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Vegetable Variety Trials 2019

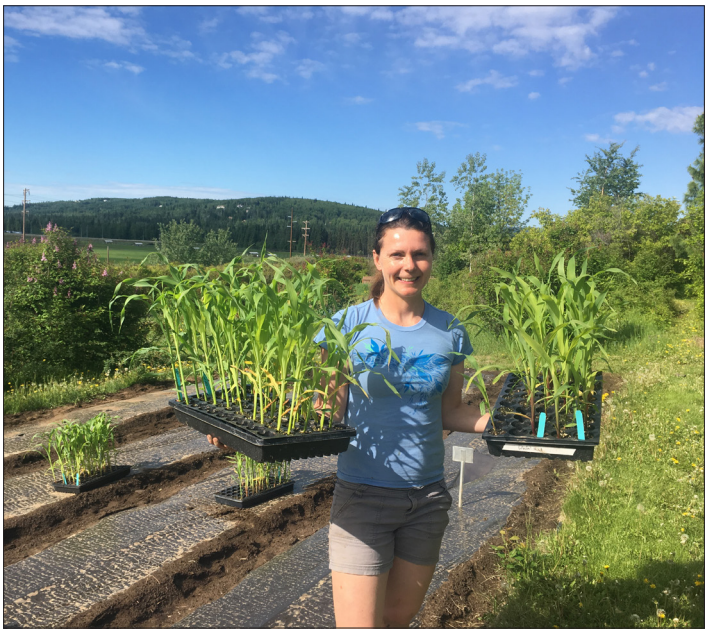
Glenna Gannon, Variety Trial Research Coordinator
Heidi Rader, Associate Professor of Extension and Variety Trial Director

VT 2019-01

Vegetable cultivar trials were conducted in the summer of 2019 at the Georgeson Botanical Garden (GBG) at the Fairbanks Experiment Farm (64° 51'N, 147° 52'W). The goal of the trials is to help gardeners and farmers choose varieties that perform well in the Tanana Valley and perhaps other locations in Interior Alaska. Plot sizes are small, and different results are likely on a larger scale.

Weather

Weather data were compiled from a U.S. Weather Service station, elevation 475 feet (145 m), located approximately 350 feet (107 m) west of the garden. The growing season started early in 2019 with an extremely warm May, followed by a warmer than average June and July, with quite a few hot days (above 80 degrees) in each. August was the rainiest on record since 1967, with a total accumulated precipitation of 5.95 inches, compared to a monthly average of approximately 1.9 inches.



Project director Heidi Rader prepares to transplant corn.

2019 Growing Season					
Temperature (degrees F)	**May**	**June**	**July**	**August**	**Sept.**
Average daily maximum	65	74	76	65	59
Monthly high	78	88	88	78	73
Average daily minimum	40	50	55	44	37
Monthly low	26	40	48	33	28
Rainfall (inches)	0.57	1.21	1.24	5.95	1.26

2019 Frost		
Last frost	**Frost-free days**	**First frost**
5/16/19	119	9/12/19

Experimental Design

In 2019, beets, beans, corn, carrots and celery were grown in replicated trials in a randomized complete block design (RCBD). Brussels sprouts were grown in unreplicated or preliminary trials.

Fertilizer

Prior to planting, plots were rototilled, and 20-10-10 slow-release fertilizer was applied at a rate of 4 pounds per 100 square feet, based on the results of soil tests. Composted steer manure was applied to beds that needed additional organic matter because of their high silt content and poor soil structure.

Planting

Celery, Brussels sprouts and corn were started in the AFES West Ridge Greenhouse at the University of Alaska Fairbanks (UAF). See Tables 1 and 2 for seed starting dates. Germination rates were uniform for celery and Brussels sprouts. Corn seeds were soaked prior to planting. Spring Treat and Ruby Queen corn varieties had poor germination

rates. All seedlings were hardened off a week or more before planting outside.

Beets, beans and carrots were all direct seeded (see Tables 1 and 2 for planting dates) in twin rows. All beet varieties had acceptable germination rates. Bean seeds were soaked in water for eight hours and inoculated with mycorrhizae. Several bean varieties germinated poorly, which is likely attributable to the high silt content and compaction of the plots in which they were planted. Carrot varieties all had excellent to acceptable germination, except for Nelson, which experienced very low germination rates. This was likely a result of old seed as this variety is no longer widely available.

