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The People's Club  
Gardening & Non GMO Food  
Communal Gathering

Gardening Guide

# Vegetables



## Artichokes, Globe



### Description:

A native of the humid warm climates of the southern Mediterranean, Globe Artichoke is grown in North America as an edible ornamental. This tall thistle like plant can reach up to 10 feet in optimal conditions. It is primarily grown for its immature flower buds which are edible. A perennial in areas with milder winters and even considered a weed in some areas, it is a perennial that is grown as an annual in Northern climates.

### Growing Instructions

Optimal Time/Temperature for Germination: Full Sun in a sheltered spot.

Optimal Soil Conditions: Well Drained, fertile soil.

**Seed Planting Depth, Spacing and Procedure:** In areas with a growing season shorter than 100 days, seeds should be started indoors. Some plants will be non productive but others will produce three or four heads per season.

9 weeks before the last frost date, plant two or three seeds to a 3 inch container. Seeds germinate in 10--5 days at a soil temperature of 70-75 degrees F (21-24 degrees C)

After the first true leaves form, thin to one plant (the largest) per container. Four weeks before the last frost, transplant seedlings to 5 inch pots. Harden off for a week before planting outdoors in fertile, well drained soil allowing at least three feet around each plant. Choose a sheltered spot with full sun at the back of the garden where the plants can be allowed to become large without shading other plants or getting knocked over by wind. In mild areas they will over winter if they are hilled over and heavily mulched.

**Best Companion Plants:** Peas, cabbage, rutabaga and broccoli will not compete for nutrients. Cucumbers can grow at the base of artichokes and they also need good soil drainage.

**Plants that Hinder:** Since Artichokes need a lot of soil nutrition and they take up a lot of space, they shouldn't be planted with vegetables that also require space and are heavy feeders.

## **Crop Maintenance**

**Moisture Requirements & Solutions:** soil should be moist but not wet. Artichokes do not like wet feet.

**Weeding Needs & Solutions:** Because of their size and spread, Artichokes are not easily hindered by weeds once they get past the seedling stage.

**Feeding Needs/Optimal Natural Fertilizers:** Dig in lots of compost and well-rotted manure

**Pests, Diseases & Solutions:** The plant suffers less infestation because it isn't from North America.

## **Harvest and Storage**

**When to Harvest/Number of days to maturity:** 100 days or more. Globe artichokes take a long time to get big enough to produce the edible part which is the immature buds of the blooms. Artichokes need a cool period to induce bloom in the first year, but will not survive a hard frost.

**How to Harvest:** To encourage a larger harvest, cut the central head while it is still compact – cut through the stem about 1 inch below the head. smaller lateral heads will appear later. As the lateral heads get large but not fully in bloom, cut them in the same way.

**Optimal Storage temperature and conditions:** Artichokes do not keep well. They are best eaten fresh immediately after harvesting.

**Optimal Preserving Procedures:** Artichoke hearts can be pickled but they are best eaten fresh.

**Seed Saving:** Allow some of the flower buds to fully bloom and they will produce seeds.

Easier to propagate from suckers: Approximately two weeks before the last frost date (or if hard frost is forecast) cut the plants back to 15cm (6") tall, and mulch well with straw, soil, leaves, or burlap, to keep the roots from freezing. Uncover after the last frost date in spring. Dig down to the roots to remove suckers for transplant. In colder areas, dig up the roots after the last frost and plant them indoors, keeping them watered but not soaked in a cool basement or root cellar. They can be brought out and transplanted in the spring.

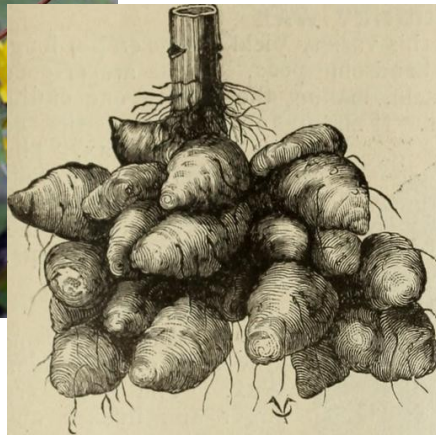
## **Notes**

Although the buds are not longer edible once allowed to flower, Globe artichokes are beautiful and attract bees and other beneficial insects to the garden.

