

Rutabaga and Turnip

Introduction

Both turnip and rutabagas are in the Cruciferae (mustard family). *Brassica rapa* Rapifera group is closely related to Chinese cabbage and mustards. It is usually a biennial but is cultivated as an annual. It seems to have originated in areas of Europe and Siberia. It has been cultivated since ancient times. Turnips have a white or yellow fleshed root generally of a flattened globe shaped root. The root is less dense than the rutabaga and lacks a neck. It is also free of secondary roots which occur on the tap root of a rutabaga. The leaves are hairy and without the wax of a rutabaga.

Brassica napus Napobrassica group (rutabagas) are closely related to Cole crops and seem to have originated in the Mediterranean area. The rutabaga was introduced by England about the end of the 18th century and was called the turnip rooted cabbage. Both white and yellow fleshed cultivars exist. The rutabaga root consists of both true root and true stem. The upper portion of the stem forms a neck. This neck distinguishes rutabagas from turnips. Rutabaga is the French name for a "Swede" turnip.

Turnips and rutabagas are well adapted to cool and humid growing conditions. The minimum temperature for germination is 5°C, the optimum germination range is 15 to 40°C, with an optimum germination temperature of 15°C. They favor growing temperatures in the 15°C to 20°C range and are frost resistant but are not usually left in the ground later than the end of October. They can withstand dry periods if some soil moisture is available. Growth is reduced by an excess of water. Cracking of the root may occur with an excessive growth rate brought on by heavy fertilization, wide spacing's and hot humid weather. Sometimes these growth cracks become infected with soft rot.

These crops thrive on moist, well drained and moderately acid, sandy loams, loams and clay loams which are well supplied with organic matter. On sandy loams roots may tend to be elongated especially in dry weather and with dense plant populations. The best quality crops seems to come from clay loam soils which are well drained and that have not been intensively cropped.

In the Atlantic area both turnips and rutabagas are grown commercially only for their roots. The turnip (white purple top) being earlier is marketed 2 weeks before the early rutabagas are available July 1 - 14. Turnips may be grown throughout the year especially with the aid of irrigation from July 1st to the end of October. This crop may also be stored for short periods of time depending on the availability of markets. Yields of turnips could range between 25,000 to 35,000 kg per hectare. Rutabagas are marketed from mid-July until the end of October from the field and are marketed from storages until the 1st of July (or later in some years). It is one of the few vegetable crops we can have on the market 12 months of the year. Rutabagas should produce marketable yields of 20,000 to 50,000 kg per hectare under good growing conditions with adequate pest control.

Turnips and rutabagas are important crops in the Atlantic area for domestic markets and for export. Maintaining and expanding markets for this crop with better quality and marketing techniques is probably the best development strategy. Small amounts of rutabagas are processed on a sporadic basis mainly for canning purposes. Specialty markets may exist for some types of turnips.

Nutrient Content: Good source of Vitamins A and C; potassium and small amount of other nutrients. Low in Sodium. 250 mL (1 cup) rutabaga raw contains 42 kilocalories; cooked – 74 kilocalories.

Crop Establishment

Seed Treatment – obtain sized, registered seed of a high percentage germination and vigor.

Seedling planting – Rutabaga seeding for early market may be made as soon as soil can be worked. For the main storage crop, plant late in June or early in July, so that the roots will develop during the cool fall weather. Seed at the rate of 225 to 450 g per hectare and at a depth of .6 to 1.2 cm. Seed should be sown 10 to 17 cm apart in rows 50 to 90 cm apart. Use seeders that space the seeds to known intervals, or to stand. This will eliminate thinning and produce a highly uniform crop. Where thinning is required, do so when the plants are 4 to 8 cm high. Space 15 cm apart in the row. Use the wide in row spacing for early production and the close spacing for producing small product for poly bag packs. (Spacing affects both the size and the harvest date.)

Crop Management

Cultivate – Start cultivation early for weed control, cultivate shallowly and frequently.

Irrigation – May be used sometimes to cool and slow the growth of the crop as well as to promote growth and quality. Irrigation may activate soil insecticides or carry fertilizer to the plant roots.

