

2023 Northern Hardy Fruit Evaluation Project Update

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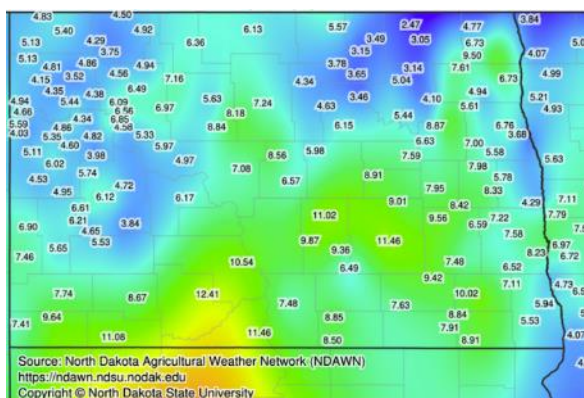
This year, the Northern Hardy Fruit Evaluation Project provided educational information to over 1,370 people with video conference programs, tours, meetings and personal phone calls. 74 people attended the Fruit Project Field Day tour to learn about the orchard and to learn about growing pears from Gretchen Merryweather, owner of Sweetland Orchard, in Webster, Minnesota. In the afternoon, on a second tour sponsored by Northern Plains Sustainable Ag Society, 51 people learned about the cider-making business and had an orchard tour. In addition to North Dakota, we provided information to people in Iowa, Minnesota, Montana, South Dakota, Texas and Wisconsin.

Cooperators: Our 2023 cooperators were Dakota Sun Gardens Winery, Carrington, ND, Karen's Kuchens, Larimore, ND. We also worked with a new, local jellymaker to introduce them to new fruits and growing the plants.

Weather: After many years of dry weather, we had a year of plentiful and timely moisture. Fall 2022 was still dry, but then from November 10, 2022 through April 2023, there were 118" of snow. Mid-March through April was especially cold (15.7°F below average) and this delayed the snowmelt and pruning. Most meltwater soaked into the ground.

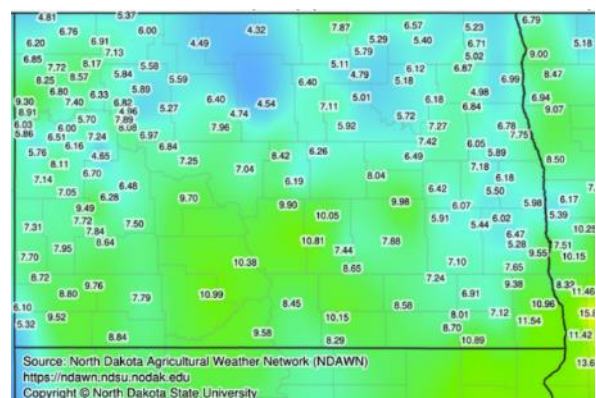
In May through early June, however, conditions reversed and temperatures were about 9°F warmer than average. By the end of June, we were over 370 GDD^{41F} units ahead of normal, and the season continued like this. All months except August had plentiful rainfall. The first frost was October 6th, but lows were only in the upper 20s, as were the subsequent freezes. The first snowfall of 11" came October 26th followed by 10 days of temperatures that averaged 20°F below normal. The snow subsequently melted as mild temperatures reappeared.

After Christmas 2023, a large swath of southern and eastern North Dakota was affected by freezing rain. In the Carrington area, ½" of ice damaged some trees and powerlines while areas further south were heavily impacted by at least 1" of ice. Our snow remains coated in ice and we have not been able to assess the orchard plants in January.



Rainfall 4/1 - 6/30/2023

8.91"



Rainfall 7/1 - 10/31/2023

8.04"

Irrigation: General drip irrigation was not utilized this year. Drip tape was laid but was only utilized once in the Juneberries in early July and later in the Aronia area from mid-July to mid-August.

SWD: Spotted wing drosophila pressure was quite high this year because of the consistent moisture. Pesticides were applied with a Jacto A200 airblast sprayer. We followed a 5-, 6- or 7-day application schedule in the evening, utilizing NuFilm at 0.125% of total volume as a spreader-sticker. Pesticides in the rotation included malathion, Mustang Maxx, Excirel and Entrust. Due to warm temperatures, control began June 12th. All crops were sprayed pre-harvest and at least once post-harvest until no fresh fruit is left within. Control was not as good this year. Early black currants were affected and fruit became soft and dropped. Aronia had damaged fruit, too, but the cause has not been determined.

Field Day: 74 people attended the morning Fruit Project Field Day tour to learn about the orchard and to learn about growing pears from Gretchen Merryweather, owner of Sweetland Orchard, in Webster, Minnesota. In the afternoon, on a second tour sponsored by Northern Plains Sustainable Ag Society, 51 people learned about the cider-making business and had an orchard tour.

