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# Palmer Vegetable Variety Trials 2020-2021

VT 2021-01

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Vegetable cultivar trials were conducted in the summers of 2020 and 2021 at the UAF Alaska Agricultural and Forestry Experiment Station (AFES) and Matanuska Experiment Farm and Extension Center (MEFEC) (61.5° N, 149.24° W). 2020 was the first year variety trials were held at MEFEC and there was insufficient data on some crops, so those results have been included in the 2021 report.

The goal of the trials is to help local gardeners and farmers choose varieties that perform well in Southcentral Alaska. The soil at the farm is Knik silt-loam with a pH of 7. Plot sizes are small and different results are likely on a larger scale and in different soil types and fertility.

**MEFEC research technician Shannon Powers with winter squash varieties, Winter Sweet and Bonbon, at research station.**

## Weather

Weather data was compiled from a U.S. Weather Service station located approximately 1,171 feet (357 meters) west of the research plots. The table below captures weather data from the 2020 and 2021 growing seasons (rounded to the nearest whole degree). You can locate an Alaska weather station near you by visiting: https://www.weather.gov/aawu/stnlist and obtain historical weather data for your specific area. In 2020, the Palmer growing season started with relatively warm temperatures in May that continued into June, July and August. Precipitation was not particularly great throughout the growing season, with the most precipitation occurring in July. The warm temperatures in May, June, July and August allowed crops that thrive in warmer temperatures to do a little better than expected. In comparison to 2020, the 2021 Palmer growing season started with a cooler May. The cool temperatures continued in June, July and August, with August and September having larger amounts of precipitation. The cooler weather in 2021 seemed to

### Table 1: 2020 Growing Season

| Temperature (degrees F) | May | June | July | August | Sept. |
|---|---|---|---|---|---|
| Average daily maximum | 62 | 65 | 70 | 68 | 57 |
| Monthly high | 75 | 71 | 81 | 79 | 63 |
| Average daily minimum | 39 | 47 | 51 | 49 | 40 |
| Monthly low | 25 | 40 | 44 | 39 | 28 |
| Precipitation (inches) | 0.47 | 1.38 | 2.42 | 1.73 | 1.63 |

**Table 1: 2020 Frost**

| Last Frost | Frost-free days | First frost |
|---|---|---|
| 5/05/20 | 129 | 9/11/20 |

**Table 2: 2021 Growing Season**

| Temperature (degrees F) | May | June | July | August | Sept. |
|---|---|---|---|---|---|
| Average daily maximum | 59 | 66 | 67 | 64 | 54 |
| Monthly high | 76 | 74 | 80 | 81 | 69 |
| Average daily minimum | 38 | 56 | 50 | 47 | 37 |
| Monthly low | 25 | 37 | 43 | 37 | 20 |
| Precipitation (inches) | 0.95 | 0.49 | 1.22 | 3.86 | 2.96 |

**Table 2: 2021 Frost**

| Last Frost | Frost-free days | First frost |
|---|---|---|
| 5/01/20 | 141 | 9/19/21 |

slow germination rates and warm-weather crops did not perform as well in 2021 as they did in 2020.

## Experimental Design

In 2020, beans, beets and carrots were grown in replicated trials in a randomized complete block design (RCBD). Fennel, spinach and winter squash were grown in randomized unreplicated or screening trials.

In 2021, the same experimental design was employed, with the addition of Brussels sprouts and celery, which were grown unreplicated.

## Fertilizer and Soil Amendment

Prior to planting in 2021, plots were tilled and 8-32-16 slow-release fertilizer was applied at a rate of 4 pounds per 100 square feet based on the results of soil tests. No fertilizer was applied in 2020.

## Planting and Growing

Brussels sprouts, celery, fennel and winter squash plants were started in the greenhouse at the University of Alaska Fairbanks MEFEC. See Tables 1 and 2 for seed starting dates. In 2021, germination rates were mostly uniform among fennel, celery and winter squash. The only exception was the Red Kuri winter squash variety, which had lower germination rates than other winter squash varieties. Celery seeds were soaked for 25 minutes in warm water prior to planting. In 2020, germination rates were mostly uniform among fennel and winter squash in the greenhouse. All seedlings were hardened off a week or more prior to planting outside.

Beets, beans, spinach and carrots were all direct seeded (see Tables 1 and 2 for planting dates) in twin rows. Bean seeds were soaked in water for eight hours and inoculated with mycorrhizae prior to planting. Carrots were planted using custom-made seed tape to ensure even spacing. Seed tape was built from two-foot lengths of toilet paper. Seeds were glued to toilet paper with Elmer's glue with two to three seeds being placed every ¾ of an inch. Crops were planted in 30-inch-wide beds with 18-inch aisles. Plot sizes were large enough to fit a minimum of 10 plants of each variety. Crops were irrigated using an overhead sprinkler system and hand weeded throughout the summer. In 2021, celery, Brussels sprouts and winter squash plots were fertigated midway through the growing season with a 24-8-16 MiracleGro solution of 1.5 tablespoons of fertilizer per 1.5 gallons of water and applied at 1 gallon/100 $ft^2$.

## Trial Evaluation

Harvest began July 26 and continued until Sept. 17. 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 farmer's market were not included in the marketable yield upon which results are based (see summary tables). Data was collected in the field using a harvest log notebook, or indoors (for crops where the whole plant was harvested) using a laptop and Google Forms.

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, with 1 being very poor and 9 being excellent. Taste tests were conducted at home by UAF Agriculture and Forestry Experiment Station staff in 2020 and in person in 2021 with UAF Agriculture and Experiment Station staff due to COVID-19 making in-person taste testing with participants from the community infeasible. 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).

