North Dakota State University
CROP & PEST REPORT
NDSU EXTENSION

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entomology

CANOLA FLEA BEETLES SLOWLY EMERGING

As we begin to look towards Memorial Day weekend, many have noticed the absence of canola flea beetles due to the cool, wet spring weather over the past few weeks. This past week, the first emergent crucifer flea beetle was found at the NCREC in Minot. The upcoming forecast is for warmer temperatures and a brief period of drier weather. This will push more of the overwintering populations of flea beetles to emerge as temperatures warm above 57-59°F. However, the lack of spring-planted canola will force flea beetles to feed on volunteer canola, flixweed, wild mustard or garden plants (brussel sprouts, radishes, etc.) for a short period of time before switching to newly emerged canola.

Striped flea beetle (left) and crucifer flea beetle (right) on canola leaf (Patrick Beauzay)

Two species, *Phyllotreta striolata*, the striped flea beetle, and *P. cruciferae*, the crucifer flea beetle, account for most of the flea beetle observations in North Dakota canola fields. The striped flea beetle tends to emerge earlier and be less common than the crucifer flea beetle. Both beetles are oval shaped and small, typically between 1/32nd to 1/8th of an inch in length. Both beetles are black with an iridescent blue sheen on the wing covers, however, the striped flea beetle has two yellow longitudinal bands on their wings. Flea beetles have enlarged hind legs and will jump when they are disturbed.

Flea beetles overwinter as adult beetles in the leaf litter of grassy areas and shelterbelts. There is one generation per growing season. Warm and dry weather can promote rapid flea beetle emergence and increased feeding activity. More information on the flea beetle can be found in the NDSU Extension publication E1234 (revised) – ***Integrated Pest Management of Flea Beetles in Canola***. For insecticides registered for control of canola flea beetles in North Dakota, please reference the North Dakota Field Crop Insect Management Guide.

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HIGH RISK FOR SEED CORN MAGGOT

Cool wet springs favor the infestation of seed corn maggots in many field crops including sugar beets, peas, lentils, dry beans, soybeans and corn. Besides cool wet weather during early crop stages, soils that have high organic matter or manure spread on it will increase risks for seed corn maggot infestations. This spring has been so wet and cool that conditions have been ideal for maggot infestation.

Seed corn maggot adult. (Pest and Diseases Image Library, Bugwood.org))

Seed corn maggots overwinter in the soil as pupae. Adult flies emerge from the puparium in spring when soil temperatures reach 50°F. They deposit eggs in soil where there is abundant organic matter and decaying green crop residue, or on the seed or seedling. The egg hatches in 2-4 days and a seed corn maggot (larva) emerges from the egg. Maggots fed on the seed, weakening seedlings and decreasing plant stand counts. The yellowish-white, headless and legless maggot, about <¼ inch, can often be observed burrowing into the seed or emerging stems. Larvae pupate in the soil and an adult fly will emerge in 12 -14 days. There are multiple generations per year (4-5).

The decision to manage seed corn maggots must be made before purchasing seed or planting. Insecticide seed treatments and insecticides applied at planting will control seed corn maggots. When conditions are wet and cool, or if planting into high green cover crop / crop residue conditions, seed treatments will provide the best defense against crop injury. Delayed planting also can mitigate seed corn maggot injury by increasing the rate of seed germination due to warmer soil temperatures. Consult the *E-1143 North Dakota Field Crop Insect Management Guide 2022* for insecticide treatment registered by crop.

Seed corn maggot larva (W. Cranshaw, Colorado State University, Bugwood.org)

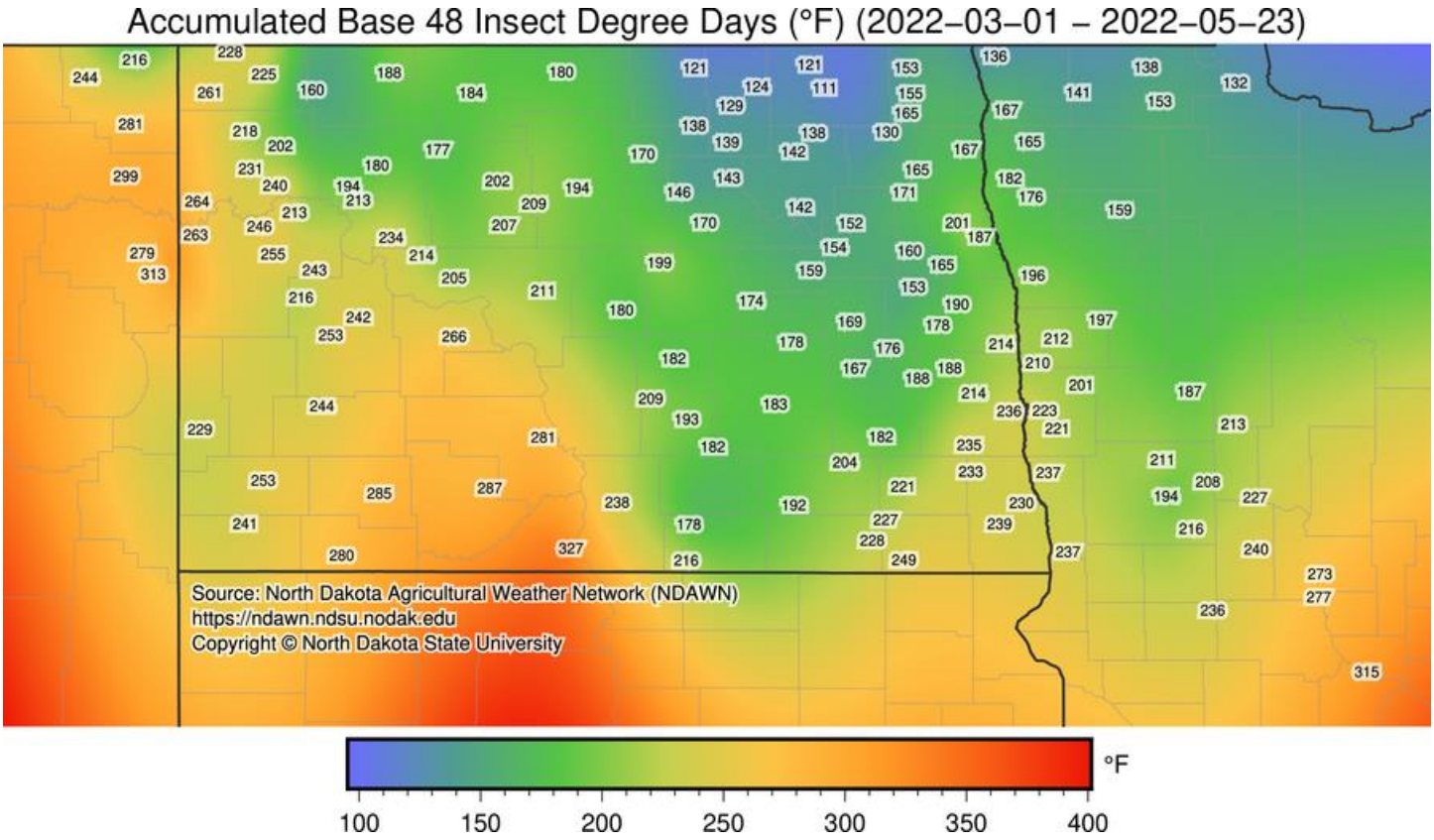
Seed corn maggot larvae. (J. Osorno, Plant Sci., NDSU)

ALFALFA WEEVIL UPDATE

Degree day accumulation for alfalfa weevil emergence continues to be slow due to the recent cool weather. Egg hatch occurs at 300 accumulated degree-days (ADD). Most of North Dakota has not reached 300 ADD yet (Figure 1). Scouting should begin immediately after egg hatch, and fields should be scouted weekly up through the first cutting. A 15-inch sweep net is useful for finding adults and larvae in alfalfa fields. More on scouting and thresholds when we get closer to 300 ADD.

For more information, see the NDSU Extension publication ***Integrated Pest Management of Alfalfa Weevil in North Dakota E1676***

Figure 1. Current Alfalfa Weevil Degree-Day Accumulations (base 48°F) as May 23, 2022 (Source: NDAWN)



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plant pathology

BEST MANAGEMENT PRACTICES FOR HIGHEST RETURNS IN LATE PLANTED SUGARBEET

Select your best fields for sugarbeet with highest preference going to a previous crop of wheat. Ensure there is proper drainage or else the environment will be favorable for soil-borne diseases later in the season. Prepare a friable, weed-free seedbed and fertilize in the fall or spring based on a soil test. If fertilizing in spring, please note 130 pounds of total N is required for those sampling to 4 feet and 100 pounds of total N for sampling to 2 feet. Ensure that a minimum amount of 65 pounds N per acre is present to optimize early growth.

