Curcurbits: Vegetable Vine Crops

Grow with USask

University of Saskatchewan

Cucumber, winter squash, cantaloupe, watermelon and pumpkins are all vegetable crops in the Cucurbitaceae family that grow on vines and will ripen in Saskatchewan: some vine crops requiring more assistance than others to reach maturity during our relatively short growing season. Botanically speaking, these cucurbits are classified as a fruit: a seed bearing structure in flowering plants that forms from the ovary after flowering. However, in the common plant language and culinary world, the cucurbits are referred to as vegetables.

The Cucurbitaceae family consists of nearly 1000 different species of plants. Winter squash, zucchini, inedible gourds, watermelon, other melons and luffa are all members of this family. The majority of these vegetables are produced on annual vines. Their ancestors originate from warm climates in tropical and temperate zones.

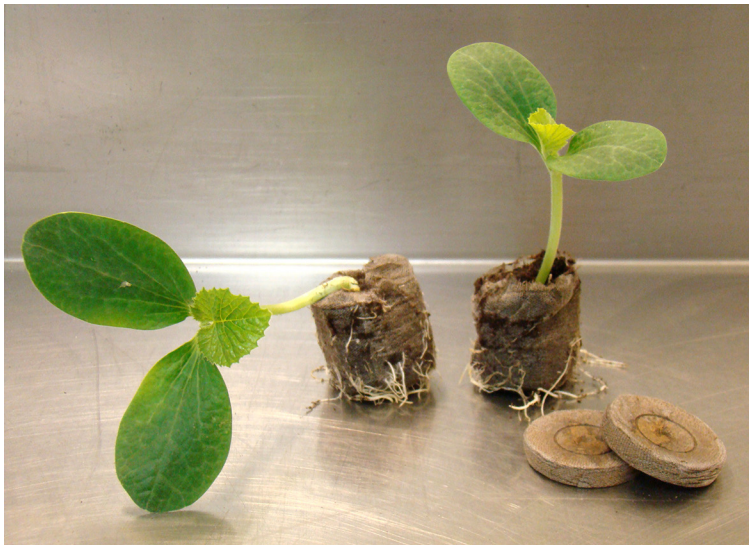
Tips for Growing

- Curcubit vine crops are warm season crops; requiring soil temperatures of at least 15°C before seed germination and optimal growth occur.
- Cucumbers and pumpkins can be directly seeded outdoors in warm soil in spring in Saskatchewan however, winter squash, cantaloupe, gourds, luffa, melons and watermelon should all be started indoors and transplanted outdoors in order to produce mature fruit by the end of the season.
- Cucurbits do not like to have their roots disturbed: germinate seeds in Jiffy 7's and transplant the Jiffy 7 directly into the soil – without disturbing the cucurbit roots. When transplanting, cover the Jiffy 7 peat pellet completely with soil to prevent the pellet (and the transplant) from drying out.
- Vegetable vine transplants should only be 10-14 days old before planting out (cotyledons have emerged along with only one or two true leaves). Larger transplants will experience transplant shock when they are planted outdoors: plants will not grow for several weeks (or at all) depending on the level of transplant shock they experience.
- Cucurbit vine crops benefit from growing in plastic mulches, supported plastic tunnels or crop covers. Crop covers and tunnels must be removed as soon as flowers are present so that bees and other pollinators can pollinate flowers.
- Cucurbits have both male and female flowers on their vines. Male flowers are the first flowers to appear on the plant. It is normal to observe some of these initial male flowers falling off – don't be alarmed. Female flowers appear 7-10 days after the male flowers start to appear. The female flowers are identified by what looks like a small fruit where the stem meets the flower. This 'small fruit' is missing on the male flowers.
- Poor fruit set on female flowers can occur for several reasons: lack of female flowers on the plant and/or poor pollination by bees or insects. This poor pollination can be due to a lack of pollinators or poor weather (cold, rainy, cloudy) that discourages bees and other insects from flying around to pollinate.

