Northern New York Agricultural Development Program
2023 Project Final Report

Establishing New Commercial Fruit & Nut Crops for Northern NY

Project Leader(s):

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Collaborators:

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- Myra Lawyer, Lake Champlain Basin Program Agronomist and NEIWPCC (formerly New England Interstate Water Pollution Control Commission) Environmental Analyst

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 for four high value fruits: juneberries, aronia berries, honeyberries, and elderberries, plus hazelnuts added to the trials in 2023.

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.

Since the inception of NNYADP-funded Juneberry research in 2013, our objectives have been to develop a living collection of juneberry plants that includes wild-collected, novel lines native to the Northeast and that have commercial fruit production potential, along with all current commercially available fruit-producing cultivars; evaluate the performance of commercially available cultivars and promising wild lines in replicated field trials; and promote the potential for juneberry fruit production in orchards and market gardens.

2023 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: Most of the plants in the commercial fruit producing trial did not produce any flowers at all in 2023, and those plants that did produce flowers had very few. As a result, only a handful of juneberries were produced in the entire trial this past field season. The extensive spongy moth infestation that defoliated the trial in 2022 likely depleted the resources the plants needed for flower and fruit production in 2023. It will be interesting to see how quickly the juneberry plants recover their fruit production capacities.

The timing of flowering in 2023 was comparable to 2022, as most of the flowers on the commercial fruit producing varieties opened on May 10 (Table 1).

A1702 Wild-Collected Lines: The wild-collected juneberry lines, that were also defoliated by the spongy moths in 2022, followed the same pattern as the commercial varieties, and produced almost no flowers or fruit in 2023. Most of the lines with plants that managed to open a few flowers flowered on May 10, the same date as the commercial fruit producing varieties. The one exception was 13-472 that had a couple plants open flowers on April 28. 13-472 consistently flowers earlier than the other wild-collected lines in the trial, and about the same time as the ornamental varieties in A1602.

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. As in past seasons the three ornamental varieties flowered profusely but did not produce much fruit. All three entries started flowering on April 28, 2023 (Table 1).

***Essex Farm Juneberries*:** Mark Kimball at Essex Farm reported that the fruit producing juneberries planted on his farm were not infested with spongy moths in 2022 and his plants flowered heavily in early May 2023. However, a severe frost on May 17 wiped out the fruit production in 2023 and he did not get any harvestable yields. Varieties planted at

Essex Farm include *JB30*, *Martin*, *Thiessen*, *Honeywood*, *Smoky*, *Northline*, *Regent*, *Nelson*, *Parkhill*, and *Lee#8*.

HONEYBERRY (*Lonicera caerulea*)

The blue honeyberry (*Lonicera caerulae*) 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 current surge in 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.

2023 research objectives were to manage the field trial of promising commercial honeyberry cultivars on the Cornell Willsboro Research Farm, develop a comprehensive data set of flowering dates, and quantify any fruit yields.

2023 Honeyberry Results:

Honeyberry plant size appears to have plateaued for several of the varieties in 2023 (Figure 1), even though many of the bushes are shorter than expected.

Honeyberry trial plants started flowering on April 21, 2023 (Photo 1); markedly earlier than in 2020 and 2022, but not as early as 2021 (Figure 2). Flowering dates for all but two of the varieties in the trial have overlapped nicely each field season. Overlapping flowering periods for the different varieties are necessary for effective cross pollination and fruit set. The two outlier entries are *Blue Moon* and *Blue Pacific*, which consistently start flowering just as the other varieties are approaching the end of their flowering period.

Two *Blue Pacific* plants appeared to exhibit significant winterkill in 2023. The plants showed no signs of disease or health problems in the fall of 2022, but large portions of the impacted branches were dead in the spring (Photo 2). We'll prune off the dead branches from the affected plants and monitor their recovery.