## Results of Replicated Trials

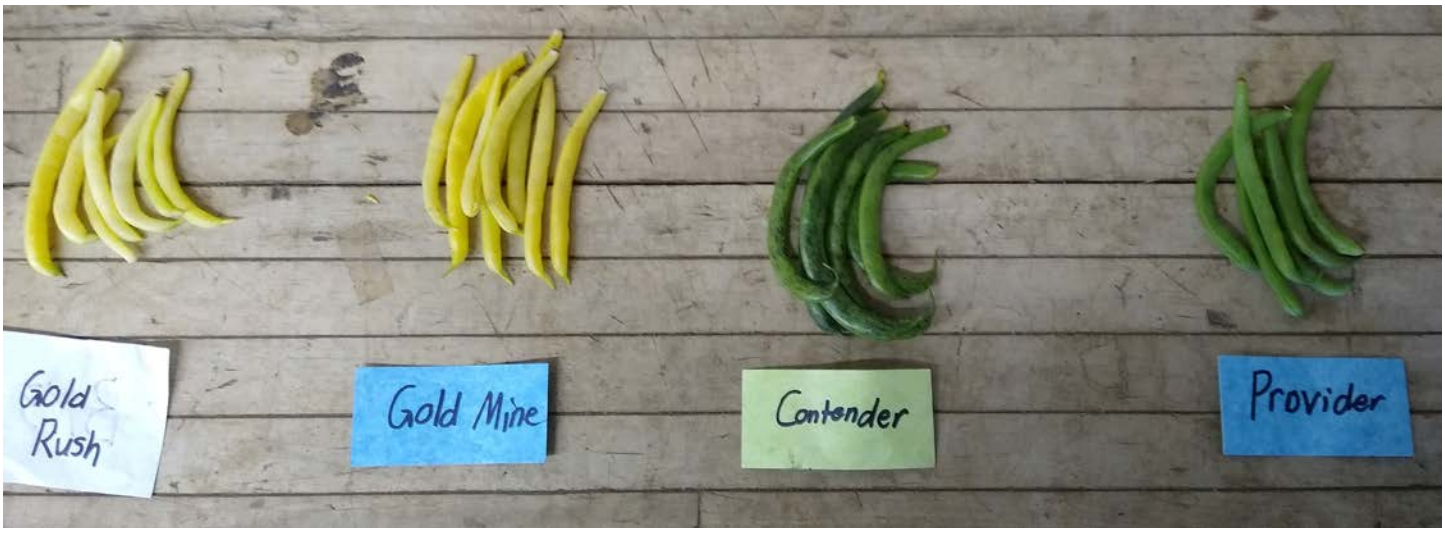
Total marketable yields were evaluated in terms of both weight and units harvested. For replicated varieties in 2021, yield per plot was statistically evaluated ($P \leq 0.05$). Mean yield per plot, yield per row foot, average unit weight, as well as subjective ratings were collected (see table 1) for all crops regardless of replication.

### Beans

Beans performed fairly in 2020 and all varieties had acceptable to excellent germination. All plots were thinned to 17 plants per plot to ensure equal comparison between varieties. Beans were covered with cheesecloth in 2020 to prevent birds from predating on the seedlings. Contender significantly outperformed all other varieties, and varieties Rocdor and Provider significantly outperformed Jumbo. In 2020, Provider and Bountiful scored the highest for both taste and texture (n=1).

In 2021, all bean varieties suffered poor germination rates, including lack of emergence, broken cotyledon, and embryos in all varieties. As such, all plots were thinned to two plants per plot to ensure equal comparison. Contender significantly outperformed all other cultivars and had the best germination rates prior to thinning. Although 2021 was only the first year Gold Mine was trialed, based on results from trials in both Palmer and Fairbanks, this variety does not appear to be a suitable cultivar for Alaska's growing conditions, and Rocdor remains our recommended wax bean (yellow bean). In 2021, Provider performed best in the taste test for both taste and texture, but Contender and Gold Rush had equally high ratings for texture (n=4).

**Assorted beets grown in 2021**




**Assorted bush bean varieties**

## Table 3: 2021 Randomized Complete Block Design Trials

| Vegetable | Cultivar | Source | Spacing | | | Date Seeded | Days to Maturity | Harvest Period | Avg. Yield (lbs.)/Plot | Yield (lbs.)/ row foot | Avg. Unit weight (oz.) | 1= Very Poor 9=Excellent | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Within Row | Between Rows | Plot Length | | | | | | | Plant vigor | Pest Resistance | Disease Resistance |
| **Beans** | | | | | | | | | | | | | | |
| | Contender | Burpee | 2" | 15" | 4' | 5/27 | 55 | 8/13-9/13 | 0.5 | 0.1 | N/A | 8 | 8 | 6 |
| | Provider | Johnny's | 2" | 15" | 4' | 5/27 | 55 | 8/13-9/13 | 0.1 | 0.03 | N/A | 5 | 8 | 4 |
| | Gold Rush | High Mowing | 2" | 15" | 4' | 5/27 | 55 | 8/13-9/13 | 0.1 | 0.03 | N/A | 6 | 7 | 5 |
| | Gold Mine | Burpee | 2" | 15" | 4' | 5/27 | 50 | 8/13-9/13 | 0.2 | 0.1 | N/A | 6 | 6 | 6 |
| **Beet** | | | | | | | | | | | oz. | | | |
| | Early Wonder | Burpee | 3" | 15" | 4' | 5/27 | 50 | 7/26 - 8/12 | 1.5 | 0.4 | 6.6 | 7 | 9 | 4 |
| | Detroit Dark Red | High Mowing | 3" | 15" | 4' | 5/27 | 55 | 7/26 - 8/12 | 3.8 | 1.0 | 5.3 | 6 | 5 | 4 |
| | Red Ace (F1) | Johnny's | 3" | 15" | 4' | 5/27 | 55 | 7/26 - 8/12 | 3.8 | 1.0 | 9.3 | 7 | 5 | 5 |
| | Zeppo (F1) | Johnny's | 3" | 15" | 4' | 5/27 | 55 | 7/26 - 8/12 | 5.0 | 1.3 | 6.4 | 6 | 5 | 5 |
| | Boro (F1) | Johnny's | 3" | 15" | 4' | 5/27 | 50 | 7/26 - 8/12 | 3.1 | 0.8 | 5.5 | 7 | 6 | 6 |
| | Merlin (F1) | Johnny's | 3" | 15" | 4' | 5/27 | 50 | 7/26 - 8/12 | 2.7 | 0.7 | 5.3 | 7 | 6 | 6 |
| | Cylindra | Burpee | 3" | 15" | 4' | 5/27 | 58 | 7/26 - 8/12 | 3.6 | 0.9 | 4.9 | 7 | 6 | 6 |
| | Robin (F1) | Territorial | 3" | 15" | 4' | 5/27 | 50 | 7/26 - 8/12 | 3.1 | 0.8 | 4.3 | 6 | 7 | 5 |
| | Subeto (F1) | High Mowing | 3" | 15" | 4' | 5/27 | 55 | 7/26 - 8/12 | 3.4 | 0.8 | 5.4 | 6 | 5 | 5 |
| **Carrot** | | | | | | | | | | | oz. | | | |
| | Romance (F1) | Johnny's | 1" | 15" | 2' | 5/27 | 70 | 8/18 - 8/25 | 1.3 | 0.7 | 4.5 | 7 | 8 | 8 |
| | Touchon | Burpee | 1" | 15" | 2' | 5/27 | 65 | 8/18 - 8/25 | 1.1 | 0.6 | 4.9 | 8 | 7 | 7 |
| | Nantes half long | Burpee | 1" | 15" | 2' | 5/27 | 75 | 8/18 - 8/25 | 2.2 | 1.1 | 5.7 | 8 | 8 | 7 |
| | Hercules (F1) | Johnny's | 1" | 15" | 2' | 5/27 | 63 | 8/18 - 8/25 | 2.2 | 1.1 | 5.0 | 8 | 8 | 7 |
| | Napoli (F1) | Johnny's | 1" | 15" | 2' | 5/27 | 58 | 8/18 - 8/25 | 1.3 | 0.7 | 4.5 | 7 | 8 | 7 |
| | Bolero (F1) | Johnny's | 1" | 15" | 2' | 5/27 | 70 | 8/18 - 8/25 | 1.8 | 0.9 | 5.3 | 9 | 7 | 7 |
| | Yaya (F1) | Burpee | 1" | 15" | 2' | 5/27 | 65 | 8/18 - 8/25 | 2.0 | 1.0 | 3.6 | 7 | 7 | 8 |
| | Scarlet Nantes | Fedco | 1" | 15" | 2' | 5/27 | 85 | 8/18 - 8/25 | 0.8 | 0.4 | 3.9 | 8 | 8 | 7 |
| | Nectar (F1) | Johnny's | 1" | 15" | 2' | 5/27 | 72 | 8/18 - 8/25 | 2.4 | 1.2 | 3.4 | 8 | 8 | 8 |
| | Napa (F1) | Territorial | 1" | 15" | 2' | 5/27 | 65 | 8/18 - 8/25 | 3.2 | 1.6 | 5.7 | 7 | 8 | 8 |

