Introduction

Rutabagas and turnips are both biennial root crops in the Brassica family, and are related to all crops developed from Brassica oleracea (cabbage, broccoli, cauliflower, kale, canola etc.). Rutabaga is a cross between turnip (Brassica rapa) and cabbage (Brassica oleracea). Turnip and rutabaga both produce a medium-sized bulbous tap root that can be used for both human consumption and livestock feed. The major difference between the two is that in the edible portion of turnip, all tissues are derived from the root, while the edible portion of a rutabaga is composed of both root and stem tissues. The confusion caused by visual similarities between these two crops is further exacerbated by that fact that in Newfoundland and Labrador, rutabaga is most often referred to as turnip. Rutabaga has been grown and consumed in Newfoundland and Labrador since its early colonization, and continues to be major vegetable crop for the province.

Growth Requirements

These crops respond positively to well-draining, moderately acidic soils with good soil organic material and good water-holding capacity. Soil pH values between 6.0 and 6.8 are considered optimum for rutabaga and turnip. When grown in light soils, the tap roots tend to elongate more than in fine-textured soils and result in long, slender roots. Excessively stony fields can damage the roots of these crops during development.

Vegetable cultivars suggested in this production guide are based on available season length, tolerance to disease, and suitability for current production practices prevalent in the Province of Newfoundland and Labrador.

Rutabaga: American Purple Top, Laurentian, York, A.C. Brookfield (green)
Turnip: White Lady, Just Right, Purple Prince
Crop Guidelines – Rutabaga and Turnip

Nutritional Value

Both rutabaga and turnip are good sources of Vitamins A and C, as well as potassium. One cup of cooked rutabaga provides 74 kilocalories.

Crop Establishment

Seed Germination

Minimum soil temperatures of 5°C are required for germination; however, optimum germination and vigor occurs at temperature between 15-30°C.

Seeding/Planting

Spacing for rutabaga and turnip should be 50-90 cm between rows and 10-17 cm between plants within the row. Plant seeds at a depth of 0.5-1.5 cm. If thinning is required, wait until plants are between four to eight cm in height and thin to 15 cm between plants in the row. Spacings are generally wider for early season production, while production for storage often involves tighter spacing. Direct seeding of rutabaga requires between one to two kg of seed per hectare depending on season and end use.

Crop Management

Rutabaga and turnip show optimum growth at temperatures between 15-20°C and are well adapted to cool growing conditions. Conditions that lead to excessive growth in a short period – such as high amounts of rainfall after periods of drought, or over-application of nitrogen fertilizer – can cause roots to crack. This can reduce marketable yield due to root tissues cracking, or infection by soil borne organisms that can enter through these cracks. When rutabagas and turnip are produced on droughty soils and/or in high densities, roots tend to elongate rather than fill, and can produce oddly shaped roots that may be difficult to market.

Nutrition

All soil fertility and limestone applications require soil analysis at the provincial Soil, Plant and Feed Laboratory. Test soil before undertaking any agricultural activities. Consult your crop or soil fertility specialist for production recommendations.

Nitrogen: Rutabaga and turnip have relatively low nitrogen requirements, where excess nitrogen can cause uneven growth throughout the season. This can cause excess cracking and result in problems in storage. Both crops require approximately 55 kg nitrogen per hectare.

Phosphorus: Rutabaga and turnip are unlikely to respond to potassium application when soil potassium levels are 300 mg/L or above. For organic soil, please consult your crop or soil fertility specialist.

Potassium: Rutabaga and turnip are unlikely to respond to potassium application when soil potassium levels are 300 mg/L or above. For organic soil, please consult your crop or soil fertility specialist.
Micronutrients: Boron deficiency can cause a disorder called brown heart, which causes a brownish, water-soaked appearance in root tissues. In severe cases, the internal tissues become soft. If boron deficiency is suspected, conduct a soil analysis. If boron deficiency is confirmed, incorporate approximately one kg/ha boron as part of the broadcast fertilizer application prior to planting. If deficiency symptoms present during the season, a foliar application of boron is advisable.

If deficiency symptoms are suspected, contact your crop or soil fertility specialist for diagnostic services (soil or plant tissue analysis may be needed).

Application

All prescribed phosphorous, potassium and micronutrients, and two-thirds of the prescribed nitrogen should be broadcast and disked in before planting. The remaining one-third of the nitrogen application should be applied six to eight weeks after planting.