Early crops – May be grown with the use of transplants. Transplants may be started in late March and field set or placed in tunnel houses in mid to late April. Turnips are earlier than rutabagas. There appears to be little difference in the earliness of maturity in rutabaga cultivars. These crops may be seeded in module trays or peat blocks.

Rotation – Long rotation is critical in most crops.

Nutrition

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

Turnips and rutabagas require only moderate amounts of fertility. A better quality product is produced if the growth is moderate and uniform, and the crop matures under cool conditions.

Manures – Manures may be used but excessive levels coupled with wide spacing and hot humid weather have led to excessive splitting and sometimes total loss of the crop. There are high risks in trying to produce rutabagas by mid-July.

Lime – Lime should be applied to maintain the soil pH in the range 6.0 to 7.0.

Nitrogen – Too much can be detrimental to this crop in terms of growth cracks and the reduced storage life of the crop. Excessive nitrogen and high plant populations may also cause the rutabaga root to become elongated. Usually nitrogen is broadcast pre-plant and incorporated into the soil. Some early rutabaga growers may also side-dress their crop in June.

Phosphorus – Is generally applied pre-plant and incorporated into the soil. High rates of phosphorus are thought to increase the growth rate of this crop in warm humid weather along with nitrogen resulting in more growth cracks.

Potash – These crops do not generally respond to potash. Generally potash is applied pre-plant incorporated.

Sulfur – On sandy soils with low organic matter that are intensively cropped without the use of manure, application of gypsum should be considered

Magnesium – On soils low in pH, especially sandy soils, magnesium levels may be low. Apply magnesium in the fertilizer, apply dolomitic limestone and/or apply foliar sprays of magnesium sulphate (Epsom salts).

Micronutrients – *Boron* deficiency causes brown heart or water core. Apply 3 kg per hectare of boron with the fertilizer at the time of planting; also apply one or two sprays (10 days apart) of solubor at 3.5 per hectare when the roots are 1 to 3 cm in diameter. If the soil pH is over 6 then foliar sprays are essential to obtain a marketable crop.

Manganese - may be a problem where pH is high on sandy soils. Control may be obtained with a number of sprays of manganese sulphate.

Application Method – Fertilizers at high rates are best broadcast and incorporated prior to planting. Fertilizer placed too close to the root will result in excessive root formation, misshapen roots and consequently high cull rates.

Pests and Pest Control

Weeds

Herbicides recommended for use on rutabagas will not provide total weed control, therefore, it is important to grow rutabagas in soil where the weed seed population is low. This is best accomplished by a crop rotation program utilizing crops where weeds can be thoroughly controlled for a year or two prior to rutabagas. Stale seedbed technique can be used to considerable advantage on late seeded rutabagas. Care must be taken to avoid fields where residual herbicides from previous years persist in the soil as crop injury may occur. Cultivation is required to supplement chemical weed control.

Diseases

Downy Mildew (fungus)

Characteristics – Shows as a white, fuzzy fungus in patches on underside of leaves, stems and heads. The fungus overwinters on seed, in cruciferous weeds and perhaps soil. May cause internal discoloration of roots.

Control – Plant hot-water-treated seed. Avoid thick or heavy seeding. Plow crop residue following harvest. If infections are severe rotate with non-susceptible crops.

Clubroot (fungus)

Characteristics – Causes wilting and yellowing of above ground parts. Large spindle shaped galls form on the roots. The fungus causing clubroot in rutabagas and cole crops is usually present in areas where these crops have been grown for many years. Land will remain infested for 7 years or longer after a diseased crop. Certain weeds of the mustard family, such as wild radish and wild mustard (cadlock) will maintain or increase the level of infestation year after year. Every effort should be made to control weeds of this family. Soil pH of less than 7.2 favors the disease.

Control – Avoid fields known to be infested and practice a rotation of 7 years once infestation has been encountered. Do not use manure from animals fed on infected crops on land intended for rutabagas or any cole crop. Put manure back on the fields that contained the infected roots and do not grow any cole crop on the field for at least 7 years. Grow resistant varieties. Even when growing a resistant variety, practice a 3 year rotation between cruciferous crops. Do not rely on resistant varieties alone.