Crops were planted in 30-inch-wide beds with 18-inch aisles. Plot sizes were large enough to fit at least 10 plants of each variety.

Growing

Crops were irrigated using drip irrigation and hand weeded throughout the summer. Corn and Brussels sprouts were planted into infrared-transmitting (IRT) plastic mulch, which acted as a weed barrier and soil warmer. Brussels sprouts and corn plots were fertigated midway through the growing season with a 23-13-8 water-soluble fertilizer at an approximate rate of .5 pounds per 2,000 square feet. Celery plots were fertigated by hand at the same rate.

Trial Evaluation

Harvest began in mid-July and continued twice a week until September. Mature vegetables were harvested each week or, in the case of beans, biweekly. Diseased or very deformed vegetables that would be considered unmarketable at a farmers market were not included in the yield. Data was collected in the field using an iPad and Google Forms/Sheets.

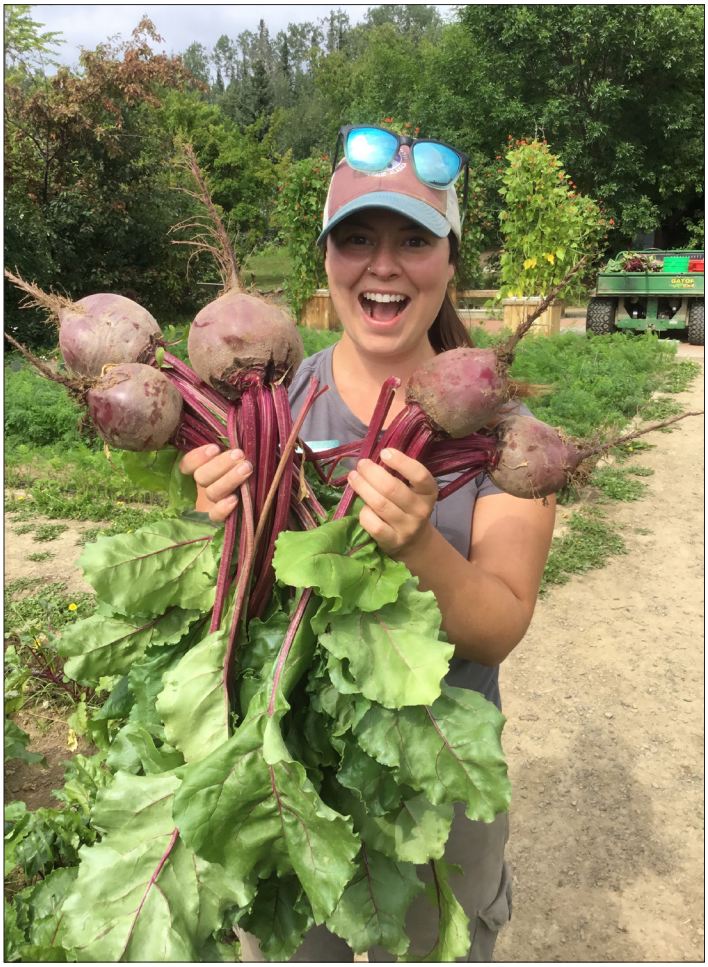
Each cultivar was evaluated at least once in terms of plant vigor, bolting sensitivity (or susceptibility to bolt), uniformity, pest resistance and disease resistance. These traits were evaluated on a scale from 1 to 9, 1 being very poor and 9 being excellent. Blind taste tests were conducted with Fairbanks Experiment Farm staff and with volunteers who participated in a workshop. As many varieties of each crop as possible were rated for flavor and texture on a scale of 1 to 5 (1 being very poor and 5 being excellent). Carrots, beets, beans, Brussels sprouts and corn were evaluated by 23, 22, 3, 3 and 10 taste testers, respectively.

Results of Replicated Trials

For 2019, data were summarized numerically and visually. Total yields were assessed in terms of both weight and units harvested. Averages and highest and lowest yields were determined for all crops regardless of replication. For additional details about statistical methods used, please contact the authors.