Apples: The blossom period was just 7-8 days for each variety this year. Until May 1st, high temperatures were 10-20 degrees below normal and snow persisted. Then during blossom, just three weeks later, temperatures were about 15 degrees above the average for late May, or, in the mid-80s. 'Zestar!' was the first to bloom with first flowers opening May 19-20. 'Hazen' and 'Honeycrisp' opened next on May 23rd, 'Haralred' followed and 'Sweet 16' was last, beginning to blossom on May 25th. 'Zestar!' blossoming was judged completed on May 25-26 while the others were done May 30th. Fruit was thinned three times: once at dime-nickel size, again at quarter size and finally in mid-August.

For the first time, potato leafhoppers infested our orchard. All the apple trees at CREC and the surrounding area were affected. The first damage was seen June 19th but had started about 5 days prior to this. Good, new, growth was observed on July 5th. We consulted one of our Extension specialists, and he said that he had never seen significant economic damage to mature apple trees from leafhoppers. No sprays were applied and after several weeks, the new growth looked normal and healthy. Overall though, it did seem to stress the trees. The 2024 crop will show us if this is true.



Curled leaves and triangular 'hopper burn' on apple leaves

- **'Sweet 16'** had only 25-30 fruits from the 4 trees.
- **'Hazen'** had quite a few apples but the quality was poor: approximately 50 pounds were of good quality while 150 pounds were poor with many split, affected by watercore,

fungal problems or bird damage. Many pounds of apples were removed from the trees in mid-August in the final thinning of the fruit.

- **'Haralred'** produced approximately 56 pounds of good-quality apples and 21 pounds of damaged fruit. This variety has quite a bit of watercore. There was almost no bird damage in this later variety.
- **'Honeycrisp'** apples were very problematic this year. There were many fruits that had stem cracks and fungus-damaged areas where there was light brown, soft spots. Many had interiors that were completely eaten by wasps and birds – they were just skin shells. And finally, though they looked perfect, some of the 'good' apples had brown, very bitter areas inside the flesh. Two trees were removed this spring and the remaining four were removed this fall after harvest. All of the trees became infected with both black rot and *Schizophyllum*, which was feeding on the black rot. There were 54 pounds of usable fruit and 76 pounds of damaged fruit among 4 trees. All four trees were removed after harvest.



Honeycrisp stem cracks, black rot spoilage, small fruit, green fruit, and completely spoiled fruit.

- **'Zestar!'** had a nice crop of fruit. 63 pounds of fruit were #1 or #2 quality but 135 pounds were damaged, primarily by birds. We did not use the bird scare this year, which was a mistake. Amazingly, the later apples such as 'Haralred', 'Honeycrisp' and 'Sweet 16' were hardly pecked at all. We attribute this to plentiful water sources for the birds. 'Zestar!' are nice apples; they usually set one fruit per blossom cluster and they are quite tasty. The biggest tree had an oozing area on the lowest branch, right at the trunk. The tree was removed in the fall.

Aronia: The Aronia crop was average this year which was expected after the 2022 drought. Though rainfall was mostly plentiful this year, Aronia was irrigated as the fall is always a time of high evaporation.

Date	Water	Interval
6/24	2.23" rain	--
7/15	23 gal per plant	20 days
7/17	1.47" rain	3 days
8/4	10 gal per plant	20 days
8/11	10-12 gal per plant	6 days
8/13	0.77" rain	1 day
8/20,24	rain, apx 0.2" + 0.4"	--
8/29	Harvest begins	16 days

Fruit size was small, averaging 0.95 g/berry. There were cherry fruit worms in the berries again this year. This was characterized by the fruit typically being a bit wrinkled or softer and the stem pulling away easily and leaving a large hole in the top of the fruit. The interior of an affected berry is dry and brown. Is this the work of the fruit worm or could it be a fungal problem? We don't really find a worm nor a worm exit hole in a berry that is brown and dry inside.



Canadian Sour Cherries: There was a nice cherry crop this year. These Canadian shrub cherries seem to bear heavier/lighter crops in alternating years. We saw it with our older varieties and we see it with the bumper crop 'Juliet' had this year. 'Romeo' has been a disappointment as it has had very few fruits over the years; we have never harvested it because of low production, bird or squirrel depredation and SWD infestation. The five 'Juliet' plants produced just shy of 100 pounds this year, which is 25 pounds more than in 2021. Harvest was early, July 11th, due to the warm spring.

Black Currants: Sticky traps and lures for current borer were not used this year. We did not catch any in 2022 but we still implemented some controls. We set out *Trichogramma* wasps over 6 weeks and also sprayed with *Beauveria* fungus several times. Bt, or *Bacillus thuringiensis* ssp. *kurstaki*, was not used because we accidentally ordered a ready-to-use product which was not enough to cover the area. The plants were quite beautiful this year.