Select seed varieties with high recoverable sucrose potential that is suitable for your production area. When ordering seeds, make sure seeds are treated with fungicides such as Kabina, Systiva and Vibrance that will give protection against Rhizoctonia damping-off. Add a seed treatment of Tachigaren (hymexazol) which is an inexpensive insurance against Aphanomyces damping-off. Most seeds include insecticidal seed treatments that will control common insect pests such as sugarbeet root maggot and wireworms. Fields in an area with a history of sugarbeet root maggot will also need a granular insecticide at planting as well as protection just before peak fly activity.

Plant seeds about 4½ to 4 5/8 inches apart to get about 175 to 200 evenly spaced plants per 100 ft of 22 inch rows; plant closer in 30 inch rows. Adequate soil moisture should help increase percent germination and emergence from an average of 68% to 72 to 75% that will help to utilize N and moisture to improve final sugar content of the crop.

Weed control options are somewhat limited in sugarbeet, so a grower must be careful and strategic. Since all growers use crop rotation, it is recommended to use herbicides that are more available in rotating crops such as wheat, corn and soybean to control herbicide resistant weeds. Start weed control early – start with a weed free seed bed, use a pre-emergent or soil incorporated herbicide where possible. For post emergent herbicide applications, start when weeds are small and continue until row closure. If necessary, use mechanical weed control and/or labor to keep the weed seed population as low as possible.

Select varieties that will perform well in fields with a known cropping history. For fields with a history of Rhizoctonia, use a Rhizoctonia resistant variety and apply fungicides such as azoxystrobin as early as possible in the season to provide adequate protection. After row-closure, fields should be scouted for Cercospora leaf spot (CLS) since the population of the causal agent, *Cercospora beticola*, is very high. Apply fungicide mixtures starting at first symptoms or when the disease is first reported in the factory district. It is best to mix fungicides with two modes of action and apply in 20 gallons of water per acre at 14 day intervals in dry conditions and at 10 to 12 day intervals during wet conditions. The crop should be protected from CLS until harvest starting in October. By following best management practices, growers will get the highest yields possible with a high sugar content.

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SOYBEAN YIELD POTENTIAL

With the late start of the planting season, producers are wondering what the yield potential of the soybean crop might be. In order to look at some soybean trends, I compiled North Dakota's soybean yield data as reported by the National Agricultural Statistics Service. The dots in the graph represent the average farm yields and we can assume that on average farmers planted between May 15 and the end of May. The red line is the trend line based on the data presented. The North Dakota annual soybean yield on the farm based on the equation has increased by 0.2 bushel per acre per year, since 1984 (Figure 1). This is due to advancement in genetics, more efficient farming equipment, and crop management practices. The variability in yield from year to year is mainly the result of the weather conditions during the season. For instance, the yield for 2021 was below the trend line due to the drought conditions. Secondly, I compiled the yields obtained in NDSU soybean variety trials at Langdon, Carrington, Central ND (Grandin – Arthur -– Hatton), and Southern ND (Wyndmere –– Milnor) for the same period 1984 – 2021 (Figure 2).

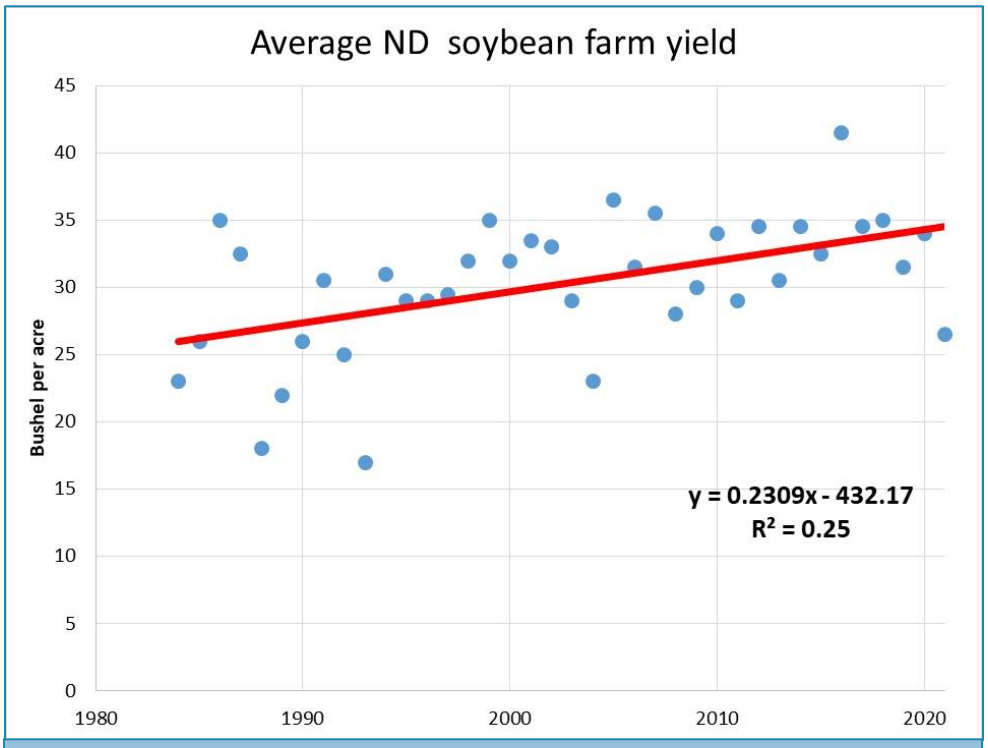

Figure 1. Average North Dakota soybean farm yields from 1984 to 2021, and trend line. Source: North Dakota National Agricuultural Statistics Service.

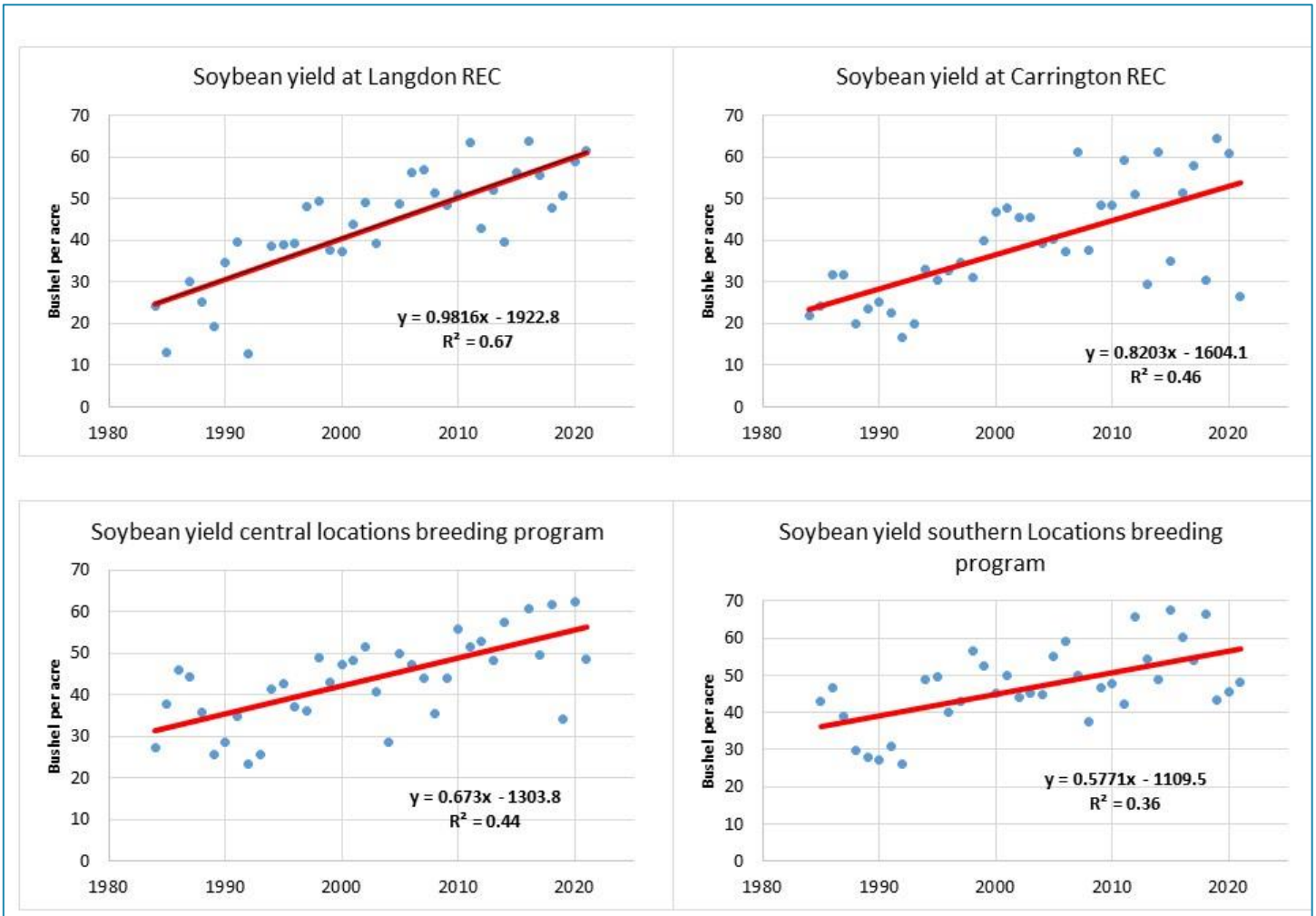

Figure 2. Average North Dakota soybean variety trial yields from 1984 to 2021 at Langdon, Carrington, Central, and Southern NDSU trial locations. Source: NDSU North Dakota Soybean Variety Results and selection guides https://www.ag.ndsu.edu/varietytrials/soybean.

