

## Orange and Red Carrot Variety Trials - 2019

### Instructions for On-Farm Sites across Canada

#### **Project Context**

Thank you for participating in the Canadian Organic Vegetable Improvement (CANOVI). This project is a collaboration between the Centre for Sustainable Food Systems at the University of British Columbia and the Bauta Family Initiative on Canadian Seed Security at USC Canada. One of the goals of this project is to create a national network and platform where existing varieties and new breeding lines can be evaluated for their performance in a range of regional organic and ecological farming conditions through on-farm variety trials.

Varieties that are sold to organic and ecological farmers in Canada have not necessarily been trialed on sites that reflect the diversity of Canadian farming conditions. Through a co-ordinated trialing network across Canada and integration with partner networks in Canada and the United States, we can gather information about both existing varieties and new breeding lines grown under organic management and across a range of farming conditions.

The information gathered through this trial network will be used to help farmers:

- Identify the best-performing varieties in your region, both for market garden production and seed production
- Identify which varieties would be suitable as parents for future regional breeding projects
- Build the capacity of farmers to conduct on-farm variety trials useful for their farming operation

For any questions you may have about the variety trials, please contact the [regional coordinator](#) for the Bauta Family Initiative on Canadian Seed Security ([seedsecurity.ca](http://seedsecurity.ca)) for your region:

- Atlantic Canada: Steph Hughes, USC Canada, [shughes@usc-canada.org](mailto:shughes@usc-canada.org)
- Quebec: Hugo Martorell, USC Canada, [hmartorell@usc-canada.org](mailto:hmartorell@usc-canada.org)
- Ontario: Rebecca Ivanoff, Ecological Farmers Association of Ontario, [rebecca@efao.ca](mailto:rebecca@efao.ca)
- Prairies: Iris Vaisman, Organic Alberta, [iris.vaisman@prairieorganicgrain.org](mailto:iris.vaisman@prairieorganicgrain.org)
- British Columbia: Chris Thoreau, [chris@farmfolkcityfolk.ca](mailto:chris@farmfolkcityfolk.ca)

You may also contact one of the CANOVI researchers:

- Alex Lyon, UBC Centre for Sustainable Food Systems, CANOVI Lead Researcher; [alexandra.lyon@ubc.ca](mailto:alexandra.lyon@ubc.ca); 604-710-2096
- Helen Jensen, Bauta Initiative Research Manager; [hjensen@usc-canada.org](mailto:hjensen@usc-canada.org); 514-433-8445

**Carrots for trialing**

Two market classes of carrots (*Daucus carota*) will be trialed in 2019:

<b>Market Class</b>	<b>Number of Varieties</b>	<b>Key Traits for Evaluation</b>
Orange, Nantes-shaped storage carrots	6 required “core” varieties, 7 optional varieties	Storage quality, appearance, shape, flavour, vigor
Red carrots	6 varieties	Delayed bolting, flavour, appearance, vigor

The orange trial consists of both open-pollinated (OP) and hybrid (F1) varieties, while the red trial consists of mostly OP varieties with one hybrid “check” variety and one experimental breeding population (explained below). Both trials are for a May/June planting window and fall (September/October) harvest.

For the orange carrot trial, you will receive the six core varieties as well as any optional varieties you requested through the online sign-up form. For the red trial, growers will be sent all available varieties.

Growers may also chose to **add additional varieties of their own choice to their trial** to make it more useful for their specific farm. Farmers will need to source their own seeds for any additional varieties they wish to add.

See the table below for both “code names” and real variety names. If you wish to do a “blind” trial, please label your plants and plots using the codes only. This helps remove any bias you may have associated with the variety names, seed sources, etc. You will need to refer to the real variety names to enter data in the online SeedLinked platform, discussed later.