## Jerusalem Artichoke (Sunchoke)



**Description:** Tuber as nutritious food source (plant is a relative to the sunflower)  
Botanical Name: Helianthus tuberosus



### Growing Instructions:

**Optimal Time/Temperature for Germination:** Plant in spring and water/prefers full sun but better with morning than evening sun/very hardy between zone 4a to 9b

**Optimal Soil Conditions:** loose and loamy (not clay)

**Seed Planting Depth, Spacing and Procedure:** 3 inches deep and 1 foot apart

**Best Companion Plants and Plants that Hinder:** it's a perennial and when container grown is great with peas to climb its stalks and zucchini and cucumber can trail off the edges. When in the ground it will spread in its permanent home.

### Crop Maintenance

**Moisture Requirements & Solutions:** contains inulin so a great substitute for diabetics instead of potatoes. may give some flatus (but more wind pass sound than aroma).

**Weeding Needs & Solutions:** returns in spring so don't mistake for a weed

**Feeding Needs/ Optimal Natural Fertilizers:** grows itself very well

**Pests, Diseases & Solutions:** if too heat stressed ants, ear wigs, or grasshoppers may find it but otherwise it's very vibrant.

## **Harvest and Storage**

**When to Harvest/Number of days to Maturity:** After the summer as leaves and stalks die off

**How to Harvest:** Cut down to growing point (about 1 foot above the ground) use the stalks for composting.

**Optimal Storage Temperature and Conditions:** Most people leave them in the ground to retrieve during winter for meals. Ground cover with dry straw if freezing regions.

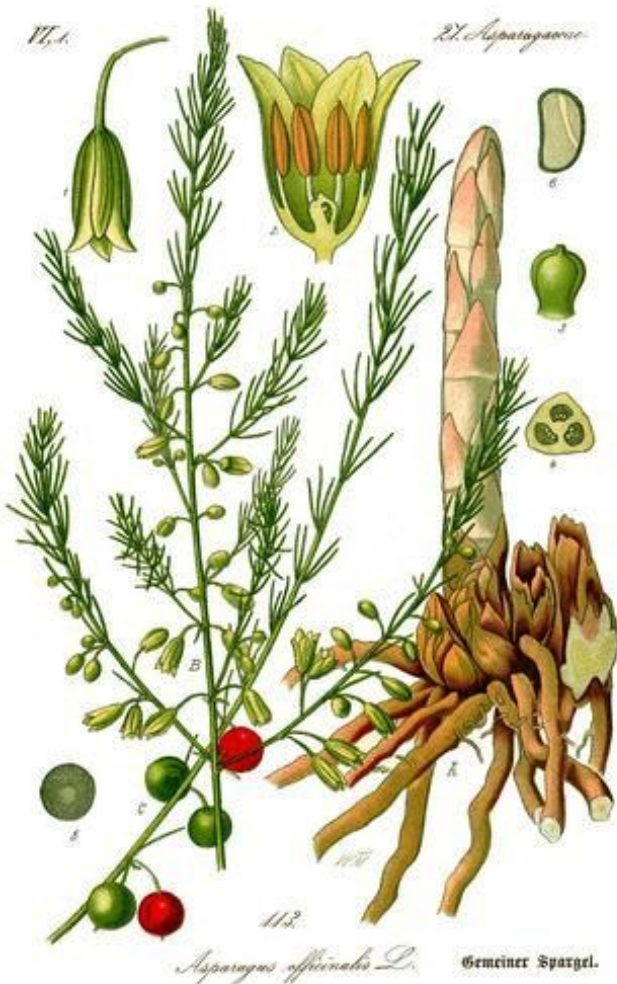
**Optimal Preserving Procedures:** if not kept in the ground place in a bucket with dirt into a basement (others may treat them like potatoes in a dry cool place but if green noted like potatoes, don't eat it, just replant it).

**Seed Saving:** the dried flower heads pop apart easily to find small blackish seeds.

### **Notes on Jerusalem Artichokes:**

- okay to eat raw
- only peel skin if making a cream soup can cube and roast in oven
- thin slice or grate for stir fry or steam pickling into jars
- fermentation use

## Asparagus



### Description:

Asparagus is a hardy perennial vegetable native to the seacoasts of Europe and eastern Asia. Early settlers brought asparagus to North America.