If applying raw manure, it must be applied at least 120 days before harvest.

Growers should either:
- Use properly composted or otherwise sterilized manure for application during the current growing season, or
- Apply raw manure in the fall before crops are planted the next spring.

Climatic Limitations

Bolting (flowering) can be problematic for early plantings, and temperatures as mild as 3°C for three to five days can be enough to induce early flowering. Early flowering greatly reduces yield and root quality.

Pests and Diseases

Disease: Black Rot (Xanthomonas campestris)

Characteristics: Lesions often start at the edge of leaves and develop into a large, v-shaped yellow area, which extends the width of the leaf. After infection of the midrib of the leaf the disease travels through vascular tissues into the root, where it can cause a darkening of the vasculature. This is visualized by a dark coloration of the tissues just below the outer surface of the root.

Control: Proper crop rotations will help reduce the populations of the black rot bacterium in the field. If an outbreak occurs, the field should not be used for the cultivation of any Brassica species for a minimum of five years. This also includes the removal of any brassica weed species and crop residues from the field. Hot water treatment of seeds will also reduce seed transmission of this pathogen.

Disease: Clubroot (Plasmodiophora brassica)

Characteristics: Clubroot is a major pathogen of all Brassica crops (which includes rutabaga and turnip) grown in Atlantic Canada. The pathogen is soil borne and enters plants through the root tissues. Symptoms of the disease generally involve swelling and/or malformation of root tissues and can be accompanied by wilting and eventually death of the plant. The pathogen is more problematic in wet, cool, acidic soils.

Control: Proper crop rotation is extremely important to control the populations of this pathogen in the soil.
A proper crop rotation should have a minimum of three years between the cultivation of Brassica species. Spores of this pathogen can survive in soil for up to seven years and can infect any member of the Brassica species grown as crops in Newfoundland and Labrador. If an outbreak occurs, Brassica species in the same field can become infected, resulting in a major, or complete crop failure. Sanitation is important, as spores of this pathogen are released into the soil when infected plant tissue begins to breakdown and decay in the field. If an outbreak occurs, infected material must be removed and destroyed before the spores enter the soil. In addition, weeds in the Brassica family may harbor infections and create a source of new spores. There are very few chemical controls for Clubroot and those that do exist provide inconsistent control.

**Disease: Powdery Mildew**
*(Erysiphe polygoni)*

**Characteristics:** The disease appears as a white to gray fungal mass on the outside of leaves and the fungus often has a fluffy or powdery appearance. From a distance it can appear as if the leaves are dirty or mildewed. This disease can reduce yield significantly, but is unlikely to cause a complete crop failure.

**Control:** Proper crop rotations will help to reduce the populations of this disease in the field. Field sanitation is also important, and the removal of weeds in the Brassica family is essential, as this disease requires a living host plant to survive. As this fungus primarily attacks leaf tissues, it is advisable to avoid dense crop canopy that can reduce air movement.

**Insects: Cabbage maggot**
*(Delia radicum)*

**Characteristics:** The larvae stage of the cabbage maggot feed on the root tissues of rutabaga and turnip. They tunnel into and feed along the surface of the root causing major damage which often leads to wilting and death. In addition, the root feeding site acts as an entry point for soil borne pathogens to enter the root tissues and cause infection. This disease can cause massive marketable yield losses and complete crop failure if not controlled.

**Control:** Proper crop rotation is important to control this insect as larva of Delia radicum will not feed on non-brassica crops. Proper incorporation of plant residues to depths greater than five cm will also help reduce populations of cabbage maggot by displacing their food source. Crop monitoring is important for the control of this pest. A model has been created to predict the date of emergence of adult flies. The model uses growing degree days (base 6°C) and predicts an averages of 356, 904 and 1,525 for the first, second and third emergence of adult flies respectively.

**Harvest and Handling**

Rutabagas are generally pulled from the ground and the tops are trimmed in the field. The roots are then washed and rinsed with clean water before being dried. If rutabaga are intended for immediate sale, they are waxed however this is not advantageous if the crop is to be stored long-term. Diseased, bruised or otherwise damaged roots will not store well and can act as a source for contamination in storage. Turnips and rutabaga can be harvested mechanically in situations involving large areas.
Storage Conditions
Both crops should be stored at between 0-2°C and with a relative humidity between 90-95 per cent.

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