Brassica Vegetable Crops

Grow with USask

University of Saskatchewan

Brassica vegetables (cole crops) belong to the mustard family of plants. These brassicaceae plants were formerly classified as cruciferous plants. 'Cruciferous' because the petals of the flowers of these crops form a cross. Brassica vegetables include; cabbage, broccoli, cauliflower, kale, kohlrabi, Brussels sprouts, radish, turnip, rutabaga, Chinese cabbage, mustard greens and mustard cabbage (bok choi or pak choi).

Tips for Planting

- Brassica vegetables are one of the crops that are ideally suited to growing in a northern climate. Most of these crops prefer temperatures around 20-25˚C for optimum growth and can easily mature during our growing season if directly seeded in the soil early in the season. However, if the 'time to harvest' on the seed packet is recommended to be longer than 90 days, that cultivar should be transplanted to ensure it will be mature prior to winter freeze-up in fall.
- All young brassica vegetables can withstand a couple of degrees of frost. Brassica crops can be direct seeded around May 1st or transplanted out around May 14th in a typical Saskatchewan growing season.
- Transplanting broccoli, cabbage, cauliflower, kale, kohlrabi or pak choi in spring will give you a head start on the growing season and an early summer harvest.
- All Brussels sprout cultivars must be transplanted in order to produce sprouts during the relatively short Saskatchewan growing season.

Starting your own plants indoors

- Brassica vegetables that are going to be transplanted outdoors should be started approximately 5-6 weeks prior to transplanting out.
- Sow weeds in a commercial soilless media containing peatmoss, perlite and vermiculite (ex. Sunshine Mix #4). Soilless media provides a disease-free environment as well as excellent drainage to minimize root disease problems.
- Use flats, pots or containers with bottom drainage holes. At a soil or media temperature of 24°C, brassica seeds will germinate in 5 or 6 days.

White Vienna and Purple Vienna Kohlrabi

- Brassica seedling transplants require a minimum of 14 hours of light each day. Supplemental grow lights will probably be necessary to produce healthy, sturdy transplants. To test if you have sufficient lighting: the shadow cast on a white piece of paper at midday by an object 10 cm above a white piece of paper should have a definite outline. If there is no outline, light is inadequate and plants will stretch toward the light, becoming leggy. A set of florescent tubes (one cool white and one warm white) placed 30-45 cm above the seedlings for 12-14 hours during the day will provide adequate light.
- Fertilize developing transplants two times/week using 20-20-20 soluble fertilizer. Mix according to label directions.
- A common disease disease found in brassica transplants is 'Damping off': a fungal disease affecting young brassica plants and transplants. Stems become water-soaked and constricted at the soil level. Plants wilt and eventually collapse. To prevent damping off, provide adequate air movement, avoid overwatering and crowding in young seedlings and transplants.

Mature head of broccoli.

Planting Outdoors

- Brassica transplants can be transplanted outdoors as soon as daytime temperatures reach15°C and night temperatures are not below -2°C for several nights in a row.
- Harden off transplants prior to planting out by moving them outdoors into a sheltered, frost-free location at least 3 days prior to transplanting.
- Recommendations for planting and harvesting brassica vegetables in the cold season climate.

Vegetable	Seed or Transplant	In row spacing (cm)	Between row spacing (cm)	Days to maturity from seeding
Broccoli	Both	30	75-100	60-80
Brussel Sprouts	Transplant	50	100	140
Cabbage	Both	50	100	100-140
Cauliflower	Both	30	75	60-100
Chinese Cabbage	Both	30	75	75-100
Kale	Both	20-30	50-75	60-90
Kohlrabi	Both	8-10	50	70-100
Mustard Greens	Seed	3-5	30	50-75
Pak Choi	Both	20-30	40-50	75-100
Radish	Seed	3-5	20-30	30-60
Rutabaga	Seed	10	40-50	100-120
Turnip	Seed	10	30-40	80-100