| | | Quality: 1= Poor 5=Excellent | | |
|---|---|---|---|---|
| Bolting Sensitivity | Uniformity | Taste | Texture | Comments |
| | | | | |
| 9 | 6 | 3 | 4 | Had slightly better germination rates in 2020 than other bean varieties. |
| 9 | 5 | 4 | 4 | Variety had some issues with disease that affected the marketable quality of beans. |
| 9 | 6 | 3 | 4 | Susceptible to white mold. |
| 9 | 5 | 3 | 3 | Overall, the size and shape of beans varied. |
| | | | | |
| 1 | 4 | 3 | 3 | Plants bolted before beetroot was harvestable. Cracks and soft spots in beetroot. |
| 9 | 6 | 2 | 3 | |
| 9 | 6 | 3 | 3 | |
| 9 | 6 | 2 | 4 | Texture described as crisp and having good crunch. Shape of beets was generally more uniform. |
| 9 | 6 | 3 | 4 | |
| 8 | 5 | 2 | 4 | Beet roots were not very uniform mainly due to variations in shape and some 'hairiness.' |
| 9 | 5 | 3 | 3 | |
| 9 | 6 | 3 | 4 | Some hairy beet roots. |
| 9 | 6 | 4 | 4 | Across plots of this variety, shape of beetroot was more uniform than size. |
| | | | | |
| 9 | 6 | 4 | 5 | |
| 9 | 6 | 4 | 3 | |
| 9 | 6 | 4 | 3 | |
| 9 | 6 | 3 | 3 | |
| 9 | 6 | 4 | 4 | Some carrots had non-uniform shapes. Plants on the smaller side. |
| 9 | 5 | 4 | 3 | Carrots from this variety mainly discarded due to 'hairiness.' |
| 9 | 5 | 3 | 2 | |
| 9 | 3 | 4 | 3 | Highly non-uniform shape and several carrots cracked. |
| 9 | 6 | 3 | 3 | |
| 9 | 6 | 4 | 5 | Crooked and leggy carrots lowered uniformity rating. |

## Beets

In 2020, beet varieties had acceptable to excellent germination, although Merlin had poor to acceptable germination. In descending order, Subeto, Detroit Dark Red, Merlin, Boro and Zeppo yielded the highest, while Red Ace, Pablo and Robin yielded the worst. Merlin was rated the highest for taste (n=3). Varieties Pablo, Robin, Red Ace, Subeto, Merlin and Boro had the highest rated textures. Pablo, Zeppo and Boro all received the lowest ratings for taste. In both 2020 and 2021 most varieties also experienced a degree of bacterial blight and cercospora infections on leaves, likely due to the overhead sprinkler irrigation system.

In 2021, beets were grown in twin rows spaced 15 inches from one another. Beet varieties generally had poor to acceptable germination, with Early Wonder and Red Ace having the poorest germination rates. Zeppo, Red Ace, Detroit Dark Red, Cylindra and Subeto all significantly outperformed Early Wonder (see Table 1). All beet varieties grown in 2021 appeared to be affected by soil-borne pests and disease, such as scab and cercospora, which affected the quality of beets. In 2021, the highest rated variety for both taste and texture was the Subeto beet (n=4). Texture was rated equally high for varieties Subeto, Robin, Merlin, Boro and Zeppo. Detroit Dark Red, Zeppo and Merlin all scored the lowest for taste.