Based on the regression equations, the annual yield **gain** under research test conditions was 1 to 0.6 bushel per acre per year. The most gain was achieved in the northern location (Langdon) partly because of increased availability of improved early maturing varieties, extended growing season and better weed management using herbicide resistant traits. The average yield for the period of 1984 to 2021 indicates that the highest yield potential was in the southern location, as expected (Table 1).

The average state yield of 30.3 bushels is 16.4 bushels less than obtained at the Southern location and 8.2 bushels less compared to the Carrington trials (Table 1). This yield gap between farmer obtained yield and research plot yields is mosly due to management of the crop. Small plots can be managed more intensively than normally occurs in large farm fields. However, the data indicates that North Dakota farmers could increase the farm yields with improved mangement.

Table 1. Predicted soybean yield for 1984 and 2021 based on the regression equations in Figure 2, annual yield gain, and average yield for 1984-2021.

	Langdon	Carrington	Central	Southern	State
		----------bushel per acre----------			
1984	24.7	23.4	31.4	35.5	25.9
2021	61.0	53.7	56.3	56.8	34.5
Yield gain per year	1.0	0.8	0.7	0.6	0.2
Average yield 1984-2021	43.5	38.5	43.9	46.7	30.3

Producers may wonder how the delay in planting will influence the yield potential. Based on a large farmer survey, the yield potential decreased about 0.3 bushel per acre per day between May 15 and May 31 (Figure 3). Producers can take their own farm proven yield, use that as a starting point for their own yield potential, and reduce that potential due to later planting to estimate the yield potential for 2022. However, soybean yield potential will only be achieved if the rest of the season is favorable, especially with moisture availability during the grain-filling period.

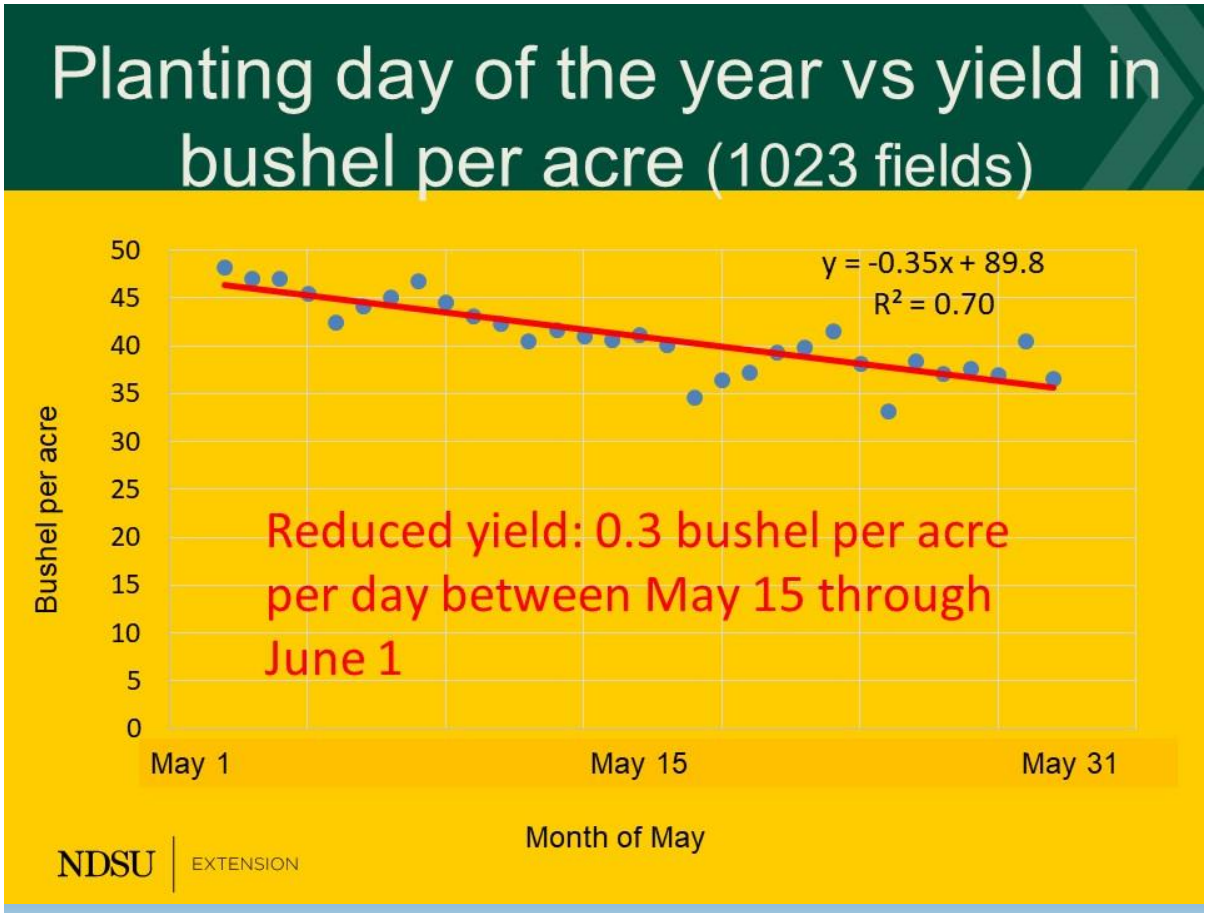

Figure 3. Soybean yield as reported by participating producers based on the date of planting.

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Extension Agronomist Broadleaf Crops

LATE START OF THE PLANTING SEASON

We have a late start to the planting season but adequate soil moisture is present. With high commodity prices, profit margins are good, even with reduced yields due to later than normal planting. Though seed yield potential likely is reduced with delayed planting of our cool-season crops, we possibly may have an adequate growing season for corn and soybean. Favorable soil and air temperatures, adequate soil moisture, and sufficient time for crop maturity before frost would be desirable.

A crop planted late in the season will germinate rapidly as the soil and air temperatures have increased. The most critical factor will be the growing season temperatures. Above average temperatures early in the season, generally are beneficial but can reduce yield with small grain if occurring during the 3- to 5-leaf stages, and detrimental during flowering and seed fill of all crops. Increasing the seeding rate slightly, as the season advances, would be a good strategy as there is less time left for crops to compensate for adverse growing conditions.

With late seeding, there is a potential danger that the crop will not mature before the fall frost. Average temperatures drop about 10 degrees from the middle of August until the middle of September. The day length during the middle of September is about three hours less than the longest day. A growing crop makes less progress to maturity in one day during the middle of September than in the middle of August. A crop seeded late may take twice as many fall days toward maturity compared with a crop seeded at the normal time. For instance, while there may only be four or five days difference in maturity between flax varieties when planted at the optimum time the difference may be 10 or more days when sown late. The approximate number of days from emergence to maturity of various crops sown in a normal season are buckwheat 70 days, flax 85 to 92 days, pinto beans 80 to 84 days, soybean 110-120 days and sunflower 105-110 days.

A number of factors impact the decision of what crop to plant or change to another crop. Many of these factors deal with issues that are not necessarily biological in nature. As examples, crop insurance, equipment availability, high market prices, availability of fertilizer, herbicides or seed, and past experience with the crop are some of the factors that are carefully considered before a decision is made as to what crop to plant.

Table 1 provides some suggestions on which crops might be most appropriate for a late planting situation. For additional information see NDSU Extension Publication A-934, Replanting or Late Planting Crops https://www.ndsu.edu/agriculture/ag-hub/publications/replanting-or-late-planting-crops

Table 1. Crop selection suggestions for North Dakota when planting late.

