

805 Odegard Ave SW • PO Box 70 • Cooperstown, North Dakota 58425
Megan Vig, Agriculture and Natural Resources Extension Agent
Alyssa Rickford, Extension Office Administrative Assistant

701-797-3312
megan.vig@ndsu.edu
alyssa.rickford@ndsu.edu

Rainfall and Growing Degree Days (GDD)

Location	Cooperstown	Finley	McHenry	Pillsbury
Barley/Wheat GDD (Plant date: 4/15/2017)	815	840	847	877
Compared to 2016	-184	-168	-116	-121
Corn GDD (Plant date: 5/1/2017)	262	260	263	300
Compared to 2016	-87	-81	-42	-48
Rain Since 4/15/2017	3.55	3.80	2.64	2.20

Note: Actual rain amounts may vary.

WEATHER

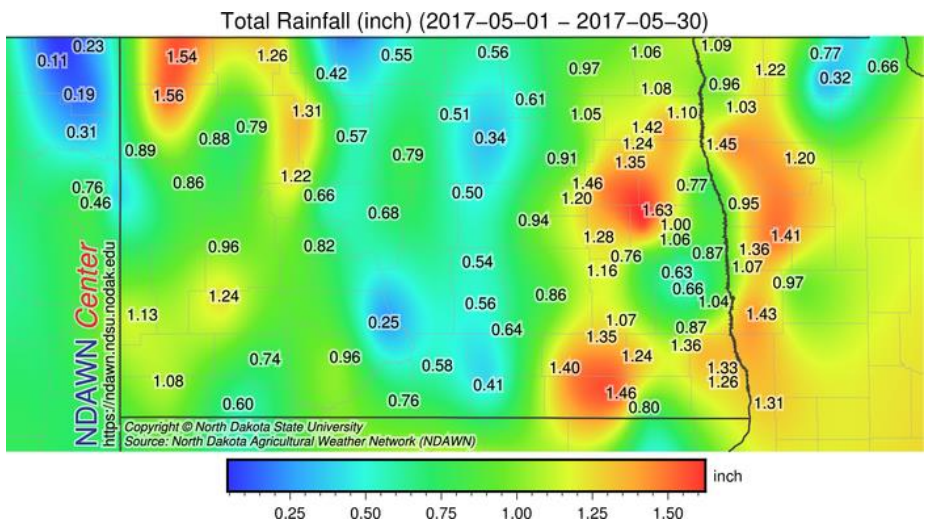
The June 1 through June 1, 2017 Weather Summary/Outlook

This past week was another cool period across the region with temperatures running about 2° to 4° below average with the exception of north central North Dakota where temperatures were near the 30 year average for the time of year. The next 7 days should bring some welcomed warmer temperatures.

Often when it is cool this time of year, it is rainy as well. Although there were some rainy periods, the actual amount of rainfall was quite light. There were a few pockets of rain near 0.50 inches, but a vast majority of the area recorded around 0.25 inch of rain or less with some areas only recording a trace or none at all.

This lack of rain was the general trend for the month of May with rainfall totals at the NDAWN stations mostly in the 0.50 inch to 1.50 inch range. The average rainfall in May runs from near 2 inches in western North Dakota to around 3 inches in the southern Red River Valley. This means that rainfall last month was mostly below 50% of normal with pockets even below 25% of normal. Some parts of North Dakota recorded the driest May since 1994 and in a few localized spots you would have to go back to 1984 to find a drier month of May. Total rain at NDAWN stations for last month is given in the graphic to the right.