**Full Variety Lists for 2019****Orange Carrots**

Market Class	Trial Group	Code	Variety	Seed Company	F1/OP
Nantes/Storage	Core	CA-14	Rumba	BC Eco Seed Co-op	OP
Nantes/Storage	Core	CA-19	Nash's Nantes	BC Eco Seed Co-op	OP
Nantes/Storage	Core	CA-09	Dolciva	High Mowing Organic Seeds	OP
Nantes/Storage	Core	CA-20	Dulcinea	Fruition Seeds	OP
Nantes/Storage	Core	CA-01	Bolero F1 (CHECK)	Johnny's Selected Seeds	F1
Nantes/Storage	Core	CA-21	Naval F1	High Mowing Organic Seeds	F1
Nantes/Storage	Optional OP	CA-22	Touchon Selection	William Dam	OP
Nantes/Storage	Optional OP - Nelson replacement	CA-23	Coral	Fedco	OP
Nantes/Storage	Optional OP	CA-16	Nantes di Chioggia	Franchi	OP
Nantes/Storage	Optional F1 - Nelson replacement	CA-24	Romance F1	Johnny's	F1
Nantes/Storage	Optional F1	CA-25	Jerada F1	Osborne	F1
Nantes/Storage	Optional F1	CA-26	Bangor F1	High Mowing Organic Seeds	F1
Nantes/Storage	Optional F1	CA-27	Resistafly F1	High Mowing Organic Seeds	F1
Nantes/Storage	Optional F1	CA-28	Nelson F1	West Coast Seeds	F1
Nantes/Storage	Optional Breeding Line	CA-29	OSA Orange Flavour Pop*	Organic Seed Alliance	OP

\*OSA Orange Flavour Pop' is a genetically diverse breeding population created by Organic Seed Alliance, with parent lines selected for flavour. Individual carrots in this population may have highly variable performance. As this is a variety under development, OSA requests that growers who trial this variety sign a Materials Transfer Agreement specifying that you will not save seed of this variety without first consulting Organic Seed Alliance. If you have questions or are interested in potential opportunities to collaborate in breeding this variety, please talk to your RC and Alex Lyon.

**2019 Red carrots:**

Market Class	Trial Group	Code	Variety	Seed Company	F1/OP
Red	Multi-Coloured	CC-01	Atomic Red Carrot	Willhite	OP
Red	Multi-Coloured	CC-02	Nutri-red OP carrot	Osborne Seed	OP
Red	Multi-Coloured	CC-03	Kyoto Red	Kitazawa	OP
Red	Multi-Coloured	CC-04	Malbec (CHECK)	Johnny's	F1
Red	Multi-Coloured	CC-05	Vampire carrot	BC Eco Seed Coop	OP

*Notes on Red Carrot Varieties: Many red carrot varieties have been selected in southern or tropical climates and are prone to bolting in northern climates. In particular we have been advised by Kitazawa Seeds that 'Kyoto Red' is an heirloom Japanese variety traditionally planted in mid-summer and harvested in late December for New Years celebrations. While we hope to ultimately use this trial information to support participatory breeding for bolt resistance, growers should be aware that existing varieties will have higher bolting than orange carrots.*

**Planting and Cultivation Recommendations**

The table below provides *suggestions only* for trial implementation. **The trial should be grown as you would normally grow carrots, including your normal bed and row spacing - the purpose of on-farm trials, is to test them on your farm!**

<b>Seeding dates</b>	<ul style="list-style-type: none"> <li>● Mid-June to early July depending on weather conditions and your normal planting dates for storage carrots.</li> <li>● UBC Farm seeds carrots for storage around the 3rd week of June.</li> </ul>
<b>Plants per Variety</b>	<ul style="list-style-type: none"> <li>● 12 row feet per variety per replication</li> <li>● Replications: 1 per variety, 2 replications of the check variety</li> </ul>
<b>Row and bed spacing</b>	<ul style="list-style-type: none"> <li>● At UBC Farm we plant 2 rows/bed, with 14" between rows.</li> <li>● Bed width may vary depending on tillage methods; at the UBC farm beds are 3.67 ft center-to-center.</li> <li>● We suggest no smaller than 10" (25 cm) between-row spacing, unless you have had previous success this way.</li> </ul>
<b>Seeding rate and thinning</b>	<ul style="list-style-type: none"> <li>● <b>Plots will require hand-seeding, as we are not able to provide enough seed to work with mechanical seeders.</b></li> <li>● Aim for in-row spacing of approximately 1" (2.5cm). The most reliable way to accomplish this is by seeding as evenly as possible and then thinning.</li> <li>● We have provided more seed than needed (approximately 300 seeds/variety). We have noted expected germination rates on the seed packets; please seed more of varieties with lower expected germination.</li> </ul>
<b>Evaluation</b>	<ul style="list-style-type: none"> <li>● 3-4 weeks after planting for seedling vigour; at maturity; and for storage or field holding in fall/winter.</li> </ul>