Plant Date†	Barley	Buck-wheat	Canola	Corn	Dry Bean	Flax	Millet	Pea, Lentil	Soy-bean	Sun-flower	HRSW, Durum, Oat
May 21-31	1,5	1	3	3	1	3	-	3	1	1	1,5
June 1-10	2,4	1	3,4	2,4	1,3	3	1	4	3	3	2,4,5
June 11-20	2,4	1	4	2,4	3	4	1	4	4	3,4	2,4
June 21-30	2,4	1	4	4	4	4	3,4	4	4	4	2,4

1. Plant.
2. Plant for use as silage or grazing forage.
3. Plant with earlier-maturing varieties/hybrids.
4. Use alternative crop with shorter maturity. (Be aware of possible herbicide residue restrictions).
5. Plant using higher seeding rates (~1.6 million plants/acre for small grain).

† Final planting date for crop insurance is different for various regions in ND. Latest date is for the northeast part of the state.

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PINTO BEAN ROW SPACING AND PLANT POPULATION

North Dakota State University has traditionally recommended an established stand of 70,000 plants per acre for pinto bean grown in wide rows, typically 30-inch rows. However, narrower row spacings and greater plant populations are trending in dry bean production. Previous field research in eastern North Dakota indicated a pinto bean seed yield increase of 14% with 18-inch rows compared to 30-inch rows. North Dakota data from a 2021 dry bean grower survey indicate 55% of pinto bean acres were planted in row widths ranging from 11 to 25 inches compared to 40% grown in wide rows. In addition, the survey of North Dakota bean growers indicates 53% of pinto bean acres were planted at rates of 80,000 to 99,000 seeds per acre, with the likely goal of establishing greater than 70,000 plants per acre.

From 2018 to 2021, the Carrington (Photo 1) and Langdon Research Extension Centers, conducted a pinto bean field study comparing intermediate (18- or 21-inch) to wide (28- or 30-inch) row spacing and targeted stands of 50,000, 70,000 and 90,000 plants per acre. Seed yield was primarily influenced by row spacing. Average yield increase was 17% with intermediate row spacing and plant populations of about 65,000 or 84,000 plants per acre versus wide rows (Table 1).

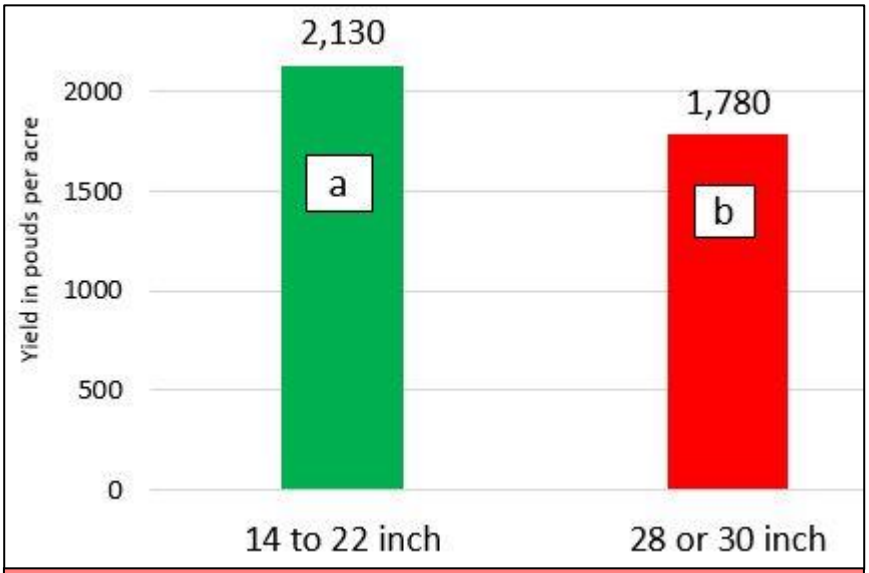
Photo 1: Pinto bean at the unifoliate leaf stage during row spacing by population study at Carrington.

Table 1. Pinto bean seed yield among row spacings and plant populations, Carrington and Langdon, 2018-21 (4 site-years).

Row spacing	Plant population (per acre)		
	49,900	64,700	83,600
Inches	*Seed yield in pounds. per acre*		
18 or 21	1,790 bc	**1,860** ab	**1,990** a
28 or 30	1,500 d	1,610 cd	1,690 bcd
LSD (0.05)	----------200----------		

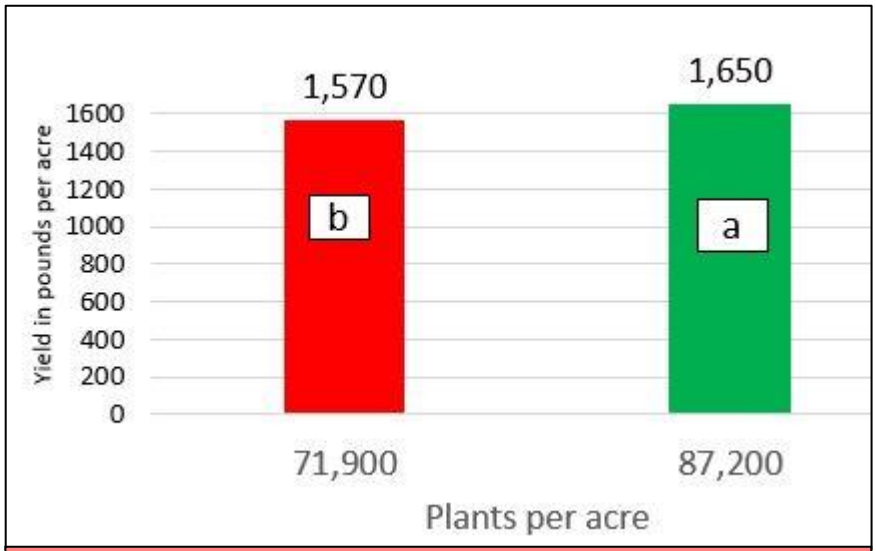
[1] Means with no similar letters are significantly different.

Pinto bean row spacing evaluated as a single factor across 11 trials (Carrington, Langdon and Minot; 2011 to 2013 and 2018 to 2021) indicates a yield increase of 20% with 15- to 22-inch rows versus wide rows (Figure 1).



(Means with no similar letter are significantly different at P = 0.05.)
Figure 1. Pinto bean seed yield between row spacings, Carrington, 2011-13 and 2018-21; Minot, 2018-19; and Langdon, 2020-21 (total of 11 site-years)

Plant population evaluated as a single factor across trials at Carrington and Langdon indicates a yield increase of 5% with population at 87,000 plants per acre compared to a population similar to the standard density of 70,000 plants per acre (Figure 2).



(Means with no similar letter are significantly different at P = 0.10.)
Figure 2. Pinto bean seed yield between standard and increased plant population, Carrington, 2013 and 2018; and Langdon 2021 (total of 3 site-years).

For more details, see the new extension publication A2060 "Pinto bean response to row spacing and plant population in North Dakota" available at https://www.ndsu.edu/agriculture/extension/publications/pinto-bean-response-row-spacing-and-plant-population-north-dakota

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LAND ROLLING

Land rolling is a common practice used in soybean and dry bean fields in North Dakota and northwest Minnesota. Land rolling can also be used for other pulse crops. The practice is used to manage rocks or corn root balls by pushing them into the soil, in order to improve harvesting efficiency and reduce combine damage. Rolling residue and flattening of stalks may cause the corn root balls to break apart quickly. The better residue contact with the soil may aid in the microbial decomposition of the residue, especially in a reduced tillage system. Other benefits of rolling include less down time and wear-and-tear on harvesting equipment, faster combine speeds, and reduced operator fatigue.

Rollers are pulled across the soil in the spring, if possible right before or after planting. The drums should exert a packing force of about 3 pounds per square inch. Land rolling could cause plant injury if done after the crop is emerged. There is a cost associated with rolling the field. A recent Canadian study estimated the average cost of rolling at $3.50 per acre with appropriate tractor size. With an oversized tractor, the cost would be closer to $4 per acre. These numbers were generated in 2019. With current higher fuel prices, the cost would be even higher than reported in the study. The disadvantage of rolling is its effect on surface soil structure. Rolling pulverizes surface soil aggregates, which may cause the sealing of the soil surface. The even surface is more prone to wind erosion and, due to the reduced infiltration rate, there may be water movement over the surface and ponding in small depressions. Do not roll when the soil surface is moist to reduce the risk of crusting or sealing and soil sticking to the roller. Do not use rolling to level soil ruts.

During a three year University of Minnesota study with 7-site years, there were no significant differences in stand, average yield, or seed quality among the treatments. The treatments included rolling pre-plant, post-plant; 50% emerged, first soybean trifoliate (V1), third trifoliate (V3) and no rolling. The study also concluded that soybeans could be rolled up to the third trifoliate growth stage (V3), when soybean plants are about 4-6 inches tall. Rolling in wet conditions may make plants more susceptible to soil-borne diseases. Rolling after V3 is not recommended because of the increased potential to injure plants, resulting in reduced yield. If rolling after emergence, roll in the afternoon, during the heat of the day, when soybean plants are flexible. When rolling, the wheel tracks usually cause more plant damage to the plants than the rollers themselves. Control wheel damage by configuring tractor tires and roller width to minimize plant injury.

