How to Save Seeds From: Broccoli!

Species Name: *Brassica oleracea*

Family: Brassicaceae

Reproductive cycle: Annual

History: Broccoli is a cole crop like cabbage, kale, Brussels sprouts and cauliflower. It was developed when farmers started selecting cole crops with large edible flower buds. This species was most likely first domesticated in the Mediterranean or Asia minor region. There are records of Ancient Greeks cultivating this crop since 300 BCE and it subsequently spread throughout Europe. According to a gardening book published in the 1800s, there were at least 40 different types of broccoli being grown in England.

Planting & Cultivation:
Start broccoli seeds indoors in early Spring (March or April in Michigan), it takes five to eight days to germinate. Don't let plants become pot-bound in their pots. Transplant outside in 4-6 weeks, 18" apart. Or sow broccoli seeds directly outside once the soil has warmed. Sow 3-4 seeds together in a group ½" deep, spaced 18" between groups. Keep seeds evenly moist until germination. Thin to the strongest plant in each group. Broccoli plants need consistent water throughout the growing season.

Broccoli heads are the immature flower shoot. For eating, harvest heads while still tight. If harvested regularly, the broccoli will produce a continuous supply of smaller shoots through the season. For harvesting for seeds, let the buds grow until they flower and produce seed pods.

More than 80 plants are needed for genetic preservation but only 20-50 plants are required for variety maintenance and only 5 plants are required to produce sufficient viable seeds. Small scale farmers are encouraged to share seeds with other farmers to meet the variety maintenance threshold.

Pollination: Broccoli forms small yellow flowers on stalks that extend from the broccoli head. Pollination is performed by insects like bees. This plant has a self-incompatibility system that prevents self-pollination, but it can pollinate with other cole crop varieties like cabbage, cauliflower, and other broccolis, so isolation is necessary. Broccoli also suffers from inbreeding depression if seeds from enough different plants are not saved.

Isolation Methods: The recommended isolation distance between varieties is 800 feet to 1/2 mile. Commercial seed growers should separate different varieties by 1-2 miles.

Seed Maturity: To harvest seed, allow plants to flower and collect seed when mature**.** At maturity seedpods dry and turn brown and the seeds turn brown.

Harvesting and Cleaning Your Seeds: Once pods are dry, you can cut the branches and thresh by hand, however larger branches and whole plants can be threshed by putting them on a tarp and treading on them. Stalks can be composted once seeds have been dislodged. The seeds should then be screened and winnowed to remove excess chaff. If seeds require further cleaning: drape a piece of felt over a hard surface. Raise the surface to an incline of 20 to 35 degrees then pour the seeds down the ramp. You can also use a seed screen to sift the seeds from the chaff.

Storage: Seeds should be stored under cool and dry conditions. When stored properly they can be expected to remain viable for six years. However, it is recommended to regrow the seeds every 2-3 years.

Eat and Enjoy! In a bowl mix olive oil, sea salt and pepper. Throw your broccoli in the bowl and stir till the broccoli is covered in oil. Evenly separate your broccoli on a baking sheet and broil for 5 minutes with the broccoli stem facing down.

Sources used to create this guide: *Saving Our Seeds: The Practice & Philosophy* by Bevin Cohen; *The Seed Garden: The Art and Practice of Seed Saving* edited by Lee Buttala and Shanyn Siegel; *The Timber Press Guide to Vegetable Gardening in the Midwest* by Michael VanderBrug. Recipe by Kelvis Quaynor.

Created by: Ashhad Abdullah and Kelvis Quaynor*, SEMN211, Kalamazoo College, Winter 2023.* **Edited by:** Amy Newday, *Winter 2023.*

How to Save Seeds From: Butternut Squash!

Species Name:
Cucurbita moschata

Family: Cucurbitaceae

Reproductive cycle: Annual

History: The *Cucurbita moschata* species, which includes butternuts, cheese pumpkins, and some cushaw squashes, probably originated in northern South America but there is also evidence of these squashes in human settlements in southern Mexico around 4900 BCE.

Planting & Cultivation: You can harvest viable seeds from one squash plant, but if you would like to maintain strong genetics in your squash variety over time, plan to plant and harvest seeds from at least 5-10 plants.

The best time to plant butternut squash is when all the danger of frost is past and soil has warmed to 75 degrees F. You can also start your seeds as transplants indoors and plant them outside in 3-4 weeks once the soil has warmed. Plant butternut squash 15 inches apart in a row or in hills of 3 plants spaced 3 foot apart. Squash need fertile soil and adequate moisture. *Cucurbita moschata* squashes are less susceptible to squash vine borers than other squash species.

Butternut Squash turn a tan color when ripe and can be harvested at that time but will benefit from a process of "curing" after harvest. Let them set in a warm dry place for 20-30 days after harvesting and they will become even sweeter and will keep better throughout the winter.

Pollination: Butternut squash produces both female and male flowers. You can tell them apart because the male flower will be attached to a stalk, while the base of the female flower will be attached to a tiny, squash-shaped ovary that grows from the stem of the plant. In order for the female flower to be fertilized and a squash to grow, pollen must be transferred from a male flower into the female flower. This is usually done by insects like bees.

Isolation Methods: Since all varieties of *Cucurbita moschata* can easily be cross-pollinated by insects, grow only one variety in order to save seeds that are "true to type." If you have neighbors within a half mile that are also growing squashes, you may want to hand-pollinate your squash to make sure that insects don't transfer pollen from your squashes to theirs.

Seed Maturity: Squash seeds will be mature at the same time as the fruit is mature. You will get the most mature fruit and seeds if you let your squash after-ripen for at least 20 days after harvest in a warm dry place.

Harvesting and Cleaning Your Seeds: Once your squash is mature, you can harvest the seeds anytime you choose to cook your squash. Cut open your squash and scoop out the seed before you cook the squash! Place seeds and the attached pulp in a bowl, rinse with water, and use your hands to squish the seeds out of the pulp, removing a much of the pulp as possible. Spread in a single layer on a plate to dry.