Honeyberry fruit yields were much lower in 2022 and 2023 compared to 2021 for all varieties. Figure 3 illustrates this trend for a select group of the most productive varieties. As in previous years, *Blue Hokkaido*, *Blue Moon*, and *Blue Pacific* were the highest yielding entries. The significant yield drop for two years in a row, along with the shorter than expected bush sizes, suggests that our nutrient and/or irrigation management strategies may be deficient. Crop nutrient status will be monitored closely during the 2024 growing season to check for deficiencies. Additionally, plants will be aggressively pruned in the spring of 2024 to open the plant canopies that have become very dense in some varieties.

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. Numerous 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 multi-million dollar industry that includes more than 60 unique value-added products.

2023 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.

2023 Aronia Results:

After an unproductive fruiting season in 2022, fruit yields rebounded some in 2023, but fruit production was still markedly lower than in 2020 or 2021 (Figure 4). Yields for the four fruit-producing varieties *Nero*, *Select*, *Viking*, and *Galicjanka* were notably higher than the two ornamental varieties *McKenzie* and *Autumn Magic*. Possible explanations for the low/moderate fruit yields in 2023 compared to 2020 and 2021 include: 1) the plants lacked the resources or nutrients needed for higher fruit yields. Plant nutritional status will be monitored in 2024 to see if any deficiencies can be identified; or 2) the hard freeze that hit the trial on May 17, three days after all the varieties were in full bloom (May 14), may have reduced fruit production.

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.

2023 Elderberry Results:

The Willsboro Research Farm elderberry variety trial includes five American varieties (*Sambucus canadensis*): *Nova*, *York*, *Adams*, *Ranch*, and *John's*, and two European varieties (*Sambucus nigra*): *Samdal* and *Samyl*. The elderberry plants were heavily browsed by deer in 2023 and their development was severely set back. One *York* plant that escaped browsing reached a height of 2.26 meters (~7 feet) and produced flowers and fruit, but most of the trial did not flower or fruit in 2023. An additional layer of deer fencing will be installed to provide year-round deer protection.

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

Hybrid hazelnuts are multi-stemmed, woody perennials that are well 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.

2023 Hazelnuts Results:

Working in collaboration with Myra Lawyer from the Lake Champlain Basin Program, 116 American hazelnut seedlings were planted in two 230' long rows at the Willsboro Research Farm on April 30 and May 4, 2023. The planting is in a deer-fence protected field. Seedlings were watered, weeded, and fertilized, and all the plants established nicely. An oat/pea fall cover crop was seeded on either side of one of the rows (Photo 3). Seedlings of eight additional hybrid hazelnut varieties were sourced and purchased for planting in spring 2024. Hybrid hazelnut varieties include *Aldara*, *Andrew*, *Dawn*, *Frank*, *Joanne*, *Kiara*, *Marion*, and *Northern Blais*.

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 fruit yield to aid growers in selecting varieties well suited to NNY.
2. Fine tune pruning and fertility management practices to optimize fruit quality and yields.
3. Evaluate in-row mulch material options, and experiment with potential companion groundcovers.
4. Expand the hazelnut plantings and establish a hybrid hazelnut variety trial.
5. Update and advance the resource information that growers need to successfully establish, manage, harvest, and market these specialty crops.
6. Add trials of chestnuts and cold-hardy pecans.

Outreach:

We hosted a well-attended fruit (and hazelnut) meeting at the Willsboro Farm on July 11, 2023, where we toured the field trials and shared results from our studies. We continue to partner with extension specialists to provide juneberry, honeyberry, aronia berry, and elderberry production guidance to farmers and gardeners. Results of the 2023 trials were also presented at the March 13, 2024 NNYADP Research Results Update Meeting at Miner Institute, Chazy, Ny.

Acknowledgments:

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For More Information:

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APPENDIX: Establishing New Commercial Fruit & Nut Crops for Northern NY

