



Cross-Pollination: A Quick Guide for Seed Savers

Keep your saved seed true to type, with separation distances, crop-by-crop notes and a pin-up cheat sheet.

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1. Why it matters

If you save seed from a plant that has cross-pollinated with a different variety, the seed will grow into something unpredictable. The fruit you eat this year is fine. The surprise comes next year, when you sow the seed.

Cross-pollination only matters for the plants you save seed from. If you're just growing to eat, you can plant anything next to anything.

2. The key idea: same species, not same crop name

Plants only cross with others of the **same species**. Different species rarely cross, even if they look similar.

- Varieties of one species cross freely. Two different courgettes will cross with each other.
- Different species don't. A courgette (*Cucurbita pepo*) will not cross with a butternut squash (*Cucurbita moschata*).
- **How to tell:** every plant has a two-part scientific name in italics, such as *Cucurbita pepo*. Two plants are the same species if both parts match. Ignore anything after the second word (variety or group names). The first word on its own is just the genus, a wider family group, and sharing it means very little.
 - *Cucurbita pepo* (courgette) and *Cucurbita pepo* (Sugar Pie pumpkin): both parts match, so they will cross.
 - *Phaseolus vulgaris* (borlotti bean) and *Phaseolus coccineus* (runner bean): the first word is the same but the second differs, so they won't cross.
 - You'll find the scientific name on each crop's guide on the site, and on many seed packets.
- Careful: several crops share a species. Cabbage, kale, broccoli, cauliflower and Brussels sprouts are all *Brassica oleracea* and will all cross with each other.

3. Three types of plant

Self-pollinating (easy). The flower pollinates itself, often before it opens. Crossing is rare. Examples: peas, French-type beans (including borlotti), lettuce, tomatoes (most varieties), peppers (with some caution).

Insect-pollinated (needs planning). Bees and other insects carry pollen between plants, sometimes over long distances. Examples: squash and courgettes, runner beans, broad beans, brassicas, carrots, onions, radish.

Wind-pollinated (needs the most distance). Pollen travels on the wind. Examples: sweetcorn, spinach, beetroot and chard.

4. How to stop crossing

Choose one of these methods. You only need one.

1. **Let only one variety flower.** The simplest method. Save seed from one variety of each species per year, and make sure it is the only variety of that species that flowers and sets seed. Stop any others from flowering, either by pulling the plants up (and eating them) before they flower, or by cutting off every flower stem while it is still in bud.

2. **Distance.** Separate varieties by enough space that pollinators or wind are unlikely to carry pollen between them. Typical figures are in section 5.
3. **Timing.** Sow varieties at different times so they flower at different times.
4. **Barriers.** Cover the plants with fine mesh or a cage, or bag individual flowers. Mesh cages work well for brassicas, carrots and similar crops, but you need to hand-pollinate or introduce pollinators inside the cage.
5. **Hand-pollination.** Pollinate flowers yourself and cover them so insects can't. The standard method for squash (see section 7).

Gardens are small, so don't forget your neighbours' plants and wild relatives. Wild carrot (Queen Anne's lace) will cross with garden carrots.

5. Typical separation distances

These are practical guidelines for a home garden. They are not absolute rules. More distance is safer; a hedge, wall or building in between helps.

Crop	Ease of seed saving	How pollinated	Typical distance
Peas	Easy	Self	3 m (10 ft)
French-type beans (dwarf, climbing, borlotti, kidney, haricot, black turtle)	Easy	Mostly self, occasional insect crossing	3-5 m (10-16 ft)
Lettuce	Easy	Self	3 m (10 ft)
Tomatoes	Easy	Mostly self	3 m (10 ft), more for old potato-leaf and heritage types
Runner beans	Medium	Insect (bees cross them freely)	400 m (1,300 ft), or cage
Broad beans	Medium	Insect (bees cross them freely)	400 m (1,300 ft), or cage
Peppers	Medium	Mostly self, some insect	5-10 m (16-33 ft), or bag flowers
Squash, courgette, pumpkin	Medium	Insect	400 m (1,300 ft), or hand-pollinate
Cucumber	Medium	Insect	400 m (1,300 ft), or hand-pollinate
Onion, leek	Medium	Insect	400 m (1,300 ft), or cage
Brassicas (same species)	Hard	Insect	400 m (1,300 ft), or cage
Carrot	Hard	Insect	400 m (1,300 ft), or cage
Radish	Hard	Insect	400 m (1,300 ft), or cage
Sweetcorn	Hard	Wind	250 m (800 ft), or stagger sowing by 2-3 weeks
Beetroot, chard	Hard	Wind	400 m (1,300 ft) or more

Crop	Ease of seed saving	How pollinated	Typical distance
Spinach	Hard	Wind	400 m (1,300 ft) or more

Please check the crop's own page on the site for the details of each one.