Storage: Make sure that seeds are thoroughly dry before storing. Test for dryness by using your fingernail to break a seed in half. The seed should snap in half, not bend. Store seeds in an envelope in a cool, dry place. If stored well, seeds will be viable for approximately six years.

Eat and Enjoy! To make roasted Butternut Squash, first cut the squash in half and remove seeds. Then peel the squash and cut into cubes. Toss with olive oil, season with salt and pepper. Spread onto baking sheet and bake for 25-30 minutes at 400 degrees until soft and golden brown.

Sources used to create this guide: *The Seed Garden: The Art and Practice of Seed Saving,* edited by Lee Buttala and Shanyn Siegel
Guide Created by: Lizzy Rottenberk, Katherine Black, Scarleth Perez, *SEMN211, Kalamazoo College, Fall 2021* **Edited by:** *Amy Newday, Kalamazoo College, Fall 2021*

How to Save Seeds From: Common Beans!

Species Name: *Phaseolus vulgaris*

Family: Fabaceae

Reproductive Cycle: Common Beans are an annual plant, replant yearly.

History: Common Beans have been cultivated throughout the Americas since they were domesticated around 7,500-8,000 years ago. In the 16th century the Spanish introduced common beans to Europe and from there they made their way across the world. Common Beans have many different classifications, including bush beans, pole beans, and half-runners, in addition to size and color, and specific regional variations. Their pods are eaten at all stages of maturity, from immature pods to immature "shelly" beans to mature seeds.

Planting & Cultivation: Plant beans in warm (at least 60-65ºF), loose-textured soil. Plant bush beans about 1 inch deep and 1-2 inches apart. You can thin to 3-4 inches apart once the plants begin to show true leaves. Plant pole beans 3 inches apart near a trellis or something else they can climb on. For viable seeds one plant is enough. For variety maintenance 5-10 plants should be grown. For genetic preservation at least 20 plants should be grown. Observe plants throughout the season and choose the most vigorous, productive, and disease-free plants to save seeds from.

Pollination: Beans are mainly self-pollinating. Depending on the variety there is also a possibility of cross-pollination through insects. If saving for genetic preservation take caution with isolation methods.

Isolation Methods: For most purposes, plant varieties 10-20 feet apart. However, if genetic preservation of rare varieties is the goal, then there should be 100 feet between varieties for extra assurance or you can stagger planting times so that only one variety of bean will be flowering at any given time.

Seed Maturity: The seeds of the plant are matured once the pods become dry and tan (or mahogany for some varieties). Seed crops can take anywhere from 90-120 days to mature. Each pod will typically develop 3-8 seeds. If desired, one can select for more. Seeds should be harvested when the pod is dry and papery, care should be taken to harvest before the pods split and disperse their seeds in the garden.

Harvesting and Cleaning Your Seeds: Seeds can be harvested after about 70-80% of pods have been left to dry on the stalk and are at the point of breaking. The pods can then be opened by hand and seeds collected. If the weather is especially damp or rainy during harvest season, harvest frequently and take care not to let ripened seeds get exposed to too much moisture that might cause rotting or sprouting. This is especially a problem with bush beans where the pods can be touching the ground.

Larger quantities of bean seeds can be cleaned by threshing them by putting them inside a bag or pillowcase or on top of a tarp and "dancing" on them until the dry pods are broken up and the beans are freed. Winnow off the chaff by pouring the beans and the broken pods into a tub in front of a box fan. (The chaff will blow off and the beans will fall into the tub.)

Storage: Bean seeds should be stored in a cool, dry environment. Seeds stored this way can last about 3 years. Make sure they are fully dry before storing!

Eat and Enjoy!
Ingredients: fresh green beans (topped and tailed), olive oil, sea or kosher salt.
Heat oven to 450 F. Lay beans in a single layer on a pan. Drizzle them with oil until they are evenly coated. Cook for about 15 minutes, shaking the pan occasionally to ensure even cooking. When roasted, remove from oven and sprinkle with salt. Enjoy!

Sources used to create this guide: *The Seed Garden: The Art and Practice of Seed Saving,* edited by Lee Buttala and Shanyn Siegel. *The Timber Press Guide to Vegetable Gardening in the Midwest* by Michael VanderBrug

Created by: Nmesomachi Nwoko and Donovan Greene, *SEMN211, Kalamazoo College, Fall 2021.* **Edited by:** Amy Newday, *Kalamazoo College, Fall 2021*

How to Save Seeds From: Cucumber!

Species Name: *Cucumis sativus*

Family: Cucurbitaceae

Reproductive cycle:
Cucumbers are an annual plant, so they need to be replanted every year. Cucumbers will not survive frost.

History: Cucumbers may have originated in Asia or in Africa. There is evidence of cucumber cultivation in western Asia around 1000 BCE and in Europe as early as 100 CE. Cucumber types range from stubby pickling cucumbers to elongated slicing cucumbers to small round cucumbers. Colors can range from white to yellow to green.

Planting & Cultivation: It is recommended to germinate cucumber seeds in pots indoors and then transplant the seedlings outside about 12 inches apart once the soil has warmed. Seeds planted directly outdoors about ½ deep work as well, though you should expect slower growth early in the season when the weather is cool. Plant or transplant your cucumbers outdoors in a sunny location late Spring/early Summer. Provide them with fertile soil and plenty of water. If you have a small garden, you can save space by helping them to grow up a trellis.

Harvest immature fruits for eating and pickling, but choose fruits from the most vigorous, productive, and disease-free plants to leave to mature for seed. One plant is needed for viable seeds, five to ten plants to maintain a variety, and 25 plants for genetic preservation. Fruits with mature seeds will turn orange, yellow or tan (depending on variety) and will start to soften when ready for seed harvesting.