Today (Thursday) and Friday will likely see many areas either near 80° or in the 80s for a maximum temperature with minimum temperatures generally in the 50s the next few mornings. This is much warmer over what was experienced in the past couple of weeks. Although the temperatures are expected to cool down somewhat this weekend into next week, the temperatures should be at least near

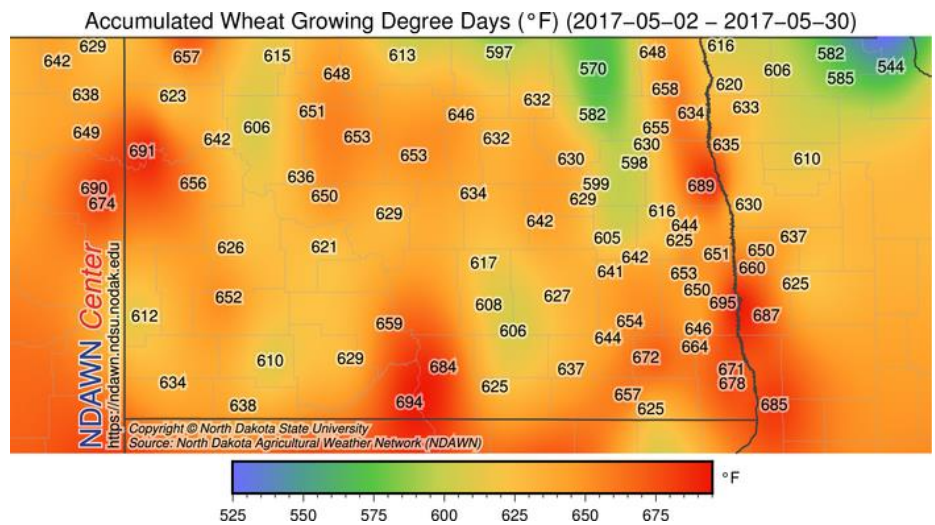
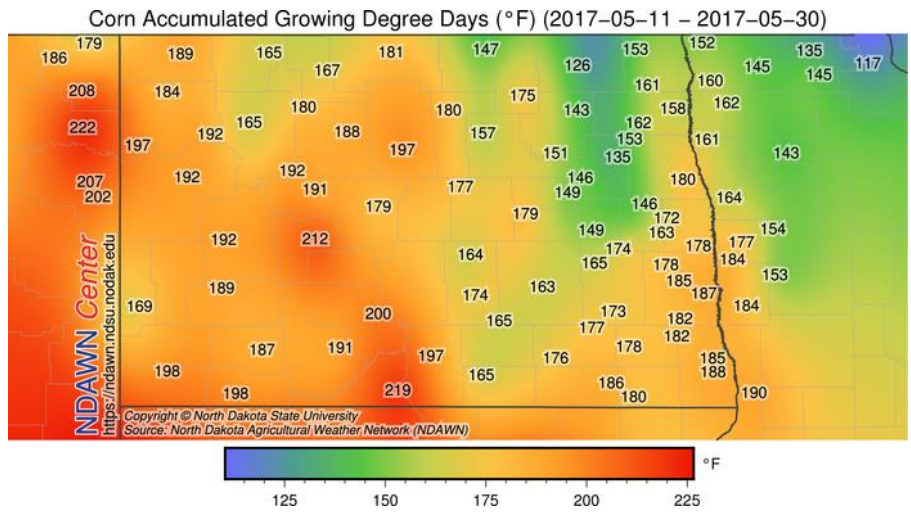


the average if not a bit above into early next week. The trend toward slightly cooler air will also trigger some rain and thunderstorms on Friday into Saturday. Not all areas are expected to get rain and the odds favor that those locations that do get some moisture the amounts will stay near or under 0.50 inches for most locations. After the Friday/Saturday potential rain, it may take until the middle of next week for any widespread precipitation to move back into the region.

The projected growing degree days (GDDs) for the next 7 days, Base 32°, 44° and 50° are presented below. Many areas will record 30% to 50% more GDDs this period than what was received in the past 7 days.

Using May 10, 2017 as an average planting date, the number of corn growing degree days accumulated this season is depicted to the upper right hand image. The exact numbers based on your actual planting date(s) can be found here: <https://ndawn.ndsu.nodak.edu/corn-growing-degree-days.html> Other agricultural tools can be found in the applications tab in the menu on the left side of the ndawn.org website.

