Northern New York Agricultural Development Program
2022 Project Final Report

Establishing New Commercial Fruit Crops for Northern NY

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Collaborators:

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Cooperating Producers:

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- Jenna Mulberry, Northern Orchards, Clinton County, NY
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- Loren and Chris Bush, Bush Gardens, Jefferson County, NY
- Andrew and Dorothy Kramer, Cedar Knoll Farm, Lewis County, NY

Background:

The goal of this project 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.

JUNEBERRY (*Amelanchier* spp.)

Juneberry, with its sweet flavor and "superfruit" antioxidant content, has the potential to be a major novel fruit crop for both fresh market and value-added sales in Northern New York. These small, multi-stemmed shrubs or trees are native to every U.S. state except Hawaii. Historically, 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 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;
2. Evaluate the performance of commercially available cultivars and promising wild lines in replicated field trials; and
3. Promote the potential for juneberry fruit production in orchards and market gardens.

Methods and Results: JUNEBERRY

Nursery

Nursery plantings at the Willsboro Research Farm, Willsboro, NY, are New York State's first and only such collection of commercial and wild-collected lines of Juneberry. The plantings were weeded, fertilized, irrigated as needed, and monitored for disease and insect issues during the growing season. The juneberry collections continue to flourish.

Juneberry Variety Trials

A1601 Commercial Fruit Producing Varieties: Spring weather patterns followed a more "typical" trajectory in 2022 compared to the very early spring in 2021, and the commercial juneberry variety flowering dates followed suit (Table 1). The flowering period was condensed as all entries, except *Parkhill*, started flowering on May 11, 2022 (Photo 1). *Parkhill*, which has consistently been the first variety to flower in the spring, started flowering a day earlier on May 10.

While fruit set looked abundant in the trial following flowering, the commercial fruit-producing cultivars were all completely defoliated by spongy moth caterpillars by the first week in June. As a result, there was no fruit production to speak of in 2022. The plants did produce another set of leaves following the spongy moth infestation, and it will be interesting to see how the plants yield in 2023. Spongy moth caterpillar infestations are cyclical and severe outbreaks occur every 10-15 years. 2022 was the first regional spongy moth caterpillar spike since the establishment of the juneberry trials in 2013 and we were unprepared. Control strategies are being developed for the 2023 field season.

Most of the commercial juneberry varieties have continued to increase in plant height through the 2022 growing season (Figure 1). Selective pruning of older shoots will be conducted in 2023 to maintain the opportunity for optimal cropload for maximum plant productivity.

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 Dianna*, and *Autumn Brilliance* were not defoliated by the spongy moth caterpillars, even though they are situated between the other two trials. As in past seasons, the three ornamental varieties flowered profusely but did not produce much fruit. All three entries started flowering on May 8, 2022 (Table 1), about the same time as many of the wild-collected lines and earlier than the commercial fruit-producing varieties.

The tall, healthy plants have continued to increase in size and height through the 2022 growing season (Figure 2).

A1702 Wild-Collected Lines: Most of the wild-collected juneberry lines started flowering on May 8, 2022. *13-Laevis* and *13-472* started flowering a few days earlier on May 5, and *13-473*, consistently the last entry to flower, started on May 11.

As with the commercial fruit producers, all the wild-collected entries were defoliated by spongy moth caterpillars in late May to early June and did not produce fruit in 2022. They did produce a second flush of leaves that were retained through the remainder of the growing season. Spongy moth control strategies are being developed for 2023, and plant health and fruit yields will be closely monitored.

The wild-collected lines increased plant heights through 2022 (Figure 3). As with the commercial lines, older shoots will be pruned during the late winter 2023 to maintain the opportunity for optimal cropload for plant productivity.

Methods and Results: 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.

2022 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.

Honeyberry trial plants at the Willsboro Research Farm continue to grow and increase plant heights (Figure 4). The honeyberry plants were not infested with spongy moth caterpillars and did not experience any leaf loss in 2022.