Pollination: Cucumbers are insect pollinated. They have both male and female flowers on one plant, so only one plant is necessary for viable seeds. To maintain strong genetics in a variety, though, it's recommended to select seed from at least 5-10 plants.

Isolation Methods: For proper isolation, grow each variety at least 800 feet away from other cucumbers to avoid insect cross pollination or hand pollinate.

Seed Maturity: Wait to gather seeds until the fruit is bloated, soft, and has gone through a color change to yellow, orange or tan. For the most mature seeds, wait several weeks after color change to harvest (if disease or predation is a concern, you can harvest your cucumbers and let them "after ripen" in a container in a shady spot). Make sure to harvest seeds before the cucumber starts to rot or they will be very smelly. The seeds should be opaque and not transparent and should be hard and not squishy.

Harvesting and Cleaning Your Seeds: Cut the cucumber lengthwise for easiest removal of seeds from fruit. Scoop seeds and gel out of the seed cavity and allow to ferment one to three days in a loosely covered container in a warm location. Once fermentation is complete, add water to the container, stir vigorously, then allow seeds to settle to the bottom and pour off any floating immature seeds along with the pulp and scum. Rinse this way several times until the water is clear and then pour through a strainer to catch the seeds. Set seeds out in a single layer on a flat surface to dry.

Storage: When seeds are thoroughly dry, store them in an airtight container in a cool, dark, and dry place. Expect a seed harvest to last five years.

Eat and Enjoy!

Bread & Butter Pickle Relish: Clean and dice a gallon of cucumbers and onions together and layer into canning jars. Mix 3½ cups sugar, 3 cups vinegar, ⅓ cup salt, 1tbsp celery seeds, 1tsp turmeric, 1tsp mustard seeds, and 1tsp alum in a bowl. Stir until sugar is dissolved and the mixture is near homogenous throughout. Pour mixture into the jars and close lids tightly. Keep refrigerated. Relish in the relish with hotdogs, chip dip, or as an ingredient in other baking!

Sources used to create this guide: *The Seed Garden: The Art and Practice of Seed Saving,* edited by Lee Buttala and Shanyn Siegel. *The Timber Press Guide to Vegetable Gardening in the Midwest* by Michael VanderBrug. Bread and Butter Pickle Relish from Naomi Smith (Ashley's maternal grandmother).

Created by: Ashley C. and Jessalyn V.*, SEMN211, Kalamazoo College, Fall 2021.* **Edited by:** Amy Newday, *Kalamazoo College, Fall 2021.*

How to Save Seeds From: European Kale!

Species Name: *Brassica oleracea*
(The "Cole Crops")

Family: Brassicaceae

Reproductive cycle: Biennial

History: Kale's origins can be traced back to somewhere in the Mediterranean region where it was first domesticated. The first known example of Kale being consumed by people dates to 300 BCE with the Greeks. They were known to consume many of the Cole crops, including kale. From 50 to 450 CE, Kale spread throughout Northern Europe because of trade within the Roman Empire. What is most interesting about Kale is that European Kale was one of the first cultivated forms of Brassica oleracea and it was developed for its edible leaves.

Planting & Cultivation:
Kale is a plant that grows best in lower temperatures and it requires overwintering at temperatures below 50 degrees F for 10-12 weeks before it will flower and set seeds. When planting seeds, holes should be made 10 inches apart and ¼ inches deep, about 3-4 seeds should be placed in each hole and should be covered lightly with the soil. The soil should be kept moist until germination, which is about 5-8 days. You can also start kale indoors in pots and transplant outside after 6 weeks.

If you intend to grow kale for seed saving, it is best to plant the kale in the summer, as a fall crop, so that it will be younger and better able to withstand the cold temperatures. Additionally, if winter temperatures permit, kale plants can overwinter during the cold season outside (if not, a protected environment must be created for vernalization to occur). For best seed-saving practices, viable seeds for kale plants can likely be collected from 5 plants, however, 20-50 plants are the recommended population size for variety maintenance. It Is also important to note that typically spacing for second-year biennials is 18-24 inches in between plants in rows that are 36 inches apart. This will allow space for the kale to grow and will make it easier to cultivate. A moderate amount of leaves and flower buds can be harvested for eating from plants that are designated for seed saving without overly depleting the plant's vigor.

Pollination: The cole crops have four-petaled, cruciform flowers, which are most commonly yellow. The flowering stalks can grow 4 to 5 feet, staking is recommended. The plants that belong to this species are self-incompatible. Cross-pollination between varieties easily occurs with plants of this species. This species is pollinated by insects.

Isolation Methods: Varieties of Russian kale are from the species *Brassica napus* and do not cross with *Brassica oleracea.* But any plant in the *Brassica oleracea* species (including broccoli, cabbage, cauliflower, collards, and kohlrabi) will cross-pollinate with each other. The recommended isolation distance between varieties to prevent this is 800 feet to ½ mile; only plants that are flowering need to be isolated from each other.

Seed Maturity: Seeds are produced in pods called siliques. You can tell the seed is mature when the siliques have dried and turned brown. The dried pods can easily be shattered, so place them on drop cloths or in containers when gathering seeds.

Harvesting and Cleaning Your Seeds: The dried siliques must be gathered carefully by clipping branches or entire plants as seeds can be lost in the process. Harvesting the seeds can be done by threshing by banging the pods into a bucket or "dancing" on top of the dried plants on a tarp, allowing the seeds to detach from the pods, then winnowing in front of a box fan to separate the seeds from the chaff.

Storage: The seeds can be viable for 6 years if stored under cool and dry conditions.