Using a planting date of May 1, 2017, the number of wheat growing degree days accumulated so far this season is presented above. The exact numbers based on your actual planting date(s) can be found here: <https://ndawn.ndsu.nodak.edu/wheat-growing-degree-days.html>



Daryl Ritchison
 Assistant State Climatologist/Meteorologist
 Forecast Blog: ndsu.edu/ndawnblog
 (701-231-8209) Twitter: @darylritchison

PLANT SCIENCE

Dry Soils and Poor Corn Emergence

Conditions during the last couple of weeks have been good for planting. Most of the corn and soybeans have now been planted (94 percent of the corn and 83 percent of the soybeans as of May 28). Plant stands in the early-planted corn fields I have seen in the eastern part of the state appear to be good to excellent. Nevertheless, I have heard of at least one case where corn emergence was extremely variable with the final plant population far below optimum. This was due to dry soil conditions coupled with a shallow planting depth. I suspect there will be more such reports in the coming weeks particularly for later planted fields as most of the state has not received adequate rainfall to restore moisture in the surface layer that was lost from tillage and evaporation. For most soils, 0.5 inches of rain (sandy soils slightly less) is needed in order for moisture to move to a 2 inch depth (the seed zone) in dry soils. Therefore, the 0.2 and 0.3 inch rainfall events



Figure 1. Rootless corn due to inadequate soil moisture around the crown during nodal root development.

received recently in parts of the state have not been sufficient to ensure good germination if the soil was previously dry. Other factors can also affect germination and emergence when soil moisture is marginal. Poor soil-seed contact can restrict the corn seed from extracting enough moisture from the soil to germinate. Crop residues that touch the seed can similarly impede the movement of water to the seed. Occasionally, fertilizers placed with the seed inhibit germination due to their salt effect being more pronounced in dry soils.

Moisture in the top two inches of soil is also required for nodal root development. Nodal roots develop from the crown, which establishes about ¾ inch below the soil's surface, regardless of planting depth. These roots initiate soon after the V1 stage and rapidly develop to become the primary means by which the plant acquires water and nutrients by the V3 stage. If the soil remains dry around the crown for an extended period during early vegetative growth, however, nodal roots will not develop and when plants obtains sufficient size, they flop over (accompanying photo). Though this phenomenon, called the floppy or rootless corn syndrome is found occasionally in areas of the field with lighter soils or where there is compaction or shallow seeding, it may be more widespread during seasons of limited early rainfall like this year.

For those with poor stand struggling with a decision about replanting I have included a table developed from many years of experiments conducted in Wisconsin that may provide some guidance (Table 1). These data indicate that even a half stand planted early will likely be more productive than a full stand planted after the June 1st. Of course, uniformity of the field and uniformity of

emergence can also be factors to consider when looking at the potential productivity of your field and the need for replanting. Before deciding to replant, also, take into account the final planting date for full insurance coverage for corn in your area (May 25 for all except the southeast corner which is May 31). When replanting, the original stand of corn should be destroyed before you replant. Late planted plants that grow next to an early-planted plant will be at a competitive disadvantage and will very likely not produce an ear.

Information in this table is adapted from data obtained for the northern zone of Wisconsin (70-95 RM zone).

Table 1. Expected relative corn grain yield from various planting dates and harvest populations.

Plant Population	May 1*	May 20	June 1	June 10	June 20
	-----% of expected yield-----				
32,000	98	80	64	45	18
28,000	95	78	62	44	18
24,000	91	75	59	42	17
20,000	86	70	56	40	16
16,000	80	65	52	37	15
12,000	72	59	47	33	13

See <http://corn.agronomy.wisc.edu/Pubs/UWEX/A3353.pdf> by J. Lauer for the full report. The May 1st column in this table assumes that a full season hybrid is used. All other columns assume a hybrid adapted to the shorter season is grown.

