Northern New York Agricultural Development Program
2021 Project Final Report

Establishing & Advancing New Commercial Fruit Crops for Northern NY

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Background:

Our goal is to increase the number of specialty fruit crops available to Northern New York (NNY) market farms by evaluating varieties and production practices for four high value fruits: juneberries, aronia berries, honeyberries, and elderberries. This project began with juneberry in 2013 and has steadily added participating farms and other berry crops for their potential to become significant economic crops for Northern New York growers and another locally-grown food option for consumers. The research effort that first collected wild and commercial cultivars of juneberry for propagation in the greenhouse at SUNY Plattsburgh before transplant to the Willsboro Research Farm is now augmented with trials on participating commercial fruit farms in Northern New York. These fruits

have been dubbed "superfruits" for their high antioxidant and phytonutrient value, making them of increasing interest to the marketplace.

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, our objectives have been to:

1. Develop a juneberry nursery – 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 (established 2013-2015);
2. Evaluate the performance of commercially available cultivars and promising wild lines in replicated field trials (ongoing at Willsboro); and
3. Promote the potential for juneberry fruit production on orchards and market gardens (NNY commercial growers are now growing juneberry for market).

2021 Juneberry Results:

Nursery

Nursery plantings were weeded, fertilized, irrigated as needed, and monitored for disease and insect issues during the growing season. The juneberry collections continue to flourish, and propagation strategies are being explored for 2022.

Juneberry Variety Trials

A1601 Commercial Fruit Producing Varieties: **2021 juneberry flowering dates were earlier than in any of the previous years** (Table 1). An early, but gradual, spring warm up resulted in the commercial entries starting to flower over an eight-day period, and this expanded range of first flower dates exposed interesting varietal differences in flowering times. *Parkhill*, *Thiessen*, and *Martin* were the first to flower, followed by *Honeywood* and *JB30*. As in past seasons, *Nelson* was the last variety to start flowering.

Earlier flowering times translated into earlier harvest times, and **for the first time in this trial we had ripe fruit by the end of June**. Overall, 2021 fruit yields were comparable to 2020 (Table 2). *Martin* had another banner year as it more than doubled its mean yield per plant, and continued to top the yield ranking. *Thiessen* also yielded well and followed *Martin* in the rankings. *Martin* was originally selected from a collection of *Thiessen* seedlings, so it is not surprising that the two entries are performing similarly.

A1602 Ornamental Varieties: As in past seasons the three ornamental varieties *Prince William*, *Princess Dianna*, and *Autumn Brilliance* flowered profusely, but did not produce any fruit. The plants are all tall and healthy, and nursery catalogs maintain that they will produce fruit, so we will continue to monitor them.

A1702 Wild-Collected Lines: **Flowering dates for the wild-collected lines were even earlier than the other juneberry trials** (Table1). Entry *13-472* first started flowering on

April 19, while entry *13-473* was the last to start flowering on April 29. *Hudson* flowered for the first time in 2021, but did not produce any fruit.

Greenhouse morph and *13-473* were the highest yielding wild lines in 2021 and their mean yields were comparable to 2020. In contrast, *13-472*, *13-Burgess*, and *13-449* produced markedly lower yields in 2021 than in 2020. It is possible that these three lines are shifting into an every-other-year fruiting pattern. It will be interesting to see how they yield in 2022, and pruning strategies may need to be implemented to encourage more consistent annual fruiting.

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 surge in commercial production of honeyberry in North America has been facilitated by breeders in Oregon and at the University of Saskatchewan that 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.

2021 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.

2021 Honeyberry Results:

Honeyberry plantings require more than one cultivar with overlapping flowering periods for effective pollination, so flowering periods were monitored for each of the established varieties. **All the honeyberries flowered much earlier and for a longer time period in 2021 compared to 2020** (Figure 1). Most of the varieties started flowering during the second week of April, 2021, and continued to produce flowers through the second week of May. Notable exceptions were *Blue Moon*, *Blue Pacific*, and *Blue Hokkaido*, which started flowering as much as two weeks later than the other cultivars.

We recorded our first fruit yields in 2021 (Figure 2.) While the plants are still young and the yields are not indicative of mature plant production potential, it is useful to track fruit production as the plantings grow and develop. It was interesting that the three late flowering varieties, *Blue Moon*, *Blue Pacific*, and *Blue Hokkaido*, had the three highest yield averages in 2021.