Eat and Enjoy! Kale salad with lemon dressing

Ingredients: 8 cups kale (chopped); 1 lemon, zested and juiced (or ¼ cup lemon juice); 1 tablespoon maple syrup; 1 teaspoon Dijon mustard; 1 clove garlic (grated); ⅛ teaspoon Sea salt; 1 pinch black pepper; ¼ cup extra virgin olive oil; 1 (15-ounce can) chickpeas, rinsed and drained (same as 1 ½ cups cooked); ½ large avocado, pitted and diced; ¼ cup walnuts (chopped); ¼ cup parmesan cheese

Remove and discard stems from the kale, then rinse and remove excess moisture with an absorbent towel. Set aside. In a mixing bowl, whisk lemon juice/zest, maple syrup, Dijon, garlic, salt, and pepper until well combined. Continue whisking and drizzle in olive oil until the mixture emulsifies into a creamy texture. Cover and refrigerate until ready to serve. To serve, add dressing to the kale and firmly massage for a few minutes until the leaves soften and all surfaces are well-coated. Add chickpeas, avocado, walnuts, and any optional ingredients. Mix and serve.

Sources used to create this guide: *The Seed Garden: The Art of Seed Saving,* edited by Lee Buttala and Shanyn Siegal; *Saving Our Seeds: The Practice & Philosophy, by Bevin Cohen;* "The Best Kale Salad with Lemon Dressing" by Traci Antonovich, *The Kitchen Girl*, 3 Jan. 2023, thekitchengirl.com **Created by:** *America Ramirez and Colby Skinner, SEMN211, Kalamazoo College, Winter 2023.* **Edited by:** Amy Newday, Winter 2023

How to Save Seeds From: Kohlrabi!

Species Name: *Brassica oleracea*

Family: Brassicacea

Reproductive cycle: Biennial

History: *Brassica oleracea* includes a wide variety of crops such as broccoli, cabbage, and kale, and was likely first cultivated around 300 BCE in the Mediterranean region before spreading throughout northern Europe. Kohlrabi specifically, was developed more recently, in 1500 CE in Germany. Farmers developed this crop through the careful selection for a bulging edible stem that can vary in color.

Planting & Cultivation: Considering that kohlrabi originated in the northern hemisphere, it is fairly hardy and does well in temperatures as low as 15°F (-9°C). However, the young plants are still susceptible to the cold and seeds should therefore be sown indoors 6 weeks before the last frost. Growers can sow their seeds in small pots at a 1/4" deep. After the risk of freezing has passed, the seedlings can be transplanted into the garden. They should be planted at about 4-9 inches apart depending on desired size and making sure not to plant them too deep! To prevent kohlrabi from obtaining a "woody" texture, it is important to make sure the plants receive enough water. Kohlrabi are thankful for a healthy dose of nutrients in the form of compost or diluted stinging nettle fertilizer (easily made at home) and do well when planted next to beans, radishes, or lettuce.

Since kohlrabi is a biennial, gardeners can grow multiple varieties—some for consumption, and others for seed keeping. Plants that are not grown for consumption typically need more space, between 18-24 inches, and require a period of overwintering. For overwintering, seed savers can grow kohlrabi almost to full size before digging them up and storing them in containers layered with sand or wood shavings. These containers can be kept in a garage or basement until the following spring, when the kohlrabi can be replanted. Five kohlrabi plants are enough to produce viable seeds, however, in order to maintain genetic diversity, growing 20-50 plants is recommended for seed saving.

Pollination Methods: *Brassica oleracea* flowers contain both male and female parts, however, they are self-incompatible and cross-pollination is therefore necessary. A variety of insects may contribute to pollination, including flies and bees.

Isolation Methods: Since *Brassica oleracea* cross-pollinates, it is important to isolate different varieties (including varieties of different types of this species such as broccoli, cabbage and kale) in order to prevent unwanted cross-varietal pollination. Only plants that are flowering need to be isolated and should be separated by 800-2640 ft.

Seed Maturity: *Brassica oleracea* produce long, narrow seed pods, called siliques, that will dry and turn a light brown color. The seeds inside the pod will also be light brown.

Harvesting and Cleaning Your Seeds: For *Brassica oleracea,* there is a short window of optimal harvest time because seeds can be lost to shattering or bird predation. Mature seeds can be gathered by cutting branches or by harvesting whole plants. Harvested materials should be placed on drop cloths or containers to prevent seed loss and to promote drying. Harvested plants should dry for at least five days before seeds can be dislodged by threshing, in other words, gently rubbing or beating the seed pods into a cloth or tub. The stalks can then be composted and the dislodged seeds and remaining chaff should be screened or winnowed. The easiest way to winnow your seeds is to drop your seeds from one container to another, letting the wind blow away unwanted chaff.

Storage: After threshing, *Brassica oleracea* seeds should be placed in an airtight container in a cool, dry, and dark place where they will remain viable for six years.

Eat and Enjoy!
Jane Brody's Braised Kohlrabi: (from Amy Newday's Farm Blog: harvestofjoy.com)

Ingredients: 1 Tbsp butter; chicken or vegetable broth; peeled and julienned (i.e., cut into thin strips) kohlrabi; freshly ground pepper

Heat butter in a saucepan over medium-high heat and sauté kohlrabi strips, stirring often, until they are slightly golden (about 5 minutes). Add broth, bring to a boil, reduce heat and simmer, partially covered, until just tender. Uncover the pan and increase heat to high for another 5 minutes or so to evaporate the rest of the liquid.

Sources used to create this guide: *The Seed Garden: The Art and practice of Seed Saving,* edited by Lee Buttala and Shanyn Siegel; *Saving Our Seeds: The Practice and Philosophy* by Bevin Cohen; and **https://harvestofjoyfarm.wordpress.com** by Amy Newday
Created by: Alisha Clark & Natalie Pineda*, SEMN211,* Kalamazoo College, Winter 2023.
Edited by: Amy Newday, Winter 2023

How to Save Seeds From: Lettuce!

Species Name: *Lactuca sativa*

Family: Asteraceae

Reproductive cycle: Annual

History: The place of origin of lettuce is commonly believed to be in the area of present-day Iran and Turkey. Archeological evidence also reveals that it was cultivated by farmers in Egypt more than 6,000 years ago.