## Carrots

Overall, carrots experienced variable germination rates and were thinned to 13 plants per plot as a result in 2020. Carrots were planted in single row plots (as opposed to twin-row plots in 2021), and in descending

**Assorted carrot varieties grown in 2021**

## Table 4: 2020 Unreplicated

| Vegetable | Cultivar | Source | Spacing | | | Date Seeded | Transplanted | Days to Maturity | Harvest Period | Yield/plot (lbs.) | Yield (lbs.)/ row foot | Avg. Unit weight |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Within Row | Between Rows | Plot Length | | | | | | | |
| **Fennel** | | | | | | | | | | | | **lbs.** |
| | Fino | Johnny's | 10" | 48" | 8' | 4/27 | 5/29 | 70 | 7/22 | 6.2 | 0.8 | 0.9 |
| | Orazio | Johnny's | 10" | 48" | 8' | 4/27 | 5/29 | 72 | 7/22 | 9.2 | 1.2 | 1.2 |
| | Solaris (F1) | High Mowing | 10" | 48" | 8' | 4/27 | 5/29 | 75 | 7/22 | 4.1 | 0.5 | 0.7 |
| | Preludo (F1) | High Mowing | 10" | 48" | 8' | 4/27 | 5/29 | 75 | 7/22 | 6.8 | 0.9 | 1.0 |
| | Finale | High Mowing | 10" | 48" | 8' | 4/27 | 5/29 | 80 | 7/22 | 4.7 | 0.6 | 0.7 |
| | Orion (F1) | High Mowing | 10" | 48" | 8' | 4/27 | 5/29 | 82 | 7/22 | 3.7 | 0.5 | 1.0 |
| **Spinach - Bolting and taste study only, no yield data collected** | | | **Planting :** | | | **1st** | **2nd** | | | | | |
| | Renegade (F1) | High Mowing | 2" | 12" | 2' | 7/2 | 7/30 | 30 | 7/6 - 9/1 | N/A | N/A | N/A |
| | Escalade (F1) | Territorial | 2" | 12" | 2' | 7/2 | 7/30 | 30 | 7/6 - 9/1 | N/A | N/A | N/A |
| | Acadia (F1) | High Mowing | 2" | 12" | 2' | 7/2 | 7/30 | 37 | 7/6 - 9/1 | N/A | N/A | N/A |
| | Corviar | Territorial | 2" | 12" | 2' | 7/2 | 7/30 | 45 | 7/6 - 9/1 | N/A | N/A | N/A |
| | Oceanside | Fedco | 2" | 12" | 2' | 7/2 | 7/30 | 25 | 7/6 - 9/1 | N/A | N/A | N/A |
| | Space | Johnny's | 2" | 12" | 2' | 7/2 | 7/30 | 27 | 7/6 - 9/1 | N/A | N/A | N/A |
| | Lakeside | Territorial | 2" | 12" | 2' | 7/2 | 7/30 | 30 | 7/6 - 9/1 | N/A | N/A | N/A |
| | Regiment | Territorial | 2" | 12" | 2' | 7/2 | 7/30 | 27 | 7/6 - 9/1 | N/A | N/A | N/A |
| | Palco | Territorial | 2" | 12" | 2' | 7/2 | 7/30 | 38 | 7/6 - 9/1 | N/A | N/A | N/A |
| | Olympia | Territorial | 2" | 12" | 2' | 7/2 | 7/30 | 45 | 7/6 - 9/1 | N/A | N/A | N/A |
| | Lizard (F1) | Johnny's | 2" | 12" | 2' | 7/2 | 7/30 | 27 | 7/6 - 9/1 | N/A | N/A | N/A |
| | Flamingo | Johnny's | 2" | 12" | 2' | 7/2 | 7/30 | 27 | 7/6 - 9/1 | N/A | N/A | N/A |
| | Seaside | Johnny's | 2" | 12" | 2' | 7/2 | 7/30 | 45 | 7/6 - 9/1 | N/A | N/A | N/A |
| | Persius Hybrid | Burpee | 2" | 12" | 2' | 7/2 | 7/30 | 28 | Crop Failure | N/A | N/A | N/A |
| | Giant Winter | West Coast Seeds | 2" | 12" | 2' | 7/2 | 7/30 | 43 | 7/6 - 9/1 | N/A | N/A | N/A |
| | Bloomsdale Long Standing | Burpee | 2" | 12" | 2' | 7/2 | 7/30 | 43 | 7/6 - 9/1 | N/A | N/A | N/A |
| **Winter Squash - Data from 10 plants/ variety** | | | | | | | | | | | | **lbs.** |
| | Yuxi Jiang Bing Gua | Baker Creek | 36" | 48" | 30' | 5/1 | 5/29 | 98 | Crop Failure | 0.0 | N/A | 0.0 |
| | Bonbon | Johnny's | 36" | 48" | 30' | 5/1 | 5/29 | 90 | 8/24-9/03 | 88.9 | N/A | 4.5 |
| | Sunshine (F1) | Johnny's | 36" | 48" | 30' | 5/1 | 5/29 | 95 | 8/24-9/03 | 45.9 | N/A | 3.5 |
| | Uncle David's Dakota Desert | Fedco | 36" | 48" | 30' | 5/1 | 5/29 | 95 | 8/24-9/03 | 22.7 | N/A | 1.9 |
| | Gete-Okosomin | Baker Creek | 36" | 48" | 30' | 5/1 | 5/29 | 95 | 8/24-9/03 | 95.3 | N/A | 4.3 |
| | Honey Boat | High Mowing | 36" | 48" | 30' | 5/1 | 5/29 | 95 | Crop Failure | 0.0 | N/A | 0.0 |
| | Sweet REBA | High Mowing | 36" | 48" | 30' | 5/1 | 5/29 | 98 | 8/24-9/03 | 6.2 | N/A | 1.2 |
| | Red Kuri | High Mowing | 36" | 48" | 30' | 5/1 | 5/29 | 90 | 8/24-9/03 | 48.3 | N/A | 3.0 |

