



Northern New York Agricultural Development Program 2024 Project Final Report

Establishing New Commercial Fruit & Nut Crops for Northern NY

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Collaborators:

- Cornell University Professor Marvin Pritts, Horticulture Section of the Cornell School of Integrative Plant Science, Ithaca, NY
- Myra Lawyer, Agronomist with the Lake Champlain Basin Program and an Environmental Analyst with NEIWPC (New England Interstate Water Pollution Control Commission)

Cooperating Producers:

- Dani Baker, Cross Island Farms, Jefferson County, NY
- Mark Kimball, Essex Farm, Essex County, NY
- Jenna Mulberry, Northern Orchards, Clinton County, NY
- John Bonaparte, Strong Roots Community Farm, Franklin County, NY
- Loren and Chris Bush, Bush Gardens, Jefferson County, NY
- Andrew and Dorothy Kramer, Cedar Knoll Farm, Lewis County, NY

Background:

The project goal is to increase the diversity of specialty fruit and nut crops available to Northern New York (NNY) farmers by evaluating varieties and production practices. The product has increased over time to now include seven crops: four high value fruits: juneberries, aronia berries, honeyberries, and elderberries; and three nut crops: hazelnuts, chestnuts, and cold hardy pecans.

JUNEBERRY (*Amelanchier* spp.)

Juneberry, with its sweet flavor and “superfruit” antioxidant content, has the potential to be a major novel fruit crop in Northern New York. These small, multi-stemmed shrubs or trees are native to every U.S. state except Hawaii, and wild-harvested juneberry fruit were a favored food and medicine for Native American cultures and early European settlers. There are now growers in NNY producing juneberry crops.

Since the inception of NNYADP-funded Juneberry research in 2013, our objectives have been to

- develop a living collection of wild-collected, novel lines of Juneberry plants native to the Northeast and with commercial fruit production potential for NNY growers, along with all current commercially-available fruit-producing cultivars;
- evaluate the performance of commercially-available cultivars and promising wild lines in replicated field trials under NNY growing conditions, including trialing and evaluating production strategies, and
- promote the potential for Juneberry fruit production in orchards and market gardens by providing production data on such factors as establishment, disease and pest susceptibility, flowering and fruiting dates, and flavor profiles.

2024 Results:

Juneberry Nursery Management

Nursery plantings at the Willsboro Research Farm were weeded, fertilized, irrigated as needed, and monitored for disease and insect issues during the growing season.

Juneberry Variety Trials

A1601 Commercial Fruit Producing Varieties:

Juneberry plants in the commercial fruit-producing trial appear to still be recovering from the impact of the 2022 spongy moth infestation. While more plants flowered in 2024 than in 2023, there were still a few varieties that did not produce any flowers (Table 1), and fruit set on those plants that did flower was minimal. Most of the plants that produced flowers in 2024 started flowering on May 6, which is on the early side for the commercial lines trial (Table 1). The slow recovery of the Juneberry plants in the commercial trial is concerning, and as a result we are considering pruning the plants extensively to renovate/rehabilitate the planting.

A1702 Wild-Collected Lines:

The wild-collected Juneberry lines that were also defoliated by the spongy moths in 2022 again followed the same pattern as the commercial varieties with reduced flowering and fruit set. While all the wild-collected entries produced flowers in 2024 (Table 1), fruit production was very low and there were not harvestable yields. 2024 flowering dates in the wild-collected lines were also on the early side compared to previous years (Table 1) with a mean first flower date of May 4. Extensive pruning will also be done in this trial as a plant renovation strategy.

A1602 Ornamental Varieties:

In contrast to the commercial fruit-producing Juneberry varieties and the wild-collected Juneberry lines, the three ornamental varieties *Prince William*, *Princess Diana*, and *Autumn Brilliance* were not defoliated by the spongy moth caterpillars in 2022. All three ornamental varieties started flowering profusely on May 4, 2024 (Table 1).

HONEYBERRY (*Lonicera caerulea*)

The blue honeyberry (*Lonicera caerulea*) is a perennial, fruit-producing shrub that is a member of the honeysuckle family and is native to cool temperate forests of western North America, Asia, and Europe. Domesticated subspecies of *Lonicera caerulea* have been cultivated in northern Japan for hundreds of years, and the Japanese refer to the fruit as “the elixir of longevity.” The commercial production of honeyberry in North America has been facilitated by breeders in Oregon and at the University of Saskatchewan who have produced numerous cultivars with large, exceptionally flavorful fruit.

