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READER SURVEY

Dear Crop & Pest Report Reader:

You are invited to participate in this short survey about the NDSU Extension Crop & Pest Report. Results from this survey will provide us with important information about the value of the Crop & Pest Report, and help us serve your needs better. Completing the survey should take less than 10 minutes.

Your participation in this survey is voluntary and your responses will be completely anonymous.

If you have any questions related to the research subjects’ rights or wish to file a complaint, please contact the NDSU Institutional Review Board at 701-231-8995, toll-free at 855-800-6717 or ndsu.irm@ndsu.edu). Completion of the survey implies consent to participate.

Part of the support for the NDSU Extension Crop & Pest Report is from the Crop Protection and Pest Management Program [grant no. 2017-70006-27144/accession 1013592] from the USDA National Institute of Food and Agriculture.

Thank you for your participation and support!

Please click on this link or scan the QR code to take the survey:
https://ndstate.co1.qualtrics.com/jfe/form/SV_3Kx4zpBjtMT2XHv
ARMYWORM AND ARMY CUTWORM PUBLICATION

If you grow wheat, barley, corn, or forage (alfalfa), you will be interested in this revised extension publication on The Armyworms and the Army cutworm E830 (Revised). Although the names of these two insects are similar, they look different both as adult moths and larvae. They also have different life cycles, feeding habits, scouting techniques and economic thresholds in various crops. This publication provides an overview of Integrated Pest Management of armyworm and army cutworms. It is sponsored by the Great Plains Diagnostic Network. The pdf is free from the NDSU Extension Distribution Center website.

2018 IPM SURVEY RESULTS – SOYBEAN AND SUNFLOWER INSECT PESTS

The purpose of the IPM (Integrated Pest Management) Survey is to detect the presence and population levels of diseases and insect pests that are common in soybeans and sunflowers grown in North Dakota. Ten survey scouts or insect trappers operated out of the Dickinson Research Extension Center, the North Central Research Extension Center (Minot), the Carrington Research Extension Center, the Langdon Research Extension Center, the Williston Research Extension Center and the Fargo Agricultural Experiment Station. The NDSU IPM scouts were:

- Brittney Aasand, central and south central counties, worked out of Carrington REC with Greg Endres
- Marc Michaelson, southwest and west central counties, worked out of Dickinson REC with Ryan Buetow
- Caleb Cross and Bree Obergfell, north central counties, worked out of NCREC in Minot with Travis Prochaska
- Scott Roseth and Jace Paryzek, northwest counties, worked out of Williston REC with Audrey Kalil
- Dan Kraemer and Stafford Thompson, southeast and east central counties, worked out of NDSU campus, Fargo with Jan Knodel, Andrew Friskop and Sam Markell.
- Kaylee Anderson and Traci Murphy, northeast counties, worked out of Langdon REC with Leslie Lubenow and Benson County Extension Office with Scott Knoke

NDSU IPM field scouts surveyed a total of 544 soybean fields and 101 sunflower fields in North Dakota during 2018. The survey was initiated in early June and continued through August 10. Crops were surveyed from the 2-leaf stage through R5 growth stage in soybeans and R6 growth stage in sunflowers. IPM survey data/maps provide near real-time pest information to North Dakota producers and others in agriculture to assist with scouting and pest management decision making. Pest maps from the 2018 IPM Survey in North Dakota were uploaded weekly onto the NDSU IPM website. Some of the insect pest highlights for soybean and sunflower are summarized below.

Soybean Insect Pests:

Soybean aphids - No soybean aphids were observed in 82% of the soybean fields surveyed. The percent of plants infested with soybean aphids in fields was low with an average of 17% of plants infested and ranged from 1 to 100% of plants infested. The higher percentage of plants infested with soybean aphids in fields were found late in the season (August) and mainly in Cass and Richland Counties. The average number of aphids per plant was only 3 aphids per plants and ranged from 1 to 59 aphids per plant. Soybean aphids never reach the economic threshold (E.T.) level (average of 250 aphids per plant, 80% of plants infested with one or more aphids and increasing population levels) in any of the fields scouted in 2018. This just goes to show why it is good to scout and use E.T. for soybean aphids!
Spider mites were observed in only 4% of the field scouted. Hot spots for spider mites were common on the field edges and in the droughty areas of ND, especially in the northwest including Divide, Williams, Mountrail and Burke Counties.

Bean leaf beetle is an uncommon insect pest of soybeans in ND. It usually does not overwinter successfully in ND due our cold winters. However, the IPM scouts collected low numbers of bean leaf beetles in sweep net samples in three counties: Stutsman, Sargent and Richland.