Beets

In descending order, Subeto, Zeppo, Robin, Red Ace, Boro and Pablo had the highest yields, and Detroit Dark Red had the lowest (see Table 1). Subeto, the highest yielding variety, averaged 2.5 pounds/row feet. The higher yielding varieties also had correspondingly high ratings in other areas, including plant vigor, bolting sensitivity, uniformity, and pest and disease resistance. The lower yielding varieties tended to bolt more and be less productive. Volunteers performed taste tests at a workshop. Robin, Merlin and Subeto were the best tasting while Detroit Dark Red was rated lowest for taste and texture. Taste test results should be considered cautiously as beets were in storage for two months prior to taste testing, and perhaps best represent varieties' storability.



Research coordinator Glenna Gannon harvests giant Subeto beets.

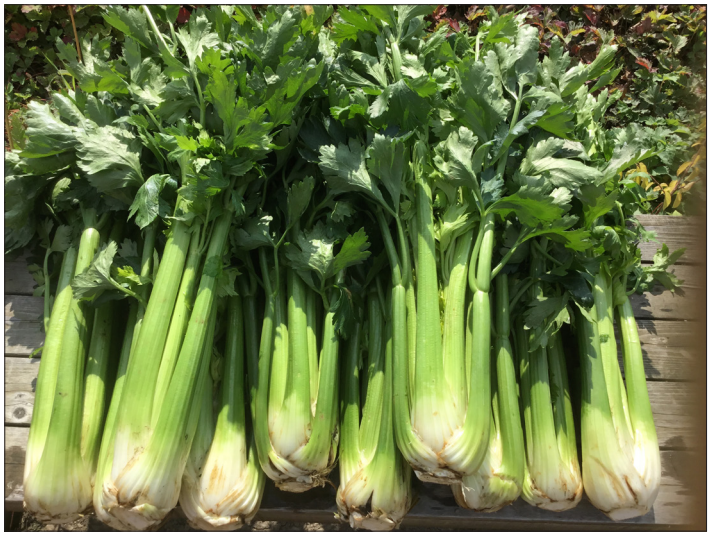
Carrots

Overall, carrots yielded well with some variation and a few notable outliers. Bolero yielded the highest with an average weight of 3.1 pounds/row foot, while Nelson, a formerly dependable variety, yielded notably less at 0.7 pounds/row foot, largely due to poor germination. Hercules and Yaya also underperformed compared to other varieties. Napoli, Napa, Nantes Half Long and Nelson were highly rated for uniformity and had a pleasing carrot shape. Bolero, Yaya, Napoli and Eskimo scored highest for taste. As with beets, carrots had been in storage for two months when tasted, so taste test results are probably more indicative of their taste after a period of storage rather than the taste when harvested fresh.

The 2019 variety trials included a dozen varieties of carrots.

Celery

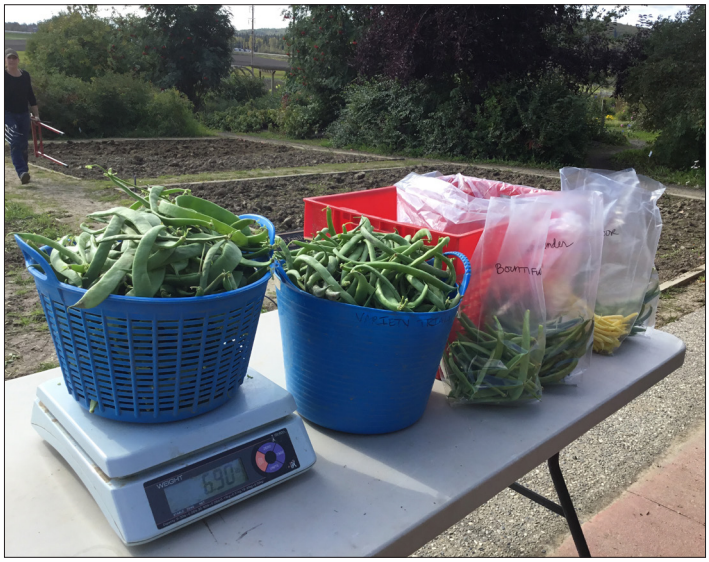
Most celery varieties did uniformly well with the exception of Tall Utah 52-70, which yielded only 1.9 pounds per row foot compared with Merengo, Tango OG, Nero and Conquistador, which yielded an average of 4.8–5.8 pounds per row foot and produced uniform, large heads. Merengo had the greatest yield, with an average of 5.8 pounds per row foot. Slugs were found on most plants across all varieties, but little sustained damage was observed. The hollow shoots, bitter taste and low yields of Tall Utah 52-70 may be attributable to high temperatures experienced in July.