Joel Ransom
Extension Agronomist for Cereal Crops

SOILS

Dust Storms throughout the State over the Weekend

Although there are more farmers using cover crops, no-till and no-till systems around the state than in the recent past, the number of 'clean-tilled' fields is still large. The image in this article is from Steele County and shows soil blowing from planted fields. Soil from the state around 1900 had organic matter content over 6%. Today, the remnant of the originally rich topsoil contains around 3%. Most of what we call topsoil today is a mixture of the remains of the original higher organic matter topsoil mixed through tillage with some subsurface horizon. Loss of soil in millions of



Image courtesy of Angie Johnson, Steele County Extension Agent

acres can be measured in feet over the past 120 years. Farmers and landowners lose topsoil anytime that the surface soil is dry, the surface soil is not covered by residue, cover crop or when the crop is large enough to protect the soil from blowing. Early in the season, clean-tilled fields have none of these wind-erosion impeding properties. Soil is leaving the field along with fertilizer that was applied and sometimes the pre-emergence herbicide application. Most lost soil, as can be seen in the image, is going high into the air, and only a small amount lands in a roadside ditch.

There will be opportunities this summer to attend field days where improved conservation measures are presented. Visit Dr. Wick's Soil Health Webpage for information regarding coming events and the opportunity to join a soil health support group in your area for discussion with like-minded farmers and landowners who truly want to be 'stewards' of the soil.

For more on the sad wind-erosion history of the state and region and recommendations for soil improvement, see the video "The History of Soil Erosion in North Dakota".

Dave Franzen
NDSU Extension Soil Specialist

WEEDS

Flag your Herbicide Trait







"Hey Dad, why is there a bicycle flag in the corner of our soybean field?" "Jimmy, it's so our ag-retailer can verify they are spraying the herbicide matching our soybean variety."

A crop protection practice was introduced way back in 2011 in Arkansas that offers peace of mind to growers, crop consultants, and custom applicators alike. The program called 'Flag the Technology' has caught on and has been implemented across the country including in North Dakota and Minnesota. The Idea is a color-coded flag at the entrance and corners of each field identifies the herbicide tolerant trait of the crop in the field. In this way, the farmer, his/her crop consultant, farm employees, neighbors or custom applicators know instantly which herbicides can and cannot be applied to that field. Flags are 12 x 18 inch triangular shaped flags and mounted on a six-foot fiberglass pole.

Where can I order flags? An internet search indicates one potential vendor is Parker Flags. Flags and poles are available in units of 50 (you can mix and match colors) for \$5.95 each, including shipping.

Tom Peters
Extension Sugarbeet Agronomist
NDSU & U of MN



Color Codes			
<p>RED signifies conventional varieties with no herbicide technology traits. <i>Extreme caution.</i></p> 	<p>BRIGHT YELLOW is the color chosen for Clearfield® rice technology and STS® soybeans.¹</p> 		
<p>WHITE represents the Roundup Ready® technology that is tolerant to glyphosate herbicide.</p> 	<p>TEAL indicates tolerance to both 2,4-D and FOP (Accase) herbicides or the Enlist® technology. The white stripes indicate tolerance to glyphosate. For Enlist cotton and soybean fields, a green flag should be added to denote tolerance to glufosinate (Liberty).</p> 		
<p>BRIGHT GREEN indicates the Liberty Link® technology. This technology is tolerant to glufosinate (Liberty®) herbicide.</p> 	<p>BLACK indicates tolerance to dicamba herbicide or Xtend®. The black and white checks indicate tolerance to both dicamba and glyphosate (Roundup). A green flag should be added for cotton to denote glufosinate (Liberty) tolerance.</p> 		

¹Although many herbicides are in the ALS family of herbicides, crops with this technology are not tolerant to all ALS herbicides.

Adjuvant Properties from Humic Acid

Question: Humic acid is getting some 'play' in the countryside. I understand it is sourced locally, derived from North Dakota Leonardite shale. We heard from farmers that humic acid has been suggested as a herbicide adjuvant to increase the activity of and to improve the rainfastness of translocated herbicides. I understand the trade is suggesting humic acid at 1 pint per to the spray solution. Sometimes it is recommended alone, other times it is recommended with non-ionic surfactant. An on-line query suggests many more uses:

-SOIL APPLIED: Apply 4-8 quarts per acre before or after a major fertilization. Apply 2-4 quarts per acre as needed through the crop cycle.

- AS AN ADDITIVE TO LIQUID FERTILIZER: Add 1-2 percent by volume to the nutrient solution to activate nutrients, provide organic matter and remediate salt problems. This product may be used in fertilizers for injection into drip or low volume irrigation systems. Do not mix with solutions that contain ammonium sulfate or phosphoric acid.