As there was not a yield increase with rolling, the main benefit is the easier harvest operation. While the harvest after rolling might be easier, it is difficult to assign an economic benefit to the harvest ease during the long work hours and potentially limited light conditions during the evening.

Reference: Rolling soybean in the Upper Midwest

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FERTILIZER OPTIONS IF PLANNED CORN MOVES TO PLAN B

Last fall supported fertilizer application, and a corn grower applied all the N, P and K except for the at-planting row-starter, but the soil is still very wet. What cropping options will not be adversely affected by the corn fertilizer?

First of all, it will be important to consult the prevent plant insurance dates and percent of coverage drop due to later planting, and the final 'drop dead' date when insurance coverage for corn ends. With the high corn price, and the kind of spring we have had, the calendar means something with respect to insurance; but although 'late planting' taken over many years results in 'X' bushel yield decrease with advance in calendar date, is that relationship true in all years? I think not. Just a couple years ago, later planting resulted in better corn stands and yields compared to earlier planting due to the 'cold shock' experienced by corn planted early. If earlier hybrids are available, and they might be because some corn growers will probably give up their seed and go to prevent planting or another crop, there is some chance that good corn yields might be better in this weird year than one might think.

Let's assume that 150 pounds N per acre are available to the planned corn crop through residual fall nitrate-N and any previous crop credits. Losses have probably been small even with the rainfall/snowmelt due to the cold soils up until present. What crops will stand up (literally) to this N rate and which will struggle?

Soybean- If iron deficiency chlorosis is not an issue (and it will not be from about 50 miles west of the Red River and further west, then soybean will be just fine with the N. It will not yield more nor less than it would have if the available N were lower. Soybean in IDC country will struggle due to interaction of soil nitrate with the ability to take up iron (Fe), and perhaps some physiological issues within the soybean leaf cells. A companion crop put in at seeding, such as oats, barley, or any grass easy to kill when necessary, will decrease the nitrate affect and reduce IDC.

Wheat- Spring wheat/durum is probably the number one choice because price is favorable, all wheat except in southwestern ND will be put in late anyway, and the N applied is supportive to a good spring wheat crop.

Sunflower- 150 is probably too high for sunflower and it would lead to increased disease pressure, lodging if there are high winds at the wrong time, and lower oil content leading to potential dockage on delivery.

Flax- Absolutely not. With 150 pounds N per acre, you would be raking it off the ground to harvest it.

Canola- This is possible, but a grower would need to be set to seed it, apply a P starter at planting and fortify the field with additional sulfate sulfur or apply thiosulfate before emergence.

Barley- 150 pounds N per acre is greater than a recommendation for malting barley. If the season does not turn hot and dry later, a 2-row cultivar would be able to grow adequately without rejection by a malting delivery point. The 2-row cultivars are far more resistant to above-market protein than the 6-row cultivars growers used in the past.

Lentils, chickpea, field pea- This is possible. The N would have little effect on these crops.

Buckwheat- The N is probably too high for buckwheat. The lodging might be too great.

Dry bean- The N would not be too high for dry bean, even though it is a higher rate than recommended.

Oat- The N rate would be similar to that normally recommended.

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weeds

THE WAR AGAINST WEEDS PODCAST

Many folks around the state are finally getting some tractor cab time in while spraying, planting, scouting, etc. For those who enjoy listening to podcasts, I am a co-host of one focused all about weeds and their control. The War Against Weeds is a podcast hosted by myself, along with my colleagues at Kansas State University (Sarah Lancaster), and the University of Missouri (Mandy Bish). We cover a diverse set of topics all related to weeds. Each episode typically has a guest host with expertise in that episode's topic. I like to say that not every episode is for everyone, but there is an episode for everyone.

Episodes are typically about 30 minutes in length. We currently have three seasons (about 45 full length episodes) of content posted online (https://waragainstweeds.libsyn.com/). The podcast can also be accessed using phone apps like iTunes, Google Play, and Spotify. So, if you have some cab time and want to listen to some Weed Science topics, feel free to check it out.

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around the state

NORTH CENTRAL ND

An early week shower impacted parts of the north central region early this week. This may delay field work a bit more. If the forecast holds true, rain chances are small Tuesday thru Friday and will hopefully allow some growers into the field. At the NCREC, 0.57" of rain has been observed since last Monday (May 16th). The following are precipitation observations across the area as noted by local NDAWN stations from May 16th through May 23rd: Bottineau: 0.57"; Garrison: 0.27"; Karlsruhe: 0.53"; Mohall: 0.53"; Plaza: 0.29"; and Rugby: 0.57".

Calls have been quiet into the Extension Crop Protection Office this week; however, our first Canola Flea Beetle was found last week. Planting delays mean little to no impact of flea beetle on canola crops now. However, as canola is planted, this is an insect to be on the lookout for during the short term.

Very few field work activities have occurred in the region. The soils are still too wet for planting, spraying or fertilizer application. Some farmers are able to enter in portion of the fields for field work specially fertilizer application. In our foundation seeds field, we were able to plant one field last week.

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NORTHEAST ND

Planting season is delayed a few days again with majority of the fields still being wet (Figures 1 and 2). Yesterday's rain showers brought in more moisture ranging from 0.07 inches to 0.3 inches in the area. Producers are trying to get as much as they can do in between these rain events. The areas with lighter soils and higher ground have seen a little activity. There is very less progress in terms of plantings from last week. Weeds like kochia and lambsquarters are emerging (Figures 3 and 4). Planting and field work have been delayed at the Langdon Research Extension Center too because of the wet conditions. A few field pea trails have been planted last week and corn and small grain trials are going in today. The grasses in pastures are up due to good available moisture compared to last year. However, the grass growth is being limited due to lack of enough growing degree days. Producers are letting their cattle into pastures because of shortage in hay supplies. Cold conditions have delayed the insect activity too.

Figure 1: Field with standing water in Cavalier County

Figure 2. A producer in Cavalier County applying fertilizer in drier areas of his field.

Figure 3. A patch of kochia seedlings

Figure 4. A patch of lambsquarter seedlings

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NORTHWEST ND

ROOT ROT RISK IN FIELD PEA AND LENTIL WITH LATE SEEDING INTO WET SOILS

Soil-borne root rot pathogens, such as the fungal pathogens *Fusarium* or *Rhizoctonia* or the oomycete pathogen *Aphanomyces euteiches*, thrive under warm soil conditions. The water loving *Aphanomyces euteiches* is more problematic when soils are wet, particularly during crop emergence (**Figure 1**). With planting delayed and frequent rains, pea and lentil are at higher risk of developing root rot. Fields with a long history of pulses in close rotations (every 2-3 years) are at greatest risk. Pea and lentil are both affected by *Aphanomyces euteiches* and thus fields with a history of pea are still at risk for root rot if lentil is planted and vice versa. Recent research conducted at the NDSU Extension Centers highlight the effect higher temperatures at seeding can have on root rot in pea and what benefits can be expected from seed treatment.

Aphanomyces root rot of field pea. Photo credit: Taheni Gargouri-Jbir, NDSU

From 2017 to 2020, the Carrington and Williston Research Extension Centers conducted field studies evaluating the impact of planting date on field pea agronomic performance, with studies conducted in Carrington, Williston, and on-farm locations in Mountrail, McLean and Williams Counties. Two sets of studies were conducted: studies planted in fields with no history of root rot but inoculated at seeding with the pathogen causing Fusarium root rot, and studies planted to fields with a history of severe root rot in field pea.

In fields with a history of root rot problems in pea, late planting was associated with increases in root rot severity and this was associated with warmer soil temperatures **(Figure 2A).** Yields were maximized when soil temperatures at seeding depth averaged 45 to 50°F in the 7 days after planting (**Figure 2 B**).