Honeyberry plantings require more than one cultivar with overlapping flowering periods for effective pollination, so flowering periods were closely tracked for each of the established varieties. Overall, the 2022 honeyberry flowering period was more compressed than previous years (Figure 5). First flowers appeared on April 27 and all the varieties were done flowering by May 23. As in past years, *Blue Moon*, *Blue Pacific*, and *Blue Hokkaido* started flowering later than the other varieties.

Honeyberry fruit yields were lower in 2022 compared to 2021 for all varieties due to rips in the bird netting that allowed cedar waxwings to enter the trial and feed on the fruit. While bird feeding certainly lowered fruit yields and increased variability in our harvest,

it seems unlikely that it accounted for the overall trial-wide reduction in fruit production. It is possible that the reduction in 2022 fruit yields was cyclical, or it could be a function of dry growing conditions in 2021. Notably, the three late flowering varieties: *Blue Moon*, *Blue Pacific*, and *Blue Hokkaido* had the three highest yield averages in both 2021 and 2022.

Methods and Results: 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 aroma, leading to the fruit being labeled a "superfood." As a result, aronia 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.

2022 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.

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*. As with some of the juneberry trials, the aronia trial had an unproductive fruiting year in 2022 and it is not clear why. All the aronia varieties started flowering on May 17, 2022, and fruit set following flowering appeared excellent. While the aronia plants experienced some spongy moth caterpillar feeding, they were not defoliated like the juneberry plants. They did experience considerable feeding from rose chafers and Japanese beetles, and it is possible that this hurt fruit production.

The aronia cultivars continue to grow well and plant heights increased through the 2022 season (Figure 6). Plants will be closely monitored in 2023 with attention to the need for possible pest controls measures.

Methods and Results: 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 domestic market growth is high.

The Willsboro Research Farm elderberry variety trial that was established in 2020 includes five American varieties of elderberry (*Sambucus canadensis*): *Nova*, *York*, *Adams*, *Ranch*, and *John's*, and two European varieties (*Sambucus nigra*): *Samdal* and *Samyl*. While the trial plants are too young for significant fruit production, they are establishing nicely. Trial plots were fertilized, irrigated, and monitored for disease and insect issues in 2022.

Conclusions:

Juneberries: six commercial fruit producing juneberry cultivars have performed

particularly well in NNY trials: Martin, Thiessen, Northline, JB30, Smoky, and Honeywood. Juneberry plants are susceptible to spongy moth caterpillar outbreaks and it will be important to identify effective control strategies to combat future infestations.

Honeyberries: Growth habits, flowering times, and fruit quality characteristics have been recorded for the 20 honeyberry cultivars in the Willsboro Research Farm trials. While the honeyberry plants in our trials have not yet reached full size, fruit production has been variable, and we are exploring the possibility that management practices and/or environmental conditions could initiate cyclical fruit yields.

Aronia: 2022 fruit production was significantly reduced for all four aronia fruit-producing cultivars as well as the two ornamental entries. Reduced yields may have been a function of dry growing conditions in 2021, spongy moth infestations in 2022, rose chafer and japanese beetle attacks in 2022, or some combination thereof.

Elderberry: The seven elderberry varieties planted in the replicated field trials at the Willsboro Research Farm are still in the establishment phase.

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 the need for pest management for spongy moth caterpillars, etc.
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:

We continue to field numerous requests for Juneberry, Honeyberry, Aronia and Elderberry production information from within and beyond the northern New York region. The project leader also maintains communications with NNY regional growers who have planted these fruits at their farms. Trial results and demonstration plots were toured by visiting groups of farmers, gardeners, and students, and highlighted at the Willsboro Farm open house on July 7, 2022.

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For More Information:

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Table 1. 2017, 2018, 2019, 2020, 2021 and 2022 mean flowering dates for commercial, ornamental, and wild-collected juneberry varieties, NNYADP Willsboro Research Farm juneberry trials, Willsboro, NY.

