

## EFAO 2024: Research Protocol Working Draft

# Indian Red Carrot Variety Trial

**Farmer-researcher(s):** Nathan Klassen, Nith Valley Organics - WEST

**Project type:** Variety trial

**Research priorities:** Seed selection, production, & breeding

**EFAO Contact:** Rebecca Ivanoff

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## Objective

This trial aims to find what red carrot varieties will perform best in ecological conditions in southern Ontario and produce a carrot acceptable for the Indian specialty market. The information gathered will be used to help farmers to identify the best-performing red carrot varieties for our region, both for market garden production and seed production, and to identify varieties that would be suitable parents for future regional breeding projects.

## Background

Nith Valley Organics is a diverse market farm raising vegetables and livestock. Many of our crew members are from India. Red carrots, which are culturally significant to them, are expensive and often poor quality in Ontario. They are looking to find suitable varieties to increase local availability of this specialty crop. They are looking for sweet, red coloured, long carrots that are similar to Indian red carrots. Nathan has heard it claimed that red carrots are sweeter than the orange carrots in Canada.

## References

[Orange and Specialty Carrot CANOVI Variety Trials - 2023](#)

[CANOVI Red Nantes Carrots Report- 2022](#)

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### Experimental Design

#### Varieties

This red carrot variety trial includes 6 varieties, all of which will be direct-seeded in the field within 4 replicates.

Code	Variety	Variety Type	Days to Maturity	Breeder	Seed Source	Intellectual property <sup>1</sup>	Ordered
RCV1	<a href="#">Redsun F1</a>	F1	70	Bejo Seeds	SeedWay	Unknown	Arrived ▾
RCV2	<a href="#">Rubypak F1</a>	F1	72	Bejo Seeds	Johnny's Select Seeds	Unknown	Arrived ▾
	<a href="#">Kintoki</a>	OP	70	Heirloom	Agro-Haitai	Unknown	Arrived ▾
RCV3	<a href="#">Kesar</a>	OP	85-90	unknown	Seeds of India	Unknown	Ordered ▾
RCV4	<a href="#">Carnelian</a>	OP	95	Organic Seed Alliance	Organic Seed Alliance	Unknown	Arrived ▾
	<a href="#">Malbec</a> F1	F1	70		WH Perron	Unknown	Arrived ▾

1. Plant Breeders Rights Granted in Canada, see <https://inspection.canada.ca/plant-varieties/plant-breeders-rights/varieties/eng/1300463863953/1300463978655>
2. MTA = Material Transfer Agreement

#### Red carrot seed we were unable to source

Variety	Variety Type	Breeder	Seed Source	Intellectual property <sup>1</sup>
Ruby Queen	F1		Not available untreated so far as we can tell	
<a href="#">WI-OSC Red</a>	Breeding Population	<a href="#">Irwin Goldman</a> , <a href="#">Claire Luby</a> University of Wisconsin-Madison	Irwin Goldman wrote to say "I'm so sorry I don't have any more of that strain available Rebecca, though I hope I can re-create it sometime in the future. "	OSSI

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### Field Layout

The six trial varieties are to be grown in a 300-foot bed with two rows, with each variety allotted 100 continuous row feet. Two noncontiguous 12-foot sections of each 100-foot row would be flagged as two distinct replicates. This approach will necessitate only one seed cleanout during the season, thereby minimizing the impact of any inadvertent seed mixing during changes. Additionally, approximately two feet of spillover would occur with each variety change due to the seeds already present on the seed plate at the time of change and employing longer rows enables Nathan to flag out two replicates within the row and mitigate mixing of varieties.

Nathan will try to avoid the edge of the field when finding a place for the trial, as well as avoiding areas with known soil, shade or irrigation differences that would affect some plots more than others, and if possible, to plant the trial in a spot where it has the same crop on either side of it. He will try to keep these plots mostly out of the worst spots in their fields and otherwise make note.

Nathan will 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! **Please snap a photo of the layout and send it to Rebecca**, which is a third back-up!

### First Planting around the end of May

Rep A and B		
RCV1	RCV3	RCV6
RCV2	RCV5	RCV4
Two noncontinuous 12 row feet will be selected out of the 100 row feet of each variety for each replication		

### Second Planting around mid June

Rep C and D		
RCV6	RCV1	RCV5
RCV4	RCV3	RCV2
Two noncontinuous 12 row feet will be selected out of the 100 row feet of each variety for each replication		

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### Statistical model

This trial will be a randomized and replicated trial. We will use an ANOVA (or other appropriate statistical methodology) to determine the significance of each measurement.