During the last two weeks of the soybean survey, scouts looked for dicamba herbicide injury on soybeans. Dicamba injury was observed in about 14% of the 118 soybean fields surveyed in late summer.
Sunflower Insect Pests:
Red sunflower seed weevils were found in 72% of the sunflower fields that were scouted during flowering. The average number of weevils per head was 3.7 and ranged from 1 to 18 weevils per head depending on field site. Counts that were taken on field edges were higher and averaged 6 weevils per heads compared to 2.8 weevils per heads in field (at least 25 feet into field). In 2018, the E.T. for red sunflower seed weevils was 4-6 weevils per head for oilseed sunflowers. Approximately 36% of the fields with weevils present were above the E.T. and these fields needed to be treated with insecticides. The hot spots included Stark, Mercer and Emmons Counties.

Banded sunflower moth was collected at all 10 trap sites throughout ND. The first moth was trapped on June 21st and peak moth catch was the last week of July. Moth capture varied depending on field site but overall an average of 344 total moths were captured per field site. Counties with more than 100 moths per trap per week included: Cass, Foster, Divide, Mountrail, Renville, Ward and Towner.

Sunflower moth was collected at 7 of the 10 trap sites. The sunflower moth migrates annually into ND and was first detected on June 28th. The peak catch occurred during late July into early August. None of the trap sites reached the trap economic threshold for sunflower moths (>25 moths per trap per week). The average trap catch among sites was only about 5 moths per trap per week.

Acknowledgments: Sincere thanks to the hard working field scouts of 2018! We also appreciate the help of Darla Bakko, NDSU Dept. of Plant Pathology, for data compilation, and Honggang Bu, NDSU Dept. of Soil Science, for ArcMap programming. This survey is supported by the Crop Protection and Pest Management Program [grant no. 2017-70006-27144/accession 1013592] from the USDA National Institute of Food and Agriculture.
PULSE CROP SURVEY – INSECT PEST REPORT

NDSU pulse crop scouts (WREC: Shawn Postovit, NCREC: Graysyn Kitts) surveyed field pea, lentil and chickpea fields in northwest and north central North Dakota for insect pests from late May until early August. A total of 218 chickpea fields, 51 lentil fields, and 29 field pea fields were scouted. A summary of selected insect pests are discussed below.

Cutworms were observed in all three pulse crops surveyed but only present early in the crop growing season from late May to mid-June. The overall percentage of fields infested with cutworms was low – 8% of lentils fields, 3% of field pea fields and <1% of chickpea fields. The northwest area of ND had the highest densities of cutworms.

Pea aphids - Scouts collected aphids using 20 180-degree sweeps in each field at 5 spots. Pea aphids were most common later in the field season, usually late July into early August, and were only economic in 10% of the lentils scouted and <1% of the chickpea field scouted. Pea aphids were absent from the 29 field pea fields scouted. The hot spot for pea aphids was in Williams and Burke Counties. Otherwise, pea aphids were not a major problem in most of the pulse crop areas in 2018.

Pea leaf weevil (Sitona lineatus) is a new insect pest of field pea that was first discovered in the fall of 2016 near Beech, ND. In 2017, additional survey work found pea leaf weevils in field pea or faba beans fields the following areas: southwest (Dunn, Golden Valley and Stark counties), north-central (Mountrail and Ward counties) and northwest (Divide County). In 2018, pulse crop scouts and the IPM scout (Marc Michaelson from Dickinson REC) looked for feeding injury (leaf notching) of pea leaf weevil by examining 100 plants per field. Leaf notching was found over a wider range than previous years. Five new county records were documented in 2018 including Billings, Bowman, Hettinger and Slope Counties in southwest and Mercer County in west central. This survey focuses on number of leaf notches caused by adult feeding, and not the yield depriving larval feeding on the nitrogen-fixing root nodules. When the number of leaf notches are greater than 9 notches per plant (yellow square or red triangle on map), economic damage (yield loss) can be significant if conditions are favorable for pea leaf weevil in the spring of 2019 (warm springs >68F). Only Billings and Slope Counties had leaf notching greater than 9 notches per plant. Pulse producers should use this information along with field history of pea leaf weevil abundance to make decisions for the 2019 crop year. Research has demonstrated that insecticide seed treatments are more effective in reducing losses due to pea leaf weevil than foliar insecticides.

Please see the new extension publication Integrated Pest Management of Pea Leaf Weevil in North Dakota E1879, April 2018, for more information.