Table 1. 2017, 2018, 2019, 2020, 2021, 2022 and 2023 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, 2018, 2019, 2020, 2021 & 2022 Mean Juneberry Flowering Dates							
Trial A1601	Commercial Varieties						
Variety	2017	2018	2019	2020	2021	2022	2023
Honeywood	May 5	May 14	May 17	May 17	May 1	May 11	May 10
JB30	May 4	May 14	May 14	May 17	May 1	May 11	May 10
Lee #8	May 5	May 14	May 17	May 18	May 3	May 11	May 10
Martin	May 6	May 13	May 14	May 17	April 29	May 11	May 10
Nelson	May 8	May 14	May 17	May 19	May 5	May 11	DNF
Northline	May 8	May 15	May 16	May 17	May 5	May 11	DNF
Parkhill	May 2	May 11	May 12	May 17	April 28	May 10	DNF
Pembina	May 6	May 13	May 15	May 17	May 3	May 11	May 10
Regent	May 4	May 15	May 17	May 18	May 3	May 11	May 10
Smoky	May 7	May 14	May 15	May 17	May 3	May 11	May 10
Thiessen	May 4	May 13	May 14	May 17	April 29	May 11	May 10
Trial A1602	Ornamental Varieties						
Variety	2017	2018	2019	2020	2021	2022	2023
Autumn Brilliance	May 2	May 10	May 12	May 14	April 26	May 8	April 28
Princess Diana	May 2	May 10	May 12	May 14	April 26	May 8	April 28
Prince William	May 2	May 10	May12	May 14	April 26	May 8	April 28
Fergie	May 6	May 15	May 20	May 19	May 10	May 13	May 10
Trial A1702	Wild Collections						
Collection ID		2018	2019	2020	2021	2022	2023
13-451		May 10	May 10	May 14	April 25	May 8	May 10
13-Burgess		May 10	May 10	May 14	April 25	May 8	May 10
13-Laevis		May 10	May 8	May 4	April 23	May 5	DNF
13-449		May 10	May 10	May 14	April 25	May 8	May 10
Hudson		DNF	DNF	DNF	April 25	May 8	DNF
13-472		May 10	May 8	May 3	April 19	May 5	April 28
Greenhouse morph		DNF	May 10	May 14	April 25	May 8	DNF
13-473		May 12	May 12	May 16	April 29	May 11	May 10
Gaspensis		May 10	May 10	May 14	April 25	May 8	May 10

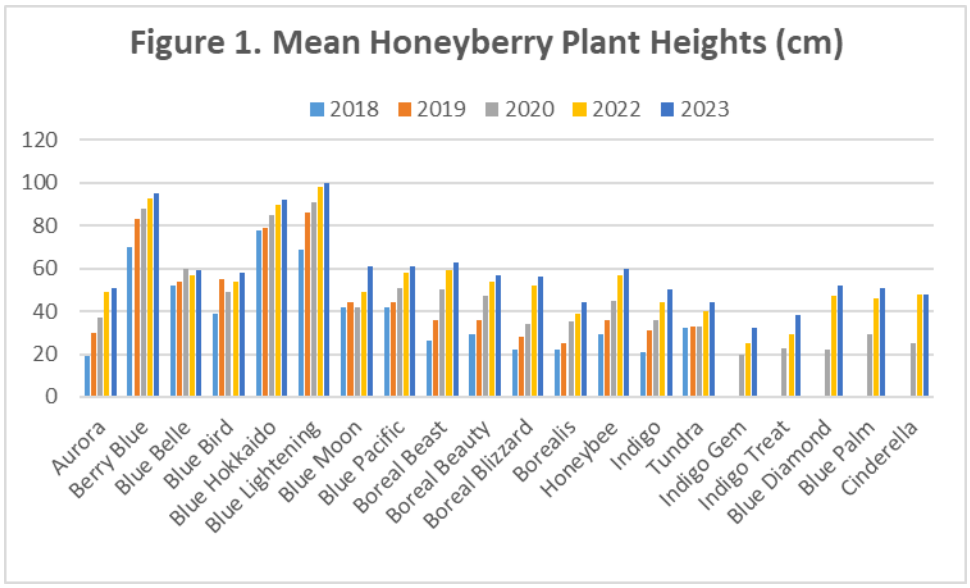

Figure 1. Trial H1801 Mean Plant Heights (cm) for 20 honeyberry varieties between 2018 and 2023, Willsboro Research Farm Trials, Willsboro, NY, NNYADP, 2023.