Skin Rot (fungus) & Common Scab (Bacterium)

Characteristics – Rhizoctonia and scab, which are well known as diseases of potatoes, may cause quite severe damage to rutabagas. If these diseases are present in the soil, they may be much more severe where insecticides are not used to control root maggots. Rhizoctonia also develops further in roots kept under poor storage conditions.

Control – Practice crop rotation, such as: potatoes, grain, and one year of hay; then plow early, keep land free of weeds in the fall, and plant rutabagas the following year, do not use manure from cattle fed on diseased roots on land to be sown to rutabagas. Keep storage temperature between 0°C and 2°C.

Blackleg (fungus) and Black Rot (bacterium)

Characteristics – Early signs of blackleg appear as small spots on leaves of young plants. On stems the spots are more linear and often surrounded by purplish borders. Stem lesions at the soil line usually extend to the root system causing dark cankers. The fibrous root system may be destroyed although new roots sent out above the lesion may keep the plant alive. Plants may wilt abruptly and die. Dark cankers may develop in fleshy roots of turnip and rutabaga or may develop as a dry rot on stored roots.

Black rot lesions first appear at margins of leaves. The tissue turns yellow and the lesion progresses toward the center of the leaf, usually in a v-shaped pattern with the base of the v toward the mid rib. The veins become dark and discoloration frequently extends to the main stem and proceeds upward and downward. Black discoloration of rutabaga roots may occur.

Control – Use hot water treated seed or seed treated with an antibiotic. Practice a 4 year rotation. Destroy cruciferous weeds as they may harbour the black rot organism.

Water-Core or Brown Heart

Characteristics – Caused by boron deficiency. Appears at first as firm, water soaked patches in the rutabaga flesh. May eventually turn brownish and punky inside.

Control – Apply boron with the fertilizer and/or as foliar sprays.

Insects

Root Maggot

Characteristics – The adult is a two-winged, ash-grey fly with black stripes on the mid-section. It is half the size of a housefly, but has longer legs. Larvae are white, legless maggots. They are wedge-shaped with dark feeding hooks at the pointed front end. The pupae are 6 mm long, oval, hard shelled and dark brown. There are two to three generations a year. Pupae overwinter in the soil near the roots of the host plant. Adult flies emerge in the spring and crawl to the surface. They fly close to the ground near host plants and lay elliptical white eggs on the stems or in nearby crevices in the soil. Eggs hatch in three to seven days. Maggots enter the roots and feed by rasping the plant tissue with a pair of hook-like mouthparts. They mature in three to four weeks and pupate. Flies emerge in two to three weeks. Larvae or maggots feed by tunneling in the roots. Plants may be killed, weakened or stunted, and yields reduced. Plants that are killed, wilt, have a grey overcast and remain in place in the row unlike those severed at ground level by cutworms. A small amount of tunneling in rutabaga or radish lowers the grade or renders the crop unmarketable.

Control – Practice crop rotation, and grow the current year's crop as far as possible from fields used for rutabagas or cole crops last year. Do not grow crops of early and late rutabagas close together. Separate them by at least 200 meters. Apply insecticides as listed in publication 1400A.

Wireworm

Characteristics – Early in the spring, adult wireworms (click beetles) lay their eggs around grass roots. The larvae hatch in about a week and will live for 2 to 6 years in the ground feeding on roots and seeds. The wireworms, or larvae, are yellow, white or darker shades of brown. They may be 1.2 to 4 cm long and have a hard, smooth surface. When a larva is mature, it pupates in the fall. It then becomes an adult beetle and waits until spring to emerge. Wireworms are often numerous in land that has been in sod for several years. See appendix III in the supplement to this guide. These are sometimes confused with millipedes which have numerous pairs of legs and coil up when disturbed.

Control – Plant treated seed and avoid planting crops highly susceptible to wireworms in a field that has been recently in sod.

Aphids

Characteristics – Aphids are small, soft-bodied, slow-moving insects. They are often found in large colonies on the undersurface of leaves. A colony consists of winged and wingless adults and various sizes of nymphs. Aphids may be black, yellow, or pink but mostly are various shades of green. Aphids feed by sucking plant sap. Saliva injected while feeding may carry plant viruses or may be toxic to the host plant. Feeding by large numbers discolours foliage, curls leaves and damages developing buds. The plants may be covered by a sticky substance, honey dew, which is excreted by the aphids.

