

Carrots & Parsnips



Introduction

Carrot (*Daucus carota*) and parsnips (*Pastinaca sativa*) belong to the Umbelliferae (the carrot family). This family includes other vegetables such as celery, celeriac, parsley and several herbs. Both carrots and parsnips originated in the Mediterranean area and were in use over 2000 years ago. Carrots (Queen Anne's Lace) in Southeast Europe and Afghanistan – parsnips in central and southern Europe. Both are botanically biennial plants which were first used as medicines and then became popular as food crops – parsnips in the 16th century in Europe and the orange carrot in the 17th century in Holland. The edible part of these plants is an enlarged taproot.

Carrots are grown in the tropics where high elevations give cool night temperatures and in temperate regions of the world. Optimum growing temperatures for these crops are 15-20°C with a minimum of 5°C and a maximum of 24°C. The minimum temperature for germination is 2°C with an optimum range of 10°C to 25°C. The optimum germination temperature for parsnips is 18°C and carrots is 27°C. The maximum temperature for germination is 30°C and 35°C respectively. These crops therefore favor cool season conditions. Low and high temperatures reduce seed germination. Both carrot & parsnips foliage is affected by light frosts (-1.5°C) but is not harmful to the roots. Adequate moisture is necessary for good yields and quality. Parsnips usually overwinter well on sandy well drained soils. When seedlings with roots 6 mm in diameter or larger are subjected to cold temperatures (below 10°C) for a period of time flower initiation takes place. For early seeded carrots of susceptible varieties, bolting may occur in the Atlantic area.

A deep well aerated soil, free from stones and well supplied with moisture is required for the development of long smooth roots. Well drained sandy loam and organic soils are preferred. Seed germinates over a 2 week period or is restricted if a crust forms on the soil surface. The earliest seeds to germinate produce the largest roots. The seed bed also has to be prepared free of clods since hilling of

cylindrical varieties is required late in the season to prevent greening or "sunburn". Planting on hills also increases the length of carrots. Soil compaction affects root growth and length. In compacted soil the taproot is conical in shape and the root is usually heavily furled.

Carrot harvest begins with the bunched crop in mid-July. Roots for packaging are harvested starting in early to mid-August. By September 1st carrot harvest is intensifying. By mid-September harvesting of the storage and processing crops are in full swing. Carrots harvested from mid-September to November yield a gross weight of 30,000 to 80,000 kg per hectare. Marketable yields average 20,000 kg per hectare (fresh or processed).

Parsnip harvest usually begins in mid-September for fresh market and storage although some hand harvest may be done for roadside market sales in early September. Parsnip yields are 20,000 to 30,000 kg per hectare.

Carrot production in the Atlantic area is important due to a large fresh market and processing industry. It is a crop with a high per capita consumption and there appears to be some potential for increased consumption of both fresh and processed products. Parsnip consumption in this area is traditionally high and it is not anticipated there will be much increase in this market. Carrot growers usually produce some parsnips to make up truckloads and hopefully increase overall profits.

There may be some markets for specialty crops such as baby carrots (fresh and processing), large carrots for HRI trade, and parsnips for processing.

Nutrient Content of Carrots: One of our best sources of Vitamin A. One medium raw carrot supplies our daily requirement of this nutrient. It also contains other vitamins and minerals including potassium. 1 raw carrot contains 20 kilocalories. 250 mL (1 cup) cooked carrots has 47 kilocalories.

Nutrient Content of Parsnips: Good source of calcium, potassium and folate. Contains small amounts of other nutrients including Vitamin A and C. A 250 mL (1 cup) serving of cooked parsnips contains 186 kilocalories.

Crop Establishment:

Seed Treatment – Usually pelleted seed is purchased for use in precision seeders. High quality seed is essential for good germination and seedling vigor.

Seeding/Planting – Sow as early as the soil can be prepared. This is usually late April or early May. Soil moisture levels then are usually higher; there are fewer problems with crusting and generally better stands result from early seedling. Late seeded crops may burn off if they emerge during hot dry weather.

The seeding depth should not exceed 0.6 to 1.2 cm. Deeper planting results in uneven or no germination.