Planting & Cultivation: It is best to grow lettuce in cooler temperatures, as the seeds will not germinate if soil temperatures are greater than 80°F. Seeds can be started indoors between 4-6 weeks before planting or sown directly into the soil. In both cases, planting in the garden in the early spring, a few weeks before the last winter frost, is recommended (plants may need to be protected in the event of a hard frost).

Begin planting with up to 12 seeds per foot, at a depth of about 1/4 inch, eventually thinning to 12-15 inches apart (you can eat the plants you thin!). During the process of growing, plants will require rich soil and plenty of water. Depending on the variety, plants will form heads of densely or more loosely packed leaves. For a lettuce seed crop, allow your most beautiful heads to continue to grow until they “bolt” or send up a flower stalk out of the middle of the plant. Select your seed crop from your slowest bolting plants in order to promote that characteristic in future generations.

Viable lettuce seeds can be produced from a singular plant. However, to maintain a variety, it is recommended to save seeds from a population of 5-10 plants.

Pollination: Lettuce plants grow many composite flowers, called heads, that are comprised of between fifteen and twenty-five yellow flowers. Each head will open for just one day, usually for only a few hours. These flowers are almost completely self-pollinating, and growers should have few worries regarding cross-pollination.

Isolation Methods: Lettuce can cross-pollinate with other varieties, but this is rare. The self-pollinating nature of the plant will prevent it from cross-pollinating in most cases. However, if working towards genetic preservation, separate the varieties by a minimum of 10 feet to effectively prevent cross-pollination. If planted with a smaller spacing, staking the plants can also be helpful to reduce the chances of cross-pollination.

Seed Maturity: The indication of seed maturity is when light gray pappuses emerge from a mature lettuce head. The pappuses will share a similar appearance to dandelion seeds as they will be white puffs.

Harvesting and Cleaning Your Seeds: There are several methods for harvesting seeds from pappuses. First, one can simply pick the pappuses to gather the seeds from each mature pappus head. One can expect 15 to 25 seeds per head. Another method is to bend the plant into a bag and proceed to shake the mature seeds out. Finally, if you wish to harvest all at once, given that about two-thirds of the seed heads are mature, cut the stem of the plant and move it to a space where the seeds can continue drying before threshing the seeds loose by shaking them into a bag or "dancing" on them on a tarp. Remove excess chaff by hand or with a seed screen and then winnow in front of a box fan to remove the finer chaff.

Storage: When stored somewhere cool and dry, lettuce seeds can remain viable for up to six years.

Eat and Enjoy! *Roasted Romaine with Pine Nut Vinaigrette*

Ingredients: 2 tablespoons balsamic vinegar; 3 oil-packed sun-dried tomatoes, drained and minced; 1 tablespoon minced kalamata or other black olives; 1/4 cup extra-virgin olive oil, plus more for brushing; 2 large romaine heads; 1/3 cup pine nuts; Kosher salt; Shaved Pico Melero or Manchego cheese, for serving; Flaky sea salt for sprinkling

Preheat the oven to 425°. In a medium bowl, whisk the vinegar with the sun-dried tomatoes, olives and the 1/4 cup of olive oil. Set aside. Brush the romaine hearts all over with olive oil and arrange on a rimmed baking sheet. Spread the pine nuts in a pie plate. Roast the romaine and pine nuts for about 13 minutes, tossing the nuts occasionally, until the lettuce is browned in spots and the nuts are golden. In a mortar, finely crush the pine nuts. Stir into the vinaigrette and season with kosher salt. Transfer the romaine to a work surface. Cut the hearts in half lengthwise, transfer to a platter and spoon the vinaigrette on top. Scatter shaved cheese over the romaine and sprinkle with sea salt. Serve right away.

Sources used to create this guide: *Saving Our Seeds: The Practice and Philosophy*, by Bevin Cohen, *The Seed Garden: The Art and Practice of Seed Saving*, edited by Lee Buttala and Shanyn Siegel, and *The Timber Press Guide to Vegetable Gardening in the Midwest*, by Michael VanderBrug. Recipe from harvestofjoyfarm.wordpress.com.
Created by: Lucas Priemer and Jackson Mitchell*, SEMN211, Kalamazoo College, Winter 2023.* **Edited by:** Amy Newday, *Winter 2023.*

How to Save Seeds from: Peas!

Species Name: *Pisum sativum*

Family: Fabaceae

Reproductive Cycle: Annual

History: The *Pisum Sativum* species was domesticated in the Mediterranean basin or within the Middle East approximately 10,000 years ago. *Pisum Sativum* spread throughout Europe, the Middle East, and western Asia as one of the earliest agricultural crops. They were originally domesticated and eaten while dry and mature. Around the sixteenth-century new varieties of "garden" peas were grown and eaten in the immature stages.

Planting & Cultivation:
Planting season is primarily late March to mid-May. You can sow peas as soon as the ground can be worked. Plant an inch apart and about an inch deep. Inoculation with nitrogen fixing bacteria is recommended. Keep soil moist until germination. Provide trellising stakes placed roughly 6 feet apart with twine run between the stakes to provide structure for the plant to climb, especially for taller varieties. Straw mulch can be used to help hold moisture in the soil. Note that temperatures above 85 degrees (F) during the flowering period may reduce the seed set in peas.

Harvesting season ranges from late May to the end of June. You can harvest immature snow pea for eating when the pea pods are small and still flat. Snap and sugar peas are larger and rounder. You can also taste your way through the maturity process! To harvest pea seeds, wait until the pods have turned brown and dried on the vine.

While viable seeds can be saved from a single plant, to retain a variety's genetic diversity plant 5-10 plants or 20+ plants if you seek genetic preservation.

Pollination: Within the pea flower both male and female parts exist. Within the flower, self-pollination occurs by the male parts producing pollen which falls onto the female parts of the flowers. Once fertilization occurs, a pea pod will begin to form.

Isolation Methods: Only 10-20 feet of distance is recommended between plant varieties to maintain varieties. If the goal is genetic preservation, then 50 feet is recommended for isolation distance. Other forms of controlled pollination are not needed as the species is self-pollinating.

