



**Northern New York Agricultural Development Program
2017-2018 Project Final Report**

Establishing New Commercial Fruit Crops for Northern NY

Project Leader(s):

- Michael H. Davis, Cornell University Agricultural Experiment Station, mhd11@cornell.edu
- Michael B. Burgess, Department of Biological Sciences, SUNY Plattsburgh, mburg005@plattsburgh.edu

Collaborators:

- Amy Ivy, Clinton County Cornell Cooperative Extension and Eastern New York Commercial Horticulture Program
- Cornell University Professor Marvin Pritts, Horticulture Section of the Cornell School of Integrative Plant Science, Ithaca, NY

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

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 three high value fruits: Juneberries, *Aronia* berries, and Honeyberries.

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, the objectives are 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 currently commercially available fruit-producing cultivars,
2. Evaluate the performance of commercially-available cultivars and promising wild lines in replicated field trials, and
3. Test Juneberry plantings on fresh market farms in Northern NY.

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 Russian horticulturalists became interested in this fruit in the mid 1900s. The current 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.

2018 research objectives included:

1. To establish and manage a field trial of promising commercial Honeyberry cultivars on the Cornell Willsboro Research Farm, and
2. To work with NNY farmers to establish two on-farm commercial Honeyberry cultivar plantings. On-farm trials will provide growers with some exposure to this new fruit crop, while also providing information on cultivar performance across a range of NNY growing conditions.

ARONIA

Aronia is a genus in the Rose family that includes three species of multi-stemmed, deciduous shrubs native to the eastern United States. Aronia fruit cultivars have been grown commercially in Russia and Eastern Europe since the mid-twentieth century. 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.

2018 Aronia research objectives included:

1. To manage the Willsboro Research Farm trial of commercially-available Aronia cultivars that was established in 2017, and
2. To establish Aronia variety demonstration plots on commercial produce farms in Northern NY.

2018 Willsboro Farm Results:

Juneberry Nursery

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

Juneberry Variety Trials

2018 was the third full growing season for trials A1601 (11 commercial fruit-producing varieties) and A1602 (4 ornamental varieties), and the second season for trial A1702 (9 wild-collected juneberry lines). Plants in all three juneberry trials achieved solid growth and continued to increase in size (Appendix: Figures 1-3).

All the commercial varieties in trial A1601 flowered and fruited in 2018 (Photo 1), and we were able to get a first estimation of the early production capabilities of these varieties (Appendix: Tables 1-4). The ornamental entries in trial A1602 flowered, but produced very little fruit. Flowering and fruit production was varied in the young wild collections, but we were able to get some initial data for some of the entries.

Flowering in the commercial and ornamental trials was 7-10 days later in 2018 than in 2017 (Table 1), but the flowering pattern was consistent over the two years as the ornamental juneberries, with the exception of *Fergie*, flowered a few days earlier than the commercial fruit-producing varieties in both seasons. It was interesting to note that the flowering times for the seven wild-collected lines that did produce flowers in trial A1702 were also on the early side, and aligned with the ornamental flowering dates (Table 1).

Juneberry fruit production was visually assessed in all three trials on July 9, 2018. Fruit set was scored on a scale of 0-9, with 0 indicating no fruit production, and 9 designating a fully loaded plant. Fruit size was scored on a 1-4 scale: 1=Small, 2=Medium, 3=Large, 4=Extra Large. On July 12, 2018, fruit was hand-harvested from each plot in the commercial variety trial (A1601) and some of the plots in the wild collections trial (1702) to quantify per-plant fruit yields (Photo 2). Additionally, the weight of 15 fruits from each plot was recorded as a numerical measure of fruit size. The ornamental trial plants did not produce enough fruit to harvest.

In the commercial variety trial (A1601), it was notable that the larger, taller varieties, such as *Thiessen*, *Martin*, *Honeywood*, and *JB30* produced the biggest fruit (Table 3), while the shorter varieties generally produced smaller fruit. Fruit yield was less correlated with plant size as some of the shorter varieties, including *Nelson* and *Parkhill*, were loaded with fruit, while a couple of the taller varieties, including *Thiessen* and *Martin*, had lower yields (Table 2). It will be interesting to see if this trend continues in future years. The plants are still very young, and some additional years of growth and fruit

production data are needed to provide a competent assessment of each variety's fruit producing capabilities in the North Country.

A juneberry taste test was conducted following the harvest. Fruit from each entry was evaluated by a four-judge panel and scored on a scale of 1-5, with 1 indicating poor flavor and 5 representing exceptional flavor. Top performers are presented in Table 4, with the caveat that flavor can vary greatly with fruit maturity, as well as the vagaries of a growing season. *Martin* was the clear and consistent winner, followed by *Northline* and *Thiessen*. Among the wild collections, *13-Laevis*, *13-Burgess*, and *13-449* had promising results.