<b>Days to harvest</b>	<ul style="list-style-type: none"> <li>• 100-120 days depending on weather conditions and your judgement. Some red carrot varieties, especially 'Kyoto Red' are traditionally harvested in December/January in mild climates.</li> </ul>
<b>Weeding and rust fly</b>	<ul style="list-style-type: none"> <li>• Please use organic pest and disease control measures you would normally use.</li> <li>• If desired, you may use row cover to prevent carrot rust fly damage. However, if you are specifically trialing with the goal of comparing rust fly resistance (including with 'ResistaFly F1),' it would be more effective to expose the trial to carrot rust fly pressure.</li> <li>• Use flame weeding if it is part of your normal management practices.</li> </ul>

### How to Arrange the Trial

**The trial arrangement is flexible as long as you plant a total of 12 row-feet per variety, and 2 plots of 12 row-feet each of the check variety.** 12 row feet could be planted in a single row or in multiple side-by-side rows in a bed. Please observe these best practices to the extent possible:

- Plots may be distributed in multiple side-by-side beds or planted in one bed.
- Avoid the edge of the field and the end of the bed when finding a place for the trial, as well as any areas with known soil, shade, or irrigation differences that would affect some plots more than others.
- A border around your trial of buffer crops not included in your trial is recommended to prevent crop loss from mechanical damage or pests/critters. The crops that make up the border can be other varieties of carrots, or other types of crops.
- Create your own random order for the varieties, either by drawing variety names out of a pile or randomly choosing which flat to transplant next.
- **Distribute the check plots through the trial so that they are not all next to each other.**
- Use stakes to label the plots AND draw a field map showing the order and location of varieties. This serves as a backup in case the stakes get lost!

If you have any questions, including questions about growing fewer varieties or adding additional varieties, please contact your regional coordinator and/or Helen Jensen.

We strongly encourage growers read [On-Farm Variety Trials](#) by the Organic Seed Alliance - an incredible how-to-guide on how to implement variety trials for your own farm.



*At UBC Farm, carrots are planted in 2 rows of 6' each with a label at the head of each row. The label has the variety code on the front and the plot number (shown here) in the back. But even with good labeling a layout map is crucial in case stakes go missing!*

Please observe the layouts below as a examples of how you can organize your trial:

**Please randomize the planting of varieties *within the replication***

<b>Border</b>		
<b>Border</b>	Dolciva	<b>Border</b>
	Bolero F1	
	Optional Variety 1	
	Nash's Nantes	
	Optional Variety 2	
	Naval F1	
	Rumba	
	Bolero F1	
	Optional Variety 3	
<b>Border</b>		

**Evaluation**

Ultimately, the purpose of gathering data for the trial is to answer these two questions:

1. Does this carrot variety work well on your farm?
2. Is it a suitable candidate for future breeding projects?

Data will be collected in a systematic way to help answer those questions. Evaluation forms are still being finalized for the trial and will be provided shortly after farmers receive seed for the trial. The evaluation forms will be quite simple, requesting farmers to evaluate the following information throughout the trial:

- Would you grow this variety again?
- How marketable is this variety?
- Please rate the flavour and productivity of the variety
- Are there any disease/insect/stress problems related to the variety?

This year, we are going to pilot an online platform for data collection called [Seedlinked](#). This platform should make the final results of the trials accessible to farmers faster. You will also have the option to collect your data on a paper evaluation form. Webinars to orient participants to the use of “Seedlinked” for data entry were held in April 2019. See our latest webinar at the links below:

- **English:** <https://tinyurl.com/y6a29elj>
- **French:** <https://tinyurl.com/y5jhwx8w>

Growers will also be asked to make note of some of the basic parameters of the trial management to facilitate the comparison and interpretation of results across locations. We ask that you evaluate the carrots at a few points during the season, as outlined below.

Time window	Evaluation/Record	Worksheet
At seeding	Record date	Through the SeedLinked platform or on paper data sheets.
3-4 weeks after seeding	Germination/vigour - notes only, no rating	Through the SeedLinked platform or on paper data sheets.
At harvest	Notes and rating on key characteristics	Through the SeedLinked platform or on paper data sheets.
After harvest	Storage/overwintering notes	Through the SeedLinked platform or on paper data sheets.

### THANK YOU TO OUR FUNDERS!



Additional financial and organization support for this project has been provided by FarmFolk CityFolk.



The [Organic Science Cluster 3](#) is led by the [Organic Federation of Canada](#) in collaboration with the [Organic Agriculture Centre of Canada at Dalhousie University](#), and is supported by the [AgriScience Program](#) under Agriculture and Agri-Food Canada's [Canadian Agricultural Partnership](#) (an investment by federal, provincial and territorial governments) and over 70 partners from the agricultural community.