Table 1. 2017, 2018, 2019, 2020, 2021 & 2022 Mean Juneberry Flowering Dates						
Trial A1601	Commercial Varieties					
Variety	2017	2018	2019	2020	2021	2022
Honeywood	May 5	May 14	May 17	May 17	May 1	May 11
JB30	May 4	May 14	May 14	May 17	May 1	May 11
Lee #8	May 5	May 14	May 17	May 18	May 3	May 11
Martin	May 6	May 13	May 14	May 17	April 29	May 11
Nelson	May 8	May 14	May 17	May 19	May 5	May 11
Northline	May 8	May 15	May 16	May 17	May 5	May 11
Parkhill	May 2	May 11	May 12	May 17	April 28	May 10
Pembina	May 6	May 13	May 15	May 17	May 3	May 11
Regent	May 4	May 15	May 17	May 18	May 3	May 11
Smoky	May 7	May 14	May 15	May 17	May 3	May 11
Thiessen	May 4	May 13	May 14	May 17	April 29	May 11
Trial A1602	Ornamental Varieties					
Variety	2017	2018	2019	2020	2021	2022
Autumn Brilliance	May 2	May 10	May 12	May 14	April 26	May 8
Princess Dianna	May 2	May 10	May 12	May 14	April 26	May 8
Prince William	May 2	May 10	May12	May 14	April 26	May 8
Fergie	May 6	May 15	May 20	May 19	May 10	May 13
Trial A1702	Wild Collections					
Collection ID		2018	2019	2020	2021	2022
13-451		May 10	May 10	May 14	April 25	May 8
13-Burgess		May 10	May 10	May 14	April 25	May 8
13-Laevis		May 10	May 8	May 4	April 23	May 5
13-449		May 10	May 10	May 14	April 25	May 8
Hudson		No flowers	No flowers	No flowers	April 25	May 8
13-472		May 10	May 8	May 3	April 19	May 5
Greenhouse morph		No flowers	May 10	May 14	April 25	May 8
13-473		May 12	May 12	May 16	April 29	May 11
Gaspensis		May 10	May 10	May 14	April 25	

Photo 1. Flowering in the NNYADP juneberry variety trial, June 11, 2022, Willsboro Research Farm, Willsboro, NY. Photo by Michael H. Davis.

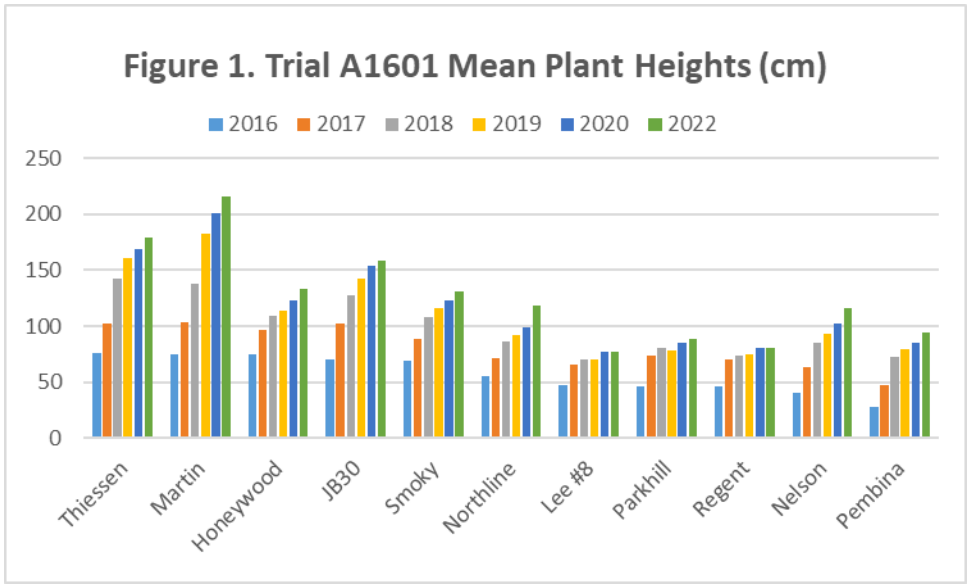

Figure 1. Trial A1601 Mean Plant Heights (cm) for 11 commercial fruit-producing juneberry varieties between 2016 and 2022, NNYADP Willsboro Research Farm Trials, Willsboro, NY.