Honeyberry Trial

A honeyberry variety trial (H1801) designed to evaluate 15 commercially-available cultivars was planted on May 18, 2018. Entries included: *Boreal Beauty*, *Boreal Beast*, *Honeybee*, *Boreal Blizzard*, *Tundra*, *Indigo*, *Borealis*, *Aurora*, *Blue Belle*, *Blue Hokkaido*, *Blue Lightning*, *Blue Moon*, *Berry Blue*, *Blue Pacific*, and *Blue Bird*. Since honeyberries require cross-pollination from a compatible companion variety in order to produce fruit, and there is a wide range of bloom times among the varieties, the trial layout was designed to optimize the pollination potential for all entries.

Aronia Trial

The Willsboro Research Farm *Aronia* spp. variety trial includes four fruit-producing varieties: *Nero*, *Select*, *Viking*, and *Galicjanka*, plus two ornamental varieties: *McKenzie* and *Autumn Magic*. 2018 was the second growing season for these plants that were weeded, irrigated, and fertilized as needed, as well as monitored for disease and insect problems.

2018 On-Farm Test Plots:

Essex Farm

The Essex Farm demonstration plot is located on fertile loamy soil with subsurface tile drainage. Eleven juneberry varieties including *JB30*, *Martin*, *Thiessen*, *Honeywood*, *Smokey*, *Northline*, *Regent*, *Nelson*, *Parkhill*, *Lee#8*, and *Gaspensis* were transplanted into the plot in 2017. The juneberries established well and exhibited solid growth in 2018.

Twenty-eight honeyberry plants representing thirteen different varieties were added to the planting on June 1, 2018. Honeyberry varieties included *Blue Moon*, *Tundra*, *Honeybee*, *Berry Blue*, *Indigo*, *Blue Pacific*, *Blue Bird*, *Borealis*, *Aurora*, *Boreal Blizzard*, *Boreal Beauty*, *Boreal Beast*, and *Hoikkado*.

Cross Island Farms

Twenty-eight honeyberry plants representing eleven different varieties were transplanted into the demonstration permaculture garden plot at Cross Island Farms on May 5, 2018. Honeyberry varieties included *Blue Moon*, *Tundra*, *Honeybee*, *Berry Blue*, *Indigo*, *Blue Pacific*, *Blue Bird*, *Borealis*, *Aurora*, *Boreal Blizzard*, *Boreal Beauty*, and *Boreal Beast*. The honeyberry planting added to the seven juneberry (*Northline*, *JB30*, *Smokey*, *Thiessen*, *Honeywood*, *Hudson* and *Gaspensis*) and five *Aronia* berry (*Nero*, *Viking*,

Galicjanka, *McKenzie*, and *Autumn Magic*) varieties that were transplanted into the garden in 2017.

We revisited the garden plots on November 1, 2018 (Photo 3). Dani Baker, Cross Island Farms co-owner, noted that the dry summer appeared to stress some of the transplanted honeyberry plants. Plants that had larger root systems at transplanting appeared to be doing better than plants with less developed root systems. Establishment survival for the transplanted honeyberries will be assessed in the spring of 2019. Dani harvested fruit from some of the *Aronia* plants in 2018, and she hopes to market some to restaurants in the future.

The demonstration site is located on a slight slope with heavy clay soil and no subsurface tile drainage. As a result, the ground can be very wet in places and this appears to have influenced the vigor of some of the juneberry plants. Another challenge is that the juneberry and *Aronia* berry plants appear to be a favored browse for the local deer population, and some of the plants were suffering the effects of heavy deer feeding. It was notable that the deer did not browse the honeyberries. The browsing effects on plant vigor will be tracked in 2019.

Strong Roots Community Farm

A new planting of four juneberry varieties: *Martin*, *JB30*, *Smoky*, and *Honeywood*, and five honeyberry varieties: *Boreal Blizzard*, *Boreal Beast*, *Boreal Beauty*, *Blue Pacific*, and *Blue Moon* was established at the Strong Roots Community Farm gardens in Hogansburg, NY, on November 12, 2018. A total of 26 plants were transplanted into the raised beds constructed by the farm manager John Bonaparte. Establishment will be assessed in the spring of 2019 and plant performance will be monitored.

Northern Orchards

In collaboration with farm owner Jenna Mulberry, seventeen dormant honeyberry plants were transplanted into some test beds at Northern Orchards in Peru, NY, on November 13, 2018. Varieties included *Boreal Blizzard*, *Boreal Beast*, *Boreal Beauty*, *Borealis*, and *Aurora*. Establishment success and plant vigor will be assessed in 2019. A trial planting of juneberries is planned for the site in 2019.

