



Growing Squash for Seed Saving

Squash are heat loving, fast-growing annuals (meaning that they flower, produce fruit, and die in one year). They require lots of space, water, and nutrients. Unlike many vegetables we grow, the male and female flowers are separate on the same plant. Male flowers usually appear first. Long days and warm nights favour male flowers. As the summer progresses, shorter days stimulate the production of female flowers. Without flowers of both sexes, fruit will not be produced.



Seed savers need to learn a little about how varieties of squash (including pumpkins and gourds) are related to each other. For example, you can grow an Acorn squash, a Hubbard squash, and a Butternut squash in the same area and they won't cross pollinate. But Acorn squash and Zucchini squash are the same species¹ (*Cucurbita pepo*) and will cross-pollinate.

¹**Species:** the scientific name of plants or animals that share common characteristics and are capable of breeding and producing viable offspring. Species have two names that always go together for each individual, called *Genus* and *species*. The first part of the name, *Genus*, may include a number of species.

Four species of squash are grown in Canada, although one, cushaw squash, is not very common. The following table gives distinguishing features and examples of varieties, of which there are hundreds.

Characteristics of the Four Species of Squash Grown in British Columbia.

	<i>Cucurbita pepo</i>	<i>Cucurbita moschata</i>	<i>Cucurbita maxima</i>	<i>Cucurbita argyrosperma</i>
Examples	Crookneck, acorn, spaghetti, marrow, jack o' lanterns, zucchini.	Canada Crookneck, butternut, cheese pumpkins	Banana, pumpkin, buttercup, Hubbard, kabocha, red kuri, turban	Cushaw
Leaves and Stems	Mature leaves and stems are prickly; leaves on most varieties deeply lobed.	Mature leaves and stems are large and hairy; leaves are lobed, often with white spots.	Huge kidney-shaped leaves; hairy leaves and stems.	Large leaves with shallow or no lobes; hairy leaves and stems.
Fruit Stem	Hard and elongated, with 5 angles.	Short, hard and angular, with a bulge near the fruit.	Cork-like and round.	Similar to that of <i>C. moschata</i>
Growth Habit	Mostly vines, but a few varieties are bush.	Large vines.	Very long vines	Vigorous vines.
Seeds	uniform colour	wrinkled edge	Brown-edged.	Large and covered in a cellophane-like membrane. Edges are pale.

Derived from How to Save Your Own Seeds, Seeds of Diversity Canada, 2013.

Growing squash is easy, but protecting them from cross-pollination can be a challenge. Their large, bright yellow flowers attract pollinators from long distances. The plants must be separated from other squash plants of the same species by 400 m. Or, you can hand-pollinate and not worry about what type of squash your neighbours are growing. And you can grow several varieties of the same species and save seeds without ending up with hybrid plants the following year.

Most squash fruit are harvested when they are mature and then they can be stored for long periods. These are called winter squash. You can extract and dry the seeds from these fruit when you eat them. Summer squash like zucchini, patty pan, and crookneck are harvested for food when immature. For seed saving, they must be left on the vine until they are mature and the rind is hard.

Starting Seeds

Seeds should be started indoors in early to mid-May. Fill 4” or 5” pots with organic seed starting soil. Some types of seed starting soil have added fertilizer, so you won’t need to fertilize your seedlings. Don’t add dry fertilizer like Gaia Green to regular seeding soil because too much can kill the seedlings.

Put a variety name label on or in each pot. Popsicle sticks work well, but be sure to write the variety name with a non-fading marker pen.

Moisten the soil so it is damp but not soggy. Put 2 seeds in each pot, 2-3 cm (1 inch) deep. You should start at least 6 plants for seed saving; more is better in case one or two die.

The seeds germinate best at 24°C and may not germinate at all at temperatures below 16°C. They should sprout within a week. The new seedlings need at least 8 hours of light per day. This can be sunlight in a south-facing window, in a greenhouse, or under grow lights. The plants grow very fast and will quickly outgrow their container.