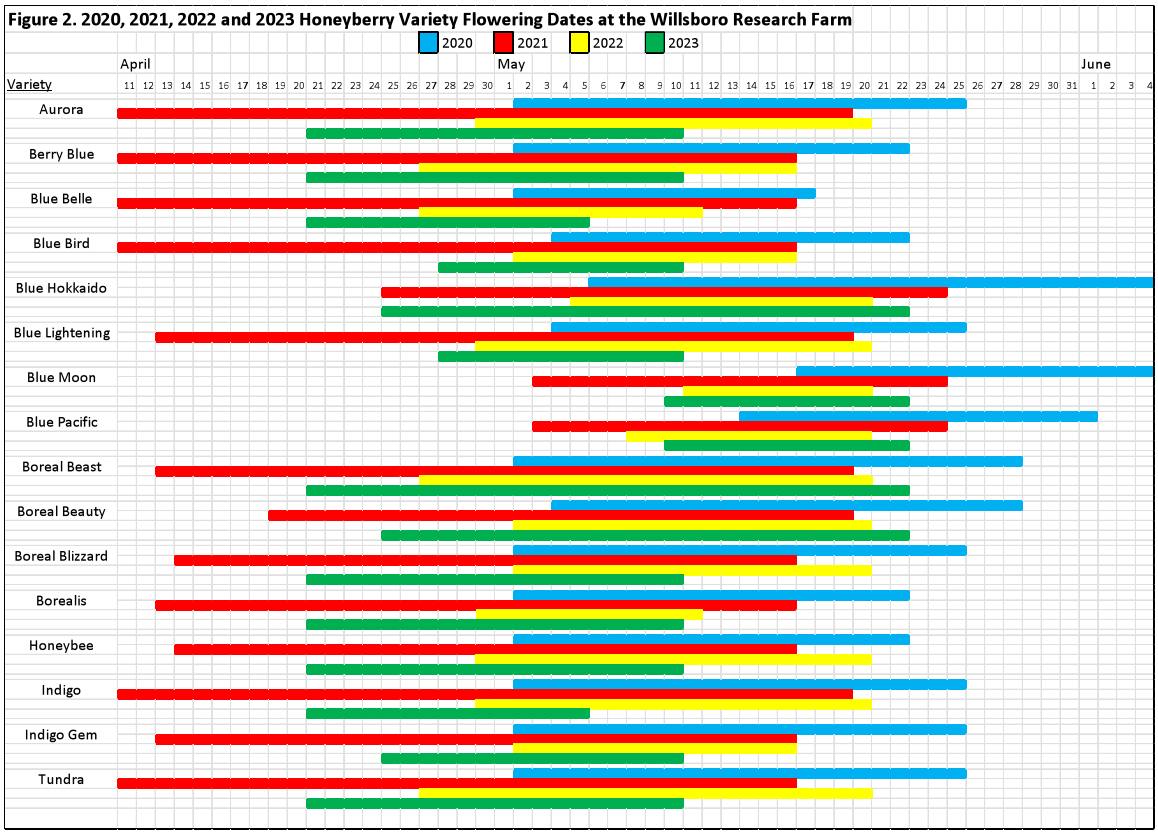

Figure 2. Trial H1801Flowering Dates for 16 honeyberry varieties in 2020, 2021, 2022, and 2023. Willsboro Research Farm Trials, Willsboro, NY, NNYADP, 2023.