The female flowers are identified by what looks like a small fruit where the stem meets the flower

Starting your plants indoors

- Watermelon, gourds, cantaloupe (muskmelon) and other melon plants must be started indoors to produce mature fruit during the Saskatchewan growing season. Winter squash cultivars that take more than 80 days to mature should be started as transplants indoors to produce mature fruit. Cucumbers and pumpkins will benefit from starting plants indoors but cucumbers and pumpkin fruit can be produced by seeding directly into the soil outdoors.
- Start cucurbit transplants 10-14 days before transplanting outside.
- Cucurbits do not like to have their roots disturbed. Avoid seeding cucurbits into transplant trays: use Jiffy 7 peat pellets to produce transplants. (roots will grow through the netting on the peat pellets)
- What are Jiffy 7 peat pellets? Jiffy 7's are flattened discs of peat moss that are approximately 4 cm in diameter and 0.5 cm thick. Soak the discs (ie. peat pellets) in warm water for 5 to 10 minutes: the pellets will expand from 0.5 to 5cm high as they soak up the water. The peat is surrounded by a biodegradable netting with a hole at one end of the cylinder. The seed is inserted in this hole of the wet jiffy 7. The netting is permeable to water, roots and nutrients and should not be removed.
- Once the seeds are sown, the jiffy 7's should be placed 'hole side up' in a plastic tray with drainage holes in the bottom. Cover the tray with a clear plastic dome or clear plastic household wrap and place it in a warm location (at least 24˚C). Soaked and seeded jiffy 7's should not be watered as excess moisture will cause the seeds to rot.
- Cucurbit seedlings should emerge within 7 to 10 days and will be ready for transplanting outdoors within 14 days.
- It's best to transplant cucurbit transplants after only one true leaf has emerged.



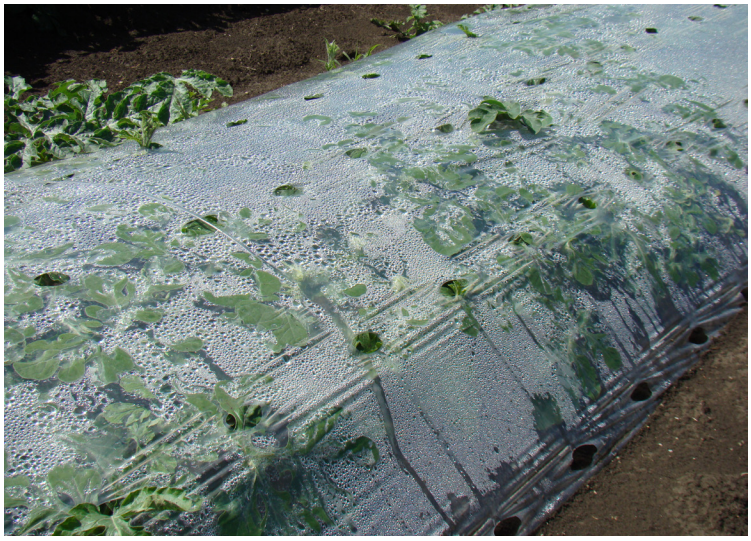
Pumpkin transplants showing one emerged true leaf.

- What is a true leaf? In the case of these vines, the first two 'leaves' to emerge are called cotyledons. The cotyledons are usually opposite and look much different than the 'real' or remainder of the leaves that develop. The third 'leaf' that emerges in a vine transplant is called the first 'true leaf'.
- If more than one true leaf has emerged before transplanting, the seedling is more likely to undergo transplant shock, resulting in stunted growth or even death. Seedlings that look chlorotic (yellow), appear stunted, and resist growth immediately after transplanting are probably suffering from transplant shock.