Merengo was one of the top-producing celery varieties in 2019.

Beans

Beans performed better in 2019 than 2018, likely due to a relatively warm summer. However, several varieties in one block germinated poorly, likely due to compact, silt-dominant soil. Provider, the standard for cold-hardy beans, surprisingly had the lowest yields in 2019 (.9 pounds/row foot), in part due to poor germination rates. Yields of other varieties did not differ greatly. In descending order these were Bountiful (1.4 pounds/row foot), Rocdor (1.4 pounds/row foot), Contender (1.3 pounds/row foot) and Jumbo (1.2 pounds/row foot). A late season bean, Jumbo matures later than other varieties. Rocdor continued to produce late into the season as other varieties' production was slowing and affected by wet and cool conditions in August.



Beans grew well in the warm 2019 summer.

Corn

Historically, corn has been considered a marginal crop for Alaska due to the temperatures and frost-free days required to produce mature ears. However, as summer 2019 temperatures were above average, and there were 119 frost-free days recorded at the Experiment Farm, all of the corn varieties trialed produced mature ears of corn. In descending order, the varieties with the highest yield were Legend (1.7 pounds/row foot), Cafe (1.5 pounds/row foot), Espresso (1.3 pounds/row foot), Sugar Buns (1.2 pounds/row foot) and Sugar Pearl (1.1 pounds/row foot). Yields were considerably lower for Spring Treat (.6 pounds/row foot) and Ruby Queen (.8 pounds/row foot). Additionally, both Spring Treat and Ruby Queen demonstrated poor germination rates among greenhouse starts.