Next Steps:

1. Establish additional field trials and demonstration plantings of juneberry and honeyberry varieties on commercial farms in Northern New York.
2. 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 the NNY-suited variety selection process.
3. Establish entomopathogenic nematodes in the Willsboro Farm fruit trial plantings to combat Japanese Beetle infestations.
4. Evaluate in-row mulch material options.
5. Experiment with potential companion groundcovers.
6. Update and advance the resource information that growers need to successfully establish, manage, harvest, and market these specialty fruits.

Outreach:

These NNYADP New Fruit Trials were featured at the Willsboro Farm Open House/Field Day on July 10, 2018 (Photo 4), and at grower meetings at the Willsboro Farm on July 31 and October 11. Thom Hallock from Mountain Lakes PBS filmed and aired a segment on the new fruit project: <https://mountainlake.org/new-superfruit/>.

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For More Information:

- Michael H. Davis, Cornell University Agricultural Experiment Station, Willsboro Research Farm, 48 Sayward Lane, Willsboro, NY 12996, 518-963-7492, mhd11@cornell.edu
- Michael B. Burgess, Department of Biological Sciences, SUNY Plattsburgh, 101 Broad St., Plattsburgh, NY 12901, 518-564-5277, michael.b.burgess@plattsburgh.edu



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APPENDIX

Establishing New Commercial Fruit Crops for Northern NY



Figure 1. Trial A1601 Mean Plant Heights (cm) for 11 commercial fruit-producing varieties of Juneberry, Willsboro Research Farm Trials, Willsboro, NY, NNYADP, 2018.



Figure 2. Trial A1602 Mean Plant Heights (cm) for 4 ornamental varieties of juneberry, Willsboro Research Farm Trials, Willsboro, NY, NNYADP, 2018.

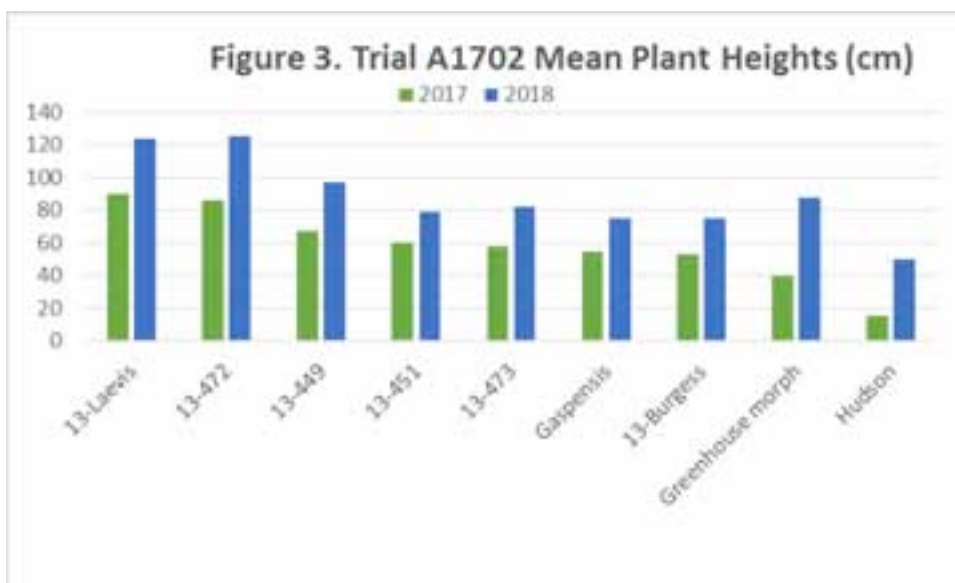


Figure 3. Trial A1702 Mean Plant Heights (cm) for 9 wild-collected varieties of juneberry, Willsboro Research Farm Trials, Willsboro, NY, NNYADP, 2018.

Table 1. 2017 and 2018 Flowering Dates for Commercial and Ornamental Varieties of Juneberry, Willsboro Research Farm Trials, Willsboro, NY, NNYADP, 2018.

Table 1. 2017&2018 Flowering Dates		
Trial A1601	Commercial Varieties	
<u>Variety</u>	<u>2017</u>	<u>2018</u>
Honeywood	5-May	14-May
JB30	4-May	14-May
Lee #8	5-May	14-May
Martin	6-May	13-May
Nelson	8-May	14-May
Northline	8-May	15-May
Parkhill	2-May	11-May
Pembina	6-May	13-May
Regent	4-May	15-May
Smoky	7-May	14-May
Thiessen	4-May	13-May
Trial A1602	Ornamental Varieties	
<u>Variety</u>	<u>2017</u>	<u>2018</u>
Autumn Brilliance	2-May	10-May
Princess Dianna	2-May	10-May
Prince William	2-May	10-May
Fergie	6-May	15-May
Trial A1702	Wild Collections	
<u>Collection ID</u>		<u>2018</u>
13-451		10-May
13-Burgess		10-May
13-Laevis		10-May
13-449		10-May
Hudson		no flowers
13-472		10-May
Greenhouse morph		no flowers
13-473		12-May
Gaspensis		10-May

Table 2. 2018 Mean Fruit Yields and Fruit Set Scores for Commercial, Ornamental, and Wild-Collected Varieties of Juneberry, Willsboro Research Farm Trials, Willsboro, NY, NNYADP, 2018.