Transplanting and Growing Curcurbits

- Hardening off cucurbit vines prior to planting outdoors is extremely important. Place transplants outdoors in a sheltered sunny location for 3 to 5 days prior to transplanting. Daytime outdoor temperatures should be at least 18°C. To avoid chilling injury, bring transplants in at night for the first few days. Do not leave them outdoors until night time temperatures are above 10˚C. If outdoor daytime/night time air temperatures are below 20˚C/10˚C respectively, and the soil temperature is below 15˚C, delay transplanting until average temperatures improve.
- When transplanting Jiffy 7 peat pellets to their permanent outdoor location, ensure that the roots are not disturbed and the peat pellet is completely submerged in the soil. Any portion of the peat pellet that is exposed above the soil surface will act as a wick, drawing water away from the tender transplant.
- Water all transplants in with 10-52-10 soluble fertilizer. Mix according to label directions.
- Not all vegetable vines need to be transplanted. Cucumbers and pumpkins germinate quickly and most cultivars will mature during a typical Prairie growing season. The key to direct seeding into garden soil is to provide warm soil for fast and efficient seed germination. Cool soil encourages seed rot before germination can take place.
- Cucurbits are warm season crops. Choose a warm, sunny location in the garden and allow at least 2m2/plant for spacing for cantaloupe, melons and watermelon and 3m2/plant for pumpkins and winter squash.
- If garden space is limited, cucurbits can be grown in pots or vertically on a trellis. Developing cucumber fruit and small gourds do not need extra support when growing vertically. However, cantaloupe, winter squash, watermelon and pumpkins must have their fruit supported. Use old nylons, socks or old pieces of cloth to provide a sling to slide under the developing fruit while it is growing. The sling should be made of material that dries easily and stretches to wrap around the expanding fruit.
- Work the soil well prior to planting and ensure it has good organic matter and fertility.

- Avoid using organic mulches such as grass clippings or leaves around the base of cucurbit plants as this will reduce soil temperatures and slow plant growth. On the other hand, clear plastic mulch around the base of the vine vegetable plants will increase soil temperatures and encourage plant growth.
- Cucurbits benefit from clear perforated plastic tunnels or crop covers with a weight of 0.5 oz/yd2 early in the season. Use crop covers that allow at least allow 85% light transmission. Be sure that the perforated plastic is supported by wire hoops as clear plastic directly on cucurbit leaves will burn the leaves.



Cantaloupe under a mini-tunnel that is ready to be removed.

- All cucurbits should have about 2.5cm of water per week early in the season. By mid-July, provide 2.5cm of water, twice weekly. Apply soluble 20-20-20 fertilizer weekly prior to fruit set, and bi-weekly after fruit set.
- A few days after flowers are evident on the plants, remove the crop covers.
- Although bees and insects will be attracted to the flowers, and pollination will eventually occur, one can speed up the process by practicing your own bee impersonation. The first flowers to appear are male flowers with stamens. The pollen is ripe and ready to use when it comes off easily on your fingers. It should not be sticky.
- Female flowers appear several days to one week after the male flowers and are very obvious in that they have a little fruit located between the flower and the stem. To pollinate the female flower, brush some pollen from the stamens onto the bristles of a small paint brush, and then brush it onto the stigma of the female flower. Try to fertilize several female flowers. After several days, the female flowers that are pollinated will continue to grow. The tiny fruit on non-pollinated female flowers will wither and die.
- A lack of female flowers could be due one or several issues: temperatures are too hot – reducing flower production, plants are too crowded, there is too much nitrogen in the soil and the leaf material is very prolific but few flowers are being produced or the cultivar that is being grown tends to set few female flowers
- After fruit has set, crop covers can be replaced, especially if outdoor temperatures are cool. Protect the plants from frost by using crop covers or heavier frost blankets.

Harvest and Storage

Cucumbers

- There are three common types of cucumbers grown on the Prairies: pickling, field (slicing) and English (also known as European or Greenhouse cucumber). English cucumbers are meant to be grown in the greenhouse and do not yield well when grown outdoors.
- Cocktail or snacking cucumbers refer to the cucumbers that have a soft skin and are mature when they are only 15cm long (often purchased in packages of 5 or 6 in the grocery store).
- Transplanting cucumbers in spring is not necessary. Once soil has warmed to 15°C, seed cucumbers directly into warm, moist soil. Keep the soil moist. Seedlings should emerge within 7-10 days.
- Cucumbers planted in spring can be harvested as early as mid-July up until a fall frost.
- It is better to harvest immature cucumbers rather than over-mature. As cucumbers start to mature, they may need to be harvested daily.
- Harvest cucumbers in the morning (this is when they have the highest amount of water in them – they will be crunchy), cool cucumbers immediately after picking to remove field heat; store at 5-10°C; will store 2 + weeks.
- The more immature the cucumber fruit is at harvest, the shorter the storage life (moisture loss). Field slicers (thicker skin) have a longer storage life than greenhouse types (very thin skin).
- If cucumbers are harvested when they are over-mature, the rind will be thicker and taste can be bitter. If the cucumber looks yellowish, fruit is too ripe and flavor will be compromised.
- Cucumber fruit that develops on vertical plants will mature on the vine without extra support.