Table 1: Replicated Trials

Cultivar	Source	Spacing			Date Seeded	Transplanted	Days to Maturity	Harvest Period	Yield (lbs)/Plot	Yield/Row Foot (lbs.)	Avg. Unit Weight	1=Very Poor 9=Excellent				
		Within Row	Between Rows	Plot Length								Plant Vigor	Bolting Sensitivity	Uniformity	Pest Resistance	Disease Resistance
Beans											**oz.**					
Bountiful	Territorial	2″	15″	48″	5/30		55	8/2–8/23	1.4	0.4	N/A	7	9	8	9	9
Contender	Burpee	2″	15″	48″	5/30		55	8/2–8/20	1.3	0.3	N/A	9	9	9	9	9
Jumbo	Johnny's	2″	15″	48″	5/30		55	8/2–8/16	1.2	0.3	N/A	6	9	7	9	9
Provider	Johnny's	2″	15″	48″	5/30		50	8/2–8/23	0.9	0.2	N/A	9	9	8	9	9
Rocdor	Johnny's	2″	15″	48″	5/30		52	8/2–8/23	1.4	0.4	N/A	9	9	9	9	8
Beet											**oz.**					
Boro (F1)	Johnny's	3″	12″	48″	5/31		50	7/30	4.0	1.0	4.9	9	9	8	9	9
Detroit Dark Red	High Mowing	3″	12″	48″	5/31		55	7/24–8/9	2.5	0.6	4.4	9	6	7	9	8
Merlin (F1)	Territorial	3″	12″	48″	5/31		55	7/24–8/9	2.6	0.7	4.5	8	7	7	9	9
Pablo (F1)	Territorial	3″	12″	48″	5/31		50–60	7/24–8/9	4.0	1.0	4.8	9	9	9	9	9
Red Ace (F1)	Johnny's	3″	12″	48″	5/31		50	8/2–8/9	7.2	1.8	4.9	8	9	7	9	9
Robin (F1)	Territorial	3″	12″	48″	5/31		50	7/30–8/9	8.3	2.1	4.3	9	8	8	9	9
Subeto (F1)	Territorial	3″	12″	48″	5/31		55–60	7/30–8/9	9.8	2.5	5.0	9	9	9	9	9
Zeppo (F1)	Johnny's	3″	12″	48″	5/31		50	7/30–8/9	9.7	2.4	4.0	9	9	9	9	9
Carrots											**oz.**					
Bolero	Johnny's	1″	12″	24″	5/29		75	8/6–8/16	6.1	3.1	3.0	9	9	9	9	9
Eskimo (F1)	Territorial	1″	12″	24″	5/29		85	8/16	4.0	2.0	2.8	8	9	8	9	9
Hercules (F1)	Johnny's	1″	12″	24″	5/29		65	8/6–8/16	2.9	1.5	3.0	8	9	6	9	9
Nantes Half Long	Burpee	1″	12″	24″	5/29		70	8/6–8/16	4.2	2.1	2.2	9	9	8	8	9
Napa (F1)	Territorial	1″	12″	24″	5/29		63	8/10–8/16	5.2	2.6	2.6	9	9	9	9	9
Napoli (F1)	Johnny's	1″	12″	24″	5/29		58	8/6–8/16	5.8	2.9	2.6	9	9	8	9	9
Nectar (F1)	Johnny's	1″	12″	24″	5/29		72	8/6–8/16	4.9	2.5	3.9	9	9	7	9	8
Nelson (F1)	West Coast Seeds	1″	12″	24″	5/29		58	8/6–8/16	1.3	0.7	3.2	5	9	9	9	9
Romance (F1)	Johnny's	1″	12″	24″	5/29		70	8/6–8/16	4.4	2.2	2.8	9	9	8	9	9
Scarlet Nantes	Burpee	1″	12″	24″	5/29			8/6–8/16	4.0	2.0	2.8	9	9	9	9	9
Touchon	Burpee	1″	12″	24″	5/29		65	8/6–8/16	3.2	1.6	3.3	8	9	6	9	9
Yaya (F1)	Johnny's	1″	12″	24″	5/29		56	8/6–8/16	2.4	1.2	2.5	8	9	7	8	9
Celery											**lbs.**					
Conquistador	Johnny's	8″	48″	72″	3/21	5/31	80	8/27	31.6	5.3	3.2	9	9	8	8	6
Merengo (F1)	High Mowing	8″	48″	72″	3/21	5/31	80	8/13–8/20	34.7	5.8	3.7	9	9	9	8	7
Nero (F1)	Stokes	8″	48″	72″	3/21	5/31	98	8/16–8/20	28.9	4.8	4.8	7	9	8	3	5
Tall Utah 52-70 Improved	Burpee	8″	48″	72″	3/21	5/31	80	8/13–8/27	11.1	1.9	4.8	6	6	7	6	6
Tango OG	Johnny's	8″	48″	72″	3/21	5/31	105	8/20–8/27	34.2	5.7	3.7	9	9	9	7	7
Corn											**lbs.**					
Cafe (F1)	Territorial	8″	48″	72″	5/1	6/3	68	8/28–9/6	15.2	1.5	1.3	9	9	9	8	9
Earlivee (F1)	West Coast Seeds	8″	48″	72″	5/1	6/3	71	8/28–8/31	6.3	0.6	0.5	8	9	8	9	9
Early Sunglow	Burpee	8″	48″	72″	5/1	6/3	63	8/28–8/31	8.5	0.9	0.7	8	9	7	9	9
Espresso (F1)	Territorial	8″	48″	72″	5/1	6/3	70	8/28–9/6	13.1	1.3	1.1	9	9	9	9	9
Legend (F1)	Park Seed	8″	48″	72″	5/1	6/3	65	8/28–9/6	17.1	1.7	1.4	9	9	8	9	9
Ruby Queen (F1)	Burpee	8″	48″	72″	5/1	6/3	75	8/28–9/10	8.3	0.8	0.7	9	9	9	9	8
Spring Treat (F1)	Jung Seed	8″	48″	72″	5/1	6/3	67	8/28–9/6	3.8	0.4	0.3	9	9	6	9	9
Sugar Buns (F1)	Territorial	8″	48″	72″	5/1	6/3	70–80	8/28–9/6	11.5	1.2	1.0	9	9	9	7	7
Sugar Pearl (F1)	Johnny's	8″	48″	72″	5/1	6/3	72	8/28–9/6	11.3	1.1	0.9	9	9	9	9	9
Sweetness (F1)	Territorial	8″	48″	72″	5/1	6/3	68	8/28–9/6	9.2	0.9	0.8	9	9	9	9	9