Seed Maturity: For harvesting seeds, the peas must grow past the green stage. Choose pods from your most vigorous, productive and disease-free plants to leave on the vines to mature. These seeds will eventually develop to maturity and can be used for seed saving. The seeds are fully mature once the pods have turned tan and dry. Harvest them at this time to prevent them from getting exposed to additional moisture through rain that could promote mold or cause the peas to sprout in their pods.

Harvesting and Cleaning Your Seeds: Once the plant has begun to dry and the pods to turn tan, the peas can be harvested. If the weather is rainy, the plants and pods can be pulled to finish drying indoors. The dried pea pods can be collected from the vines and shelled by hand. Or the seeds can be threshed by being placed into a container, sack, or tarp and stomping on them. The large seeds can be separated from the chaff easily by screening and winnowing.

Storage: When stored in a cool and dry place, pea seeds can last up to 3-4 years.

Eat and Enjoy! Split Pea Soup: Ingredients are Olive Oil, yellow onion, celery, carrots and garlic, chicken broth, water, Dried split peas, ham bone, Bay leaves, thyme, and parsley.

First, saute the vegetables and place in a large pot, then add the liquid ingredients, peas and herbs. Next, you will add ham bone, cover the pot and let simmer for about an hour. Remove the ham from the soup, add carrots and simmer for 30 minutes. Lastly, add the chopped ham back into the pot and serve warm.

Sources used to create this guide: *Saving Our Seeds: The Practice and Philosophy* by Bevin Cohen; *The Seed Garden: The Art and Practice of Seed Saving* edited by Lee Buttala and Shanyn Siegel*; The Timber Press Guide to Vegetable Gardening in the Midwest* by Michael VanderBrug. *Split Pea Soup* from www.cookingclassy.com.
Created by: Gavin Houtkooper & Audrey Walker*, SEMN-211-01, Kalamazoo College, Winter 2023.* **Edited by:** Amy Newday, Winter 2023.

How To Save Seeds From: Peppers!

Species Name:
The *Capsicum Annuum* complex includes the species *Capsicum annuum, Capsicum frutescens, and Capsicum chenense,* all of which can successfully cross-pollinate.

Family: *Solanaceae (Nightshade)*

Reproductive cycle: Perennial, though most often grown as an annual in cool climates.

History:
Peppers were wild-foraged and ultimately domesticated in multiple places across Central and South America. Their use spread northward into the Caribbean and North America and eventually to Europe, Africa, and Asia where they became staples of many cuisines. Some peppers are used as vegetables in dishes, others are used for spice, and others are purely ornamental. In their tropical homelands, peppers are perennials, but are most often grown as annuals in cooler climates.

Planting & Cultivation:
Plant the seeds indoors in late March or around 6-8 weeks before you want to transplant the plants. Plant the seeds about quarter of an inch deep in the soil. Harden off seedlings and plant outdoors 12-15 inches apart once frost danger has passed. During the germination period for the seeds, they will do best when the soil is at least 75°Fahrenheit.

To produce viable seeds, you would only need to plant 1 plant. To maintain a variety of the plant that is not weakened by in-breeding depression, you should plant 5-20 plants for a wide variety of genetic material. Genetic preservation needs a population of at least 50 plants.

Pollination: Peppers have their male and female parts are in the same flower (perfect flowers). This means that the pepper can self-pollinate but because the flowers are open, cross-pollination can occur because of insects.

Isolation Methods: Peppers should be grown with an isolation distance of 300-1,600 feet to ensure genetic maintenance. If you do not have enough space to isolate, pepper flowers or entire plants can be bagged to stop any cross pollination. You may need to hand-pollinate in this case.

Seed Maturity: Most peppers are green when immature and ripen to a different color such as red, yellow, or orange. Seeds are mature and ready for harvest when the pepper turns color and starts to soften.

Harvesting and Cleaning Your Seeds: Once the peppers have matured, you can either use a dry method by hanging them to dry and then crumpling open (this works best with thin-walled varieties) or a wet method by cutting the pepper open and removing the seeds from the still edible fruit. Use gloves, goggles, and masks with hot peppers to avoid capsaicin irritation. Discard discolored seeds. Put seeds in a bowl and fill with water. Swirl to rinse and pour off any seeds and pulp that floats to the top. Spread the viable seeds out to dry in a warm area, on mesh or a paper plate, to dry.

Storage: If seeds are stored in a cool and dry place, they can last for 2-4 years.

Eat and Enjoy! Peppers are great raw as a snack or you can put them in cooked foods like this yummy quiche!

Spinach, Red Pepper, and Feta Quiche

Ingredients: 1/3 cup plus 3 tablespoons all-purpose flour; 1 tablespoon olive oil; 3 tablespoons cold unsalted butter; 2 cups packed fresh spinach leaves; 1 tablespoon cold vegetable shortening; 2 large eggs; 1 1/2 tablespoons ice water plus additional if necessary; 1/3 cup heavy cream or milk; 1/3 cup sliced sweet pepper; 1/3 cup crumbled feta cheese

Preheat oven to 425°F. Prepare a savory pie shell by making one by hand or use a frozen pie crust. In a large skillet sauté pepper in oil over moderately high heat, stirring, 1 minute. Add spinach and sauté, stirring, until wilted and tender, about 1 minute. Remove skillet from heat and season spinach mixture with salt and pepper. In a small bowl whisk together eggs and cream. Sprinkle feta over bottom of shell and arrange spinach mixture on top. Pour cream mixture over spinach and bake quiche on a baking sheet in middle of oven 15 minutes. Reduce temperature to 350°F. and bake until set, about 10 minutes.

