheldon Whitehouse (D-RI) already has the backing of over half of the Senate as co-sponsors, including Ohio’s Sen. Sherrod Brown. The bill has come up in prior sessions of Congress without success, but the sponsors significantly reworked the bill and reintroduced it this week. The new version includes these provisions:

- Requires the USDA to conduct an initial assessment of the domestic market for carbon credits, to include assessing market actors, market demand, estimated credits in process, supply and demand of offsets, barriers to entry, monitoring and measurement technologies, barriers for small, beginning and socially disadvantaged operators, among other factors.
- Creates a Greenhouse Gas Technical Assistance Provider and Third-Party Verifier Certification Program to ensure that technical service assistance providers who work with farmers to establish and sell carbon credits have sufficient expertise, including agricultural and forestry knowledge. Certified parties are to act in good faith to provide realistic estimates of costs and revenues and to help farmers, ranchers and forester receive “fair distribution of revenues” derived from carbon credit sales.
- Establishes an online website providing information for farmers, ranchers and foresters interested in participating in carbon markets.
- Creates an advisory council that would oversee the certification program. At least 16 of the committee’s 25 members must be farmers, ranchers, or private forest owners.
- Charges the USDA with producing a report to Congress identifying barriers to market entry, challenges raised by farmers and forest owners, market performance, and suggesting additional ways to encourage voluntary participation in carbon sequestration practices.
- Authorizes up to $9.1 million in USDA funding for the program, including $4.1 million immediately and an additional $1 million per year for the next five years.

Rep. Don Bacon (R-NE) and Rep. Abigail Spanberger (D-VA) will soon introduce companion legislation in the House of Representatives.

**Rural Forest Markets Act, S. 1107.** A second proposal in Congress aims to remove barriers for small-scale private forest landowners and help them benefit from carbon markets and other climate solution markets. Senators Stabenow and Braun are also sponsors of this bill, along with Sen. Angus King (I-Maine) and Sen. Shelley Moore...
Capito (R-WV). The bill echoes previous similar legislative attempts and includes these provisions:

- Directs the USDA to create a Rural Forest Market Investment Program to guarantee up to $150 million to finance eligible projects for rural private forest landowners to participate in an “innovative market for forest carbon or other products.”
- States that eligible projects will be those developed by private entities or nonprofits to aggregate sustainable practices by rural private forest landowners for sales in a carbon or environmental market, using approved methodologies.
- Requires that eligible tree planting projects may take place only on historically forested lands using native species and be planted at ecologically appropriate densities without causing negative impacts to biodiversity or the environment.

The interest in carbon reduction practices and monetizing carbon sequestration at the federal level doesn’t end with these two proposals—there are several more that may gain interest. While not addressing private landowners, another Senate proposal focuses on public land reforestation. The “Repairing Existing Public Land by Adding Necessary Trees Act” (REPLANT Act), with Ohio’s Sen. Rob Portman as a sponsor, proposes increased funding in the Reforestation Trust Fund for replanting 1.2 billion trees over the next ten years on public land in need of reforestation. The USDA is weighing in on the issue as well, and has recently announced plans to target carbon reduction through existing programs such as the Conservation Reserve Program. And just after passing the Growing Climate Solutions Act today, the Senate Agriculture, Nutrition, and Forestry Committee held a hearing on “Farmers and Foresters: Opportunities to Lead in Tackling Climate Change” featuring testimony from several farmers and groups. Readers may get a sense of what more is to come by viewing the hearing on the committee’s website.

**Careful Placement Allows Manure to Replace Starter Phosphorus in Corn**

By Megan Sever  

Manure is the single largest resource for recycled phosphorus in Europe and a growing resource in North America. Because phosphorus is a finite resource—and because most crops in northern climates benefit from a boost from phosphorus to get started—being able to use a renewable resource is important. Using manure as a fertilizer also gives farmers a way to reuse their manure instead of having to manage that waste stream. Previous research has been iffy on how exactly to use manure to replace mineral phosphorus starter fertilizer in corn. Some research has even indicated manure can be detrimental to corn roots and growth. A new article published in *Agronomy*
Journal(https://doi.org/10.1002/agj2.20097) confirms that manure can replace starter phosphorus fertilizer in corn, but farmers must be careful in where and how it’s applied. Manure has often been applied to the surface of fields, and ideally, it is quickly incorporated to reduce phosphorus and nitrogen runoff with heavy rains. That helps build up a field’s baseline phosphorus and nitrogen levels. Broadcast manure does not provide the phosphorus needed for boosting growth of the juvenile plants, especially in cool soils. So, if manure is being used to replace starter phosphorus, it has to be placed in close proximity to the seed row. Knife-banding of manure, “the old system for applying starter phosphorus,” was “kind of like laying down a sausage underneath the soil,” says Michael Schmitt, a soil scientist at the University of Minnesota who has worked on manure and crops for 30 years but was not involved in this research. “The manure would come out of the back of a circular orifice underneath the soil surface, and if seeds got close to that sausage, it was bad news,” he says. That’s because the nitrogen in manure can burn seeds or roots. Knife-banding is thus not recommended. What is recommended, Schmitt says, is injection of a manure slurry in a way that better distributes it such as sweep injection.