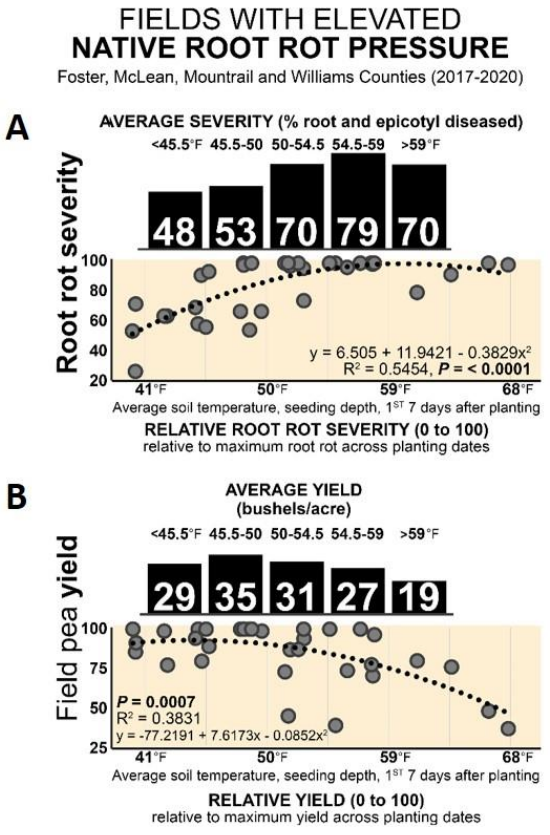

Figure 2 (A & B) Field pea A) root rot severity and B) yield relative to average soil temperatures (at seeding depth, 2 inches deep) in the 7 days after planting. Results are from field studies where peas were planted on three dates 10-14 days apart, generally mid/late April, early May and mid-May. These fields had a history of root rot. Bar graphs show the average response relative to soil temperature observed across all studies. Scatter plots show the relative performance of peas planted at a given soil temperature relative to the two other planting dates conducted in each study.

In fields that did not have a documented history of root rot in pulses but were inoculated with Fusarium, a similar but less dramatic trend was observed but overall root rot severity was lower and yields were higher than fields with a history of root disease (**Figure 3A and B**).

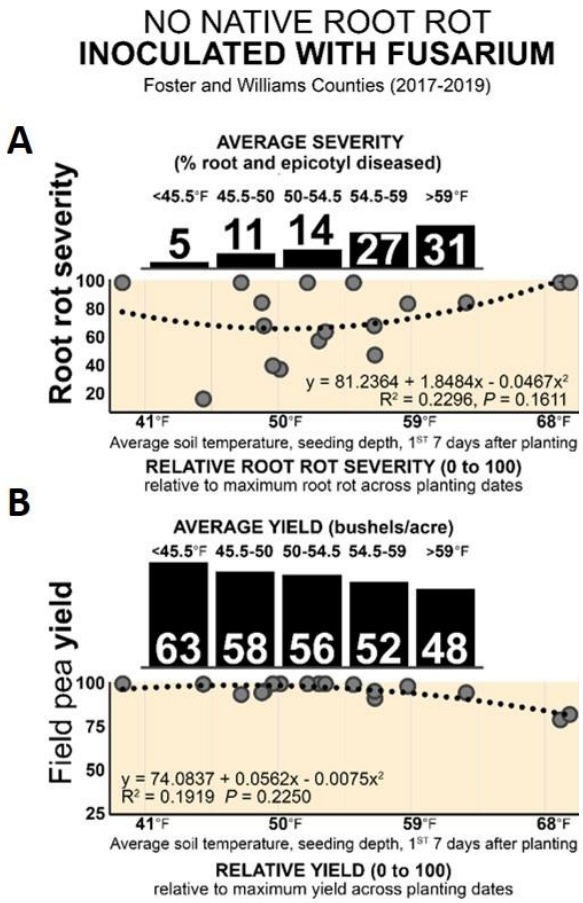

Figure 3. (A & B). Field pea A) root rot severity and B) yield relative to average soil temperatures (at seeding depth, 2 inches deep) in the 7 days after planting. Results are from field studies where peas were planted on three dates 10-14 days apart, generally mid/late April, early May and mid-May. These fields had no history of root rot but were inoculated with Fusarium. Bar graphs show the average response relative to soil temperature observed across all studies. Scatter plots show the relative performance of peas planted at a given soil temperature relative to the two other planting dates conducted in each study.

The effect of seed treatment was also considered at sites with a history of root rot. Fungicide seed treatments targeting *Pythium, Rhizoctonia, Fusarium* and insect pests increased field pea yield by an average 3 to 5 bu/ac (at seeding depth, 2 inches deep) in the 7 days after seeding (**Figure 4**). The addition of the fungicide ethaboxam (Intego Solo applied at 0.3 fl oz/cwt) with efficacy against Aphanomyces root rot partially offset the yield losses associated with

planting peas late (soil temperatures 50 to 59°F in the 7 days after planting) (**Figure 5**). At sites with no history of root rot, the yield benefit of seed treatment may be less.

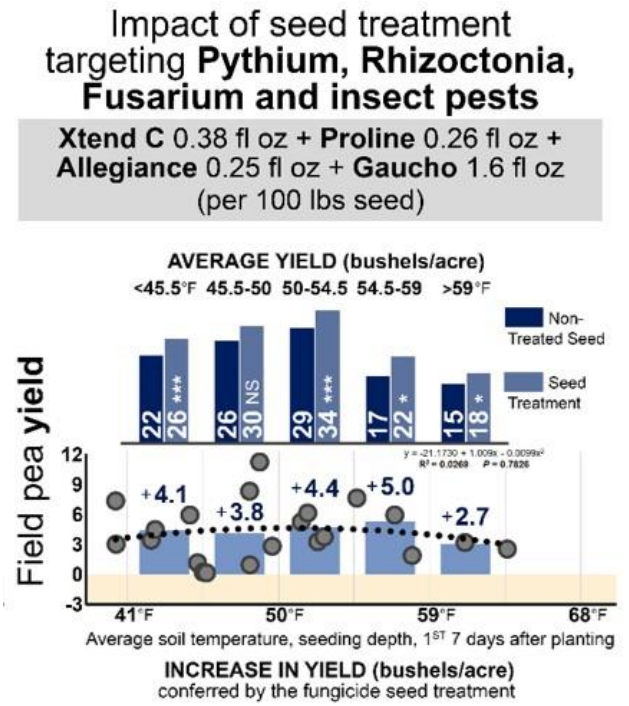

FIGURE 4. Effect of seed treatments targeting Pythium, Rhizoctonia, Fusarium and insect pests on yield relative to soil temperature (at seeding depth, 2 inches deep) in the 7 days after planting. Bar graphs depict the average response relative to the non-treated control, and scatter plots show the response observed in individual planting dates (circles) or average responses across all studies within a range of temperatures (bars).

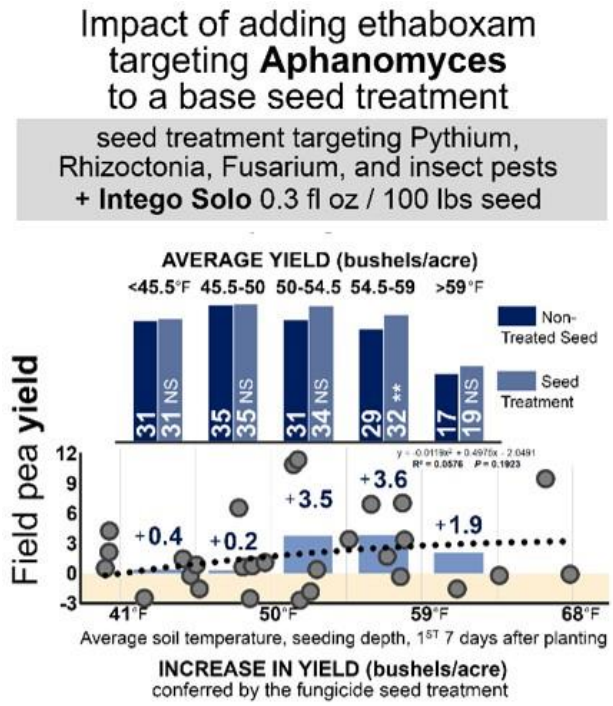

FIGURE 5. Effect of adding the seed treatment ethaboxam (Intego Solo 0.3 fl oz/cwt) targeting Aphanomyces to a standard base seed treatment package on yield relative to soil temperature (at seeding depth, 2 inches deep) in the 7 days after planting.

Having a good crop rotation is key to managing root rot in pulses preventatively. Chickpea, soybean, and faba bean are not susceptible to *Aphanomyces euteiches* and thus can be included in a rotation with pea and lentil to break up the disease cycle. Growers also may increase the number of cereal and oilseed crops in between planting pea and lentil. Tight rotations will lead to the accumulation of soil-borne pathogens over time, particularly when these crops are planted into warm, wet soils.

For more information of root rot in peas/lentils refer to the NDSU Extension Dry Pea and Lentil Root Rot Management Guide.

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SOUTH-CENTRAL/SOUTHEAST ND

According to NDAWN, the region's current rainfall during May 1-23 ranged from 1.4 inches (Harvey) to 6.3 inches (McHenry), with most areas receiving 2.5-3.5 inches. While the recent wet and cool conditions are frustrating for timely crop planting, we may be thankful for the stored soil moisture later in the season. With sunshine and warm temperatures expected this week (until the weekend), hopefully the majority of cool-season crops and corn will be planted by Memorial Day. Also, if planting during the first half of June, we actually will still be timely with dry bean and sunflower!