Honeyberry is well adapted to cold climates, has few pests or diseases, produces the first mature fruit of the season (earlier than strawberries), and can therefore offer NNY growers an exciting new specialty fruit for fresh market sales.

2024 research objectives were to assess and revise our management practices in the honeyberry variety trial in order to reverse a downward trend in fruit yields.

2024 Honeyberry Results:

Honeyberry plant size plateaued for several of the varieties in 2023 (Appendix Figure 1), even though many of the bushes were shorter than expected. Additionally, fruit yields declined markedly for most varieties from between 2021 and 2023 (Figure 2).

In 2024 yields of *Aurora*, *Boreal Beast*, and *Boreal Blizzard* rebounded some, while fruit production on *Blue Hokkaido*, *Blue Pacific*, *Blue Moon*, and Honeybee remained low (Figure 2). Low yields with *Blue Hokkaido*, *Blue Pacific*, and *Blue Moon* were associated with significant winter branch dieback, and it may be that these lines are less well-suited to the Essex County, NY climate. Low yields in other entries were not accompanied by branch dieback, so we are exploring other explanations.

Professor Robert (Bob) Bors, Ph.D., a renowned honeyberry plant breeder from the University of Saskatchewan, Canada, toured our honeyberry trial plots at the Willsboro Research Farm on June 27, 2024. Professor Bors noted that honeyberry plants perform optimally in nutrient rich soils and the sandy, low organic matter soils our trials are located on may be limiting productivity. He also thought that the black landscape fabric weedmat may be overheating and damaging the shallow root systems of the honeyberry plants on hot summer days. In 2025 we will remove the landscape fabric from the beds and replace it with wood chip mulch. We will also enhance our nutrient management applications to see if we can support improved plant growth.

ARONIA

Aronia is a genus in the Rose family that includes three species of multi-stemmed, deciduous shrubs native to the eastern United States. Commercial fruit cultivation of aronia in the United States began in 2007 in Iowa. Scientific studies have documented exceedingly high antioxidant and other beneficial phytonutrient levels in aronia, leading to the fruit being labeled a “superfood.” As a result, fruit production in North America has grown rapidly and has blossomed into a million-dollar industry that includes more than 60 unique value-added products.

2024 aronia research objectives were to manage the Willsboro Research Farm trial of commercially-available aronia cultivars, and to collect another season of data on plant growth, flowering, and fruit yields.

2024 Aronia Results:

2024 aronia fruit yields were historically low for all four commercial fruit producing varieties as well as the ornamental variety, *McKenzie* (Figure 3). The ornamental variety *Autumn Magic* was the only entry that produced a decent yield.

Several plants of each of the four fruit-producing varieties: *Nero*, *Viking*, *Galicjanka*, and *Raintree Select* exhibited poor vigor and branch dieback (Photo 1), and some plants died. The cause of the pathology was not clear, so we reached out to Heather Case, a fruit specialist with the Cornell Eastern New York Commercial Horticulture team, and Anna

Wallis, a plant pathologist with NYS IPM (Integrated Pest Management). They visited the trial in August and dug up some dead and diseased plants to bring back to the Hudson Valley lab for testing and diagnosis (Photo 2). Hudson Valley lab plant pathologists identified *Rhizoctonia* as a possible culprit. *Rhizoctonia* is a fungal pathogen that is known to cause damping off disease in other members of the Rosaceae family. It flourishes in wet soil conditions, and the heavy rains that we experienced in Willsboro during the 2023 and 2024 growing seasons may have favored the infection process. Additionally, Japanese beetle grubs were observed among the aronia roots and their feeding may have exacerbated the problems.

In 2025 we will adjust our irrigation management to reduce the potential for excessive moisture buildup, and we will apply some milky spore to help control the Japanese beetle larvae. The milky spore application can work synergistically with the entomopathogenic nematodes (<https://nnyagdev.org/index.php/persistent-biocontrol-nematodes-for-pest-management>) that have already been applied to the trial alleys.