Thanks to the Northern Pulse Growers Association for funding this survey.
MYSTERY CATERPILLAR

This is the Achemon sphinx moth larvae, *Eumorpha acehmon* (Lepidoptera: Sphingidae). It feeds on grapes and Virginia creeper. The adult moth is a beautiful, large hawkmoth with a 3½ inch wingspan and pink hindwings. It is distributed from southern Canada and throughout the U.S. (except Pacific Northwest) into Mexico. See the following website: https://www.butterfliesandmoths.org/species/Eumorpha-achemon

Janet J. Knodel
Extension Entomologist

NEW CHICKPEA PUBLICATION

NDSU authors have recently updated the Growing Chickpea in North Dakota ([A1236] publication). The publication is intended for growers considering kabuli or desi chickpea as a crop. The text covers basic plant growth habit, crop production, field selection, seedbed preparation, fertilization, inoculation, seeding, weed control, diseases, insects, rotational benefits and harvesting.

Chickpea (*Cicer arietinum* L.) originated in what is now southeastern Turkey and Syria and was domesticated about 9,000 B.C. It is an annual grain legume or “pulse” crop sold in human-food markets.

Chickpea is classified as kabuli or desi type, based primarily on seed color. Kabuli chickpea, sometimes called garbanzo bean, has a white to cream-colored seed coat and ranges in size from small to large (greater than 100 to less than 50 seeds per ounce). Desi chickpea has a pigmented (tan to black) seed coat and small seeds.

Before selecting a variety, contact potential buyers to ensure it is accepted in the market you are targeting. Variety information is available on the NDSU variety trial website at https://www.ag.ndsu.edu/varietytrials/chickpea

Chickpea is a high-value crop that is adapted to deep soils in the semiarid northern Great Plains. However, disease risks are high, and Ascochyta blight can cause devastating financial losses for growers. Thus, this crop is
recommended only for producers who are willing to scout diligently and actively manage disease pressure throughout the entire growing season.

CORN DEVELOPMENT AND DRY-DOWN IN 2018

For most of the state, corn growing degree days (GDDs) are running well ahead of normal. At some of our testing locations, hybrids with relative maturities recommended for that zone have already reach physiological maturity (black layer). In fact, some of the earlier maturing hybrids reach black layer around the first week of September. In terms of calendar days, this means that early-planted corn is maturing about two weeks ahead of normal (at least in many locations in North Dakota). When considering field drying, this is good news as the likelihood of having effective drying days is much greater for corn that matures earlier in the season. Though reaching black layer early increases the chances that the corn crop will dry quickly and require little if any on-farm drying, the rate of dry down will still be regulated by the weather in the weeks ahead.

A rough rule of thumb is that it will take at least a month to field dry corn, after reaching black layer, to the point that harvest can begin; probably less if the crop reached black layer in early September. However, the actual rate of drying is impacted by the moisture of the corn (wet corn dries faster than dry corn), and weather factors such as relative humidity, temperature, sunshine, rainfall and wind speed. It is possible for corn to lose up to 1% of grain moisture in a day when conditions are favorable, but typically, the highest rate of moisture loss one can expect is about 0.75% per day. Though temperature is not the only driver of moisture lost (one could not expect corn to dry at the same rate during a warm September day when it is raining as it would on a warm September day with low relative humidity), there are published reports that 30 GDDs are required for each percent of moisture lost. This relationship can be useful in roughly estimating the rate of dry down. For example, we might expect 6% moisture loss in the first two weeks of September when average GDD accumulations are 12.7 per day but less than 1% moisture loss the last two weeks of October when we on average accumulate only 1.3 GDD per day. The weather outlook for the next several days looks
favorable for drying as temperatures will be above average. This will be followed by a period of more normal drying weather. Overall, it looks favorable for corn to dry reasonably fast this season. When planning your harvest, consider harvesting fields that have poorer stalk strength first to reduce the risk of losses due to lodging. Drought stressed fields are more likely to have poor stalk strength and late season drought stress was common in many parts of the state this year. For information on corn drying and storage, refer to the excellent NDSU Extension resources at https://www.ag.ndsu.edu/graindrying/corn-and-soybean-page.

Joel Ransom
Extension Agronomist for Cereal Crops

HARVESTING AND STORING SOYBEANS

Harvest timing can have a huge impact on soybean shatter losses and storability. Field losses, splits and cracked seed coats increase as moisture content decreases. Shatter losses have been shown to increase significantly when seed moisture falls below 11 percent or when mature beans undergo multiple wetting and drying cycles. Also, molds develop more rapidly in soybeans with seed coat cracks, so the amount of mechanical damage occurring during harvest affects the beans’ deterioration rate. A moisture content of about 13 percent at harvest is optimal for mitigating mechanical damage.