Crop Management Field School on June 24

This school will be conducted at the NDSU Carrington Research Extension Center on Friday, June 24, 9 a.m. to 3 p.m. Participants (targeted audience are crop advisers) will receive updates on crop pest and soil management recommendations using hands-on training in field demonstration plots and research trials.

Field sessions include:

- Weed identification - identify about 60 living weed exhibits, plus receive brief reviews on selected weed biology and control
- Herbicide site-of-action - identify herbicide classes by examining crop and weed injury symptoms
- Corn and late-season wheat disease management - review identification of Goss's wilt and wheat foliar and head diseases, and management strategies
- Soil - keys to no-till management

Preregistration is required, and 50 participants will be accepted on a first-come, first-served basis. Participants will receive reference materials, refreshments and a noon meal. Certified crop advisers will receive four continuing education units in crop pest and soil management.

For more details and preregistration information, visit https://www.ndsu.edu/agriculture/ag-hub/research-extension-centers-recs/carrington-rec/events or contact the CREC at 701-652-2951. A completed preregistration form and $100 fee is required by June 20.

2021 school participants viewing living weed exhibit.

Greg Endres
Extension Cropping Systems Specialist
NDSU Carrington Research Extension Center

SOUTHWEST ND

Scattered showers this week briefly paused field activity for some in the region. According to NDAWN, from May 16th to May 23rd Dickinson received 0.35 inches, Hettinger 0.49, Bowman 0.25, Beach 0.36, Mott 0.44, and Mandan with 0.56 inches of precipitation. Early April planted wheat, planted before the snow came, is tillering and looking great. All crops continue to be planted across the region with many trying to get planting and spraying done before some more forecasted moisture this weekend and the looming insurance deadlines.

Wheat trial being planted in a low pH soil south of Dickinson.

Weeds continue to be the main concern. Other than some pockets of wireworm feeding I haven't heard much yet on insect pests. So far it seems like canola flea beetle populations aren't as bad as previous years.

We continue to get agronomy field trials laid out across the region. This week a few acid soil variety trials and some fertilizer trials have been planted.

Ryan Buetow
Extension Cropping Systems Specialist
NDSU Dickinson Research Extension Center

weather

WEATHER FORECAST

The May 26 to June 1, 2022 Weather Summary and Outlook

This past week was yet another week with all NDAWN (North Dakota Agricultural Weather Network) stations recording at least some rain. In fact, as many of you know, some areas even recorded a brief accumulating snow on Friday, May 20. These next 7 days will also bring more rain across the area with all areas probably recording rain this forecast period. The rain should hold off for most of you until Saturday, giving us today (Thursday) and tomorrow (Friday) with dry conditions to continue planting where that would be possible.

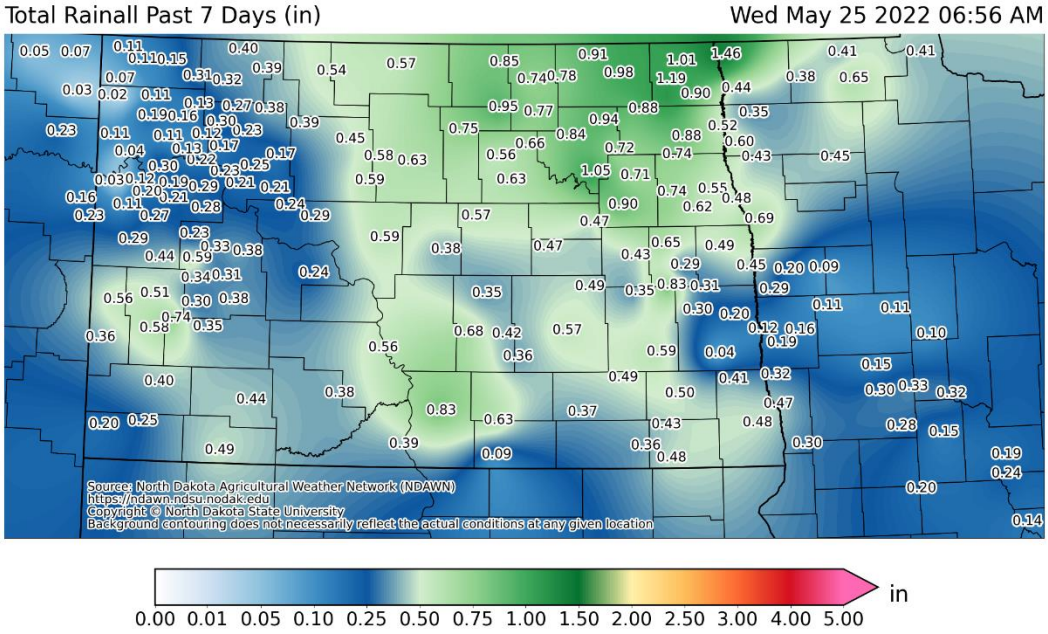

Figure 1. Total rainfall for the 168-hour period ending near 7:00 AM on May 25, 2022 at NDAWN stations

With snow falling over parts of North Dakota last week, it will come as no surprise that temperatures were well below average during the period of May 18 to May 24, 2022. Most NDAWN station were in the 7 to 10 degrees below average range. There will be another cooler than average period coming next week, but overall, temperatures should be close to the average during this forecast period.

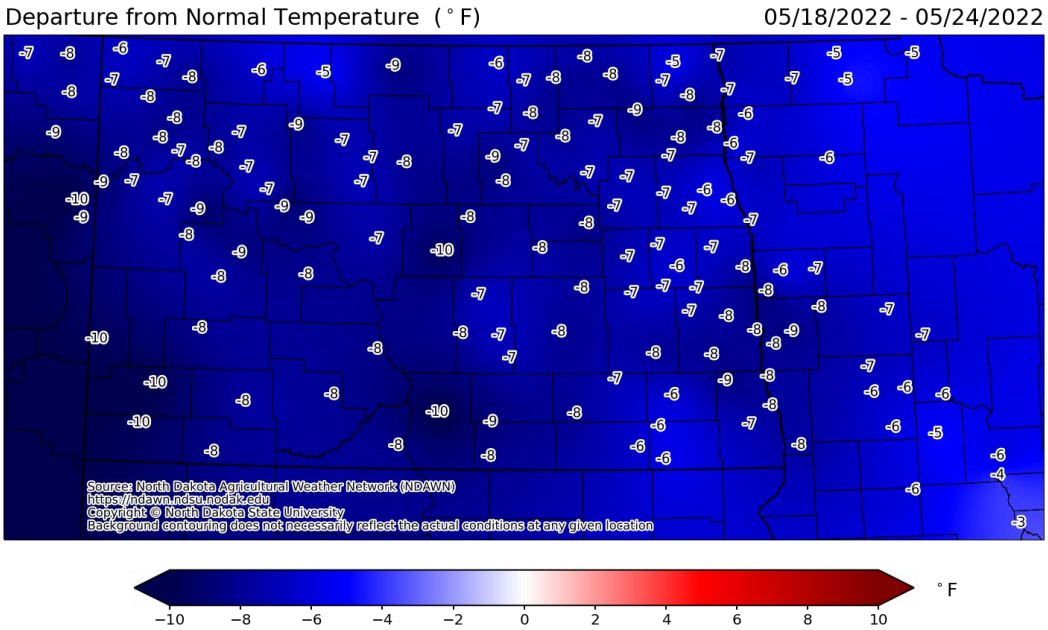

Figure 2. Departure from Normal temperature at NDAWN stations for the period of May 18-24, 2022

Figures 3 and 4 below are forecasted estimates of Growing Degree Days (GDDs) base 32° (wheat and small grains) and 50° (Corn and Soybeans). The number of GDDs in the next week should be very close to average for this time of year with a majority of the heat units occurring through the weekend with those cooler than average temperatures coming next week.