In unofficial harvest crew taste tests, *Aurora*, *Tundra*, *Boreal Beast*, and *Borealis* were selected for the 2021 all-star team. Honorable mentions included *Indigo*, *Blue Moon*, and *Blue Pacific*. Evaluating taste is tricky with honeyberries because the flavor continues to

develop and improve for several days after the fruit looks ready to pick. In future years more structured taste evaluations will be conducted.

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.

Aronia cultivars are well adapted to cold climates, have few pests or diseases, and are capable of producing fruit throughout the growing season. These benefits, in addition to the burgeoning value-added market, make aronia an exciting new specialty fruit crop for NNY growers.

2021 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.

2021 Aronia Results:

The Willsboro Research Farm *Aronia* spp. variety trial includes four fruit-producing varieties *Nero*, *Select*, *Viking*, and *Galicjanka*, and two ornamental varieties *McKenzie* and *Autumn Magic*. The aronia cultivars continue to grow well with little to no disease or insect pest pressure (Photo 1). **All the cultivars in the trial started flowering on May 14, 2021, fifteen days earlier than in 2020**. Fruit yields for all four fruit-producing varieties were excellent in 2021 and comparable to their 2020 yields (Figure 3). The ornamental variety *McKenzie* also produced exceptional yields for the second year in a row, while yields for *Autumn Magic*, the other ornamental cultivar, dropped off precipitously in 2021 (Figure 3). There was no obvious explanation for the drop off in *Autumn Magic* yields, but we will monitor them closely and see how they produce in 2022.

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 US, 95% of the elderberries consumed here are still imported from Europe, so the potential for further domestic market growth is high.

2021 research objectives were to monitor the establishment of the Willsboro Research Farm elderberry variety trial (established in 2020) that includes five American varieties (*Sambucus canadensis*): *Nova*, *York*, *Adams*, *Ranch*, and *John's*, and two European varieties (*Sambucus nigra*): *Samdal* and *Samyl*. Plots were fertilized, irrigated, and monitored for disease and insect issues in 2021. While the trial plants are too young for

fruit production, they are establishing nicely and have not experienced any disease or insect problems.

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.
4. Experiment with potential companion groundcovers.
5. Update and advance the resource information that growers need to successfully establish, manage, harvest, and market these specialty fruits.

Outreach:

We continue to field numerous requests for Juneberry, Honeyberry, and Aronia production information from New York growers. Trial results and demonstration plots were toured in 2021 by visiting groups of farmers, gardeners, and students. An introduction to juneberry production was presented at the New York State Fruit and Vegetable Expo in January 2022.

Acknowledgments: We thank the farmer-driven NNYADP and our participating growers for their continued support of this project.

For More Information:

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APPENDIX

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Table 1. 2017, 2018, 2019, 2020 and 2021 Juneberry Mean Flowering Dates for commercial, ornamental, and wild-collected varieties, Willsboro Research Farm juneberry trials, Willsboro, NY, NNYADP.

Table 1. 2017, 2018, 2019, 2020 & 2021 Mean Juneberry Flowering Dates					
Trial A1601	Commercial Varieties				
Variety	2017	2018	2019	2020	2021
Honeywood	May 5	May 14	May 17	May 17	May 1
JB30	May 4	May 14	May 14	May 17	May 1
Lee #8	May 5	May 14	May 17	May 18	May 3
Martin	May 6	May 13	May 14	May 17	April 29
Nelson	May 8	May 14	May 17	May 19	May 5
Northline	May 8	May 15	May 16	May 17	May 5
Parkhill	May 2	May 11	May 12	May 17	April 28
Pembina	May 6	May 13	May 15	May 17	May 3
Regent	May 4	May 15	May 17	May 18	May 3
Smoky	May 7	May 14	May 15	May 17	May 3
Thiessen	May 4	May 13	May 14	May 17	April 29
Trial A1602	Ornamental Varieties				
Variety	2017	2018	2019	2020	2021
Autumn Brilliance	May 2	May 10	May 12	May 14	April 26
Princess Dianna	May 2	May 10	May 12	May 14	April 26
Prince William	May 2	May 10	May12	May 14	April 26
Fergie	May 6	May 15	May 20	May 19	May 10
Trial A1702	Wild Collections				
Collection ID		2018	2019	2020	2021
13-451		May 10	May 10	May 14	April 25
13-Burgess		May 10	May 10	May 14	April 25
13-Laevis		May 10	May 8	May 4	April 23
13-449		May 10	May 10	May 14	April 25
Hudson		No flowers	No flowers	No flowers	April 25
13-472		May 10	May 8	May 3	April 19
Greenhouse morph		No flowers	May 10	May 14	April 25
13-473		May 12	May 12	May 16	April 29
Gaspensis		May 10	May 10	May 14	April 25

Table 2. Juneberry Performance Data for Commercial Varieties and Wild-Collected Lines, Willsboro Research Farm trials, Willsboro, NY, NNYADP 2021.