The approximate seeding rate for carrots is 2 to 4 kg per hectare (raw seed) and 3 to 5 kg per hectare for parsnips (raw seed). Seed in single rows or bands 10 cm wide, 60 to 70 cm apart or in beds of 3 or more rows 15 to 45 cm apart depending on the minimum required by the plants or the planting and/or harvesting equipment. Space carrots at 40 to 66 per meter of row and parsnips 25 to 35 per meter of row depending on the soil type and row width. Higher plant populations require more water and

fertilizer and reduce average root size. The closer plant spacing should be used on peat soils.

Crop Management

Cultivation should be kept to a minimum to reduce root pruning. Hilling at last cultivation will reduce green shoulders on susceptible varieties.

Nutrition

ALL ADDITIONS OF LIME AND FERTILIZER OR MANURES SHOULD BE BASED ON RECOMMENDATIONS FROM A SOIL TEST.

Carrots in research trials on mineral soils in the Atlantic area have shown little response to application of N, P and/or K fertilizers. The use of fresh manures in the spring has not led to any problems with forking of roots and has increased grower yields.

Lime – Limestone should be applied to maintain the soil pH in the range 6.0 - 6.8. Parsnips are more sensitive to acid soils than are carrots. Gypsum may be used on coarse sands where calcium levels are low and the pH is quite high to increase soil calcium and sulfur levels.

Nitrogen – Small applications are usually made at the time of seeding and the crop is often side dressed in late August or September if it appears the top growth is not sufficient for effective harvesting. Research results do not indicate a yield response to applied nitrogen. Individual recommendations must be made for those growing on organic soils. On parsnips excessive nitrogen may encourage foliar diseases.

Phosphorus – Apply phosphorus to maintain reasonable soil levels of this nutrient.

Potash – Crops may respond to potash if it is low. Maintenance levels of potash are usually applied by growers.

Micronutrients – *Magnesium* deficiency may occur where dolomitic limestone has not been used. MgO may be included in the fertilizer but it would be recommended to use dolomitic limestone. Apply some *boron* in the fertilizer (.2 to .3B) or apply 5.5 kg per hectare of Solubor to the soil before planting or as a foliar spray. *Copper* and *molybdenum* must be applied on peat soils. Apply copper sulphate (50 kg per hectare) and sodium or ammonium molybdate (5 kg per hectare).

Application Method – Generally nitrogen, phosphorus, potash, calcium and magnesium are broadcast and incorporated before planting since efficient banding equipment does not seem to be available. Nitrogen is broadcast, if necessary. High rates of commercial fertilizers and manures applied pre-plant will damage germination. If high rates are felt to be necessary broadcast the phosphorus and part of the nitrogen and potash. Then side-dress the balance of the nitrogen and potash later in the growing season.

Pests and Pest Control

Weeds

Perennial weeds should be controlled prior to planting. Pre-emergence herbicides usually provide good weed control carrots can be severely injured by pre-emergence herbicides when heavy rainfall or a high water table coincides with carrot emergence. Post-emergence treatments are also available for annual broadleaf weeds and grasses. However the stage of crop and weed growth is critical for good control

with no crop injury.

Diseases

Leaf Spots and Blight (fungi)

Characteristics - Cercospora leaf spots are brown to gray and circular. Alternaria blotches are irregularly shaped brown to black and more prevalent on older foliage. Both are seed and soil borne, can be spread by wind, rain splash and farm implements but will only infect leaves when they are wet.

Control - Apply sprays at 7 to 10 day intervals starting the first week of July or if fields are checked regularly then when disease is first detected. Continue spraying until 3 weeks of harvest. Spray intervals can be increased if there is no rainfall and night temperatures are cool (minimum temperature below 15°). Follow a 2-3 year rotation and plow down carrot debris promptly following harvest. Storages and crates should be disinfected.

Gray Mold (Botrytis) and Sclerotinia White Mold (fungi)

Characteristics - Both fungi produce decays on stored carrots. The former has a gray, "fuzzy" appearance while the latter produces white cushions of mycelium which may contain hard black pea-sized fungal structures.

Control - Plant on a well-drained soil not recently used for beans, lettuce, peas, tomatoes, carrots or cabbage. Practice a 3 year rotation. Store carrots at 0°C with a relative humidity of 95 to 98%. Spray or dip washed or unwashed carrots with an appropriate fungicide prior to storage if carrots are not for export.

