SeedChange

THE BAUTA FAMILY INITIATIVE ON CANADIAN SEED SECURITY

Seed Saving and Selection Factsheet: Carrot

Originally from Central Asia, carrots (*Daucus carota*) were then known for their white or purple, earthy, fibrous roots before they expanded and diversified through the Silk Road to the Mediterranean region and the rest of Asia. The carrot most commonly eaten today, known as Western or Carotene carrots, are as recent as the 1650s and were adapted to northern latitudes through the Netherlands and France.[1]

The USDA classifies carrots into 9 major groups, the most popular of which are the Nantes types (e.g. Bolero, Napoli, Nash's Nantes), Danvers (e.g. Danvers 126), Imperator (e.g. Cosmic Red), Chantenay (e.g. Caracas) and Parisian types. Modern breeding has focused on yield, ease of mechanical harvesting in winter, bolt resistance as well as appearance and carotene concentration. The use of cytoplasmic male sterility has made hybrid seed production possible on a large scale.[2] Today, almost half of the world's carrot seeds are being produced in Oregon, where they enjoy dry weather, isolation from their wild relatives and where the roots can be left overwintering in the ground.

In both Canada and the United States, adaptation of carrot cultivars to organic farming is a key priority[3]. Market gardeners are looking for carrots that hold flavor in storage and are resistant to disease, with strong tops and abundant foliage for weed competitiveness and manual harvesting. There is an interest for better flavored and more stable strains of purple and red carrots, which are increasingly popular among customers for their health benefits. The overreliance on a few hybrids, such as Bolero, that are adapted to multiple regions and production systems, have raised concerns over possible supply chain interruption and seed availability.

Carrots are a staple food across Canada, but selecting, and saving open-pollinated seed can be uniquely challenging across different regions. Carrots are a biennial crop that need to go dormant - a process known as vernalization - for a period of 8 weeks. In Canada, carrots being overwintered for seed production need to be stored in a root cellar or cold room at 95-98% relative humidity and 1 to 3°C. Before storing, one should trim the foliage leaving ¼ inch from the top. When conducting flavour evaluations before replanting, cut off 1 to 2 inches of the bottom end of the root and inspect and taste to select for color, taste or texture.[4]

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[1] The Carrot Museum in the United Kingdom provides a detailed history. http://www.carrotmuseum.co.uk/history.html

[2] Doré, C. and Varoquaux, F. Histoire et amélioration de cinquante plantes cultivées. 183-197.

[3] Bauta Family Initiative on Canadian Seed Security (2018).Survey Report Canadian Organic and Ecological Plant Breeding Priorities http://www.seedsecurity.ca/en/programs/create/vegetable-crops

[4] Navazio, J. (2012). The Organic Seed Grower. 83-94.

Carrots are also an insect-pollinated, outcrossing species. Selecting and maintaining a healthy population for seed saving requires between 200 to 400 carrot roots (also known as stecklings) with an isolation of 1-3 km from other flowering carrots. Unfortunately for seed producers, carrots are the same species as Queen Anne's Lace, introducing a significant isolation challenge. For this purpose, farmers are experimenting with low-cost, wind-resistant isolation structures where they can regulate temperature for flowering (27° to 30°C) and seed maturation (30° to 35°C), as well as easily introduce pollinators at weekly intervals during flowering.[5] Germination and seed weight are good indicators of the quality of the seed lot.

For more information:

- Resources for Organic Carrot Breeding and Seed Production by the Organic Seed Alliance, Carrot Improvement for Organic Agriculture and eOrganic, including webinars and reports.
- Vegetable Seed Production Guide: Carrots
- Seeds of Diversity Carrot Crop Descriptor Form
- Canadian Organic Vegetable Improvement Resources:
    - Carrot Breeding Timeline
    - On-farm Variety Trial Instructions
    - Variety Trial Results.
- BC Seeds Report on Carrot Seed Production in Isolation Structures
- CETAB+ Presentation of Variety Trial Results of Orange Storage Carrots.
- Podcast Episodes on Carrot Breeding on Gastropod and Free the Seed (OSSI)
- USDA's Guide to Carrot Pigmentation and Health Benefits
- Instructional Videos on Carrot Pollination by the University of Wisconsin-Madison and the National Association of Plant Breeders

[5] Farm Folk City Folk. (2014). Germinating Ideas: Carrot Seed Production in Isolation Structures. http://www.bcseeds.org/wp-content/uploads/2015/03/Carrot_Seed_Report_Final_2014.pdf