Trial A1601	**Commercial Fruit Producing Juneberry Varieties**						
	Mean per plant fruit yield (g)				Flavor	Ripening	Fruit size
Variety	2018	2019	2020	2021	good, fair, poor	even, uneven	L, M, S
Martin	117	334	803	1707.5	Good	Even	Large
Thiessen	117	319	675	736	Good	Even	Large
Northline	307	237	602	418.5	Good	Even	Large
JB30	237	78	488.5	429	Good	Even	Large
Smoky	434	130	427	250	Good	Even	Small
Honeywood	693	216	388.5	414.5	Good	Even	Large
Nelson	412	167	455.5	238	Good	Even	Medium
Parkhill	322	75	554	689	Fair	Even	Medium
Pembina	63	32	200	23	Fair	Even	Small
Regent	122	101	105	95.5	Fair	Even	Small
Lee#8	44	66	51	64.5	Fair	Even	Small
Trial A1702	**Wild-Collected Juneberry Lines**						
Collection ID	2018	2019	2020	2021	good, fair, poor	even, uneven	L, M, S
13-472	No fruit	57	446	118	Good	Even	Medium
Greenhouse morph	No fruit	No fruit	274	299.5	Good	Even	Medium
13-449	53	71	291	53	Good	Even	Medium
13-Burgess	54	102	300	172.5	Fair	Even	Medium
13-473	42	57	286	373	Fair	Even	Small
13-451	54	38	60	142	Fair	Even	Small
Gaspensis	30	46	185	152	Fair	Uneven	Small
13-Laevis	8	15	158	123	Poor	Even	Small
Hudson	No fruit	No fruit	No fruit	No fruit	No fruit	No fruit	No fruit

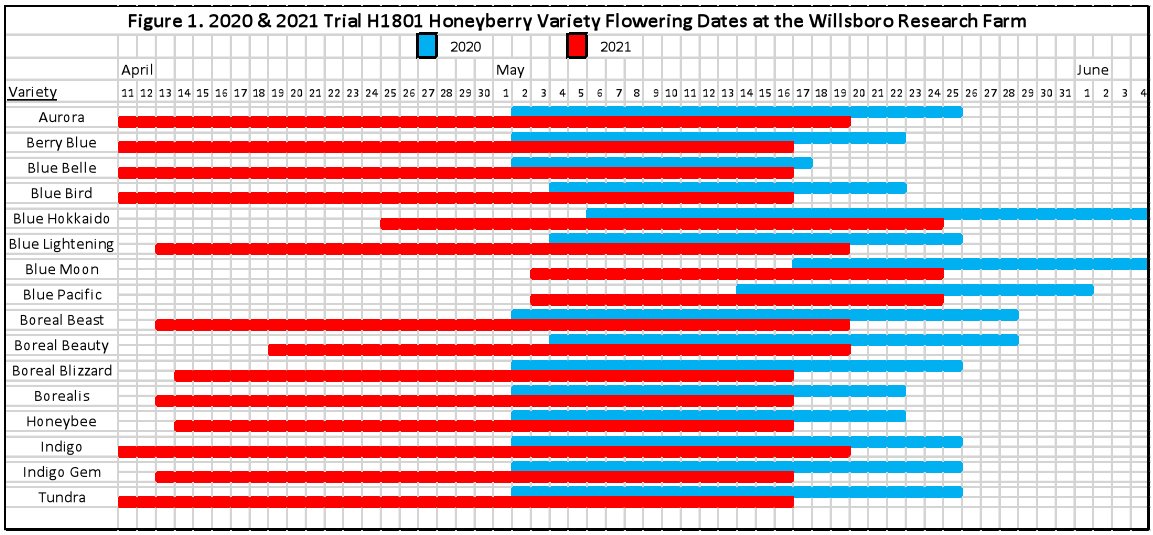

Figure 1. 2020 & 2021 Trial H1801 Honeyberry Flowering Dates, Willsboro Research Farm trials, Willsboro, NY, NNYADP, 2021.