-FOLIAR APPLICATIONS: As a nutrient activator. apply 1-4 pints per acre in sufficient water to assure thorough coverage. Do you have ideas how humic acid may 'work' as an additive to fertilizer and herbicides?

Answer:

- As used as an adjuvant: Humic acid and humates may exhibit certain adjuvant properties (droplet retention, active ingredient deposition, and absorption). There is not a large database of information to support adjuvant claims and they may be oversold as to their actual capacities. There appears to be significant variability in the products. There is also agreement that the rate of products sold is often way too low to be of any help.

As used as a soil amendment (some comments from Dr Dave Franzen, NDSU Extension Soil Scientist): Humic acid has only been known to improve yields in pure sand, and better establishment in very sandy, low OM golf-course greens has been documented. Iowa State University web site has a link for non-conventional additives and amendments. The web search engine allows to search papers on humic acid. Most papers do not show beneficial uses in agriculture. It has an high profit margin and is unregulated material.

Rich Zollinger
Extension Weed Specialist

Ammonium Thiosulfate (ATS) as an Ammonium Sulfate (AMS) Replacement

Question: I received a call who was talking to a neighbor about an idea of substituting ammonium thiosulfate rather than using AMS with glyphosate. He normally uses 8.5 lbs. AMS per 100 gallons of water as a water conditioner. Presently he is considering inducting liquid AMS versus handling the dry product this year for their post work which is a fair amount of work currently with the dry bags. They are also considering using liquid ammonium thiosulfate as a substitute because it is cheaper but want to know if weed control would be better than AMS? Both methods apply some sulfur to the crop but on a crop removal basis would only be a small percentage of what is being removed.

Liquid AMS (21-0-0-24s) contains ~3.4 lbs. of ammonium and sulfate per gallon. Liberty recommends AMS at a rate of 3 lbs./A.

Liquid ATS (12-0-0-26s) contains approximately 4.23 lbs. of ammonium thiosulfate per gallon. ATS is recommended at a rate of 1 gallon per acre (4.23 lbs./A).

Four rates were selected based on the two use rates listed above:

Lbs ai/A	ATS	AMS
2.38	2.25 qt =	2.8 qt
3 (Liberty label)	2.84 qt =	3.53 qt
3.625	3.43 qt =	4.26 qt
4.25 (ATS label)	4 qt =	5 qt

They are also considering using liquid ammonium thiosulfate as a substitute because it is cheaper but want to know if weed control would be better than AMS? Both methods apply some sulfur to the crop but on a crop removal basis would only be a small percentage of what is being removed.

Answer: Weed scientists at Kansas State University compared AMS to ATS and found ATS was less effective as AMS at conditioning water and enhancing glyphosate. Since the comparison of AMS and ATS had been shown with glyphosate I continued this comparison with Liberty last year in 2016 applied at comparable sulfate rates as shown to the right:

Summary: The data validates KSU data that ATS is less effective in overcoming hard water cations and enhancing weed control from weak-acid herbicides

	Rate (prod/A)	28 daa - % control*	
Liberty +	HW 1 pt	60	
AMS liquid	HW 2.8 qt	70	2.38 lb
ATS	HW 2.25 qt	55	
AMS liquid	HW 3.53 qt	80	3 lb
ATS	HW 2.84 qt	61	
AMS liquid	HW 4.26 qt	82	3.63 lb
ATS	HW 3.43 qt	64	
AMS liquid	HW 5 qt	86	4.25 lb
ATS	HW 4 qt	56	

HW = hard water at 1,000 ppm hardness
*Ave - flax, amaranth, lambsquarters, wild buckwheat

like Liberty than AMS. The question has been asked: “Why are they not the same?” or even, “Why is not ATS better than AMS since it contains more sulfate?”

The answer: With some explanation from Dr. Dave Franzen, NDSU Soils Specialist and some research, it appears that despite the name – ammonium thiosulfate, ATS does NOT contain sulfate!