6. Crop-by-crop notes

Easy to save

Peas. Peas pollinate themselves before the flower even opens, so crossing between varieties is rare. Choose a few healthy, vigorous plants and mark them. Leave the pods on the plant until they are brown, dry and rattling. In a wet autumn, pull the whole plant and hang it up under cover. Shell the peas, then spread them out in a cool, airy place for another couple of weeks until they are hard enough that a tooth or fingernail won't dent them. Store them dry.

French-type beans. Dwarf and climbing French beans, borlotti, kidney, haricot and black turtle beans are all one species (*Phaseolus vulgaris*), so they can all cross with each other. This is uncommon, because the flowers mostly pollinate themselves, but bees do occasionally cause it, so keep different varieties a few metres apart. They don't cross with runner beans. Leave the pods on the plant until they are dry and papery. If the weather turns wet, pull the whole plant and hang it under cover. Shell the beans and dry them until they are hard, then store them.

Lettuce. Lettuce pollinates itself, so crossing is rare. Save seed from the plants that bolt last, since those are the ones you want more of. The seed heads ripen unevenly over several weeks and turn into fluffy, dandelion-like tufts. When most of a stem has gone fluffy, cut it and hang it upside down in a paper bag to finish drying. Then rub the heads to release the seed and blow away the chaff.

Tomatoes. Most tomatoes pollinate themselves, but some old potato-leaf and heritage varieties have flowers that bees can reach more easily, so give those extra distance. F1 hybrids won't come true from saved seed, so save only from open-pollinated varieties. Pick fully ripe fruit and scoop the seeds and their jelly into a jar with a little water. Leave it for two to four days, stirring daily, until a film of mould forms on top. This ferments off the jelly that stops the seed sprouting. Rinse the seed clean and dry it on a plate (not paper, which it sticks to).

Medium difficulty

Runner beans. Runner beans (*Phaseolus coccineus*) are a different species from French beans, so they don't cross with them. They do cross freely with other runner beans, because bees visit the flowers constantly, and a neighbour's plot counts. If you have only one variety within a few hundred metres (about 1,000 ft), there is no problem. Otherwise use a cage. Leave a few pods to mature fully on the plant until they are dry. Shell the beans, then dry them until hard. If the seeds in a mixed colour variety suddenly have odd colours, that is a sign of crossing.

Broad beans. Broad beans (*Vicia faba*) are partly self-fertile, but bumblebees cross different varieties readily, so isolate them by distance or cage. Let the pods stay on the plant until they turn black and shrivel, then pick, shell and dry the beans until hard. Broad beans are prone to bean weevils in storage. Putting the dry seed in the freezer for a couple of days kills them.

Peppers. All sweet peppers and chillies of the species *Capsicum annuum* will cross, including bell peppers, jalapeños and cayennes. A sweet pepper crossed with a hot one gives hot fruit in the next generation. The flowers mostly pollinate themselves, but insects do cause some crossing. You can bag individual flowers with fine mesh to be sure. Habaneros and Scotch bonnets (*C. chinense*) are a different species. Let the fruit ripen fully to its final colour, and even go a little wrinkled. Scrape out the seeds, wearing gloves for hot ones, and dry them on a plate for one to two weeks.

Squash, courgette and pumpkin. These are the best example of why "same species" matters. "Pumpkin" and "squash" are not species names, so you need to know which species your variety belongs to. Courgettes, marrows, acorn and spaghetti squash, many ornamental gourds and the jack-o'-lantern and pie pumpkins (Sugar Pie, Jack Be Little, Connecticut Field) are all *Cucurbita pepo* and cross with each other. Giant pumpkins, Rouge Vif d'Etampes, Crown Prince, Hubbard and Uchiki Kuri are *C. maxima*. Butternut and Long Island Cheese are *C. moschata*. Each of these is a separate species, so one variety from each can be saved in the same year. **Important:** seed from a courgette that has crossed with an ornamental gourd can grow bitter, toxic fruit. If a squash tastes bitter, don't eat it. To save seed, hand-pollinate the flowers (see section 7). Courgettes need to be left on the plant until they turn into hard-skinned marrows, which takes eight to ten weeks. Winter squash should be fully ripe, then stored for a few weeks. Scoop out the seed, wash off the pulp and dry the seed for one to two weeks.

Cucumber. All cucumbers and gherkins (*Cucumis sativus*) cross with each other. They do not cross with melons or squash. Many greenhouse cucumbers are F1 hybrids, so save seed only from open-pollinated outdoor or ridge varieties. Leave one fruit to ripen fully on the plant. It will turn yellow or orange, swell and go soft, about six weeks past eating stage. The plant slows down its cropping when it does this, so pick the others first. Scoop out the seeds and jelly, ferment them for a day or two as for tomatoes, rinse and dry.