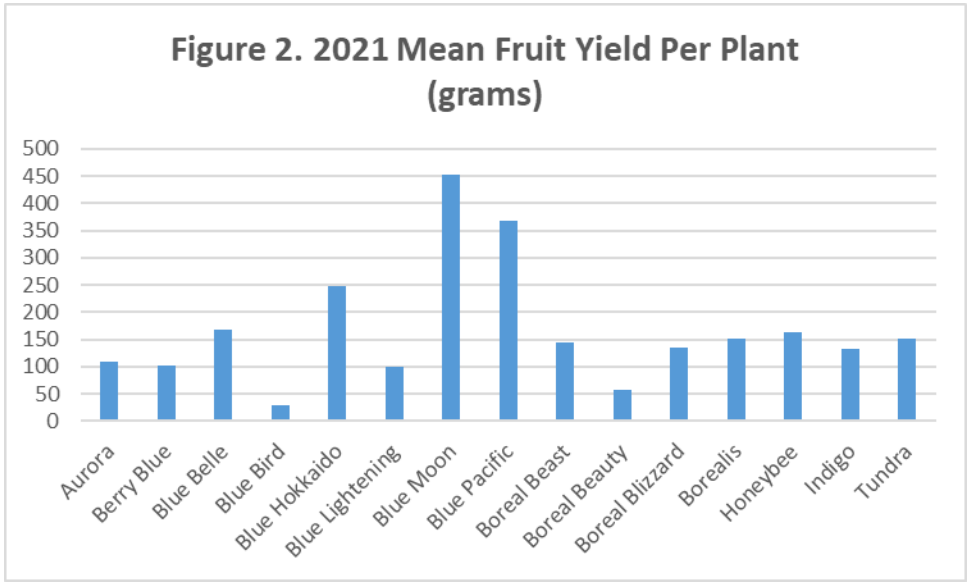

Figure 2. Trial H1801 Mean Fruit Yield Per Plant (g) for 15 honeyberry varieties in the Willsboro Research Farm Trials, Willsboro, NY, NNYADP, 2021.

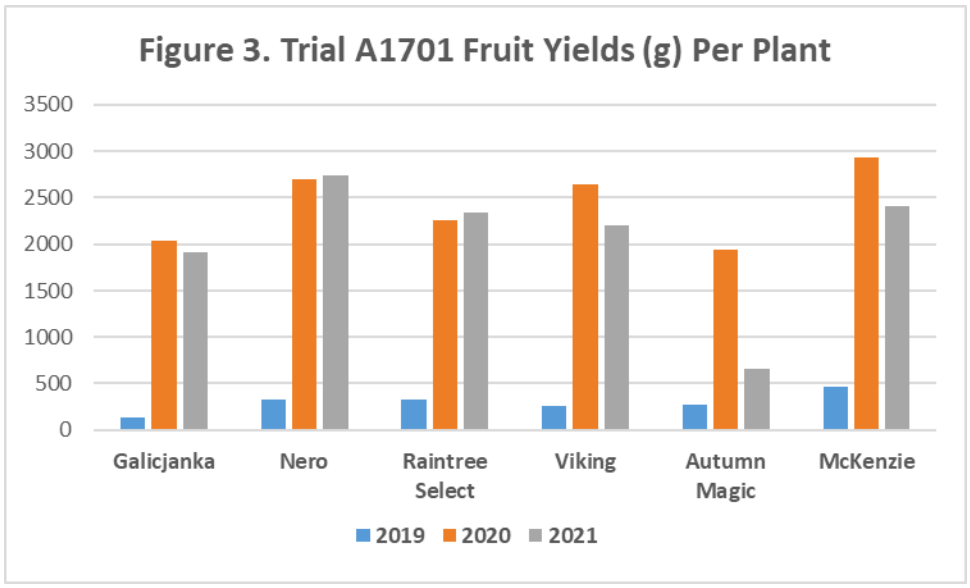

Figure 3. Trial A1701 Mean Fruit Yield Per Plant (g) for four commercial fruit-producing varieties and two ornamental varieties of aronia, Willsboro Research Farm Trials, Willsboro, NY, NNYADP, 2021

Photo 1. Fruit ripening in the aronia variety trial at the Willsboro Research Farm in 2021. Photo by Michael H. Davis