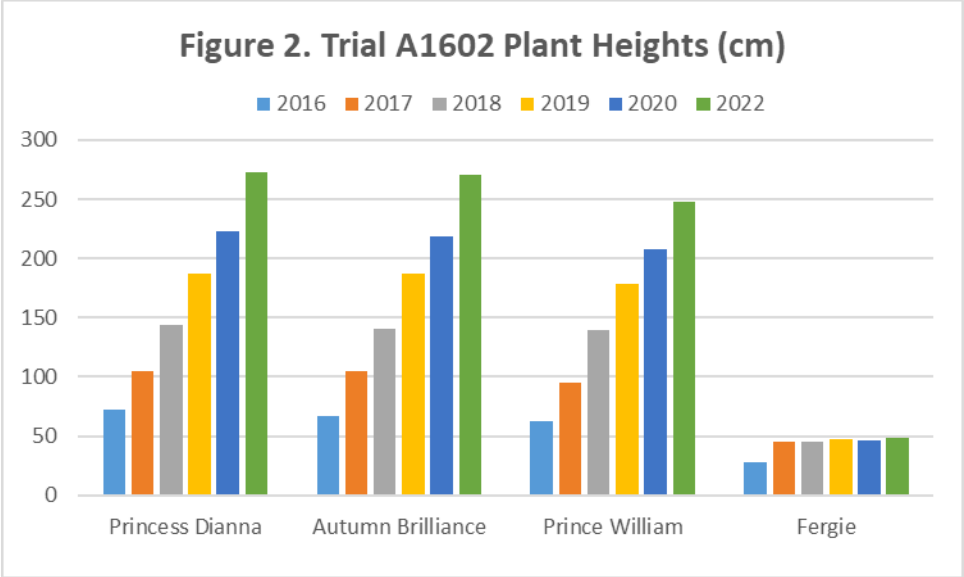

Figure 2. Trial A1602 Mean Plant Heights (cm) for 4 ornamental juneberry varieties between 2016 and 2022, NNYADP Willsboro Research Farm Trials, Willsboro, NY,