Root Knot (nematodes)

Characteristics - Carrots may have forked roots, irregular round galls and spindle-shaped enlargements on tap and side roots.

Control - Where root-knot nematodes are a problem, soil can be fumigated. Rotation or summer fallowing will reduce nematode numbers considerably.

Aster Yellow (mycoplasma)

Characteristics - Yellowish, dwarfed leaves, usually forming a tight rosette. Older leaves may develop reddish margins. The root at the crown may bulge up into a cone and many hair-like roots develop on the root. The mycoplasma overwinters in many perennial weeds and is spread by leafhoppers.

Control - Destroy weeds in fields, headlands, ditch banks, fencerows, etc. Avoid planting near susceptible crops. See leafhopper control.

Parsnip Diseases

(Itersonilia) Canker or Blight (fungus)

Characteristics - Leaf spots appear as small silvery areas which later enlarge to brown irregular shapes with indistinct dark borders. Cankers are most prevalent near the shoulder of the root; they begin where rootlets are attached to the taproot. Affected areas are first brown to reddish-brown, later becoming black as cankers develop and as affected areas become depressed. The fungus overwinters in diseased plant residue. Disease is worst in cool wet conditions.

Control - Apply five sprays at 7 to 10 day intervals beginning the first of August. In addition to spraying,

beneficial results are obtained by gradually hilling the rows. Every 10 to 14 days add a small amount of soil to the ridge until the rows are well covered.

Insects

Carrot Rust Fly

Characteristics - Damage is caused in feeding by yellowish-white, legless maggots which are 8 mm long when fully grown. Attacks result in stunting of carrot and parsnip plants. Roots may be reduced in size or distorted, scarred and riddled with rust-red burrows of the larvae. Seedlings may be killed if the growing tips are severely injured. Adult flies appear twice, in early summer and late August, and lay eggs, which hatch 6-12 days later into larvae. Adults may shelter at field margins increasing risk of damage in these areas.

Control - Where a known population exists chemical controls should be applied at planting. Planting may also be delayed until after mid-June to avoid the first generation of flies. Carrots may be harvested early (in late August or early September) before the maggot leaves the hair roots and enters the main tap root.

Aster (Six-spotted) Leafhopper

Characteristics - The leafhopper's can carry aster yellows from plant to plant as it feeds. They are small (4 mm long), slender, wedge-shaped insects. They are greenish-yellow in color. Once a leafhopper feeds on an infected plant, it can spread it to all the other plants it feeds on. They feed on many other crops such as potatoes, tomatoes, celery, spinach, lettuce, onion and squash.

Control - If granular insecticide was used for rust fly control at planting time, leafhoppers will be controlled until mid-July. At this time it will be necessary to apply foliar insecticides. If granular insecticide was not used, foliar sprays are required beginning the first week of July and repeated at 10 day intervals until the end of August. Spray field boundaries also.

SPECIFIC CHEMICAL CONTROLS FOR THE VARIOUS CROP PESTS DISCUSSED MAY BE FOUND IN THE APPLICABLE PEST MANAGEMENT GUIDES ON THE PERENNIA WEBSITE

Harvesting and Handling

To inhibit carrot sprouting, apply maleic hydrazide 4 to 6 weeks before harvest when the tops are in good condition. Follow manufacturer's directions.

Storage and Conditioning

Desirable storage conditions are a temperature of 0°C with a relative humidity of 95% to 98%. Carrots should keep 4 to 5 months under these conditions. Bunched carrots may be kept 10 days to 2 weeks at 0°C if the tips are not crowded. Do not store with apples or other fruits, as ethylene gas given off is one cause of bitter flavor in carrots. Good market quality of parsnips is the result of starch changing to sugar; this occurs after 2 to 3 weeks below 1°C in storage. It is not necessary to leave parsnips out over winter or to freeze them, although they are not injured by chilling. Because parsnips are susceptible to wilting, humidity must be kept high.

Maintaining sufficiently high humidity may be a problem, particularly in cold storage, with both carrots

and parsnips.

Bibliography

This document was originally part of the Vegetable Production in Atlantic Canada Guide Produced by the APASCC Advisory Committee on Vegetable Production, it was reformatted and updated by Perennia in 2017.

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