Cultivar	Quality: 1= Poor 5=Excellent Taste	Texture	Comments
Beans			
Bountiful	3	4	Prolific
Contender	3	4	
Jumbo	5	4	Late to mature, produced very large beans. Sweet, slightly nutty flavor
Provider	3	3	
Rocdor	4	5	Prolific. Continues to produce beans late into the season.
Beet			
Boro (F1)	3	3	Mild flavor
Detroit Dark Red	1	2	Bitter and not good for storage; not a great producer; slight tendency to bolt
Merlin (F1)	4	4	Nice texture and fairly sweet
Pablo (F1)	2	3	Not a good storage beet
Red Ace (F1)	3	4	
Robin (F1)	4	4	Large, fairly uniform beets; sweet
Subeto (F1)	4	3	Produced huge beets (largest beet was 1.3 lbs)
Zeppo (F1)	3	4	Firm after storage
Carrots			
Bolero	4	4	Very sweet and crunchy; good storage carrot
Eskimo (F1)	3	4	Crisp
Hercules (F1)	3	4	A little bland; very crunchy
Nantes Half Long	3	3	
Napa (F1)	2	3	
Napoli (F1)	3	4	
Nectar (F1)	3	3	Very crispy
Nelson (F1)	3	4	Variety no longer commercially available; poor germination and vigor likely due to use of old seed
Romance (F1)	3	4	Good texture, firm and crunchy
Scarlet Nantes	3	3	
Touchon	3	3	Nutty flavor
Yaya (F1)	3	3	Sweet, a little soft; maybe not a very good storage carrot
Celery			
Conquistador	N/A	N/A	
Merengo (F1)	N/A	N/A	Grew the largest of all varieties tested; sweet taste and not stringy
Nero (F1)	N/A	N/A	
Tall Utah 52-70 Improved	N/A	N/A	High heat days appeared to affect this variety more than some others; some plants were discarded from count due to hollow stalk as a result of temperature
Tango OG	N/A	N/A	
Corn			
Cafe (F1)	3	4	Good producer
Earlivee (F1)	1	2	Tough in texture; earlier variety; poor taste test results are likely due to ears past their prime
Early Sunglow	2	1	Starchy; earlier variety, poor taste test results are likely due to ears past their prime
Espresso (F1)	4	4	Pleasant corn flavor; produced well
Legend (F1)	2	3	Good producer
Ruby Queen (F1)	3	4	Very pretty mottled red kernels; smaller kernels; matured latest out of all varieties
Spring Treat (F1)	3	3	Low yield reflects only one plot of cultivar planted due to poor germination of transplants
Sugar Buns (F1)	4	5	Very pleasant corn flavor; agreeably sweet
Sugar Pearl (F1)	5	5	Juicy and sweet
Sweetness (F1)	4	4	Very sweet

Table 2: Unreplicated Trials

Cultivar	Source	Spacing			Date Seeded	Transplanted	Days to Maturity	Harvest Period	Yield/Plot (lbs.)	Yield/Row Foot (lbs.)	Avg. Unit Weight (oz.)	1=Very Poor 9=Excellent			Disease Resistance	Bolting Sensitivity	Quality: 1= Poor 5=Excellent		Comments
		Within Row	Between Rows	Plot Length								Uniformity	Plant Vigor	Pest Resistance			Taste	Texture	
Brussels Sprouts																			
Dagan (F1)	Johnny's	18″	48″	120″	3/27	6/3	100	8/29	7.9	0.8	0.4	9	9	9	9	9	4	4	Standard Brussels sprout in flavor, texture and size
Diablo	Territorial	18″	48″	120″	3/27	6/3	137	8/29	4.0	0.4	0.3	8	9	9	9	7	2	3	Slightly bitter; formed smaller sprouts
Franklin (F1)	Territorial	18″	48″	120″	3/27	6/3	80	8/29	3.6	0.4	0.3	9	8	9	9	9	4	5	Mild flavor; tender
Gustus (F1)	Fedco Seeds	18″	48″	120″	3/27	6/3	99	8/29	2.8	0.3	0.3	8	9	9	9	9	5	5	Sweet and nutty
Hestia (F1)	Territorial	18″	48″	120″	3/27	6/3	100	8/29	6.8	0.7	0.5	4	9	9	9	5	2	1	Bland, loose sprouts
Jade Cross (F1)	Harris Seeds	18″	48″	120″	3/27	6/3	85	8/29	6.3	0.6	0.6	9	9	9	9	8	5	4	Good flavor, a little nutty
Nautic (F1)	Territorial	18″	48″	120″	3/27	6/3	120	8/29	4.6	0.5	0.3	7	9	9	9	4	2	1	Formed loose sprouts

Corn was planted into infrared-transmitting plastic mulch, which reduced weeds and warmed the soil.