Table 2. 2018 Mean Fruit Yields and Fruit Set Scores		
Trial A1601	Commercial Varieties	
	Per Plant Yield	Fruit Set Score (0-9)
<u>Variety</u>	<u>grams</u>	<u>0=no fruit, 9=loaded</u>
Honeywood	693	7.5
Smoky	434	7.25
Nelson	412	6.125
Parkhill	322	8.75
Northline	307	4.5
JB30	237	4.5
Regent	122	6.25
Thiessen	117	3.5
Martin	117	3.25
Pembina	63	4.25
Lee #8	44	5.75
Trial A1602	Ornamental Varieties	
Autumn Brilliance	no fruit harvested	0.25
Princess Dianna	no fruit harvested	0.125
Prince William	no fruit harvested	0.25
Fergie	no fruit harvested	1.625
Trial A1702	Wild Collections	
<u>Collection ID</u>		
13-451	54	6
13-473	42	5.5
Gaspensis	30	4.5
13-449	53	4
13-Burgess	54	2.125
13-Laevis	8	1.75
13-472	no fruit harvested	0.75
Hudson	no fruit	no fruit
Greenhouse morph	no fruit	no fruit

Table 3. 2018 Mean Fruit Weights and Scores for Commercial, Ornamental, and Wild-Collected Varieties of Juneberry, Willsboro Research Farm Trials, Willsboro, NY, NNYADP, 2018.

Table 3. 2018 Mean Fruit Size Weights and Scores		
Trial A1601	Commercial Varieties	
	15 fruit weight	Fruit Size Score (1-4)
<u>Variety</u>	<u>grams</u>	<u>1=S 2=M 3=L 4=XL</u>
JB30	22	3.75
Thiessen	22	3.75
Martin	20.5	4
Honeywood	17.5	3.5
Northline	15.5	3.25
Nelson	14.7	3
Smoky	13	2.75
Parkhill	9.5	2
Regent	8.75	2
Lee #8	8.5	2
Pembina	8	2
Trial A1602	Ornamental Varieties	
Autumn Brilliance	no fruit harvested	2
Princess Dianna	no fruit harvested	1
Prince William	no fruit harvested	1
Fergie	no fruit harvested	1.25
Trial A1702	Wild Collections	
<u>Collection ID</u>		
13-472	< 15fruit	3
13-Burgess	8	2.75
13-451	9	2
13-Laevis	8	2
13-449	10	2
13-473	6.5	2
Gaspensis	7	2
Hudson	no fruit	no fruit
Greenhouse morph	no fruit	no fruit

Table 4. 2018 Taste Test Juneberry Variety Top Performers, Willsboro Research Farm Trials, Willsboro, NY, NNYADP, 2018.

Table 4. 2018 Taste Test Top Performers	
Scale of 1-5 with 1=poor, 5=exceptional flavor	
Trial A1601	Commercial Varieties
<u>Varieties</u>	<u>Mean Score</u>
Martin	4.4
Northline	4
Theissen	4
Honeywood	3.6
Smoky	3.5
JB 30	3
Trial A1702	Wild Collections
<u>Collection ID</u>	<u>Mean Score</u>
13-Laevis	3.7
13-Burgess	3.5
13-449	3.3
13-473	3



Photo 1. Willsboro Research Farm Manager Mike Davis, PhD, (L) and SUNY Plattsburgh Professor/Botanist Michael Burgess, PhD, in the Willsboro Research Farm Juneberry commercial variety trial nursery (A1601), Willsboro, NY, on May 18, 2018. Photo: Calvin Arno



Photo 2. Hand harvesting juneberries in the NNYADP Juneberry nursery at the Willsboro Research Farm, Willsboro, NY, on July 12, 2018. Photo: Michael Burgess



Photo 3. Farm owner Dani Baker viewing the new honeyberry planting at Cross Island Farms, Wellesley Island, NY, on November 1, 2018. Photo: Michael Davis



Photo 4. The NNYADP New Fruit project trials were featured at the Willsboro Research Farm Field Day on July 10, 2018. At right, Farm Manager Michael Davis, PhD, provides growers with a project update. Photo: Amy Ivy