Sources used to create this guide: *The Seed Garden: The Art and Practice of Seed Saving,* edited by Lee Buttala and Shanyn Siegel. *The Timber Press Guide to Vegetable Gardening in the Midwest* by Michael VanderBrug. Recipe from *harvestofjoyfarm.com*. **Created by:** Ella Kelly and Sofia Rowland, *SEMN211, Kalamazoo College, Fall 2021* **Edited by:** Amy Newday, *Kalamazoo College, Fall 2021*

How to Save Seeds From: Radishes!

Species Name: Raphanus sativus

Family: Brassicaceae

Reproductive Life Cycle: Annual or Biennial

History: Radishes have been grown and fed people for over 4,000 years. Although the domestications are unknown, recent evidence pointed out that the origin of the most popular varieties grown today are likely from Eurasia and Japan. Radishes can be categorized into two primary groups: annual summer radishes and biennial winter radishes. The third grouping of radishes, 'Rat's Tail,' is known for their larger edible seed pods.

Planting & Cultivation:
Annual summer radishes are a quick-growing crop for eating can be planted in the spring/fall with cooler temperatures and harvested in as little as 22 days. You can sow radish seeds directly into the soil about ½ inch deep and 3 inches apart. For seed saving, annual radishes planted in the spring with the space of 6-12 inches apart produce mature seeds in the span of more than 4 months.

Biennial winter radishes are planted in mid to late summer and need a vernalization period with temperatures below 40 degrees F for up to 12 weeks before flowering and setting seeds. Space plants in soil 4-6 inches in row and 24 inches apart. Before or just after winter, consider digging the crop to evaluate the roots and replant them with the spacing recommended for seed growing, which is 12-18 inches apart. Otherwise, for overwintering, adjust initial sowing date so that radishes are slightly smaller than full size when the cold hits.

In general, maintain regular watering, good soil drainage, and adequate sunlight. Try to avoid planting them in soil that has recently had other brassica crops, as this can increase the risk of disease and pest problems. Consider planting 5 plants for viable seeds and 20 to 50 plants to maintain the variety.

Pollination: Radishes rely on their insect neighbors to help with the pollination process. Radishes have perfect flowers that are self-incompatible, so they have to cross pollinate with other plants because of chemical signals which prevent their stigmas from accepting their own pollen. Therefore, bees and other insects track pollen from the same or similar varieties of radishes to the stigmas of other plants, which starts the reproductive process.

Isolation Methods: In order to prevent unwanted cross-varietal pollination, you should make sure to plant different varieties of radishes at least 800ft to ½ mile apart. If the constraints of home gardening make this difficult, consider alternating the variety of radish grown for seed in your garden every year.

Seed Maturity: Radish seeds will be only be ready to harvest once the root has matured past edibility. Once this happens, the radish plant will flower during the warmer periods; after the flower fades and wilts, a green seed pod will take its place. Wait for the seed pod to turn brown and dry out before harvesting.

Harvesting and Cleaning Your Seeds: Once the seeds are mature, entire radish plants can be cut and placed on a tarp or ground cloth. Radish seeds are orthodox seeds, which means they contain very little moisture. Radish plants should be properly dried before cleaning and storing the seeds. After the plants are dry, their seeds can be threshed by hand or by treading on the seed pods. Radish seeds should be shaken through a small screen and winnowed, then the seeds should be spread out on paper or cloth in a well-ventilated, shady room to dry. Allow 2 weeks for proper drying.

Storage: After the seeds have been dried, they should be stored in a container that will not add any moisture, like a glass container that is tightly sealed. Screw tops work best! These containers should be kept in cool, dry, and dark places. Under these conditions, you can expect your radish seeds to last up to 6 years.

Eat and Enjoy! A super simple, super fresh salad is a great way to enjoy your radishes. We suggest slicing 2 cups of radishes very thinly (using a mandoline, if possible). Combine with ¼ cup of toasted chopped walnuts and ¼ cup feta cheese. A lemon vinaigrette pairs nicely with this salad – whisk 2/3 cup olive oil and 1/3 cup lemon juice to create the perfect blend. Drizzle the vinaigrette over the radishes and walnuts, and season with sea salt and black pepper. Garnish with sprigs of fresh mint, and enjoy!

Sources used to create this guide: *Saving Our Seeds: The Practice and Philosophy* by Bevin Cohen; *The Seed Garden: The Art and Practice of Seed Saving* edited by Lee Buttala and Shanyn Siegel*; The Timber Press Guide to Vegetable Gardening in the Midwest* by Michael VanderBrug; *Shaved Radish Salad with Walnuts and Mint* by Mina Stone for bon appétit. **Guide created by:** Chau Ta and Emerson Wesselhoff, SEMN211, Kalamazoo College, Winter 2023. **Edited by:** Amy Newday, Winter 2023.

How to Save Seeds From: Spinach!

Species Name: *Spinacia oleracea*

Family: Amaranthaceae

Reproductive cycle: Spinach is an annual plant.

History: Spinach was brought into cultivation from southwestern Asia. From there it traveled to North Africa, then to Italy after 800 CE, and spread across Europe by the 1500s.

Planting & Cultivation:
Spinach can be sown for eating in fall or spring. Spinach is easily cultivated in most vegetable gardens. For full-grown plants, plant 10-12 seeds per foot at a ½ inch deep. For baby spinach, scatter 30-40 seeds per foot at a ½ inch deep.

In locations where winter temperatures will kill spinach (temps below 15 degrees F), you will need to plant spinach in early Spring in order for the plants to have time to make seeds. For seed crops, plant seeds 1-2 inches apart from each other in rows of 22-30 inches, then thin out those rows of younger plants by eating them, leaving a space of 8-12 inches in between each plant for them to grow and allow you to gather their seeds. Spinach seeds need moist and fertile soil to thrive.

10 spinach plants will allow for viable seeds, meaning you will get enough seeds from 10 plants to replant more spinach and 20-50 plants will allow you to maintain the genetic diversity of a variety.