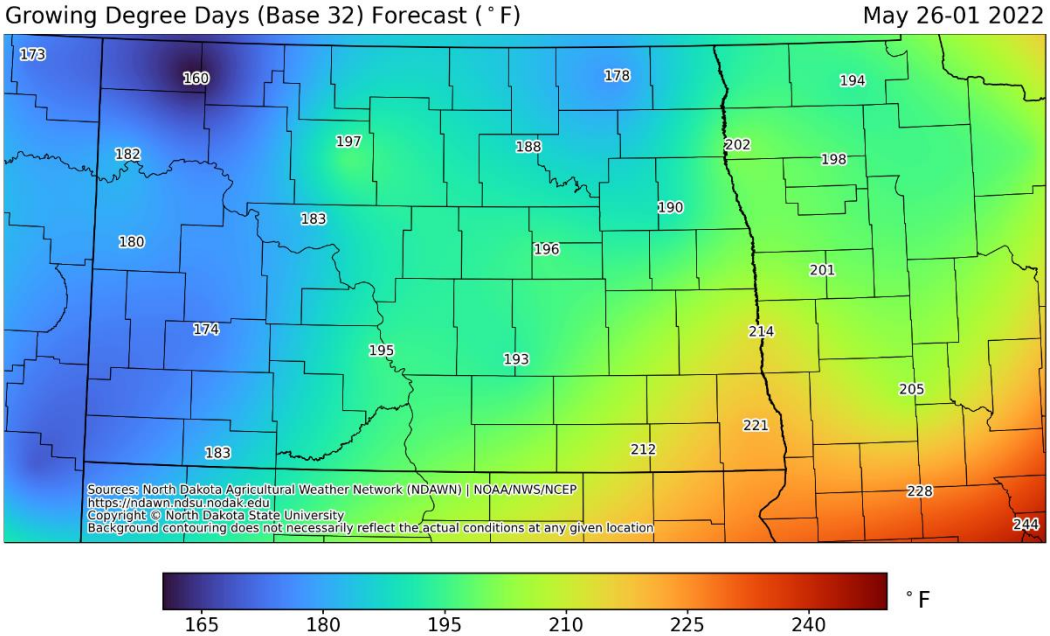

Figure 3. Estimated growing degree days base 32° for the period of May 26 to June 1, 2022.

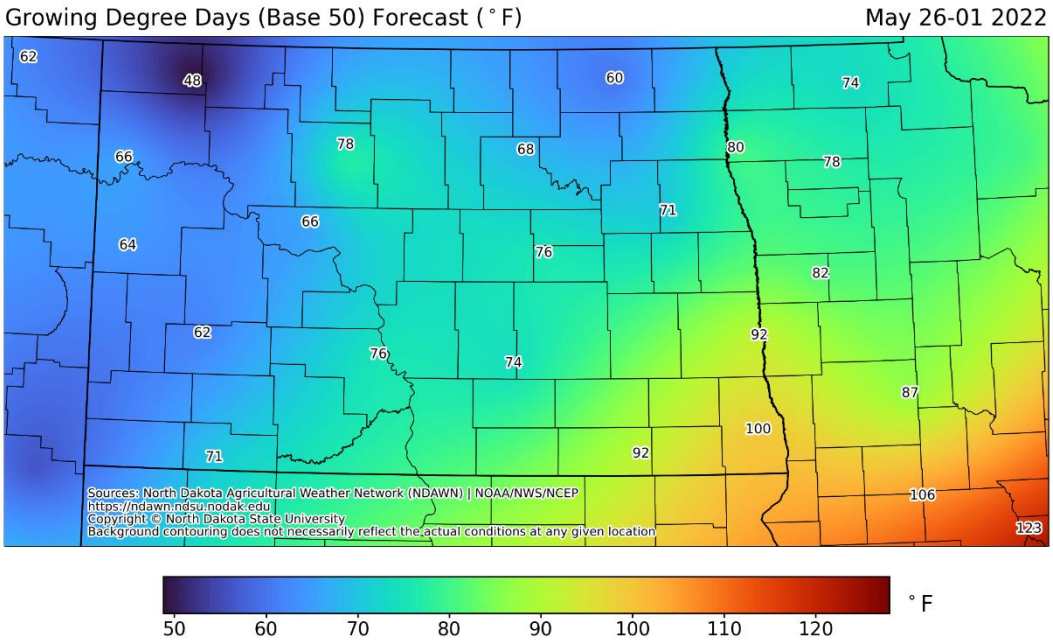

Figure 4. Estimated growing degree days base 50° for the period of May 26 to June 1, 2022.

Although many did not start planting until this week, Figures 5 and 6 are the number of accumulated GDDs for wheat (Base 32°) and Corn/Soybeans (Base 50°) at NDAWN weather stations during the period of May 18 through May 24, 2022.

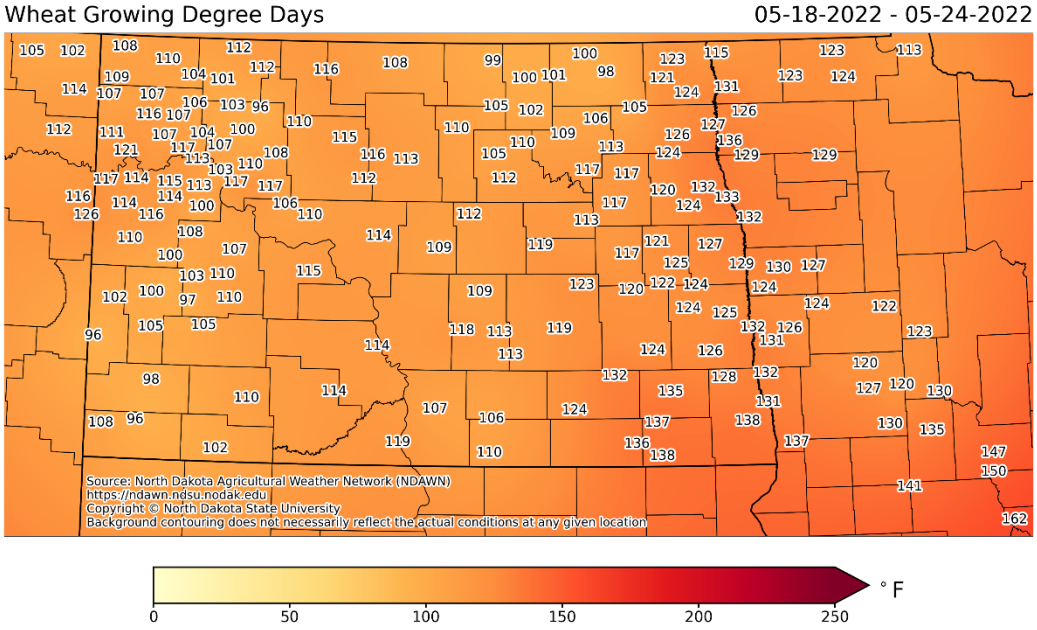

Figure 5. Wheat Growing Degree Days (Base 32°) for the period of May 18 through May 24, 2022.

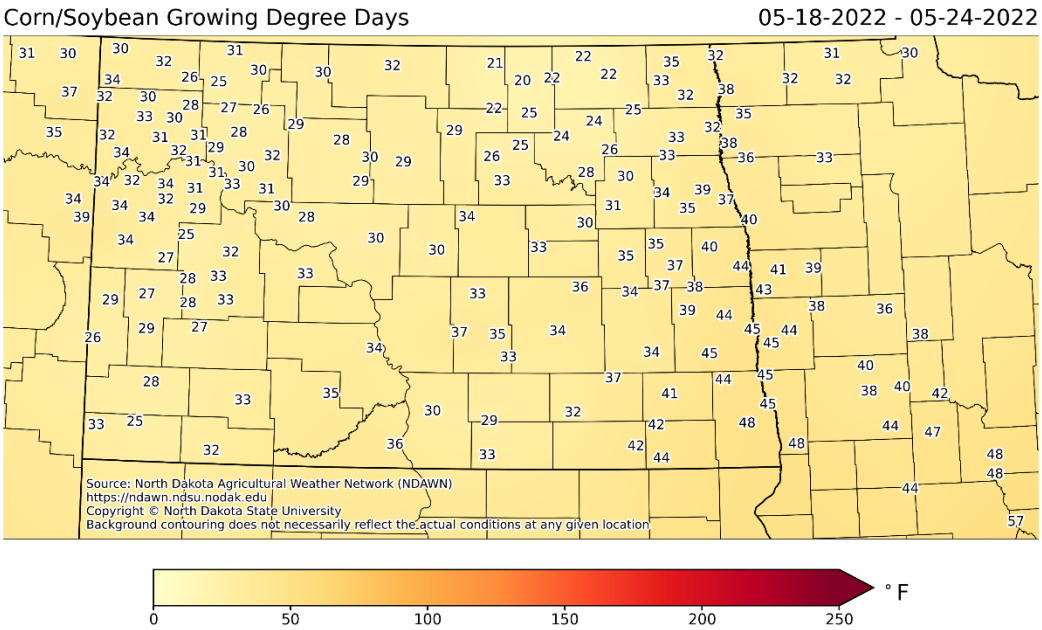

Figure 6. Corn/Soybean Growing Degree Days (Base 50°) for the period of May 18 through May 24, 2022.

Daryl Ritchison
Meteorologist
Director of the North Dakota Agricultural Weather Network (NDAWN)

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