However, some previous research has also shown that cattle slurry injected too close to corn seeds restricts primary root growth. That’s a problem because early-season root growth affects water and nutrient acquisition for the entire growing season. Inject the slurry too far from seeds, and they won’t get the benefit. So “precision-placed slurry” is really important, says Shabtai Bittman, a research scientist at Agriculture and Agri-Food Canada who has worked on precision injection of slurries in cornfields in British Columbia for more than a decade but was not involved in this study. If placed correctly, Bittman says, manure slurry can replace the phosphate mineral starter and save a lot of phosphorus fertilizer on corn.
When applying manure as starter phosphorus, knife-banding (top) is not recommended due to the possibility of nitrogen in manure burning the seeds or roots. It’s preferred to inject a manure slurry in a way that better distributes it such as sweep injection (bottom). Illustration by Karen Brey (adapted from the University of Nebraska).

Ingeborg F. Pedersen, a researcher who studies fertilizer–plant–soil processes in the Department of Agroecology at Aarhus University in Denmark, and her colleagues decided to see if they could determine the precise distance that slurry should be placed to help corn growth without injury. They also wanted to assess root growth over a longer timescale to see if roots damaged initially could recover and whether initial damage might affect corn yield. “Specifically we examined if a short vertical distance from seed to a slurry band can compromise any positive effects of placed slurry on corn growth,” Pedersen and colleagues wrote in the *Agronomy Journal* article.

The team ran their experiment in pots filled with a coarse sandy soil—a common soil type of Danish cornfields—in a climate-controlled chamber using local dairy cow slurry. The temperature, amount of light, and soil moisture levels were chosen “to mimic

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Danish corn-growing conditions in spring." They applied a 2.2-cm layer of slurry completely covering the soil at varying depths in four pots and used pots with no fertilizer or inorganic phosphorus and nitrogen fertilizer as the controls. Fertilizer bands ranged from 4.5 cm to 15 cm below the surface. Then, corn seeds were planted at varying distances from the fertilizer layer: 1.5 cm, 5 cm, 8.5 cm, and 12 cm. The team also left some pots unplanted to study the soil environment near the slurry band.

From the planted pots, the researchers harvested corn plants 24, 39, and 55 days after sowing, which corresponds to the two-, three-, and five-leaf stage (V2, V3, and V5), respectively. They also removed the intact root systems and separated them into primary, seminal, and nodal roots.

Placement of slurry 1.5 cm below the seed damaged the primary root, "which subsequently reduced shoot biomass and nitrogen uptake." High concentrations of ammonium and nitrate observed in the soil weeks after slurry application are thought to have caused the damage to the primary root, they wrote. That carried through to the seminal roots as well as to the plant, which ended up with lower shoot yields than plants where the seeds were farther from the slurry. Shoot yields and root development were similar among the 5-, 8.5-, and 12-cm depths to slurry at V2 and V3, and at V5, the 12-cm-depth had the largest primary root. Nodal roots revealed no differences among any of the slurry treatments, which makes sense, Schmitt says, because toxicity of the slurry would decrease by the time nodal roots are really taking hold.

The team also found that phosphorus uptake was not affected for any of the treatments or depths tested. "They showed the phosphorus uptake was good," Schmitt says. As the study was aimed at finding out if sweep-injected manure slurry could replace inorganic starter phosphorus, it was successful, he says. However, he adds, the nitrogen findings were challenging. "This phosphorus study all of a sudden became a nitrogen study."

Interestingly, the team found that corn plants were able to take up nitrogen from the slurry band even when the roots were damaged and even at 12 cm away. The problem arises when seed placement is too close to the slurry, Schmitt says. The study showed that seeds need to be placed at least 5 cm above the slurry for maximum benefit and minimum damage. And therein lies the problem: how to precisely apply the manure slurry to avoid the seed placement.
New research in *Agronomy Journal* shows that placement of manure slurry 1.5 cm below the seed damaged the primary root, which subsequently reduced shoot biomass and nitrogen uptake. Seeds need to be placed at least 5 cm above the slurry for maximum benefit and minimum damage. Shabtai Bittman, a research scientist at Agriculture and Agri-Food Canada, says his research has established 10 cm as the sweet spot for distance from seed to slurry.

Farmers can regulate their manure injectors to hit a certain depth, Schmitt says. But in injecting manure, they’re tilling the soil and “fluffing” it up, and it’s hard to predict how much it’s going to settle back down, he says. “Therefore, when you come through with the planter, you need to be really careful that your manure injection is [at least an inch or two] lower than where the seed is going to be placed to account for settling of the
soil." Sweep injectors are the way to go, Schmitt says, and the new results bear that out, but even with those, caution must be taken to ensure the distance from seed to slurry is adequate. In addition, Bittman says, “these results should be verified in the field under a wider set of conditions,” such as delaying planting after manure injection and testing the effects in different textured soils.

Bittman and Schmitt say that generally, this new study’s results agree with their previous results. Bittman notes that in 15-plus years of studying precision manure application in the field, usually measuring at V6, he’s only had one case where there were a few damaged plants. His research has established 10 cm as the sweet spot for distance from seed to slurry.

“There are limited examples [in the literature] of actual precision ag with manure,” Bittman says. “In some respects, it is an oxymoron since manure is inherently unpredictable and variable. Precision placement of slurry for phosphorus is an exception, and that is why it is a breakthrough technology in our view.”

“Manure is a great resource,” Schmitt says. “It recycles nutrients; it’s a holistic approach to nutrient management. Yet, there are some dangers involved with it because it can be a toxic product, especially to sensitive things such as a new seed that’s germinating.”

The takeaway, Schmitt says, is that “when you’re using manure as a fertilizer, crop management is really important. You need to be respectful of manure and its value but also its potential ramifications on early crop growth.” Thus, he says, “this study is a reminder [of what we’ve seen in the field] that there are some significant effects that can happen from not managing your manure properly.”