'Currant fruit flies' (*Epochra canadensis*) were identified last year and the same insecticides used for SWD control were applied to the currants just after blossom and then 7-10 days later. We tried to avoid spraying the *Trichogramma* wasps. The black currant fruit did not turn red and fall early, so we consider this a success. However, we still lost quite a bit of fruit before harvest and assume that it is still SWD damage. Currant fruit flies are not 'fruit flies' as you normally think of them (those are in the genus *Drosophila*) but are actual flies that appear similar to apple maggot adults.

Grapes: When the grape trellises were installed in 2006-7, the agronomy technicians never installed the second half of the earth anchors in the ensuing years. After all these years and many winters where the snow covered the entire trellis system, many wires and posts were broken. Last fall, two broken end posts were replaced and this spring then, those same posts were again pulled over due to the weight of the snow. The decision was made to remove most of the remaining plants and wires. Approximately one set of each variety now remains, so about 5 trellises from the 24 originally installed.



Haskaps and Honeyberries: In a complete turn of events from 2022, the haskap crop ripened early due to the warmth of May. However, due to timely and beneficial rainfall, what appears to be *Botrytis* fungus appeared in the orchard, killing branches in several plants and appearing as grey dust on later-ripening fruit. In the past, I have suspected *Botrytis* only once or twice on just one branch of a plant at a time.

Botrytis is the suspected culprit as this was noted by breeder Maxine Thompson for symptoms that looked just like the dead branches here. However, in blueberries, a similar-looking condition is caused by *Fusicoccum* or *Fusarium* canker diseases. To investigate this further, the exfoliating bark will have to be removed from the haskap stems.



Two haskap plants of the same variety affected by 'botrytis'.



A gray mold on the berries of later haskap berries.



Soft, pink berries on dead, brown peduncles.

A third condition seen in some haskaps, is when the fruit becomes soft and mushy while it was in the process of ripening. In the picture of this variety, the leaves and stem look healthy, but the connection from the fruit to the stem has died, cutting off nutrients to the fruit. Many of these fruits fell to the ground. This generally occurs in late-ripening varieties.

Thirteen unlucky selections of Japanese Haskaps were removed from the planting in spring 2023 for various reasons such as: Uneven ripening, too soft after picking, too much fruit fell, and too late in the season.

The 2021 plants were pruned for nice regrowth this spring. They mostly trained up well although several selections were flattened due to wind damage. We expect all of these to fruit in 2024.

Juneberries: Renewal pruning was done again in 2023 but there are not as many big, old branches left anymore. We've stopped trying to control height, however. The plants continue to produce very nice crops with about 10 pounds of fruit per plant. Juneberries do not take a year off at CREC! Volunteers and summer students continue to pick much of the crop and record the weight of their harvest. The recorded harvest was 696 pounds and we estimate the crop to have been about 750 pounds. There was very little insect or fungal damage despite adequate rainfall. The whole crop was the earliest we have recorded; larger varieties were ready from June 28 – July 7; smaller berries July 4-11. Irrigation was used just once in the middle of the season on July 6th with 1200 gallons of water applied.



Pears: Pear production was light this year except for 'Stacey'. This was the first year that we have not missed the harvest because of a vacation. But it was a bit of a disappointment. The pears were picked on August 18th and approximately 70% of the fruit was the ideal light-green/green-yellow color, while 10% was very green and 20% was overripe. At readiness, a pear should pick easily from the tree and the lenticels



should turn brown. However, for 'Stacey', each fruit had to be levered off the tree by its stem at all stages of ripeness and the lenticels were inscrutable. The fruit from one tree was more red than the second tree. In storage, most of the fruits spoiled from the inside or they had little flavor. They were pretty small, but the tree had a huge crop and was not thinned until shortly before harvest.

'Nova' pears were again the best tasting and best at following the 'pear rules' for picking and softening. The harvest was small and 'Patten' had a small crop, too. Both varieties had to be picked a bit earlier than was ideal due to the large number of yellow jacket wasps eating into the fruits. A bit frustrating. 'Schroeder Hardy ND', which is probably the 'Vitko' pear in our orchard had a crop but was cut down just after harvest due to the inedible fruit. 'Ely' did not have a crop this year.

Hazelnuts: The hazelnut crop was small this year and once again, our squirrel friends enjoyed the crop. Some winter-damaged branches have appeared in many of the shrubs. But we have not thinned the shrubs in some time, so perhaps they just need renewal pruning.

Bee and Butterfly Habitat: The grape trellis area has become a good insect reserve though the flowering species are limited. Lack of mowing has encouraged red and white clover and there are some sow thistle and other weeds. In early spring, dandelions rule. We try to mow it in late fall, which is heartbreaking, because many insects over winter in plant material. But mowing is needed to keep rodent numbers down. About 50-60 percent of the fenced area is trees and unmowed areas with grass, alfalfa, clovers a few willows and some thistle blossoms.