Sulfate = $\text{SO}_4^{(2-)}$ = 1 sulfur and 4 oxygen
Thiosulfate = $\text{S}_2\text{O}_3^{(2-)}$ = 2 sulfur and 3 oxygen. The prefix “thio” indicates that the **thiosulfate ion** is a type of sulfate ion with one oxygen replaced by sulfur. In this form it does not act as the pure sulfate ion. This is an example of where small difference (a substitution of 1 oxygen with 1 sulfur) makes a significant difference in activity. This may add some insight of “why”.

Rich Zollinger
Extension Weed Specialist

FORESTRY

Leaf Galls Already Observed...

A number of different pests – insects and mites – produce a variety of galls on tree leaves. We normally don’t observe galls until later in the summer – late June through August. This year, I’ve already observed the galls produced by the maple bladder gall mite (see photo). These tiny red growths are generally harmless to the tree, unless they are extremely numerous. And that can be said of most of the leaf galls that we see on trees.

Galls are produced by the trees in response to early-season feeding from the pest. Then, the pest will generally use the gall as protection – a sort of ‘home’ – while it completes its life cycle. The time to use a pesticide to prevent new damage was a month ago – as leaves were opening and the pests were still exposed. At this point, the gall provides quite a bit of protection, so applying a pesticide now will have very limited effectiveness at controlling what’s there, or for preventing new infestations. By the time we see the gall the damage is done and the pest may already be gone.

The good news is that damage is generally minimal. Trees can lose up to 25% of their leaf tissue without experiencing any stress. Unless the galls cover more than a quarter of the leaf surface, they won’t be causing any major damage to the trees. The only time that I observed damage that high from gall-forming pests was in a number of yards that had heavy applications of insecticide to control insects in the lawn. My hypothesis is that the chemical also killed a number of the predator insects and mites, resulting in a spike in the gall-forming insects.



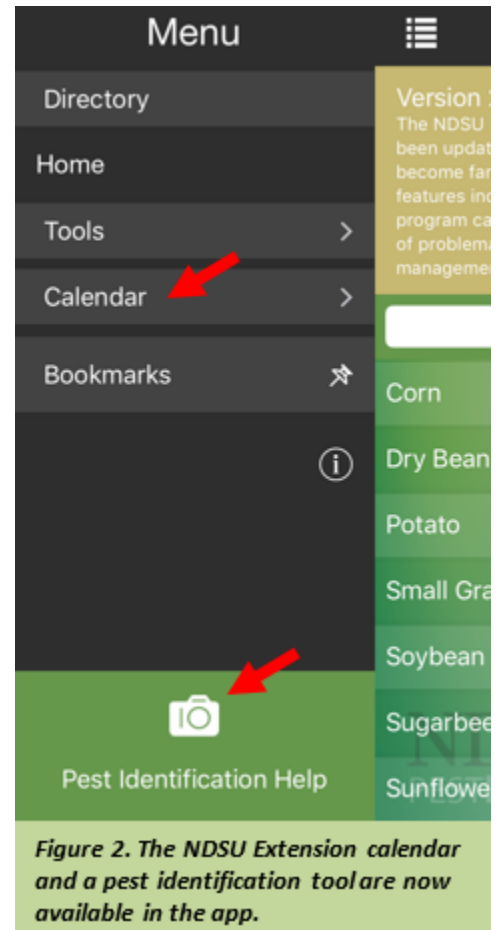
Joe Zeleznik
Extension Forestry Specialist

APPS for AG



New Features for NDSU Extension Pest Management App

The NDSU Extension Pest Management App (which houses information from the Plant Disease Management Guide, Insect Control Guide and Weed Control Guide) has recently been updated with new features. These features include a banner, a pest identification help tool and calendar function. The banner is displayed on the home screen of the app and will highlight important pest and pesticide information throughout the growing season (Figure 1). The pest identification help tool allows for digital diagnosis of pests through photos submitted by app users (Figure 2). This will help with preliminary assessments of pests, but for a more complete diagnosis, individuals may be asked to submit samples to the NDSU Plant Diagnostic Lab. The calendar function provides information on upcoming Extension events (Figure 2).



Andrew Friskop
Extension Plant Pathology, Cereal Crops