Harvesting during high humidity, such as early morning, late evening or in damp conditions, may reduce shatter loss and mechanical damage if the soybeans are below 11 percent moisture content. Moisture content can increase by several points with an overnight dew or decrease by several points during a day with low humidity and windy conditions. Avoid harvesting when beans are driest, such as during afternoons, to maintain moisture and reduce shattering losses.

The market moisture for soybeans is 13 percent, which is fine for storing soybeans during cool conditions. If your soybeans will be stored through winter and into the warmer weather of spring and summer, store at 11 percent moisture to limit mold growth and deterioration. The storage life is roughly doubled for each percentage point of reduction in moisture content.

Storage Temperature: Controlling soybean temperature during storage is critical. Free fatty acid percentages, a negative characteristic, tend to increase with storage moisture, temperature and time. At 12 percent moisture, free fatty acid percentages increase slowly with storage time if the beans are kept cool. In one study, the average free fatty acid content of 12 percent moisture beans stored at 50°F stayed below 0.75 percent but exceeded this level after only four months when stored at 70°F. Soybeans should be cooled as they go through the fall and winter to maintain quality. Aerate to keep the soybeans within 10 to 15 degrees of the average outdoor temperature during the fall. Soybeans should be stored during the winter near 30°F in northern states and 40°F or lower in southern states. During the spring and summer, aerate stored soybeans to keep the temperature as cool as possible - preferably 40 to 60°F. These temperatures enhance soybeans’ storage life, and reduce mold and insect activity.

Soybeans at 11 percent moisture have similar storage characteristics as wheat or corn at 13.5 to 14 percent moisture. Use an allowable storage time (AST) chart for cereal grains to estimate allowable storage times for soybeans. Airflow through the soybeans maintains the grain temperature but does not extend the allowable storage time.

According to the chart, the AST for 13 percent moisture soybeans at 80 degrees is only about 40 days. The AST approximately doubles for each 10 degrees the soybeans are cooled. Allowable storage time is cumulative, so the soybean temperature and moisture during the fall have a huge impact on storability next spring. For example, if 16 percent moisture soybeans are stored for 35 days at 50°F, half of the storage life has been used. If the soybeans then are
cooled to 40 degrees, the allowable storage time at 40 degrees is only 70 days, rather than the 140 days shown in a chart.

**Storage Recommendations:**

- **Keep fans covered.** Once soybeans are cooled, cover fan and duct openings to prevent snow or moisture from blowing into the bins during winter storage. Keep fans covered during the spring and summer to limit air from warming the soybeans. Ventilate the top of the bin to reduce solar heating affecting the beans at the top of the bin.

- **Monitor stored grain regularly.** Outside temperature changes can result in temperature and moisture changes inside the bin. Monitor soybeans at least once every two weeks during winter storage and weekly during the fall until the grain has been cooled to winter storage temperatures. Monitor the soybeans weekly during the spring and summer. Measure the grain temperature and watch for indications of problems such as condensation, insect activity and increasing grain temperatures. Record temperature values and grain condition to help track any changes.

- **Use available tools, but don't turn everything over to automation.** Improved technology can help producers better manage stored grain, but they still need to manage the grain and inspect it visually. Temperature cables allow producers to monitor the stored grain temperature at several locations, and fan controllers can operate fans according to desired air conditions. Monitor and verify that fans are operating as desired.

- **Equalize soybean moisture content.** Soybean moisture variation may lead to storage and marketing losses. Operating an aeration fan will help move moisture from wet beans to drier beans. Moisture movement will be minimal without aeration airflow. Initially, fans will have to run longer to equalize the moisture content than to cool the grain. The moisture will not be all the same, but it should become more uniform.