| 1=Very Poor 9=Excellent | | | | | Quality: 1= Poor 5=Excellent | | |
|---|---|---|---|---|---|---|---|
| Plant vigor | Pest Resistance | Disease Resistance | Bolting Sensitivity | Uniformity | Taste | Texture | Comments |
| | | | | | | | |
| 7 | 9 | 6 | 9 | 5 | 3 | 2 | Some bulbs appeared to be more flat in appearance. Crunchy, but stringy texture. |
| 9 | 9 | 8 | 9 | 8 | 4 | 3 | Plants looked healthy, large and uniform. Flavor is "classic" fennel taste. |
| 3 | 9 | 5 | 9 | 2 | 4 | 3 | A number of plants were underdeveloped, affecting the uniformity rating. Suffered from nitrogen deficiency. Licorice taste. |
| 7 | 9 | 7 | 9 | 6 | 3 | 4 | Texture is crunchy and has good water content. |
| 5 | 9 | 6 | 9 | 5 | 2 | 3 | Variation in the size of plants. Suffered from nitrogen deficiency. Taste is bland and a bit bitter. |
| 6 | 9 | 7 | 9 | 5 | 3 | 3 | Suffered from nitrogen deficiency. Variation in the size of plants. |
| | | | | | | | *holding refers to lack of bolting in plants. |
| 8 | 6 | 7 | 7 | 7 | 3 | 3 | Some indication of pest damage. Variation in size of plants. |
| 6 | 5 | 5 | 6 | 5 | 4 | 4 | Flavorful. Poor germination rates. |
| 5 | 7 | 5 | 4 | 6 | 3 | 3 | Extremely poor germination rates. Plants quite small. |
| 8 | 6 | 7 | 5 | 7 | 3 | 3 | Decent uniformity. Field holding capacity was mediocre. |
| 6 | 5 | 7 | 4 | 5 | 4 | 2 | Bolted more quickly than some other varieties. Described as a bit dry. |
| 6 | 5 | 6 | 6 | 6 | 4 | 4 | Described as having classic spinach flavor. |
| 7 | 8 | 8 | 5 | 7 | 4 | 4 | Extremely poor germination rates. |
| 7 | 7 | 7 | 6 | 6 | 3 | 4 | Extremely poor germination rates. |
| 7 | 7 | 7 | 6 | 7 | 3 | 3 | Poor germination rates. Flavor described as a bit bland and dry. Held up well in July 30 planting. |
| 7 | 6 | 8 | 6 | 7 | 4 | 3 | Poor germination rates. |
| 8 | 7 | 7 | 5 | 6 | 2 | 3 | Poor germination rates. |
| 7 | 6 | 8 | 4 | 5 | 4 | 4 | First planting did not hold up well to bolting. Poor germination. |
| 7 | 6 | 7 | 5 | 7 | 4 | 4 | |
| 7 | 8 | 7 | 6 | 7 | 4 | 3 | Extremely poor germination. Held up somewhat better to bolting in first planting. |
| 6 | 6 | 6 | 5 | 5 | 3 | 3 | Matured/ bolted quickly. Lots of variation in plant size. Bland taste. Poor germination. |
| 7 | 5 | 6 | 6 | 7 | 3 | 4 | Appeared to have some pest and disease damage to leaves. Plant shape was relatively uniform and size only varied a bit for this variety. |
| | | | | | | | |
| 4 | 6 | 4 | 9 | 1 | N/A | N/A | Out of entire plot, only one immature squash was produced at time of killing frost. Poor germination in greenhouse led to only 3 plants being in the plot at harvest time. |
| 8 | 6 | 6 | 9 | 6 | 4 | 4 | About 114 pounds of squash produced, but some were not mature at time of harvest. |
| 6 | 7 | 5 | 9 | 6 | 4 | 3 | Almost 104 pounds of squash produced, but some immature at the time of harvest. |
| 7 | 6 | 5 | 9 | 7 | 4 | 4 | Squash were relatively equal in size. Some squash developed scabby features on outer skin. |
| 7 | 7 | 6 | 9 | 7 | 4 | 3 | Shape of squash was relatively uniform. Some squash developed scabby features on outer skin. |
| 7 | 7 | 6 | 9 | 6 | N/A | N/A | Many immature squash still on vine at time of killing frost. Plants were vigorous. |
| 6 | 7 | 4 | 9 | 6 | 5 | 4 | May be more susceptible to disease. Only 9 plants in plot - interpret yield with caution. Full of flavor. |
| 6 | 7 | 5 | 9 | 5 | 3 | 4 | About 91 lbs. of squash produced, but many squash were immature at time of harvest. Only 9 plants in plot - interpret yield with caution. |