ELDERBERRY (*Sambucus spp.*)

Elderberries are very productive, widely adapted, native perennial shrubs that tolerate a range of soil types. As another member of the “superfruit” class, elderberries have traditionally been prized for their high phytonutrient levels, and they are an economically important fruit crop in Europe (greater than blueberries). While elderberry production is developing rapidly in the U.S., 95% of the elderberries consumed here are still imported from Europe, so the potential for domestic market growth is high.

The Willsboro Research Farm elderberry variety trial includes five American varieties of *Sambucus canadensis*: *Nova*, *York*, *Adams*, *Ranch*, and *John's*, and two European varieties of *Sambucus nigra*: *Samdal* and *Samyl*. The elderberry plants were heavily browsed by deer in 2023 and their development was severely set back. A bird-netting barrier protected the trial in 2024 and plant growth recovered, but they did not produce harvestable yields.

HAZELNUTS (*Corylus spp.*): Added to NNYADP trials in 2023-2024

Hybrid hazelnuts are multi-stemmed, woody perennials that are adapted to northern climate growing conditions. The nuts are high in protein and oil, and 81% of the oil profile is healthy monounsaturated oleic acid. Hazelnuts can be integrated into a range of cropping systems including orchard-style production, agroforestry, alley-cropping, and silvopastures. Incorporating nut-producing perennials onto NNY farms could diversify income streams while conferring significant benefits in terms of soil health, biodiversity, and water quality.

Working in collaboration with Myra Lawyer, an agronomist with the Lake Champlain Basin Program, we planted 116 American hazelnut seedlings in two 230' long rows at the Willsboro Research Farm in 2023. In April 2024 we planted a replicated hazelnut field trial with seedlings of eight hybrid hazelnut varieties: *Aldara*, *Andrew*, *Dawn*, *Frank*, *Joanne*, *Kiara*, *Marion*, and *Northern Blais*; and three promising American hazelnut lines: *Buzz*, *Akiva*, and *Kilgore*. The seedlings established well, baseline heights were recorded, and one precocious *Northern Blais* seedling produced hazelnuts (Photos 1&2).

In a June 2024 NNYADP press release about the new nut trials, Lawyer expressed an interest in “trial data regarding expected positive environmental benefits from the hybrid hazelnut’s impact on soil health, biodiversity, and water quality.”

CHESTNUTS (*Castanea spp.*): Added to NNYADP trials in 2024

Chestnut is a perennial crop that may adapt to NNY's cooler climate. In the spring of 2024, five seedlings for each of three chestnut lineages: *Hansen*, *AU Homestead*, and *R9* were planted at the Willsboro Research Farm. The seedlings were watered and weeded, and deer fencing was installed to protect the seedlings from browsing. The seedlings established well, and baseline height data was recorded.

HARDY PECANS (*Carya illinoensis*): Added to NNYADP trials in 2024

Cold-tolerant (hardy) pecans were added to the "New Commercial Fruit & Nut Crops for Northern NY" research trials in 2024. Six seedlings for each of two cold-tolerant pecan varieties: *Grimo Ultra* and *Michigan Prolific* were planted at the Willsboro Research Farm in fall 2024. Deer fencing was installed to protect the seedlings from browsing. 2025 will be the first in-ground growing season for the planting.

Next Steps:

1. Continue to maintain established research trials and collect performance data, including growth habit, flowering and fruiting times, disease incidence and susceptibility, and yields to aid growers in selecting varieties well suited to NNY.
2. Fine tune pruning and fertility management practices to optimize fruit quality and yields in juneberries, honeyberries and aronia berries.
3. Evaluate in-row mulch material options, and experiment with potential companion groundcovers.
4. Expand the chestnut planting as additional promising seedling varieties become available.
5. Update and advance the resource information that growers need to successfully establish, manage, harvest, and market these specialty crops.

Outreach:

- NNYADP honeyberry trial results presented, New York State Honeyberry Conference, Oswego, New York, June 29, 2024.
- NNYADP fruit and nut trials featured on tour of research plots, Willsboro Farm Field Day, July 10, 2024.
- A presentation on juneberry and honeyberry production is on the Eastern New York Fruit and Vegetable Conference program, February 19, 2025.
- We continue to partner with extension specialists to provide juneberry, honeyberry, aronia berry, and elderberry production guidance to growers.
- At least one commercial grower participating in this project and is now a published author makes note of her berry crops in multiple speaking engagements.