### Approximate Allowable Storage Time for Soybeans

<table>
<thead>
<tr>
<th>Moisture Content (%)</th>
<th>30</th>
<th>40</th>
<th>50</th>
<th>60</th>
<th>70</th>
<th>80</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>300+</td>
<td>300+</td>
<td>300+</td>
<td>300+</td>
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<td>13</td>
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<td>300+</td>
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<tr>
<td>14</td>
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<tr>
<td>15</td>
<td>300+</td>
<td>200</td>
<td>90</td>
<td>50</td>
<td>30</td>
<td>15</td>
</tr>
<tr>
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<td>300+</td>
<td>140</td>
<td>70</td>
<td>35</td>
<td>20</td>
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<td>60</td>
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<td>15</td>
<td>8</td>
<td>3</td>
</tr>
</tbody>
</table>

- **Airflow through the soybeans permits maintaining the grain temperature but does not extend the allowable storage time beyond that listed in the table.**

- **Allowable storage time is cumulative.** If 16 percent moisture soybeans were stored for 35 days at 50 degrees, one-half of the storage life has been used. If the soybeans are cooled to 40 degrees, the allowable storage time at 40 degrees is only 70 days.
STORAGE OPTIONS FOR GRAINS

All storage options should keep the grain dry and provide adequate aeration to control the grain temperature. Grain can be stored in many types of facilities. The important point is that all storage options should keep the grain dry and provide adequate aeration to control grain temperature. Grain must be dry and cool (near the average outdoor temperature) when placed in alternative storage facilities because providing adequate, uniform airflow to dry grain or cool grain coming from a dryer is not feasible.

**Structural Issues:** Grain pushing against walls can damage buildings not built for grain storage. The wall must be anchored securely, and its structural members must be strong enough to transfer the force to the building poles or support structure without breaking or excessive bending. Typically, you’ll need additional poles and a grain wall to support the grain force in a pole building. Hire an engineer to complete a structural analysis, or have a contractor follow exactly the building company recommendations to prevent a structural failure.

Before placing grain in a building previously used for grain storage, look for anything out of alignment, such as wall bowing and distortions in the roofline. Bowing or bending indicates the load on the building exceeded the load for which it was designed and built. This weakens the structure. Also examine connections for separation or movement and add a gusset or splice to reinforce the connection if necessary.

**Storing in Bags:** Storing grain in poly bags is a good option, but it does not prevent mold growth in damp grain or insect infestations. Place grain in the bag at recommended storage moisture contents based on grain and outdoor temperatures during the potential storage period. Heating will occur if the grain exceeds a safe storage moisture content and it cannot be aerated to control heating. The average temperature of dry grain will follow the average outdoor temperature.

Guidelines for storing grain in bags include:

- Select an elevated, well-drained site for the storage bags. Run the bags north and south so solar heating is similar on both sides. Sunshine on just one side heats that side, which can lead to moisture accumulation in the grain and spoilage on the cool side.
- Monitor the bags for damage. Wildlife can puncture the bags, allowing moisture in, which can lead to spoilage and the grain smell being released, which attracts more wildlife.
- Monitor the grain temperature at several places in the bags.
- Never enter a grain bag because it is a suffocation hazard. If unloading the bag with a pneumatic grain conveyor, the suction can “shrink wrap” a person.

**Grain Piles:** Grain frequently is stored short term in outdoor piles. However, precipitation is a severe problem for uncovered grain because grain is very porous. A 1-inch rain will increase the moisture content of a 1-foot layer of corn by 9 percentage points. This typically leads to the loss of at least a couple of feet of grain on the pile surface, which is a huge loss. For example, a cone-shaped pile 25 feet high contains approximately 59,000 bushels of grain. Losing just 1 foot of grain on the surface is a loss of about 13 percent of the grain, which is $39,000 if the grain value is $4 per bushel and $78,000 at $8 per bushel. Aeration and wind blowing on the pile will not dry wet grain adequately to prevent spoilage.

Use a cover to prevent water infiltration. Drainage is critically important to the success of any grain storage. About 25,000 gallons of water will run off an area about 100 by 400 feet during a 1-inch rain. This water must flow away from the grain and the area next to it. When determining a location for a pile, examine the entire area to assure that flooding will not occur during major rain events. The outdoor ground surface where grain will be piled should be prepared to limit soil moisture from reaching the grain. The storage floor also should be higher than the surrounding ground to minimize moisture transfer from the soil into the grain. Make sure the ground surface is crowned so moisture drains out and away rather than creating a wet pocket that leads to grain deterioration.

Also, look for these issues:
- Anything out of alignment in a bunker or bulkhead wall - Any twisting, flexing or bending of a structural member may lead to a failure.
- Separation or movement in connections
- Material deterioration

**Grain Covers:** A combination of restraining straps and suction from the aeration system holds grain covers in place, and provides adequate airflow through the grain to control grain temperature. Place perforated ducts on the grain under the cover to provide a controlled air intake for the aeration system and airflow near the cover to minimize condensation problems under the cover.