Onion, leek and shallot. Onions are biennial. They flower in their second year, so you need to store your best bulbs over winter and replant them in spring. Onions cross with other onions and with shallots, because shallots are the same species. Bunching onions (*Allium fistulosum*) are a different species. Leeks are also biennial. Leave a few standing over winter and let them flower in the second summer. Leeks cross with other leeks and with elephant garlic. Both crops suffer from inbreeding if you save seed from too few plants, so aim for at least 20. Cut the flower heads when the black seed shows in the open capsules and dry them in a paper bag.

Hard to save

Brassicas. There are three species that matter in a garden. *Brassica oleracea* includes cabbage, kale, broccoli, calabrese, cauliflower, Brussels sprouts and kohlrabi, and they all cross with each other. *B. rapa* includes turnip, Chinese cabbage, pak choi and mizuna. *B. napus* includes swede, Red Russian kale and oilseed rape, so a farmer's rape field nearby is a risk. Brassicas are biennial, so they overwinter in the ground and flower in the second spring. Most are self-incompatible, so you need several plants (at least six, ideally more) to get seed at all. Cage them, or do one species per year. Leave the pods until they are brown and dry, cut the whole stems, then thresh them in a bucket or onto a sheet.

Carrot. Garden carrots are the same species as wild carrot (Queen Anne's lace), so any wild carrot flowering nearby will cross with them and spoil the seed. They cross with other garden carrot varieties too. Carrots are biennial. Leave your best roots in the ground over winter (or lift and store them, then replant in spring) and they flower in the second summer. Save from at least 20 roots to keep the line healthy. The seed heads ripen unevenly, so cut each as it browns and dry it, then rub the seed off. The first, central head gives the best seed.

Radish. Radishes cross with other radishes, including daikon, mooli and rat-tail radish, and with wild radish. They don't cross with turnips or other brassicas. Radishes are self-incompatible, so grow at least five to ten plants. Let those plants bolt and flower. The seed forms in pods, which you leave until brown and dry, then thresh. Radishes bolt in the first season, so you get seed quicker than from most hard crops.

Sweetcorn. All maize crosses with all other maize, including sweetcorn, popcorn, flint, dent, flour and ornamental corn, and the pollen is carried by the wind. Sweetcorn also has a problem the other crops don't. If it is pollinated by a different corn, the **kernels on this year's cobs** change straight away, and a sweet cob becomes starchy and tough. So separation matters even if you don't save seed. To save seed, either keep different corn at least 250 m (800 ft) apart or stagger the sowings so the varieties flower two to three weeks apart. You can also bag the tassels and ear shoots and pollinate by hand. Plant in blocks, not single rows, so pollen reaches the silks. Save from at least 20 plants, preferably more. Leave the cobs until the husks are dry and the kernels are hard and shrivelled, then dry them further indoors.

Beetroot and chard. Beetroot, chard, spinach beet, sugar beet, mangels and wild sea beet are all *Beta vulgaris*, so they all cross with each other. Their pollen is carried on the wind for long distances. This means chard growing in a neighbour's garden can cross with your beetroot. Beets are biennial and flower in their second year, on stalks up to 1.5 m (5 ft) tall. They are self-incompatible, so grow at least ten to twenty plants. Each "seed" is actually a cluster of several seeds, which is why beet seedlings come up bunched. Cut the stems when most of the seed has browned and dry them under cover.

Spinach. True spinach (*Spinacia oleracea*) has separate male and female plants, and the wind carries pollen between them, so you need both. The males die back after shedding pollen. Spinach does not cross with chard, beetroot, perpetual spinach or New Zealand spinach. Save from the plants that bolt last, and grow at least six to ten. Cut the plants when the seed is hard and the plant has turned brown, then dry and thresh them.

7. Hand-pollinating squash and courgettes

Squash is the best-known example, because it crosses so readily and the flowers are large and easy to work with.

1. **In the evening**, find a female flower (it has a tiny fruit behind it) and a male flower (a plain stem) that will open the next morning. They look fat and are starting to colour.
2. **Tape the buds shut** with soft tape or a clothes peg so insects can't get in overnight.
3. **Early next morning**, pick the male flower, peel back the petals, and brush the pollen onto the centre of the female flower.
4. **Re-close the female flower** with tape and mark it with a tag or coloured string.
5. **Let that fruit ripen fully** before collecting its seed.

8. Check list before you save seed

- Which species is it? Is it the same species as anything else flowering nearby?
- Is it self-, insect- or wind-pollinated?
- Is there another variety of that species flowering within the distance in section 5?
- Can I use timing, a barrier or hand-pollination instead?
- Have I marked the plant I'm saving seed from?