## Table 5: 2021 Unreplicated

| Vegetable | Cultivar | Source | Spacing | | | Date Seeded | Transplanted | Days to Maturity | Harvest Period | Yield/plot (lbs.) | Yield (lbs.)/ row foot | Avg. Unit weight |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Within Row | Between Rows | Plot Length | | | | | | | |
| **Brussels sprouts** | | | | | | | | | | | | |
| | Franklin (F1) | Territorial | 24" | 48" | 10' | 3/15 | 5/27 | 80 | 9/10 - 9/13 | 17.0 | 1.7 | N/A |
| | Gustus (F1) | West Coast Seeds | 24" | 48" | 10' | 3/15 | 5/27 | 99 | 9/10 - 9/13 | 18.5 | 1.9 | N/A |
| | Hestia (F1) | Johnny's | 24" | 48" | 10' | 3/15 | 5/27 | 100 | 9/10 - 9/13 | 11.6 | 1.2 | N/A |
| | Jade Cross (F1) | Harris Seeds | 24" | 48" | 10' | 3/15 | 5/27 | 85 | 9/10 - 9/13 | 3.8 | 0.4 | N/A |
| | Nautic (F1) | Territorial | 24" | 48" | 10' | 3/15 | 5/27 | 120 | 9/10 - 9/13 | 13.2 | 1.3 | N/A |
| | Diablo (F1) | Johnny's | 24" | 48" | 10' | 3/15 | 5/27 | 110 | 9/10 - 9/13 | 14.9 | 1.5 | N/A |
| | Dagan (F1) | Johnny's | 24" | 48" | 10' | 3/15 | 5/27 | 100 | 9/10 - 9/13 | 15.3 | 1.5 | N/A |
| **Celery** | | | | | | | | | | | | lbs. |
| | Tall Utah 52-70 Improved | Burpee | 8" | 48" | 6' | 3/15 | 5/27 | 105 | 8/16/21 | 4.8 | 0.8 | 1.6 |
| | Merengo (F1) | White Seed | 8" | 48" | 6' | 3/15 | 5/27 | 80 | 8/16/21 | 2.9 | 0.5 | 1.4 |
| | Conquistador | Johnny's | 8" | 48" | 6' | 3/15 | 5/27 | 80 | 8/16/21 | 3.5 | 0.6 | 1.2 |
| | Tango OG | Johnny's | 8" | 48" | 6' | 3/15 | 5/27 | 80 | 8/16/21 | 9.6 | 1.6 | 1.6 |
| | Nero (F1) | Stokes | 8" | 48" | 6' | 3/15 | 5/27 | 98 | 8/16/21 | 4.0 | 0.7 | 1.3 |
| **Fennel** | | | | | | | | | | | | lbs. |
| | Fino | Johnny's | 10" | 48" | 8' | 4/23 | 5/27 | 70 | 7/26/21 | 6.7 | 0.8 | 0.8 |
| | Perfection | Fedco | 10" | 48" | 8' | 4/23 | 5/27 | 72 | 7/26/21 | 3.6 | 0.5 | 0.7 |
| | Solaris (F1) | High Mowing | 10" | 48" | 8' | 4/23 | 5/27 | 75 | 7/26/21 | 11.2 | 1.4 | 1.3 |
| | Preludo (F1) | High Mowing | 10" | 48" | 8' | 4/23 | 5/27 | 75 | 7/26/21 | 4.0 | 0.5 | 0.6 |
| | Finale | High Mowing | 10" | 48" | 8' | 4/23 | 5/27 | 80 | 7/26/21 | 5.1 | 0.6 | 0.9 |
| | Orion (F1) | High Mowing | 10" | 48" | 8' | 4/23 | 5/27 | 82 | 7/26/21 | 1.1 | 0.1 | 0.5 |
| **Spinach - Bolting and taste study only, no yield data collected** | | | | **Planting :** | | **1st** | **2nd** | | | | | |
| | Renegade (F1) | High Mowing | 2" | 12" | 2' | 5/27 | 8/2 | 30 | 6/18 - 9/18 | N/A | N/A | N/A |
| | Acadia (F1) | High Mowing | 2" | 12" | 2' | 5/27 | 8/2 | 30 | 6/18 - 9/18 | N/A | N/A | N/A |
| | Oceanside | Fedco | 2" | 12" | 2' | 5/27 | 8/2 | 37 | 6/18 - 9/18 | N/A | N/A | N/A |
| | Space | Johnny's | 2" | 12" | 2' | 5/27 | 8/2 | 25 | 6/18 - 9/18 | N/A | N/A | N/A |
| | Lakeside | Territorial | 2" | 12" | 2' | 5/27 | 8/2 | 27 | 6/18 - 9/18 | N/A | N/A | N/A |
| | Regiment | Territorial | 2" | 12" | 2' | 5/27 | 8/2 | 27 | 6/18 - 9/18 | N/A | N/A | N/A |
| | Palco | Territorial | 2" | 12" | 2' | 5/27 | 8/2 | 27 | 6/18 - 9/18 | N/A | N/A | N/A |
| | Olympia | Territorial | 2" | 12" | 2' | 5/27 | 8/2 | 45 | 6/18 - 9/18 | N/A | N/A | N/A |
| | Lizard (F1) | Johnny's | 2" | 12" | 2' | 5/27 | 8/2 | 28 | 6/18 - 9/18 | N/A | N/A | N/A |
| | Seaside | Johnny's | 2" | 12" | 2' | 5/27 | 8/2 | 43 | 6/18 - 9/18 | N/A | N/A | N/A |
| | Bloomsdale Long Stand | Burpee | 2" | 12" | 2' | 5/27 | 8/2 | 43 | 6/18 - 9/18 | N/A | N/A | N/A |

| 1=Very Poor 9=Excellent | | | | | Quality: 1= Poor 5=Excellent | | |
|---|---|---|---|---|---|---|---|
| Plant Vigor | Pest Resistance | Disease Resistance | Bolting Sensitivity | Uniformity | Taste | Texture | Comments |
| | | | | | | | |
| 6 | 3 | 4 | 8 | 5 | 3 | 4 | May be a bit more susceptible to pest damage on sprouts. |
| 6 | 8 | 4 | 8 | 6 | 4 | 4 | Sweet flavor. Plants were not as robust looking. |
| 8 | 6 | 5 | 6 | 5 | 3 | 3 | Plants looked very healthy, but a number of loose sprouts were observed |
| 6 | 4 | 2 | 5 | 3 | 3 | 4 | A number of loose sprouts on stalk, which accounted for lower uniformity and higher susceptibility to bolting ratings. Texture described as dense, tight-packed, and firm. |
| 8 | 6 | 6 | 8 | 7 | 3 | 3 | Plants grew large. Shape of sprouts was fairly uniform, while size varied. |
| 6 | 6 | 5 | 8 | 5 | 3 | 4 | Plants grew large, but sprouts were not as robust. |
| 7 | 5 | 4 | 7 | 6 | 4 | 4 | Shape of sprouts was relatively uniform, while size varied. |
| | | | | | | | |
| 9 | 2 | 1 | 9 | 5 | 4 | 3 | |
| 9 | 1 | 1 | 9 | 7 | 2 | 3 | Fairly uniform in both size and shape. |
| 9 | 1 | 3 | 9 | 6 | 3 | 3 | Plants did not get as large as indicated for this variety. Interpret yield with additional caution as there were 9 plants in plot. |
| 9 | 5 | 4 | 9 | 7 | 3 | 3 | Plants seemed much larger and more uniform compared to other varieties. |
| 9 | 2 | 2 | 9 | 6 | 4 | 4 | Plants in of this variety were much larger compared to other varieties. |
| | | | | | | | |
| 7 | 9 | 6 | 7 | 5 | 3 | 3 | Taste described as bland and mild. Many bulbs did not reach indicated mature size listed for this variety. |
| 7 | 8 | 7 | 2 | 4 | 2 | 2 | Appear to be more susceptible to bolting. Texture was described as tough. |
| 8 | 8 | 7 | 7 | 6 | 2 | 2 | Texture described as stringy. Bulb shape varied — some more round and others more elongated. |
| 6 | 8 | 5 | 7 | 5 | 3 | 3 | Many bulbs did not reach indicated mature size listed for this variety. |
| 7 | 9 | 6 | 7 | 6 | 3 | 4 | Shape of bulbs was relatively uniform but size varied, with some undersized. |
| 5 | 8 | 5 | 8 | 2 | 3 | 2 | A lot of the plants were very small and did not develop a bulb. Texture described as stringy. |
| | | | | | | | |
| 5 | 6 | 6 | 7 | 7 | 3 | 5 | Aug. 2 planting held up well to bolting. |
| 7 | 6 | 7 | 5 | 7 | 5 | 5 | |
| 6 | 8 | 5 | 5 | 6 | 4 | 5 | |
| 6 | 7 | 6 | 8 | 7 | 4 | 5 | May be less susceptible to bolting than other varieties. |
| 7 | 8 | 8 | 7 | 7 | 4 | 5 | |
| 5 | 7 | 5 | 7 | 7 | 4 | 5 | May be more susceptible to disease. |
| 6 | 8 | 6 | 7 | 7 | 4 | 5 | |
| 6 | 7 | 5 | 6 | 6 | 3 | 5 | May be more susceptible to disease. Aug. 2 planting held up relatively well to bolting. |
| 5 | 8 | 6 | 8 | 5 | 5 | 5 | Plants from Aug. 2 planting held up well to bolting. |
| 6 | 8 | 5 | 7 | 6 | 3 | 5 | May be more susceptible to disease. |
| 7 | 7 | 5 | 5 | 6 | 3 | 5 | May be more susceptible to disease. |