Control – Spray only if aphids are so numerous as to cause wilting of leaves during dry weather. Predators such as lady bird beetle (coloured orange with black stripes or spots) and their larvae (black or purple with orange or white markings) may control severe attacks of aphids.

Cabbage Looper, Imported Cabbage Worm, Diamondback Moth Larvae, Purple Backed Cabbage Worm

Characteristics – The adult of the imported Cabbage Worm is a white butterfly easily seen going from plant to plant laying eggs during the summer. The eggs become velvety-green larvae with one thin yellow stripe down the center of its back. The cabbage worm larvae does not loop when it walks. They are generally the most prevalent of the cabbage larvae.

The cabbage looper gets its name from the way it loops as it walks. It is a smooth green larvae with pale yellow stripes along the back and sides. They are heavy feeders.

The Diamond-Back Moth is much smaller than the previous insects. Three to six generations of 1.1 cm green larvae may develop each year. The larvae squirm actively when disturbed and produce many small holes on the host plant.

The Purple-Backed Cabbage Worm is not as commonly seen as the others but will cause serious damage in high numbers. The larvae are purple on the back and pale yellow along the sides. There are two generations per year.

Control – If worms are causing severe leaf damage, use one of the recommended insecticides.

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

The quality and flavor of rutabagas are much improved when the roots are fully matured or are exposed to a slight frost before harvesting. Immature roots have a bitter taste, and if early seeded rutabagas are left in the field until late fall the roots tend to become fibrous and woody.

Certain types of potato diggers can be readily adapted for harvesting rutabagas, but before you start to dig remove the tops with the aid of a topping device. Crops can also be harvested by using a modified sugar beet or carrot harvesting machine. In preparation for long-term winter storage (6 to 8 months), trim the tops to within 1 Cm of the body and cut off the bottom of the taproot and the fibrous side roots.

Protect newly harvested rutabagas from sunburn and freezing at all times and handle them gently to avoid bruising.

Mechanical harvesters tend to spread bacterial and fungal organisms, particularly if the crop is not dried within a week or two after harvesting, to crowns and mechanical wounds on roots. To minimize rot in the crown rutabagas should be topped a week or 10 days before harvesting, with a hoe, knife or mechanical topping machine.

Storage and Conditioning

Rutabagas may be piled up to 2 m deep over a slatted floor with an air circulation system to keep the temperature uniform. Perforated plastic sheeting placed horizontally at 45 cm intervals helps to reduce moisture loss and excessive accumulation of moisture at the top of the pile or on the roof of the storage area. To obtain best results, lower and maintain the storage temperature close to 0°C and keep the humidity at 90% or higher. Under these conditions, rutabagas keep for over 6 months, the flavor of rutabagas is improved by the conversion of starch to sugar, reducing strong or bitter flavor. This chilling may occur in the field or in storage.

In Atlantic Canada rutabagas are commonly washed. In Central Canada they are frequently waxed to prevent loss of moisture during marketing. Shelf life is also prolonged by plastics. Waxed rutabagas are considered to have a greater eye appeal and greater consumer demand than un-waxed ones. Temperatures must be kept low after waxing as waxed rutabagas spoil quickly at room temperature.

An alternative method is to place rutabagas in perforated plastic containers to prolong shelf life. Rutabagas in plastic bags have been kept at room temperature for 6 weeks without apparent deterioration compared with 3 to 4 days for waxed ones under the same conditions.

Bibliography

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Lougheed, E C.1980. Storing Rutabagas. O.M.A.F. Factsheet 80-001. 2 pp.

Nonnecke, I. L., E.W. Franklin. 1974. Rutabagas. O.M.A.F. Pub. No. 502. 15 pp.

Read, D.C. 1979. Growing Rutabagas. Agriculture Canada, Publication 1355, Ottawa, Canada, KIA OC7.

Shattuck, V. and B.J. Shelp. 1985. Brown Heart in Rutabaga. O.M.A.F. Factsheet 85-104. 2 pp.

Swedes and Turnips for the Fresh Market. 1980. Grower Guide No. 14. Grower Books, London, U.K. 92 pp.

The Waxing of Turnips for the Retail Market, Agriculture Canada, Publication 1120, Onawa Canada, KIA OC7.