If you used seed-starting mix that contains fertilizer, do not fertilize the plants until they are put into the garden. If the seed-starting mix does not have fertilizer, you will need to supply it to the seedlings. The leaves that come up first are the rounded, thick seed leaves called cotyledons. They don't need fertilizer. Start applying very dilute liquid organic vegetable fertilizer when the *first true leaf appears*.



Squash seedling with two seed leaves and one true leaf (centre).

Your fertilizer solution should contain one quarter of the amount of fertilizer for the amount of water recommended on the bottle. For example, the bottle recommends adding 30 mL (2 tablespoons) of liquid fertilizer to 4 L of water. For your new seedlings, you would mix in 7 mL (1 ½ teaspoons) to 4 L of water, or ½ teaspoon into 1 L of water.

When the seedlings start growing their *second set of true leaves*, double the concentration of fertilizer to water. So in the above example, you would put 15 mL (1 tablespoon) of fertilizer

into 4 L. of water (or about 4 mL - 1 teaspoon - into 1 L). Water the seedlings first, then apply the fertilizer solution. Fertilize every other day.

Planting

Squash can be planted outside when all danger of frost is past. They will need a lot of space, so don't underestimate how big your plants may get. If you have 2 plants in each starter pot, you can carefully separate them or plant the two in the same hole. Squash do not like having their roots disturbed.

Summer squash should be spaced 45 – 60 cm apart in rows that are 90 – 120 cm apart. Winter squash need more room, 90 – 120 cm apart in rows spaced 120 -180 cm apart.

Dig a hole about 30 cm (1 foot) wide and deep. Put about 225 mL (one cup) of Gaia Green 4-4-4 fertilizer in the bottom of the hole, add about half of the soil you took out, and thoroughly mix in the fertilizer. Water the pot. Tip it over onto one hand and strike the bottom of the pot with the other. The root ball should slide out easily if it is wet enough. Put one plant (or two in the same root ball) in each hole so the top of the root ball is just below ground level. You might need to add more soil to bring it up to this level. Fill in with soil and tamp it down around the root ball. Water the plant.

If you are planting more than one variety, make sure you put a label on each. Popsicle sticks don't last the season, so use a more durable label stick with a non-fading marker pen. Also make a map of the location of each variety.

Watering

Young squash plants need lots of water, the equivalent of 1 inch per week. Drip irrigation is better than overhead watering, as squash (like many other plants) are subject to powdery mildew. Wet leaves and poor air circulation often lead to this disease.

Pests and Diseases

Squash are no more susceptible to pests and diseases than other vegetable crops. They can be attacked by aphids, cutworms, and chewing and sucking insects. Check your plants as often as you can. It is important to catch whatever is attacking them early.

Plants in the squash family are susceptible to several viral and fungal diseases. The first symptoms are lesions or dead spots on leaves, or wilting of one or more leaves. Carefully remove infected leaves or fruit and dispose of them in the garbage, not the compost bin.

Strong, healthy plants that have good drainage and are spaced widely can withstand many diseases and pests. Many squash pathogens and pests overwinter in debris, weeds, and soil, so a thorough clean-up in fall will go a long way toward preventing problems. Do not plant squash where they were grown the previous year.

Hand Pollination

If you can't isolate your plants from those of your neighbours, or you want to grow several varieties within a species, you will need to hand-pollinate flowers. Squash bloom for most of the summer, but each flower lasts only a day. These are the steps:

Day 1 morning:

1. Look at the flowers on your plants. Male flowers have a long straight stem below the petals, while female flowers have a bulge, like a mini-squash. You will need to wait until female flowers are present before you hand-pollinate. Usually there are more male flowers than female ones.
2. Look inside the open flowers. The males have a stalk of pollen-bearing anthers. The females have a sticky organ in the centre called a *stigma*.



Female (top) and male (bottom) squash flowers.