Growth and Harvest

- For the best flavour, harvest rutabagas and Brussels Sprouts after a fall frost (or two) of -3°C. Other mature brassica crops will all tolerate light frosts but should be harvested before experiencing frosts of -2°C or lower.
- Broccoli heads are ready to harvest when heads are tight and beads (immature flower buds) are small. Both the head (florets) and the stalk of broccoli are edible. Smaller side shoots that emerge from the main broccoli stalk several weeks after the main head is harvested are also edible.
- Brussels sprouts are one of the most interesting and fun brassica vegetables to grow. Brussels sprouts must be transplanted as they require a long season to mature (at least 120 days). In order to get the modified leafy buds along the main stem to develop and enlarge, the growing point of each plant should be removed during the 3rd week in August. Simply break off the top 1cm of the plant. Instead of continuing to add growth on the top, the plant will put its energy into developing the sprouts along the side of the stem. By early October, the sprouts should be a good size for harvest. For best flavour, harvest Brussels Sprouts after a fall frost (or two) of -3°C. The cold temperatures sweeten the sprouts.
- Cabbage (green and red) heads are ready to harvest when heads are firm to the touch. There are many different cultivars of cabbage which mature at different times. An early cabbage like 'Dynamo' (small, soft ball sized heads) can be ready to harvest by mid-July whereas a later storage variety such as 'Lennox' or 'Multikeeper' may not produce solid heads until late September. Cabbage varieties that mature earlier tend to split if not picked in a timely manner whereas later varieties have a better 'holding-capacity' in the field and resist splitting. Mature cabbage heads can withstand frost temperatures of 4-5°C below freezing.

Mature brussel sprouts

- Unlike green cabbage, Chinese cabbage does not form tight heads. The heads are ready to harvest when they are full but not tight: this usually occurs by mid-summer for cultivars that are seeded in spring. Chinese cabbage that is left too long in the garden will quickly bolt (produce flower stalks). Bolting chinese cabbage can have a very bitter flavour.
- Cauliflower heads are ready to harvest when they have reached a good size, 15-25cm in diameter (depending on the cultivar), florets remain tight and leaves are tight around the heads. In the past, cauliflower needed to be 'blanched' in the field, i.e. it was necessary to tie large bottom leaves from the plant around the developing cauliflower head (curd) to ensure that the florets remained white in colour. Currently, this practice is unnecessary with seed companies selecting cultivars that have self-blanching traits. Most cauliflower cultivars today produce leaves that completely enclose the developing cauliflower head and ensure that the cauliflower head (curd) remains a bright, attractive colour – whether it is white, purple, orange or green.
- Kale should also be harvested when leaves reach a desirable size. Harvest leaves from the bottom of the plant near the main stem. New leaves will continue to grow at the top of the plant. Kale seems to be a little more forgiving and will not bolt as readily.
- To ensure a steady supply of kale and mustard greens throughout the season, consider multiple plantings seeded at 2–3 week intervals.
- Kohlrabi is ready to harvest when the swollen above ground stem reaches at least 7-8cm (early August). Trim off the top leaves. The outer layer can be woody and tough on medium to large sized kohlrabi. Peel these tough layers to expose soft, delicious flesh to eat raw or steamed. Oversize kohlrabi (15cm or more in diameter) will tend to be woody.
- Brassica greens refer to a wide array of leafy plants that belong to the Brassica family with a variety of flavours and textures. Mustard greens (Brassica juncea) consist of edible mustard plants which do not form heads and have a distinct horseradish-mustard flavour. These mustard greens are used in many food dishes originating from Africa, India, China, Japan and Italy. In Japanese cuisine, these types of greens are often referred to as 'Takana'. Recently, seed companies have provided northern gardeners with leafy green mixes that contain lettuce and/or spinach seed along with spicy mustard greens: examples include Vesey's Seeds 'Spicy Mesclun Mix' and 'Simply Salad Global Gourmet Mix' (Stokes Seeds). Mustard greens should be harvested when leaves reach a desirable size. (late June to mid-July) Cut leaves off at ground level. Mustard greens tend to bolt quickly if not harvested in a timely manner. Mustard greens that have bolted are edible but may be extremely bitter.

Mature head of broccoli.