9. Storing your seed

Pure seed is only useful if it still germinates next year. Storage is simple, and the three enemies are damp, warmth and light.

Dry it properly first. This matters more than anything else. Spread the seed in a single layer on a plate or tray in a warm, airy room, out of direct sun, for one to two weeks. Large seeds like beans and peas should be hard enough to shatter if you hit them, not squash. Small seeds should snap, not bend. Don't dry seed in an oven or in strong sun, which can kill it.

Pack it airtight. Use a glass jar with a tight lid, or paper envelopes inside a sealed tin or box. A spoonful of dry rice or a sachet of silica gel at the bottom of the jar helps absorb stray moisture.

Store it cool, dark and dry. A cupboard on an inside wall is ideal. Avoid kitchens, windowsills and anywhere near a radiator or boiler. Some seed savers keep fully dried seed sealed in the fridge or freezer. If you do, let the container warm to room temperature before opening it, so that condensation doesn't form on the seed.

Label everything. Write the crop, variety, year saved and any notes (for example "hand-pollinated" or "caged"). Seed that has lost its label is almost always wasted.

How long does it last? These are rough planning figures for well-dried seed in a sealed container. Cooler storage makes seed last longer, but the figures are estimates, not guarantees, and they vary between varieties and seed batches. Germination falls gradually, so older seed should be sown a bit more thickly, and it's worth testing it first.

Crop	Cool cupboard	Fridge	Freezer
Onion, leek, sweetcorn	1-2 years	3-4 years	5+ years
Peppers	2-3 years	4-5 years	7-10 years
Peas, beans (all types), carrot, spinach	3 years	5-6 years	10+ years
Lettuce	3-5 years	6-8 years	10+ years
Beetroot, chard	4 years	6-8 years	10+ years
Brassicas, radish	4-5 years	7-10 years	10+ years
Squash, courgette, pumpkin	4-5 years	7-10 years	10+ years
Cucumber	5 years	8-10 years	10+ years
Tomatoes	4+ years	8-10 years	10+ years

Fridge and freezer tips. Only freeze seed that is completely dry, because damp seed is damaged by ice crystals. Seal it in an airtight jar or a freezer bag with the air pressed out, and put a sachet of silica gel in with it. Take out only what you need, and let the container reach room temperature before opening it. Repeatedly freezing and thawing the same batch shortens its life, so divide a large batch into small packets first.

Test before you sow. Put ten seeds on damp kitchen paper, slide it into a clear bag or container and keep it somewhere warm. After one to two weeks, count how many have sprouted. Seven or more out of ten is fine. Fewer than that means sow thicker, or replace the seed.

Quick reference: print and pin up

Crop	Ease	Separation	How to keep it pure	Seed lasts (cupboard)
Peas	Easy	3 m (10 ft)	Nothing special	3 years
French-type beans	Easy	3-5 m (10-16 ft)	Space varieties apart	3 years
Lettuce	Easy	3 m (10 ft)	Nothing special	3-5 years
Tomatoes	Easy	3 m (10 ft)	Space apart; bag heritage flowers	4+ years
Runner beans	Medium	400 m (1,300 ft)	Cage, or one variety	3 years
Broad beans	Medium	400 m (1,300 ft)	Cage, or one variety	3 years
Peppers	Medium	5-10 m (16-33 ft)	Bag flowers	2-3 years
Squash, courgette, pumpkin	Medium	400 m (1,300 ft)	Hand-pollinate	4-5 years
Cucumber	Medium	400 m (1,300 ft)	Hand-pollinate	5 years
Onion, leek	Medium	400 m (1,300 ft)	Cage; save from 20+ plants	1-2 years
Brassicas	Hard	400 m (1,300 ft)	Cage; one species a year; 6+ plants	4-5 years
Carrot	Hard	400 m (1,300 ft)	Cage; watch for wild carrot	3 years
Radish	Hard	400 m (1,300 ft)	Cage; 5-10+ plants	4-5 years
Sweetcorn	Hard	250 m (800 ft)	Stagger sowing 2-3 weeks, or bag and hand-pollinate	1-2 years
Beetroot, chard	Hard	400 m+ (1,300 ft+)	Let one variety flower; 10-20 plants	4 years
Spinach	Hard	400 m+ (1,300 ft+)	Let one variety flower; 6-10 plants	3 years

Three rules to remember: same species means they will cross. Only one variety of a species flowers at a time. Dry seed well, store it cool and label it.

More help: crop-by-crop guides at foodwhentheshopsstop.com/seed-saving-calculator/ and a glossary of seed-saving terms at foodwhentheshopsstop.com/seed-saving/glossary/

Distances are general guidance for home gardens and vary with local conditions.