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For More Information:

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APPENDIX**

Table 1. 2017, 2018, 2019, 2020, 2021, 2022, 2023, and 2024 mean flowering dates for commercial, ornamental, and wild-collected juneberry varieties, Willsboro Research Farm juneberry trials, Willsboro, NY, NNYADP project. (DNF=did not flower).

Table 1. 2017 - 2024 Mean Juneberry Flowering Dates								
Trial A1601	Commercial Varieties							
<u>Variety</u>	<u>2017</u>	<u>2018</u>	<u>2019</u>	<u>2020</u>	<u>2021</u>	<u>2022</u>	<u>2023</u>	<u>2024</u>
Honeywood	May 5	May 14	May 17	May 17	May 1	May 11	May 10	May 6
JB30	May 4	May 14	May 14	May 17	May 1	May 11	May 10	May 6
Lee #8	May 5	May 14	May 17	May 18	May 3	May 11	May 10	DNF
Martin	May 6	May 13	May 14	May 17	April 29	May 11	May 10	May 6
Nelson	May 8	May 14	May 17	May 19	May 5	May 11	DNF	DNF
Northline	May 8	May 15	May 16	May 17	May 5	May 11	DNF	DNF
Parkhill	May 2	May 11	May 12	May 17	April 28	May 10	DNF	May 6
Pembina	May 6	May 13	May 15	May 17	May 3	May 11	May 10	DNF
Regent	May 4	May 15	May 17	May 18	May 3	May 11	May 10	DNF
Smoky	May 7	May 14	May 15	May 17	May 3	May 11	May 10	DNF
Thiessen	May 4	May 13	May 14	May 17	April 29	May 11	May 10	May 6
Trial A1602	Ornamental Varieties							
<u>Variety</u>	<u>2017</u>	<u>2018</u>	<u>2019</u>	<u>2020</u>	<u>2021</u>	<u>2022</u>	<u>2023</u>	<u>2024</u>
Autumn Brilliance	May 2	May 10	May 12	May 14	April 26	May 8	April 28	May 4
Princess Diana	May 2	May 10	May 12	May 14	April 26	May 8	April 28	May 4
Prince William	May 2	May 10	May 12	May 14	April 26	May 8	April 28	May 4
Trial A1702	Wild Collections							
<u>Collection ID</u>		<u>2018</u>	<u>2019</u>	<u>2020</u>	<u>2021</u>	<u>2022</u>	<u>2023</u>	<u>2024</u>
13-451		May 10	May 10	May 14	April 25	May 8	May 10	May 4
13-Burgess		May 10	May 10	May 14	April 25	May 8	May 10	May 4
13-Laevis		May 10	May 8	May 4	April 23	May 5	DNF	May 1
13-449		May 10	May 10	May 14	April 25	May 8	May 10	May 4
Hudson		DNF	DNF	DNF	April 25	May 8	DNF	May 4
13-472		May 10	May 8	May 3	April 19	May 5	April 28	May 1
Greenhouse morph		DNF	May 10	May 14	April 25	May 8	DNF	May 4
13-473		May 12	May 12	May 16	April 29	May 11	May 10	May 6
Gaspensis		May 10	May 10	May 14	April 25	May 8	May 10	May 6

Figure 1. Trial H1801 Mean Plant Heights (cm) for 20 honeyberry varieties between 2018 and 2023, Willsboro Research Farm Trials, Willsboro, NY, NNYADP.

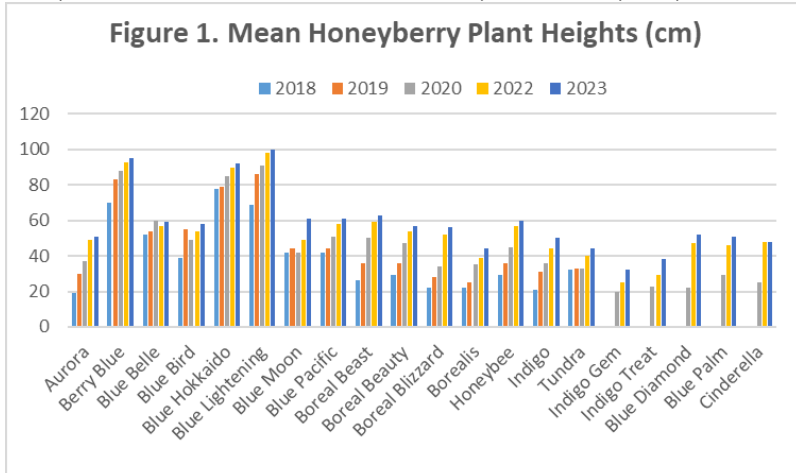


Figure 2. Trial H1801 Per Plant Fruit Yields for select honeyberry varieties in 2021, 2022, 2023, and 2024. Willsboro Research Farm Trials, Willsboro, NY, NNYADP, 2024.