Place properly sized and spaced ducts under the pile on the ground to pull air through the grain. Some storage options use a perforated wall for the air inlet. Minimize the amount of open area so the air does not “short-circuit” to the fan. Wind velocity determines the amount of suction you need to hold the cover down. Some control systems measure wind velocity and start fans based on the wind speed. Backup power can hold the cover down during power outages. Make sure the backup power starts when needed.

**Cooling Stored Grain:** Cool grain with aeration to extend the allowable storage time and reduce the potential for insect infestation. Temperatures below about 60 F reduce insect reproduction. Insects are dormant below about 50 F, and extended exposure to temperatures below about 30 F can kill insects.

Cooling grain as outdoor temperatures cool will reduce moisture migration and the condensation potential near the top of the grain pile. Also, the grain should be cooled because grain moisture content and temperature affect the rate of mold growth and grain deterioration. The allowable storage time approximately doubles with each 10-degree reduction in grain temperature.

For example, the allowable storage time for 17 percent moisture corn is about 130 days at 50 F and about 280 days at 40 F. The grain should be cooled whenever the average outdoor temperature is 10 to 15 degrees cooler than the grain. It should be cooled to near or below 30 degrees for winter storage in northern states and near or below 40 degrees in southern states.

Aeration ducts need to have perforations sized and spaced correctly for air to enter and exit the ducts uniformly and obtain the desired airflow through the grain. The maximum spacing for aeration ducts is equal to the grain depth to achieve acceptable airflow uniformity.

**Long-term Grain Storage:** Grain has an acceptable storage life before the quality is reduced enough to impact its value. Allowable storage time is cumulative, so consider the amount of storage life remaining when deciding if you can store the grain longer. For example, if corn is stored at 14 percent moisture and 60 degrees for two months (November-December), then cooled to 40 degrees for four months (January-April), then stored through the summer months (May-August) at 70 degrees, approximately 90 percent of the storage life has been used. That means very little expected allowable storage life is remaining if the grain is going to be stored for another year. Grain going into storage for a second year needs to have been kept cool and dry during the first year and have few broken or cracked kernels.

Remember, airflow through the grain permits grain temperature to be maintained, but it does not extend the allowable storage time.
### Approximate Allowable Storage Time for Cereal Grains

<table>
<thead>
<tr>
<th>Moisture Content (%)</th>
<th>--- Grain Temperature (F) ---</th>
<th>Approximate Allowable Storage Time (Days)</th>
</tr>
</thead>
<tbody>
<tr>
<td>14</td>
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<td>300+</td>
</tr>
<tr>
<td>15</td>
<td>300+</td>
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<td>140</td>
</tr>
<tr>
<td>20</td>
<td>300+</td>
<td>90</td>
</tr>
</tbody>
</table>

- Allowable storage time is the storage period before quality loss is expected to affect grain quality.
- Airflow through the grain permits maintaining the grain temperature but does not extend the allowable storage time beyond that listed in the table.

For more information, visit [NDSU grain drying and storage](https://www.ag.ndsu.edu/graindrying) website (or [https://www.ag.ndsu.edu/graindrying](https://www.ag.ndsu.edu/graindrying))

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Kenneth Hellevang  
NDSU Extension Agricultural Engineer & Professor
NEW POLLINATION PUBLICATION

This new extension publication titled *Pollination in Vegetable Gardens and Backyard Fruits H1898* was written in cooperation with Michigan State University Extension. It describes what pollination is and the role of pollinators in the home vegetable gardens and backyard fruits. It is sponsored by the Crop Protection and Pest Management Program [grant no. 2017-70006-27144/accession 1013592] from the USDA National Institute of Food and Agriculture.

Esther McGinnis  
Extension Horticulturist

Janet J. Knodel  
Extension Entomologist

FALL INVADING INSECT PESTS IN THE HOME

This time of year, as night temperatures drop and days get shorter, several insects, such as boxelder bugs, multicolored Asian lady beetles, strawberry root weevils and cluster flies, may invade the home. These insects like to overwinter inside the home for warmth, often in the wall voids where temperatures are 40-50°F. Unfortunately, they often end up inside the home walking around on floors, walls and ceilings where they become a major nuisance if they occur in large numbers. However, they are not harmful to people, pets or the house.

The best way to get rid of them inside the home is just vacuuming or physically removing them. On the outside of a home, figure out where they are getting inside the house, and caulk and seal or screen any entry points to prevent them from coming inside. Many insects only need a small crack like the ‘thickness of a credit card’ to get inside the home.