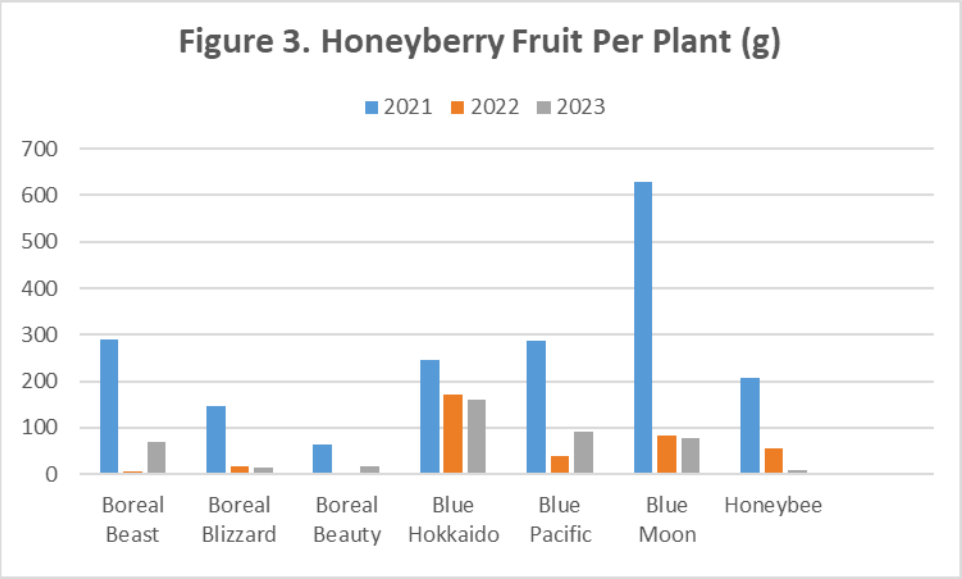

Figure 3. Trial H1801Per Plant Fruit Yields for select honeyberry varieties in 2021, 2022, and 2023. Willsboro Research Farm Trials, Willsboro, NY, NNYADP, 2023.

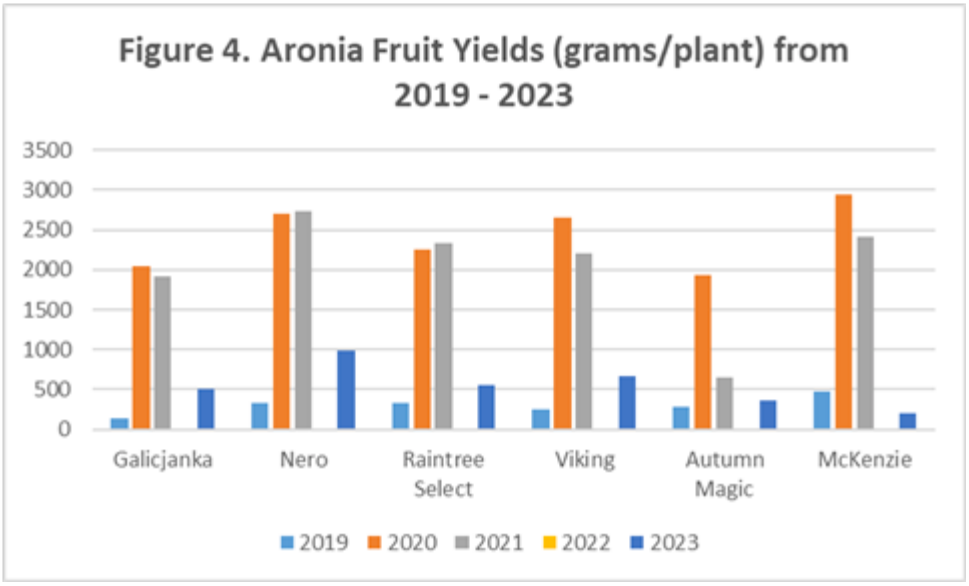

Figure 4. Trial A1701 Aronia Per Plant Fruit Yields in 2021, 2022, and 2023. Willsboro Research Farm Trials, Willsboro, NY, NNYADP, 2023.

Left: Photo 1. Flowering honeyberry plant in the variety trial on April 28, 2023, Willsboro Research Farm; NNYADP Establishing New Commercial Fruit & Nut Crops for Northern NY project, 2023. Photo by Michael H. Davis.

Right: Photo 2. Blue Pacific honeyberry plant exhibiting winterkilled branches on April 28, 2023, Willsboro Research Farm; NNYADP Establishing New Commercial Fruit & Nut Crops for Northern NY project, 2023. Photo by Michael H. Davis.

Photo 3. Established hazelnut planting at the Willsboro Research Farm on October 4, 2023. An oat/pea companion cover crop was established along one of the rows; NNYADP Establishing New Commercial Fruit & Nut Crops for Northern NY project, 2023. Photo by Michael H. Davis.