

Small scale organic carrot production

Carrots can provide small-scale farmers profit not only during the growing season if they are cared for properly.

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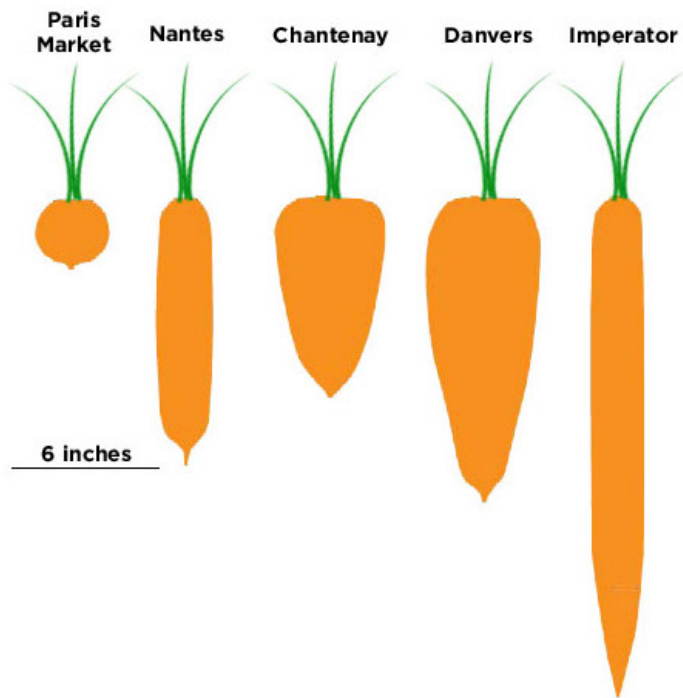


Nicely sized Nantes-type carrots | Photo by Collin Thompson, MSU Extension Educator

As the frost settles in for much of the Upper Midwest, growers are working to bring in the year’s harvest. Among the various crops relied upon by small scale producers, carrots provide the benefits of long storage potential, high dollar value, and universal familiarity among consumers.

Carrot Overview

Carrots are a cool season crop that is direct seeded in the spring for main season production or in the summer for fall and winter storage. They are in the family apiaceae, related to parsley, celery, parsnips and cilantro. They are a biennial, meaning they will produce a flowering head and seeds in their second year of growth. For most growers, carrots are not allowed to get to their seed-producing stage, as the carrot root is harvested in the first year.



Common carrot root shapes

Carrot Types

Imperator	Most commonly grown type for bagged and baby carrots; long (8-10”), slender roots with small core and bright color.
Nantes	Mid-length (6-7”) carrot with blunt tip and cylindrical form; known for excellent flavor and quality.
Danvers	Mid-length carrot with conical shape and thick form (2-2.5”); often used for processing, but can be used for fresh marketing when harvested young.

Chantenay	Primarily a processing carrot due to high yields and coarse texture; short to mid-length (4.5-5.5") with large shoulder and conical shape.
Paris Market	Palm-sized, round carrot with sweet flavor; commonly grown in less than ideal soil conditions when longer varieties struggle to perform.

Soil Preparation

Carrots prefer well-drained sandy loam or muck soils with a neutral or slightly acidic pH (5.5-7.0). Sandy soils will produce straighter, more uniform carrots, while heavy soils with rocks or debris will result in shorter, forked roots.

Pre-season preparation is essential for maximum production. Cover cropping with a grass-legume mix will help manage weed pressure, build organic matter and maintain good soil structure. Commonly used are a pea and oats blend for a spring carrot crop or a rye and vetch blend for fall carrot crop.



Properly weeded organic carrots at The North Farm

Chisel plowing, keyline plowing or broadforking to a depth of 12-20" will assist in creating deep channels for carrot roots to grow. Breaking up compacted soils will provide the best opportunities for straight taproot production. Shanks can be aligned directly with where carrot rows will be seeded, ensuring a clear path of growth. A fine seedbed is important when planting carrots, as the small seeds need to have good soil contact and water absorption to ensure proper germination. Most growers will use a rototiller, while others will use a field cultivator with a crumbling roller, to create a fine seedbed in preparation for seeding.

Most growers will also incorporate a bare fallow period to ensure adequate weed control before planting a field into carrots. This can take place during the previous summer, prior to establishing a fall cover crop, or can be a few weeks of stale bedding prior to planting. Shallow cultivation will eliminate emerging weeds without lifting buried weed seeds. Flex tine weeder, basket weeder, and flame weeder are commonly used in the stale bedding process.