Fall invaders often congregate on the sunniest sides of the house - south and west sides. If populations are high, then a perimeter ‘barrier’ insecticide spray may be useful. Spray 3-5 feet out from the base of the house and up the siding of the house. Examples of insecticides labeled for outdoor use around home are: permethrin, synergized pyrethrins (Spectracide Bug Stop and other brands), pyrethroid insecticides (such as, esfenvalerate - Ortho Bug-B-Gon Garden & Landscape Insect Killer; lambda cyhalothrin – Spectracide; beta-cyfluthrin – Tempo), or carbaryl (Sevin). Please read, understand and follow the label - it’s the law.

Left to Right: Boxelder bug, strawberry root weevil and Asian lady beetle  
(J. Knodel, P. Beauzay, J. Knodel, NDSU Ext. Ent.)

Janet J. Knodel  
Extension Entomologist
FALL NEEDLE DROP IN CONIFERS

During autumn, deciduous trees like green ash and linden change color and lose their leaves. This is normal and expected. It happens every year and people are used to it. When needles of evergreen trees turn brown and die, it’s definitely unexpected, but not necessarily abnormal.

There are several species of evergreens or conifers that are frequently grown in North Dakota. Pines and spruces are most common. These needles live for 2 to 7 years, and then die and drop during the fall. These are the older needles towards the center of the tree. Spruce needles usually live longer than those of pines, and may persist for up to 10 years. Just like pines, though, the needles which are older and more shaded may turn brown and drop during autumn. Even arborvitae trees and shrubs will sometimes shed older needles in the fall.

So, some needle drop by conifers during the fall is normal. The exception to this rule occurs with larch trees (also called tamarack). Larch trees lose all of their needles, every year. They are deciduous “evergreens”. Larch needles are 1 to 2 inches long and borne in clusters on short shoots, and individually on long shoots. They are very soft. Larch needles often turn a bright yellow color.

Evergreen needles don’t last forever. Some needle loss towards the center of the tree, during the autumn, is normal. Needle loss at other times of the year is not normal and may be due to an insect or fungal pest or is the result of severe environmental stress. And larch trees, the exception to the rule, lose all of their needles every year. Enjoy the colors this fall.

Joe Zeleznik
Extension Forester
around the state

NORTH CENTRAL ND

The North Central Research Extension Center received about 0.14” of rain over the last week. The Ross NDAWN station received 0.21”, Bottineau 0.13”, Garrison 0.11”, and Rugby 0.23”. Some smaller chances of rain are present in the 7-day forecast.

Harvest continues to roll along in many parts of the North Central region with many of the early maturing crops nearing completion, if not already completed. Many of the later maturing crops, such as soybean, are continuing to mature.

TJ Prochaska
Extension Cropping Systems Specialist
NDSU North Central Research Extension Center

NORTHWEST ND

September is off to a dry start across most of Northwest ND with still warm daytime temperatures and overnight lows starting to dip down into the 40’s and 50’s F. Most small grain and pulse crop acres across the region have been harvested and some of the later season crops are ready to come off or nearly so. Without meaningful rain the past two weeks, soybean and sunflowers are starting to dry down.

As farmers wrap-up harvest, I encourage them to start thinking about fall weed control. If warm weather continues into October, scout for emerging weeds throughout September and start planning a late fall application now. If narrow leaf hawksbeard is a problem, waiting until late fall for a glyphosate application and/or using a residual product will be necessary. For an update on weed control, attend the Fall Weed Control meeting in Crosby at the Divide County Courthouse on Thursday, September 13 at 10:00 am. Farmers and crop advisors are encouraged to come and learn about horseweed (aka marestail) and narrow leaf hawksbeard control.

Clair Keene
Extension Cropping Systems Specialist
NDSU Williston Research Extension Center

NORTHEAST ND

Dry bean harvest is in full swing. Soybean, potato and the last remnants of canola harvest is also occurring. The region picked up 0.5 to 2 inches of rainfall in the last 2 weeks. Much of the crop has been accelerating to maturity, so these rainfalls come too late to impact this year’s yield goals. In terms of corn growing degree units, much of the region is finishing with 250 more GDD units than the previous 2017 year. Langdon REC variety trial data will be up on the web as it becomes available.

Lesley Lubenow
Area Extension Specialist/Agronomy
NDSU Langdon Research Extension Center
SOUTH-CENTRAL

Based on NDAWN data, the following are rainfall ranges (and locations) within the region: August – 0.1 inches (McHenry) to 4.3 inches (Jamestown); past 60 days – 0.5 inches (Carrington) to 8.5 inches (Marion); April 1 through September 10 – 8.9 inches (Carrington and Harvey) to 16.6 inches (Marion). In the dry region (Eddy, Foster, Wells and Sheridan counties), soybean likely suffered yield loss of at least 50 percent while soybean in high rainfall areas have reduced yield due to white mold.