- Pak Choi or Bok Choi is also known as 'spoon leafed' cabbage. This plant is easily grown in cool climate areas and is ready to harvest by the end of July to early August when planted in early to mid-May. These plants are ready to harvest when the petioles have reached a tight mass just above ground level. Cut the entire head at ground level. Pak Choi typically does not bolt in the garden and can be left in the garden for brief periods until you are ready to harvest it.
- Radish, turnip and rutabaga are all root crops in the brassica family. Radishes and turnips are ready to harvest when they reach a usable root size. For radishes, 1.5-3cm in diameter is an ideal size. Oversized radishes tend to be woody or bitter.
- Turnips can be harvested when roots are as small as 4cm. The interior of the turnip is white in color; the exterior also remains white unless exposed to the sun in which case it turns pink, red, purple or green in colour. The leaves of turnips, sometimes referred to as 'turnip greens' can be eaten and taste somewhat like mustard greens. Baby turnips are harvested early, are more mild in flavour and can be eaten like radishes. Large turnips (over 10cm diameter) can become woody and bitter. Turnips are usually harvested in mid-late summer.
- The rutabaga is yellow fleshed and provides its best flavour after it has been exposed to temperatures slightly below freezing. Rutabagas should be harvested in late fall. A series of frost events will sweeten rutabaga flesh. Dig turnips out of the ground, gently shake off excess soil and remove tops. Under ideal conditions (temperatures just above freezing and humidity around 90-95%), rutabagas can be stored for 4-5 months.

Pests

Growing brassica vegetables in an area where there is a lot of canola or mustard grown on large scale farms can be a challenge. Canola and mustard are members of the brassica family. The large acreages of these two field crops attract a wide variety of Brassica pests and diseases to the Prairies.

- Flea beetles are one of the earliest pests of brassicas. Flea beetles are tiny black flies (approximately 2mm in length) that jump from plant to plant and feed on leaves, giving a shot hole appearance to stems and leaves. They are especially devastating to young seedlings by completely devouring tiny cotyledons and first true leaves as they emerge. Cover new seedlings with thin crop covers for protection. If flea beetles are a big problem, consider transplanting all your brassica crops.
- Cabbage loopers are the fleshy, green caterpillars that can be found inside broccoli, cabbage and cauliflower heads throughout the season. Not only do they chew holes in the leaves of the plant but there green mushy excrement can be found throughout the crevices of leaves and heads. Although the excrement is not harmful to humans, it is unsightly. The adult form of the cabbage looper is the small white butterfly often found flying around the garden. These butterflies lay their yellow colored eggs on the underside of leaves which then hatch into the caterpillars. Covering plants with thin supported crop covers will prevent butterflies from laying their eggs on plants. Bacillus thuringiensis (Bt) is a type of bacteria that is not harmful to humans and can be sprayed on the plant to control loopers. Check with your local garden centre for available products.
- Root maggots are a huge problem in brassica vegetables in areas with large acreages of canola. Pupae overwinter in the soil. Grey-black flies emerge from the soil and lay eggs at the base of cole (brassica) crops. The first round of egg-laying occurs from late May to early June. Shortly after eggs are laid, white maggots hatch and attack the roots of the young plants. Brassica plants affected by root maggots will appear stunted and older leaves will turn yellow or purplish-red and then eventually die. Affected plants can easily be pulled out of the ground since the roots have been eaten off my maggots. In severe cases, the maggots will be visible. A second flush of flies and maggots occurs in mid-late August. At this later stage, maggot damage may also occur at the base of the cabbage heads: they eat holes into the head. There are no chemical controls for root maggots. Covering brassica crops with a thin crop cover does not eliminate maggots that develop from overwintering pupae.

Broccoli plant affected by root maggots.

- Radishes have become especially difficult to grow due to maggot problems. Try growing radishes and other brassica crops in containers with new media, such as Sunshine #4, each year.

Diseases

- Diseases in brassica crops have not been a huge problem in the past.
- A more recent disease to the Prairie region and a potentially crippling disease for all types of brassica plants is clubroot. Clubroot is caused by the pathogen Plasmodiophora brassicae, which is classified as a protist, or an organism with plant, animal, and fungal characteristics. Clubroot is serious problem in Atlantic and Maritime regions of Canada as well as the coast of British Columbia.
- Club root was discovered in fields around Edmonton in 2003 and has since spread into central Alberta. Galls form on the roots of the brassica crop, restricting water and nutrient uptake in the plant, eventually leading to plant death.
- The pathogen is soil borne and spreads contaminated soil is moved to an uninfected area. Once club root is in the soil, there are no economic means to eradicate it. Prevention is the only answer.
- Avoid moving soil from infected areas to non-infected areas: this includes plants, potato tubers, footwear, equipment and vehicles.
- The best way to avoid diseases and pests in brassica crops in the garden is to practice good basic gardening techniques.
- Provide fertile soil with good organic matter.
- Allow adequate spacing for plants.
- Keep weeds to a minimum.
- Rotate brassica vegetables with vegetables from other families on a minimum 3 year cycle.
- Remove diseased plants and avoid watering late in the evening.