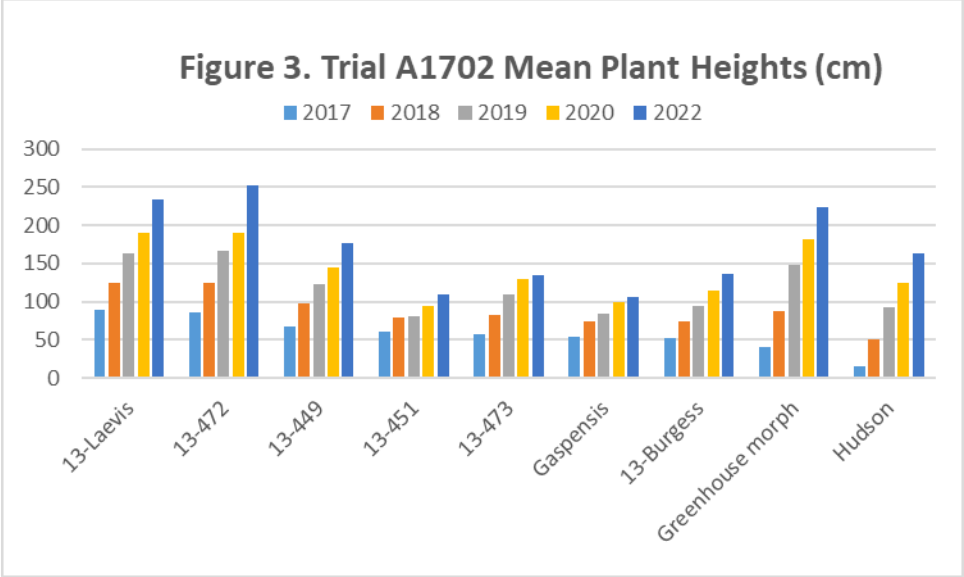

Figure 3. Trial A1702 Mean Plant Heights (cm) for 9 wild-collected juneberry lines, NNYADP Willsboro Research Farm Trials, Willsboro, NY.

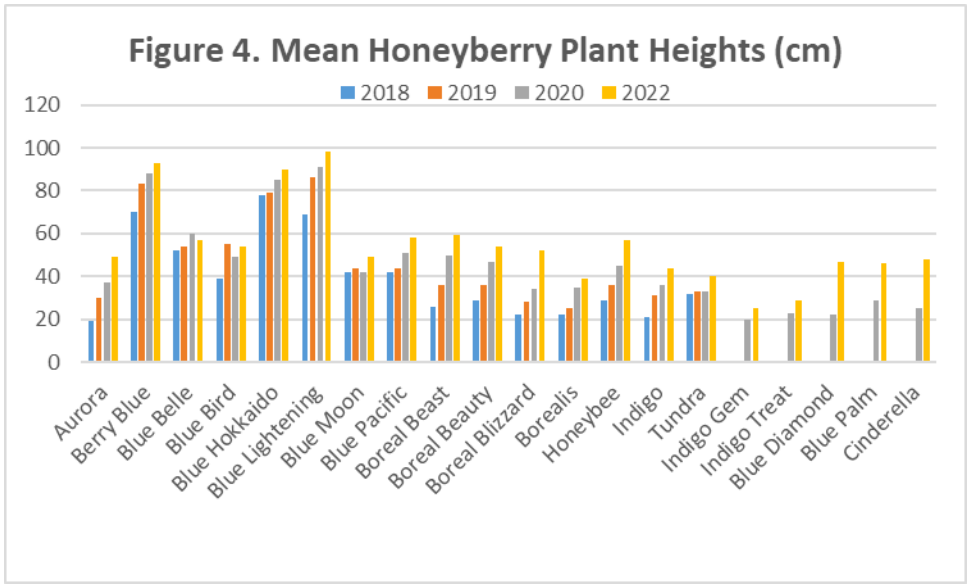

Figure 4. Trial H1801 Mean Plant Heights (cm) for 20 honeyberry varieties between 2018 and 2022, NNYADP Willsboro Research Farm Trials, Willsboro, NY.