Harvest is essentially complete with small grain and cool-season broadleaf crops. The Carrington REC has variety trial data for most of these crops: www.ag.ndsu.edu/varietytrials/carrington-rec/2018-trial-results. Dry bean harvest is at least 75 percent complete and soybean harvest has begun.

Before harvesting soybean, consider scouting fields for Palmer amaranth before seed is dropped or spread during harvest operations. Ask NDSU Extension agents or agronomists for assistance with identifying pigweed species.

Greg Endres
Extension Cropping Systems Specialist
NDSU Carrington Research Extension Center

SOUTHWEST ND

There are still a few wrapping up small grain harvest. Small grain yields across the region continue to be good. Soil moisture in the region continues to be highly variable, with some catching hail storms along with the rain. Row crops continue to mature, the recent scattered rains have come too late to help with yields. Last year most of the region was in severe drought, we now range from abnormally dry to moderate drought conditions. According to NDAWN Dickinson received 11.75 inches of rain from April 1st to September 10th this year, compared to 5.51 inches over the same time period in 2017. Over the same time periods, Mott received 8.22 inches this year and had 5.86 inches last year. Hettinger has 10.32 inches this year and had 5.58 inches in 2017. While the moisture this year has not been ideal for all of the many crop species grown in southwestern ND, the forage situation in this part of the state is much better than last year, but some are still in need of hay.

In mid to late August, we planted cover crop species demonstration plots at both the Hettinger and the Dickinson Research Extension Centers. These plots show a wide range of cover crop species including warm and cool season crops, grasses, brassicas, legumes, and more. On October 19th, we will be having Cover Crop Workshops at both locations with Hettinger in the morning from 9-11am and Dickinson from 2:30-4:30 in the afternoon. If you have any questions about late season cover crops or you’d like to see what kind of growth is possible call or visit me at the Dickinson REC. For more information be sure to check the Dickinson REC website at https://www.ag.ndsu.edu/DickinsonREC

Ryan Buetow
Extension Cropping Systems Specialist
NDSU Dickinson Research Extension Center
THE 2018 WEATHER SUMMARY

As this is the last *Crop and Pest Report* for the year, I thought I would use it as a summary as to what happened weather-wise during the 2018 growing season. After a cold April, May turned out to be a very warm month. If we take the average from May 15 through September 11, temperatures across the North Dakota Agricultural Weather Network were mostly in the 1 to 3 degrees above normal (Figure 1).

![Temperature Departure from Average for the period of May 15 through September 11, 2018](image)

**Figure 1. Temperature Departure from Average for the period of May 15 through September 11, 2018**

Yet, if we start on June 1, 2018, you will notice that the exception is northeastern North Dakota, much of the region was closer to average for temperatures, meaning, a high percentage of the growing season was pretty much normal for temperatures after the heat of late May faded (Figure 2 on next page).
Figure 2. Temperature Departure from Average for the period of June 1 through September 11, 2018

Rain was a widespread in the amount that fell across the region since May 15, which is typical in our climate where one or two thunderstorms hitting or missing a given spot will make a huge difference in the seasonal rainfall. Total rain at the NDAWN weather stations is given below in Figure 3.

Figure 3. Total Rainfall at NDAWN stations from May 15 through September 11
Using the percent of normal at each station, as a general rule much of northern North Dakota into northwestern Minnesota recorded below average rainfall this past growing season, whereas, much of the southern portion of North Dakota into west central Minnesota recorded near or above average rain. Of course, with much of our rain coming from thunderstorms, there are numerous exceptions to that rule in localized areas across the region.

Figure 4. Percent of Normal Rain from May 15, 2018 through September 11, 2018

Using May 15 as a planting date, the accumulated wheat growing degree days (Based 32°) was noticeably higher than what we recorded last year (because 2018 was warmer than 2017).


Figure 5. Difference in growing degree days in wheat in 2018 in comparison to 2017.
Using May 15 as a planting date, the increase in accumulated corn growing degree days (Based 50°) was also higher than what we recorded in 2017 (Figure 6).


![Image of accumulated GDD map]

*Figure 6. Difference in growing degree days for corn in 2018 in comparison to 2017*

Daryl Ritchison  
Meteorologist  
Interim Director of the North Dakota Agricultural Weather Network
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http://www.ag.ndsu.edu/cpr/