## Table 5: 2021 Unreplicated (continued)

| Vegetable | Cultivar | Source | Spacing | | | Date Seeded | Transplanted | Days to Maturity | Harvest Period | Yield/plot (lbs.) | Yield (lbs.)/ row foot | Avg. Unit weight |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Within Row | Between Rows | Plot Length | | | | | | | |
| Winter Squash - Data from 10 plants/ variety | | | | | | | | | | | | lbs. |
| | Lakota | Burpee | 36" | 48" | 30' | 5/5 | 5/26 | 88 | 9/08-9/10 | 17.8 | N/A | 3.6 |
| | Bonbon | Johnny's | 36" | 48" | 30' | 5/5 | 5/26 | 90 | 9/10-9/24 | 22.0 | N/A | 3.1 |
| | Sunshine (F1) | Johnny's | 36" | 48" | 30' | 5/5 | 5/26 | 95 | 9/10 | 3.0 | N/A | 1.5 |
| | Uncle David's Dakota Desert | Fedco | 36" | 48" | 30' | 5/5 | 5/26 | 95 | 9/10 | 5.5 | N/A | 2.7 |
| | Yuxi Jiang Bing Gua | Burpee | 36" | 48" | 30' | 5/5 | 5/26 | 92 | Crop Failure | 0.0 | N/A | 0.0 |
| | Gete-Okosomin | Baker Creek | 36" | 48" | 30' | 5/5 | 5/26 | 95 | 9/10-9/17 | 17.7 | N/A | 3.3 |
| | Honey Boat | High Mowing | 36" | 48" | 30' | 5/5 | 5/26 | 95 | Crop Failure | 0.0 | N/A | 0.0 |
| | Winter Sweet | High Mowing | 36" | 48" | 30' | 5/5 | 5/26 | 98 | 9/10 | 67.6 | N/A | 4.8 |
| | Red Kuri | High Mowing | 36" | 48" | 30' | 5/5 | 5/26 | 90 | 9/10-9/17 | 7.8 | N/A | 3.9 |
| | Butterscotch PMR Butternnut (F1) | Johnny's | 36" | 48" | 30' | 5/5 | 5/26 | 100 | Crop Failure | 0.0 | N/A | 0.0 |
| | Hasta la Pasta - Spaghetti | High Mowing | 36" | 48" | 30' | 5/5 | 5/26 | 80 | Crop Failure | 0.0 | N/A | |

order: Eskimo, Nantes Half Long, Hercules and Bolero had the highest marketable yields, while Touchon performed the worst. Hercules and Romance were rated the highest for taste, while Yaya, Scarlet Nantes and Nectar scored the lowest for taste (n=1).

In 2021, carrot varieties all had variable timing of emergence, but generally had acceptable germination, although Napoli had poor germination and Touchon had poor to acceptable germination. In 2021, carrots were thinned to 12 plants per plot except for one plot of Touchon, which had three plants, and two plots of Napoli, which had three, and 10 plants respectively, due to poor germination. Napa, Nectar, Hercules and Nantes Half Long all significantly outperformed Touchon and Scarlet Nantes. Romance, Touchon, Nantes Half Long, Napoli, Bolero, Scarlet Nantes and Napa scored the highest for taste (n=4).

## Results of Unreplicated Trials

Unreplicated or "screening" trials are carried out to vet crops and varieties for future fully replicated trials. Therefore, results should be interpreted cautiously as these trials do not have the same degree of experimental rigor.

### Fennel

Fennel was trialed for the first time in 2020. Six varieties were selected to test in Alaska based on bolting resistance and short days-to-maturity. In descending order, Orazio, Preludo, Fino, Finale and Solaris yielded the highest. Orion performed poorly in 2020 showing signs of nitrogen deficiency (though there was no difference in nutrient profile of soil compared to other varieties). In 2020, Orazio and Solaris received the highest rating for taste, while Finale received the lowest rating for taste (n=1). Preludo

| 1=Very Poor 9=Excellent | | | | | Quality: 1= Poor 5=Excellent | | |
|---|---|---|---|---|---|---|---|
| Plant Vigor | Pest Resistance | Disease Resistance | Bolting Sensitivity | Uniformity | Taste | Texture | Comments |
| | | | | | | | |
| 5 | 6 | 4 | 9 | 4 | 5 | 4 | Plants were not particularly large or robust looking. |
| 5 | 6 | 5 | 9 | 5 | 3 | 3 | Plants were on the smaller side. A number of immature, small squash still in plot at time of harvest. |
| 6 | 8 | 6 | 9 | 5 | 3 | 3 | Produced approximately 48 pounds of squash total; many were immature at time of harvest. Shape of squash was relatively uniform. |
| 6 | 8 | 5 | 9 | 6 | 4 | 3 | Plants were relatively large, but not particularly prolific producers. Flavor described as sweet. |
| 6 | 8 | 5 | 9 | 1 | N/A | N/A | Plants did not thrive throughout the season. No squash produced. |
| 5 | 5 | 3 | 9 | 5 | 3 | 4 | May be more susceptible to pest and disease damage on squash. |
| 8 | 6 | 6 | 9 | 6 | N/A | N/A | Plants grew relatively large and there were a number of immature, tiny squash on plants. However, no marketable yield was produced. |
| 8 | 6 | 6 | 9 | 6 | 2 | 3 | This variety produced approximately 94 pounds of squash total, but some squash were not quite mature at harvest. |
| 7 | 8 | 5 | 9 | 5 | 3 | 3 | Produced over 100 pounds of squash; many were still under-ripe at end of season. Consider yield with caution as only 8 plants were in plot. Flavor described as earthy. |
| 6 | 8 | 4 | 9 | n/a | N/A | N/A | Plants were small and did not thrive throughout the season. No squash produced. |
| 6 | 7 | 3 | 9 | 6 | N/A | N/A | Produced around 30 pounds of squash, however did not reach mature size by time the growing season was over. |

**Orazio fennel plots five days prior to harvest.**

received the highest rating for texture, and Fino received the lowest rating for texture.