Pollination: Spinach produces male and female flowers on different spinach plants and uses wind to pollinate. Spinach is daylength sensitive and requires a minimum number of hours of daylight before flowers emerge, usually around 13-15 hours/day. Female plants produce pistillate flowers over the span of a few weeks to a month and pollinate and develop seeds best when temperatures are under 75 degrees Fahrenheit.

Isolation Methods: To prevent unwanted cross-varietal pollination, grow only one variety for seed per season. You can also use a spun-poly cover to isolate your plants and protect them from cross-pollination. For those saving seeds, an isolation distance of 800 feet to one mile between each variety is recommended.

Seed Maturity: You can tell when seeds are mature when the seeds turn from green to tan. Seeds located on the lowest section of a branch will mature first.

Harvesting and Cleaning Your Seeds: Plants should be harvested when at least two-thirds of seeds are mature. Lay out branches to dry. Once your spinach plant is dried, clean seed-laden stems by hand into a bucket. Make sure to wear gloves if you are working with a prickly variety. Follow with winnowing to remove remaining debris. You can winnow at home by using a box fan to blow away light pieces of chaff, and hardware cloth to screen out large pieces of debris.

Storage: Use airtight containers to store your seeds. If you store your seeds in cool, dry conditions, you can expect your seeds to remain viable for six years.

Eat and Enjoy!
Spinach Artichoke Dip:
8 ounces of cream cheese, 1 cup sour cream, 10 ounces of spinach, 1 teaspoon minced garlic, ½ teaspoon salt, ¼ teaspoon pepper, ½ cup grated parmesan cheese, 1 ½ cups shredded mozzarella cheese, 1 tablespoon chopped parsley

Wilt spinach, wring out remaining water and coarsely chop. Preheat oven to 375 degrees F. Coat a baking dish with cooking spray. Mix all ingredients (besides parsley) together and add to baking dish. Bake for 20 mins or until cheese is bubbly and brown on the top. Serve with crackers and sprinkled parsley on top.

Sources used to create this guide: *Saving Our Seeds: The Practice and Philosophy* by Bevin Cohen; *The Seed Garden: The Art and Practice of Seed Saving* edited by Lee Buttala and Shanyn Siegel*; The Timber Press Guide to Vegetable Gardening in the Midwest* by Michael VanderBrug

Created by: Megan McGarry and Rachel Molho, *SEMN211, Kalamazoo College, Winter 2023.* **Edited by:** Amy Newday, *Winter 2023.*

How to Save Seeds From: Tomatoes!

Species Name: *Solanum lycopersicum*

Family: Solanaceae

Reproductive Cycle: Frost-sensitive perennial usually grown as an annual in cooler climates

History: The tomato plant comes from wild relatives in the mountains of western South America and was likely first domesticated in the region of Mexico. Cortes brought tomatoes from Mexico to Spain where they were grown as ornamentals and spread throughout Europe. Because of its relation to deadly nightshade, many Europeans thought the tomato was poisonous and did not eat any part of the plant. The Sicilians were the first Europeans to adopt the tomato as a food crop.

Planting & Cultivation:
With their ancestry in warmer regions of the Earth, tomatoes are heat-loving plants. In their ecosystems of origin, they can live as perennials, however, they are commonly grown as annuals in climates that are too cold for them to survive through the winters. Tomatoes need heat to germinate and are usually started in pots indoors about 6-8 weeks before transplanting outdoors. Harden off seedlings and wait until all danger of frost is passed and temperatures have warmed before planting outdoors. Plant tomatoes 2-3 feet apart. For determinate varieties, a thick organic mulch can conserve water in the root zone, prevent disease and cushion fruits off the ground. Indeterminate varieties do best with support from a cage or trellis.

Tomatoes can produce viable seeds from just one plant. Tomatoes are not as susceptible to inbreeding depression, however, it is recommended that saving seeds from 5-10 plants will give the best genetic diversity.

Pollination: Tomatoes are mainly self-pollinating because their sexual organs are contained within the flower. Some tomato varieties have extended stigmas, though, which means there is also a possibility of cross-pollination through insects.

Isolation Methods: Isolation distance varies based on variety, but is between 10-50 ft. If the stigma is enclosed, the recommended distance is 10-20 ft, but if the stigma is visible, then up to 50 ft is recommended for seed saving and up to 100 ft is recommended for genetic preservation.

Seed Maturity: Ripe tomatoes have mature seeds when the fruit have turned color and started to soften. You can scoop seeds out of fully mature tomatoes and then use the rest of the fruit to make tomato sauce.

Harvesting and Cleaning Your Seeds: Scoop or squeeze seeds out of fully ripe tomatoes into a bowl or tub. You can also mash the tomatoes in a bucket if you have a large quantity you want to extract seeds from or use a food processor with a dull blade to blend them up and free the seeds. Tomato seeds are surrounded by a gel-like substance that contains a germination inhibitor. To remove the gel, let the seeds and gel ferment (along with enough juice and pulp to keep the mixture wet) for several days or until a layer of scum forms across the top. Then add water to the mixture and stir vigorously. The scum, pulp and any undeveloped seeds should float. Pour them off, then repeat this process several times until the water pours clear and the seeds are clean. Strain out seeds and place in a single layer on a plate or screen to dry.

Storage: Scrape the seeds into a labeled envelope. Tomato seeds should be stored in a cool, dry environment. Seeds stored this way can last 4-6 years. Make sure they are fully dry before storing! The envelopes can be stored in a sealed container or a tin.

Eat and Enjoy! Many tomatoes are best when prepared simply. Try cutting smaller varieties (blush, cherry, etc.) in half and tossing them in balsamic vinegar, olive oil, salt, and pepper. This mixture would also go well on pasta with pesto.

Sources used to create this guide: *The Seed Garden: The Art and Practice of Seed Saving,* edited by Lee Buttala and Shanyn Siegel.
Created by: Gabby Riaz and Andre Walker*, SEMN211, Kalamazoo College, Fall 2021.* **Edited by:** Amy Newday*, Kalamazoo College, Fall 2021*