Cantaloupe

- Cantaloupe is ready to harvest when the fruit skin looks slightly orange in color and the stem end of the fruit easily slips free from the vine. (full slip)
- Once harvested, the cantaloupe is best stored at cool room temp (10°C); 15°C if picked slightly immature.
- After the cantaloupe is cut, store cut pieces in the fridge (5°C);

Watermelon

- Determining when a watermelon is mature can be challenging:
  - Mature watermelon fruit will sound hollow when they are tapped with your fingers.

- The tendril closest to the stem end that attaches to the fruit will be dried up.
- The skin surface of the watermelon loses its shine and become dull.
- The rind on a mature watermelon fruit will be difficult to puncture with a thumb nail.
- Watermelon fruit Does NOT slip from the vine like cantaloupe.

- Once harvested, watermelon can be stored at room temperature for several days. Long term storage of watermelon should be in the fridge (5°C).

Winter Squash

- If direct seeding winter squash, grow cultivars that mature in 80 days or less. If winter squash is transplanted, cultivars that mature in 100 days or less can be grown..
- Winter squash is a long season crop, harvest as late in the fall as possible. Plants will freeze at 0°C however, mature fruit can withstand 2-3°C below 0°C.
- Acorn, Delicata and Spaghetti squash are some of the earliest maturing types; buttercup and kabocha ripen later in the fall; butternut and hubbard squash often have the longest season to maturity.
- Harvest squash fruit with the stem attached.
- Store squash in cool, dry conditions (10°C). Flavours and sweetness vary with each different squash type.

Gourds and Pumpkins

- If direct seeding, grow cultivars that mature in 80 days or less. If transplanting gourds and pumpkins, cultivars that mature in 100 days or less can ripen during the Prairie growing season.
- Harvest pumpkins and gourds with stem attached to fruit.
- Sugar or pie pumpkins are usually earlier maturing than jack-o-lantern or giant pumpkins.
- Gourds and pumpkins are a long season crop; harvest as late in the fall as possible. Plants will freeze at 0°C however, mature fruit can withstand 2-3°C below 0°C.
- Harvested green mature gourds and pumpkins will ripen to orange or other mature colours indoors if stored in a warm (20°C), dry location (approximately 4 weeks). For long term storage, reduce temperature to 10°C and keep relative humidity low (dry).

Pests and Diseases

Damping Off

- Is caused by a variety of different pathogens found in the environment.
- Affects seedling germination and seedling growth.
- Symptoms include poor germination or germinated seedlings whose stem narrows and turns brown at the soil level resulting in collapsed seedlings.
- To prevent this disease; grow seedlings in warm soil/media and warm air, use clean seed, provide adequate air movement around transplants and plants in the garden, do not overwater and avoid watering in the evening or at night.
- Remove any plants that are infected.

Powdery Mildew

- Characterized by a white, dusty covering on the leaves and, in extreme cases, on the fruit.
- Usually occurs later in the growing season on cucurbits.
- Disease is encourage by moisture on the plants or fruit, low light conditions and a dense plant canopy. Avoid watering plants in the evening or at night, ensure adequate spacing between plants for good air movement.
- Whenever possible, grow cultivars that are resistant to powdery mildew.
- Rotate your cucurbit crops within your garden, preferably a 4 year rotation.
- Apply copper spray as a preventative spray BEFORE infection.
- Heavily infested powdery mildew plants will eventually die. Infected fruit will have off-flavours and will not store as long as healthy fruit.

Sclerotinia

- Characterized by a watery, odorless rot. This rot eventually turns to a white cottony mold with hard, black pea-shaped bodies (sclerotinia).
- Develops on the plant or fruit, especially is cool, damp areas of the plant or fruit near or on the soil. Sclerotinia will also develop in storage under cool, wet conditions.
- Cantaloupe that has been damaged in the field or during harvest often produce a secondary infection of sclerotinia.
- Prevention includes: avoiding evening/night watering, avoid overwatering, allow good air movement at the soil and the top of the soil to dry out between waterings.
- Do not compost infected plants or fruit.
- Rotate cucurbits within your garden, preferably a 4 year rotation; do not plant cucurbits on the same land as cabbage (another susceptible host).

Sclerotinia on Hubbard squash