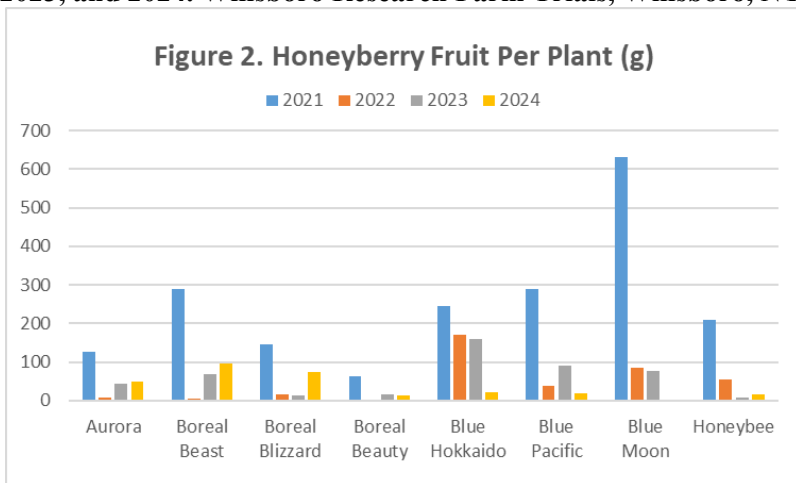


Figure 3. Trial A1701 Aronia Per Plant Fruit Yields in 2021, 2022, 2023, and 2024. Willsboro Research Farm Trials, Willsboro, NY, NNYADP, 2024.

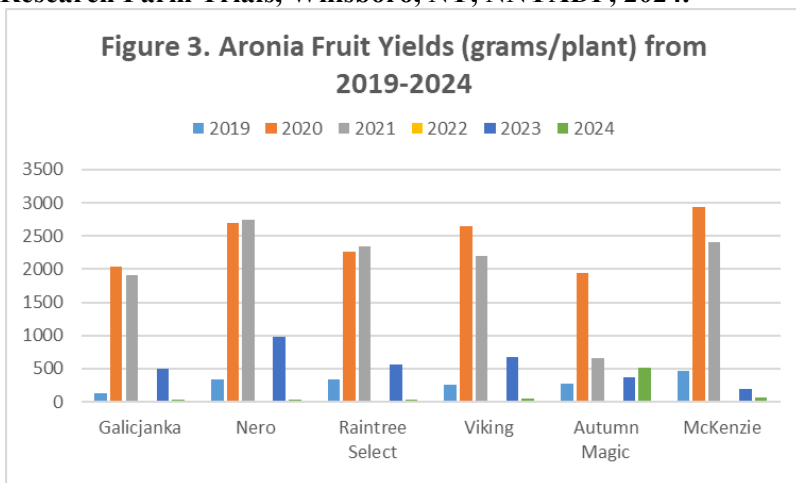




Photo 1 (left). Diseased aronia plant at the Willsboro Research Farm trial, September 13, 2024; NNYADP Establishing New Commercial Fruit & Nut Crops for Northern NY project, 2024. Photo: Anna Wallis.



Photo 2 (right). Diseased aronia plant roots at the Willsboro Research Farm trial, September 13, 2024; NNYADP Establishing New Commercial Fruit & Nut Crops for Northern NY project, 2024. Photo: Anna Wallis.



Left, Photo 3. *Northern Blais* hybrid hazelnut seedling with nuts at the Willsboro Research Farm trial, November 4, 2024; NNYADP Establishing New Commercial Fruit & Nut Crops for Northern NY project, 2024. Photo: Michael H. Davis.



Right, Photo 4. Hazelnuts harvested November 4, 2024, Willsboro Research Farm; NNYADP Establishing New Commercial Fruit & Nut Crops for Northern NY project, 2024. Photo: Michael H. Davis.