Fertility Requirements

Carrots are generally good nutrient scavengers, due to their deep taproot. All fertility applications should follow recommendations based on soil testing. For more information on soil testing, visit the [MSU Soil and Plant Nutrient Laboratory](http://www.spnl.msu.edu/) (<http://www.spnl.msu.edu/>) page.

Fertility is usually provided through two applications: 50% pre-planting, and 50% side dressed. Sandy soils generally require higher levels of fertilization than heavy soils. 100-150 pounds of Nitrogen per acre is

generally applied for adequate growth. Soil phosphorus levels should be greater than 30 ppm (bicarbonate extraction method) or 70 ppm (Bray extraction method). Exchangeable potassium levels between 100-200ppm generally do not require additional fertilization.

Crop Establishment

Carrots germinate in soil temperatures of 40 degrees Fahrenheit and warmer, while root and leaf growth occurs best between 60-70 degrees F. Carrots are direct seeded at 12-15 seeds per row foot, with 15-24" between rows on flat ground or in raised beds of 4" or more. Multi-line bed systems are also often used with 6-8 lines in 3-4 rows per bed. Two to four pounds of raw seed are need to seed an acre of fresh market carrots, which equates to 0.9-1.3 million seeds per acre, dependent on variety. Precision seeders are valuable tools in carrot establishment to avoid the need to thin and ensure an adequate stand for heavy yields and easy cultivation. Commonly used precision seeders for small-scale growers include push models (Earthway, Jang or equivalent) or vacuum or belt seeders (MaterMacc, Stanhay or equivalent). Pelleted seed can be used to make precision seeding easier, though organic producers must make sure any seed coating is NOP-compliant.



Proper seed spacing results in uniform, straight, and nicely sized carrots

Consistent moisture is essential for uniform emergence. Most growers utilize overhead irrigation systems to ensure adequate soil moisture at germination and ease of cultivation. Carrots are slow to germinate (7-10 days) and need consistent moisture during this time. Small growers can use row covers or other methods to reduce evaporation during the germination phase.

In Michigan, carrots need between 10-14 inches of water during the growing season, which can be supplied by irrigation or precipitation. Excessive water or moisture stress can cause cracking and deformities. Generally speaking, 1-1.5 inches of water per week during the growing season is adequate.

Weed Control

Much of a carrot crop's weed control must be taken care of pre-planting, though cultivation is part of any organic carrot production system. Pre-emergence weed control using flame-weeding technology is

commonly used because growers can control weeds without disturbing the soils surface. Timing is key with this method and only close monitoring of conditions will ensure proper timing. A common method to estimate is to seed a sample of beets at the end of a carrot row. When the beets emerge (one to three days before the carrots), the field can be flame-weeded.

Post emergence weeding can be a challenge for the organic grower. Carrots have little competitive advantage due to their small size and slow growth. Early management of between-row weeds can be accomplished with shallow cultivation using basket weeders, tine weeders, or tender hoes/sweeps. When the crop has reached a larger size, finger weeders and more aggressive shovels and sweeps can be used to control between- and in-row weeds and cover carrot shoulders. Depending on weed pressure and control methods, hand weeding may be required.

Harvest, Handling, and Storage

Fresh market, processing, and storage carrots can be harvested throughout the season, though cool season harvest will reduce losses. Small growers may choose to hand-dig carrots using digging forks or an undercutter bar. Growers on larger acreages will use single or multi-row digging equipment that lifts, tops and bins carrots.

Carrots stored at 32 degrees Fahrenheit and 98-100 percent humidity will last 7-9 months, depending on variety. Prompt post-harvest cooling will aid in long-term storage. Carrots are generally stored in sealed plastic or wooden macro bins, harvest lugs or plastic bags to conserve moisture. Most small producers store carrots dirty, though many growers have had successes with storing cleaned carrots. Carrots are generally cleaned using barrel washing equipment or automated brush wash lines on small scales. Washing prior to storage often reduces staining of the roots, but can occasionally lead to decay due to bruises and nicks that occur during the washing process. The use of sanitizers in wash water can reduce the presence of decay-causing organisms, potentially increasing storage life.

Carrots can be a profitable crop for the small farm, not only during the growing season, but also throughout the winter months, when storage crops help maintain consistent relationships with customers. Proper management can lead to heavy yields of this universally loved vegetable.

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