## Measurements

### Crop management records

The following information will be collected on this sheet once a year:

- Seeding date
- In-row spacing
- Between-row spacing
- Configuration (number of rows/beds)
- Fertilizer applications (rates, amounts, and date)
- Irrigation
- Mulch
- Other products or notes
- [Datasheet](#)

### Field Map

- 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! **Please snap a photo of the layout and send it to Rebecca**, which is a third back-up!
- [Datasheet](#)

### Germination rating

The following information will be collected on this sheet once a year:

- [Datasheet](#)

### Early Season Vigour Ratings

The following information will be collected on this sheet once during the season:

- Early season vigour looks at seedling size, health, and growth rate
- Early season vigour will be taken once around **30 days after sowing**
- [Datasheet](#)

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### Disease and Pest Observations

The following information will be collected on this sheet **throughout the season**:

- Growers will make notes of any disease or pest issues that occur on carrot varieties throughout the year
- [Datasheet](#)

### Bolt Resistance

The following information will be collected on this sheet **prior to harvest**:

- Growers will make notes of if these varieties resist bolting long enough for harvesting at marketable size.
- [Datasheet](#)

### Yield

The following information will be collected on this sheet during our fall harvest day.

- Marketable
  - weight of marketable harvest (lbs/g)
- Non-marketable (over ripe, diseased, etc)
  - weight of non-marketable harvest (lbs/g)
- [Printable Datasheet](#)

### Marketability

The following information will be collected on this sheet **once during the season**:

- How do the different varieties of carrot sell (at market, CSA, or other outlets)? Were people interested in them?
- [Printable Datasheet](#)

### Flavour and texture

The following information will be collected on this sheet **once during the season**:

- Notes on Flavour (sweet, bitter) and texture (woody, crisp)
- Flavour and texture will be taken once a year in the end of harvest season
  - Rating rubric below
- [Printable Datasheet](#)
- We could also create a Seedlinked tasting Trial which would allow you to have a group of participants fill out a quick online survey about the carrots (see [this video](#))

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### Overall performance

The following information will be collected on this sheet **once at the end of the season**:

- Farmers will rate their impression of the overall performance of each variety by giving a rating and **writing some notes!** Stories are always good!
  - Rating rubric below
- [Printable datasheet](#)

### Photos

Please take photos of the following times/items:

- ☐ Farmer-researchers with FLRP sign
- ☐ Sowing into the field (showing replications)
- ☐ Germination
- ☐ Ideal marketable, and unmarketable roots
- ☐ Harvest actions shot
- ☐ Tasting events
- ☐ Different varietal roots beside each other
- ☐ Other

[Please add photos to this folder](#)

Something like this would be amazing to see for each variety:



### Social media

If you are posting about your trial on social media, please tag EFAO, @efao2.

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### Research Plan

Please note that if data is submitted after the submission deadline, EFAO staff cannot guarantee that your data will be analyzed and written up before the Research Symposium and/or the next growing season.

Time	Task	Methods & Measurements or Action Item
End of May	Planting #1	
June	Germination #1	
June	Early Season #1 Vigour rating #1	
August	Disease and Pest Observations #1	
September	Yield #1	
September	Marketability, Flavour, texture #1	
June	Planting #2	
July	Germination #2	
July	Early Season #2 Vigour rating #2	
September	Disease and Pest Observations #2	
October	Yield #2	
October	Marketability, Flavour, texture #2	
October 31, 2024	Overall Rating	
December 31, 2024	Farmer-fee and research expense	Submit invoices at this site: <a href="https://efao.ca/data/">https://efao.ca/data/</a>

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	invoice with receipts for expenses	
January/February 2025	Finalize and publish research report	Work with EFAO staff to review polished research report for publication.

### Materials

Please list all materials, supplies and equipment that will be reimbursed for this project. If possible, please also indicate a short-list of any in-kind materials, supplies and equipment that you will use.

Material	Unit	Quantity Required	Total Cost*	Note
<b>Total</b>				

### Farmer-fee

Farmer-fees for this project are \$500-\$1000 in total. You are eligible for 50% (\$X) for implementing the trial, and 50% (\$X) for submitting data and photos. EFAO staff will be in touch in the fall with invoicing instructions and deadlines. If you decline, cancel, or defer the trial, you also forfeit the payment

### Memorandum of Understanding

Please fill out the MOU at <https://airtable.com/appPSElrt17OMWXia/shrgHQSEj7yONdGSm>.