3. Look for buds that seem ready to open. These are greenish-yellow. Make sure there are a good number of both male and female buds on the plants.

Day 1 late afternoon or evening:

1. Bring masking tape, Velcro plant tape, or clothespins for the male flowers, and organza tomato or pepper flower bags, or homemade cloth bags, for the female flowers. Also bring bright flagging tape or ribbon, and scissors to cut it.

2. Look for buds that are just about to open. They will be greenish-yellow and the tips will be starting to split, showing the bright yellow petals.
3. You should try to use as many male flower buds as you can find, on several plants. Tape or put clothespins securely on the buds so bees can't access them. Don't worry about damaging the petals. Mark each bud with bright flagging tape or ribbon so you can find them quickly in the morning.



Male flower before and after taping.

4. For the female flower buds, also look for ones that are just about to open. Put a bag over the whole flower and draw the strings tight so insects can't access them, or tape them closed. Be careful not to damage the flower. Continue with other female flower buds that are ready to open.



Female squash flower bud before and after bagging. Note yellow flagging tape.

Day 2 very early morning:

1. Start this process as early as you can – just after sunrise is best. The later you wait, the less chance pollination will be successful.
2. Remove from the plants 3 or 4 of the male flowers that you taped the evening before (discard any that managed to open). For genetic diversity, it is best if you take the male flowers from different plants than that of the female bud that was bagged.
3. Take off their petals. In the centre are the pollen-bearing anthers. Protect them from pollinators.



Male flower with petals removed.

4. Find a bagged female flower that opened overnight. Carefully remove the bag. Work quickly before a pollinator visits the flower.



*Open flower in bag. Note stigma
in the centre.*

5. Leave it on the vine but fold back the petals. It won't hurt to damage the petals, but be very careful with the stalk and the stigma.
6. Using several male flowers, brush pollen from the anthers onto the stigma, or just touch the anthers to the stigma several times. The pollen grains are visible, so try to cover the entire stigma with them.



Transferring pollen from anther to stigma.

7. Quickly put the bag back on the female flower and secure it so no pollinators can get in.
8. Mark the flower with bright flagging tape or ribbon so you will know which fruit to harvest for seeds.
9. Pick 3 more male flowers and proceed with another female flower.
10. In 3 or 4 days, check the bagged and marked female flowers to see if the petals are fully withered. You can now take off the bag, but not the ribbon markers. Loosen the marker as the fruit stem grows.

Harvesting

Pick summer squash to eat when they are still small. The skin is easily punctured with a fingernail. Under good growing conditions, summer squash can double in size in a couple of days. For seed saving, leave summer squash on the vine until frost is predicted.

For seed saving and eating, winter squash should be left on the vine just until frost is predicted. The skin should be very hard; you can't pierce it with a fingernail. Cut them off with a knife, leaving about 5 cm of stem on the fruit.

Let the squash ripen at room temperature for at least 3 weeks up to several months.

Processing Seeds

Cut open the fruit and scoop out the seeds and pulp. Fill a bucket or large bowl with water. Put the pulp and seeds in. With your hands, remove as much of the pulp as you can. Transfer the remaining seeds and pulp to a colander. Put under running water to clean the pulp from the seeds.

Shake the colander to remove excess water, then spread the seeds onto a large plate or cookie sheet. Make sure you label the plate with the variety name if you are doing more than one variety.

Let the seeds dry for a couple of weeks, until they break, not bend, under finger pressure.

Put the seeds in an envelope with the variety name, year, your name, and whether the plants were isolated or hand-pollinated.

Record Keeping

Fill out an evaluation form for each variety. This information will help seed bank staff decide which varieties should continue to be grown. If you keep a journal with notes on gardening activities, you will be able to remember when each variety was planted, how it grew, and whether you liked it.

Storage

Store seed bank seeds and your own in a paper envelope in a cool, dry place. Your seeds will last for years in the refrigerator if they are very dry and you put the envelope in a jar with a tight lid.

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July 2021

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