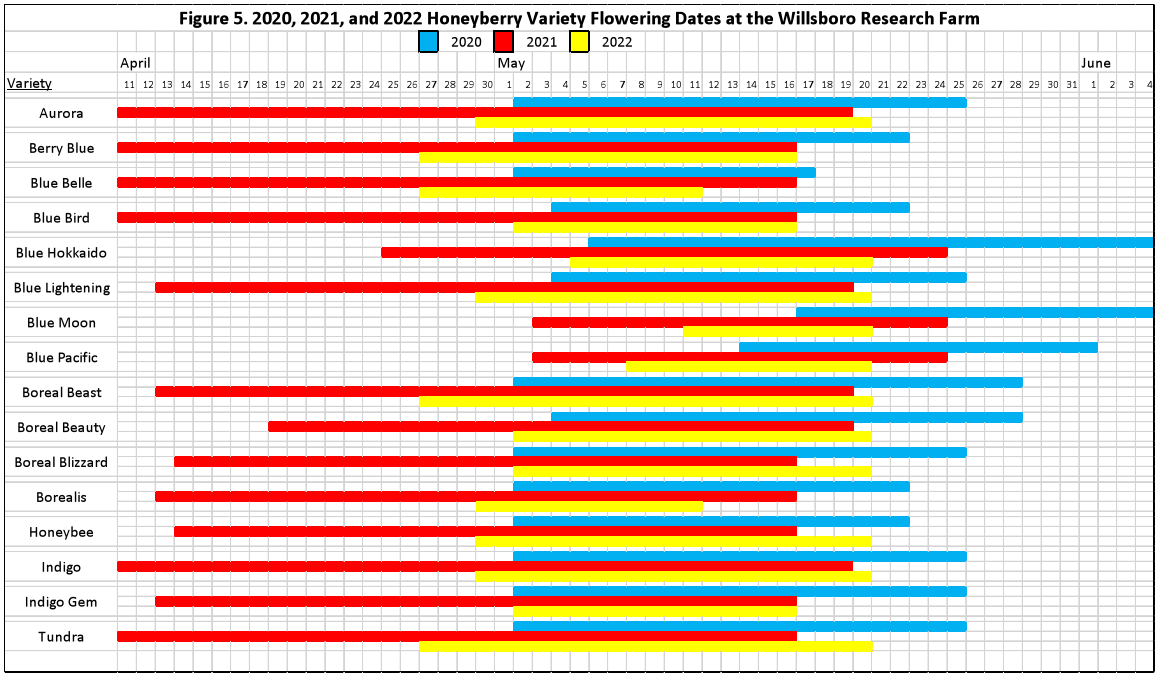

Figure 5. Trial H1801Flowering Dates for 16 honeyberry varieties in 2020, 2021, and 2022, NNYADP Willsboro Research Farm Trials, Willsboro, NY.

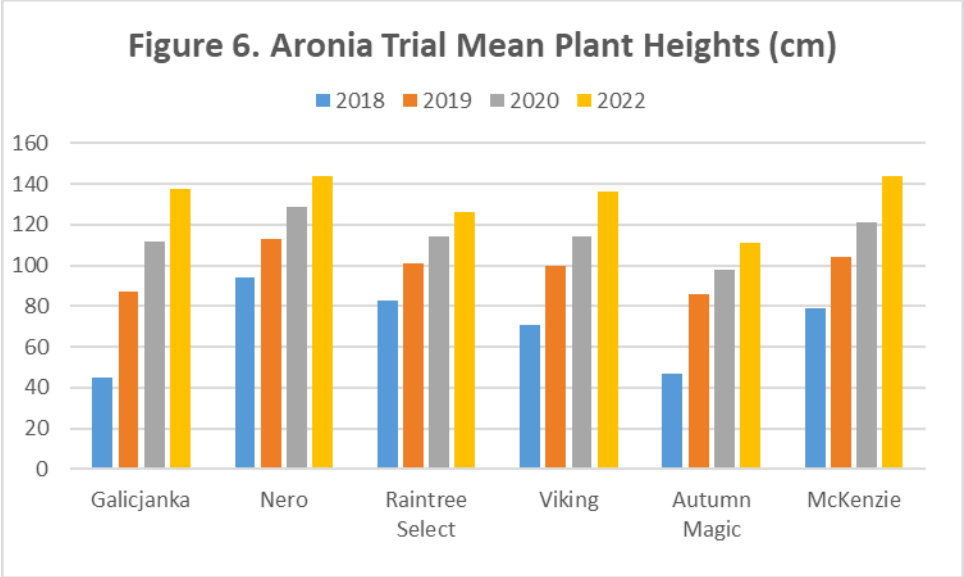

Figure 6. Trial A1701 Mean Plant Heights (cm) for 4 commercial fruit-producing varieties and 2 ornamental varieties of aronia between 2018 and 2022, NNYADP Willsboro Research Farm Trials, Willsboro, NY.