Early Sunglow and Earlivee had smaller ears and were also the earliest varieties to mature. Low taste test scores in 2019 for these two varieties, just as in 2018, are likely due to the ears being harvested after their prime so that they would be available at the time of taste testing. Corn becomes starchier and tougher as it matures past its prime or "goes to dent." Other varieties were harvested from Aug. 28 to Sept. 10. Sugar Pearl, Sugar Buns, Sweetness and Espresso scored well on the taste test.

We also planted several sample plots of direct-seeded corn under IRT plastic mulch at the time the corn starts were transplanted in the field (June 3). The direct-seeded plants grew successfully, with Earlivee and Spring Treat producing nearly mature ears at the time the growing season was complete. We believe that, had they been seeded earlier, the direct-seeded plants would have produced mature ears. We anticipate conducting follow-up research on the viability of direct-seeded corn in the future.

Results of Unreplicated Trials

Unreplicated trials were carried out to vet crops and varieties for more rigorous trials, and results should be interpreted cautiously.

Brussels sprouts

We consider Brussels sprouts a marginal crop for Interior Alaska because of the number of days required to reach maturity, ranging from 80 to 137. Dagan, Hestia and Jade Cross were the best producers with average yields of 0.6–0.8 pounds/row foot. Gustus was the lowest producing variety at 0.3 pounds/row foot. Nautic, Diablo and Franklin yielded similarly at 0.4–0.5 pounds/row foot. Some sprouts from Diablo were stolen, negatively affecting yield data. Gustus and Dagan produced nicely formed, uniform sprouts, while Nautic, Diablo and Hestia produced excessive foliage and looser sprouts. Gustus and Jade Cross scored highest for taste and texture, while Hestia and Nautic scored the lowest.

Future of Variety Trials

In 2020, we intend to increase the number of crops and varieties that are trialed at the Fairbanks Experiment Farm. Future trials will continue to focus on comparing vegetable varieties and cultural practices and testing the viability of formerly marginal crops for Interior Alaska. Information will be disseminated to the public via workshops and publications.

Acknowledgements

Our thanks to Nicole Carter, research technician; Katie DiCristina, Georgeson Botanical Garden manager; and Kyle Redilla, statistician.

Retail Sources of Plants/Seeds

Burpee & Co., www.burpee.com

Fedco Seeds, www.fedcoseeds.com

Harris Seeds, www.harrisseeds.com

High Mowing Organic Seeds, www.highmowingseeds.com

Johnny's Selected Seeds, www.johnnyseeds.com

Jung Seed, www.jungseed.com

Park Seed, https://parkseed.com

Stokes Seeds, www.stokeseeds.com

Territorial Seed Co., www.territorialseed.com

West Coast Seeds, www.westcoastseeds.com

Note: Companies, product or equipment trade names and seed sources are listed to clearly communicate what was used in the trials. This does not serve as an endorsement.

Glenna Gannon harvests Brussels sprouts during the 2019 trials.

To learn more about vegetable variety trials in Alaska:

To see more about the project, go to http://www.uaf.edu/afes/Agroborealis%2047.1.pdf.

To see results from past trials, go to http://www.uaf.edu/afes/research/variety-trials/.

To learn more about the importance of testing and choosing the right vegetable variety for where you live, go to http://bit.ly/2y3uabV and select the video "How to Choose Varieties to Grow."

To learn more about research at the Agricultural and Forestry Experiment Station, go to www.uaf.edu/afes.

Connect with Cooperative Extension Service:

Connect with your local Cooperative Extension Service agent for information on workshops, volunteering and gardening questions in your community.

Go to www.uaf.edu/ces to find out more about UAF Cooperative Extension Service.

Gardeners and farmers can help document how different varieties perform in their own gardens and farms using the Grow&Tell mobile app at www.growandtell.us.

Corn and Brussels sprouts start to mature in late July.

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