In 2021, Solaris produced much higher yield than other cultivars, and Orion performed very poorly for the second year in a row. Fino, Preludo, Finale and Orion scored the highest for taste, while Perfection and Solaris received the lowest rating for taste (n=5). Finale was rated as having the best texture while Orion, Solaris, and Perfection were rated as having the worst texture.

## Spinach

Sixteen varieties of spinach were tested in 2020 as part of a bolting study to determine which bolt-hardy cultivars perform best during the long photoperiod (length of day) in Alaska. As such, yield data was not collected for spinach, rather evaluation focused on bolting susceptibility and rating plant vigor, pest and disease susceptibility and taste. Spinach was planted two times throughout the summer in 2020 (July 2 and July 30). The data in tables 4 and 5 represents a summary of each variety across successive plantings for both 2020 and 2021. In 2020, Escalade, Oceanside, Space, Lakeside, Olympia, Flamingo, Seaside and Persius Hybrid all received the highest ratings for taste, while Escalade, Space, Lakeside, Regiment, Flamingo, Bloomsdale Long Standing and Seaside received the highest rating for texture (n=1). Lizard received the lowest rating for taste, and Oceanside received the lowest rating for texture.

Eleven varieties of spinach were tested in 2021 — a subset of those that performed the best from 2020 — with two successive planting dates (May 27 and Aug. 2). In 2021, Acadia and Lizard received the highest ratings for taste and all varieties received equally high ratings for texture (n=1). The varieties least susceptible to bolting (received a score of 7 or greater on a scale of 1-9 for bolting sensitivity) were: Escalade, Space, Lizard, Lakeside, Seaside, Palco and Regiment. Most varieties performed similarly in 2020 and 2021 despite the different planting dates. Notable differences include: Palco performed better in the late-summer (July 30) 2020 planting, and in 2021, varieties Space, Olympia, Renegade and Lizard performed better in the late summer (Aug. 2) planting. More information about how varieties differed based on planting date can be obtained by contacting the authors.

## Winter Squash

Nine varieties of winter squash were grown in 2020 to screen different squash species (i.e. Cucurbita maxima and Cucurbita moschata) and types (i.e. Hubbard, kabocha, spaghetti, etc.) for success at reaching maturity. Germination rates were generally uniform for winter squash planted in the greenhouse, except for the Yuxi Jiang Bing Gua winter squash variety, which had very poor germination. Plants were transplanted in the field after the chance of freezing temperatures had passed. In descending order, the top yielding varieties were: Gete-Okosomin (a Native American heirloom variety), Bonbon (a buttercup variety), Sunshine (a kabocha variety) and Red Kuri (a mini-Hubbard variety). The two varieties that did the poorest were the Honey Boat (a delicata variety) and the Chinese heirloom variety, Yuxi Jiang Bing Gua. Both varieties produced healthy plants, however pollination and


**Shannon Powers sorting winter squash post harvest.**

fruit set seemed inconsistent and no mature fruit were produced by the end of the growing season. In 2020, Sweet REBA received the highest ratings for taste, and Bonbon, Uncle David's Dakota Dessert Squash, Sweet REBA, and Red Kuri received the highest ratings for texture (n=1).

Winter squash did not perform well in 2021. In descending order, the top yielding varieties were: Winter Sweet (a mini-blue Hubbard variety), Bonbon, Gete-Okosomin, and Lakota (another Native American heirloom variety). There were several crop failures in 2021, meaning the plot did not yield any mature, marketable squash fruits. These included: Honey Boat, Yuxi Jiang Bing Gua, Butterscotch PMR (a butternut variety) and Hasta La Pasta (a spaghetti squash). In 2021, the highest rated squash variety for taste was Lakota, while the lowest rated squash for taste was Winter Sweet (n=4). For texture, Lakota received the highest ratings.

## Celery

Celery was trialed for the first time at MEFEC in 2021. Celery plants were planted in a trench 8 inches deep and allowed to grow for a month and a half before the trench was backfilled in order to blanch the bases of celery plants and encourage an upright versus sprawling growth habit. All celery varieties seemed to have issues with disease and pests. The base of the celery stalk was buried, and it seemed for most varieties that is where damage was the worst, largely due to slugs. Tall Utah and Nero received the highest ratings for taste, while Merengo received the lowest ratings for taste (n=4). Nero was rated as having the best texture.

**Shannon Powers preparing to harvest celery.**

**Nautic Brussels sprouts**

**Gustus Brussels sprouts.**

## Brussels sprouts

Brussels sprouts were trialed for the first time at the MEFEC in 2021 and did quite well, especially when compared to Fairbanks trials in years past. Brussels sprouts were started in the greenhouse in early March, and transplanted outdoors in late May. Besides beans, Brussels sprouts are the only other crop for which average weight per unit (i.e. per sprout) was collected. Gustus and Franklin yielded the highest, and all varieties significantly outperformed Jade Cross. Gustus and Dagan received the highest ratings for taste, and Franklin, Gustus, Jade Cross, Diablo and Dagan all received equally high ratings for texture (n=4).

**Brussels sprout transplants in greenhouse.**

## Acknowledgements

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## Retail Sources of Plants/Seeds

Baker Creek Heirloom Seeds, www.rareseeds.com

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

Stokes, www.stokeseeds.com

Territorial Seed Co., www.territorialseed.com

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

## To Learn More About Variety Trials in Alaska

To see results from past trials and take a survey that will help us decide what crops we should try in the future, please visit: https://www.uaf.edu/afes/research/variety-trials/

Results will be continuously updated at the end of each season.

## Connect with UAF Cooperative Extension Service

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

The Matanuska District Office website is: www.uaf.edu/ces/districts/matsu/

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

To connect with MEFEC and stay up to date on events, visit the Facebook page: https://www.facebook.com/matanuskaexperimentfarm/

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

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

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Escalade spinach, second seeding

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