The underground portion of the plant consists of a network of rhizomes, fleshy storage roots, and fibrous roots. The fleshy roots (as well as the spears) are initiated from the rhizomes. Together, the fleshy roots and rhizome make up the crown, which is the perennial portion of the asparagus plant. Fleshy roots serve not only as storage organs for the carbohydrates received from the fern, but also as the site of fibrous root development. Fibrous roots, which live for one or two seasons, function in the absorption of water and nutrients from the soil.

Asparagus spears are edible shoots that develop on rhizomes when the soil temperature is warm and the water supply is favorable. The spears, if not harvested, develop into ferns 4-6 feet tall. Carbohydrates and other compounds necessary for plant growth and development are produced in the ferns throughout the growing season. These substances are translocated to the fleshy roots, where they are stored and used to produce spears the following spring.

### Growing Instructions

Growing asparagus is a long term commitment that requires patience. Choose a spot at the back of the garden, along a fence or in an area of the yard that can have a permanent patch of this vegetable.

It takes two to three years for asparagus to mature enough to be harvested. Once it is established and if there are both male and female plants, asparagus will come back every year and spread into a good large patch that will provide delicious shoots in the spring and an attractive foliage through the summer. It can be a beautiful backdrop for other plants and the ferns are popular in traditional flower arrangements. If you care for your asparagus well, it will outlive you and your house. In areas with perfect growing conditions, heritage asparagus can be found naturalized. It grows wild around the foundations of old fallen down homesteads and can be found all down the road, along country fences. As birds eat the berries, asparagus also appears at the edges of deciduous woodlands.



**Optimal Time/Temperature for Germination:** When the soil temperature is below approximately 50° F or the water supply is limiting, crowns become dormant. In the Northeast, cool soil temperatures induce winter dormancy, whereas in tropical or subtropical growing areas, irrigation may be withheld to induce dormancy or special methods are employed to produce the crop without a dormant period. The dormant period preserves the carbohydrates or energy, giving rise to spear production the following season.

In areas with extremely low temperatures in winter, asparagus can benefit from a top dressing of straw in the fall to protect it from freezing.

**Optimal Soil Conditions:**

Select a spot that has at least 6- to 8-hours of full sunlight during the growing season, relatively level and free of stones. The growing area should be tilled or managed to eliminate as many weeds as possible a year ahead of planting the asparagus. It is especially important to eliminate perennial weeds and hardy grasses such as twitch or couch grass because is very difficult to weed once the bed is established. The prior year of preparation should include cultivation and (or) cover crops and the addition of lime, if needed. Check the PH of the soil. Asparagus grows well at a soil pH between 6.0 and 7.5. Manure, if free of weed seed, particularly that of perennial weeds, can be incorporated into soil during preparation. The potassium requirement is somewhat greater than the phosphorus requirement, but both are essential for high yields.

Good soil-water drainage is very important because asparagus does not tolerate wet roots. The crop can survive short periods of flooding, but not prolonged waterlogged soil. Sandy loams and loams are best for asparagus. The more sandy the soil, the more likely the plants will suffer from drought stress unless irrigation is available. Asparagus can do well in rather heavy soils, but these soils often have poor drainage and form crusts that can cause damage to emerging spears. The reserve water-holding capacity of the heavier soils can be an advantage if internal soil drainage is good. Do not plant on clay soils because freezing heaves and damages the crowns.

If your soil has a high salt content the asparagus will tolerate it.

**Seed Planting Depth, Spacing and Procedure:** The three methods of establishing asparagus fields are with crowns (roots), transplants, or direct seeding.

Crowns (Roots) : Crowns can be acquired from other gardeners or purchased from garden centers.

To grow crowns, select a level, fertile, well-drained, weed-free field that has no previous history of asparagus production. Soil borne asparagus pathogens persist in the soil for many years and attack the roots of new plants.

Untangle the crowns and discard the very small or badly injured ones. Sort into groups of the same relative size and plant each size group together so that competition among plants will be similar.

If planting is delayed, store crowns at 40° F and 85%-90% humidity. Do not let free water accumulate on them, but it is important not to let them dry out. If refrigeration is not available, store the crowns in a cool place out of the sun. If you are concerned about acquiring a disease from the source of the crowns, dip them in a 3 percent solution of food safe hydrogen peroxide before planting.

Plant crowns 24-36 inches apart. Leave plenty of space between rows for a path and to allow the plant to spread out.

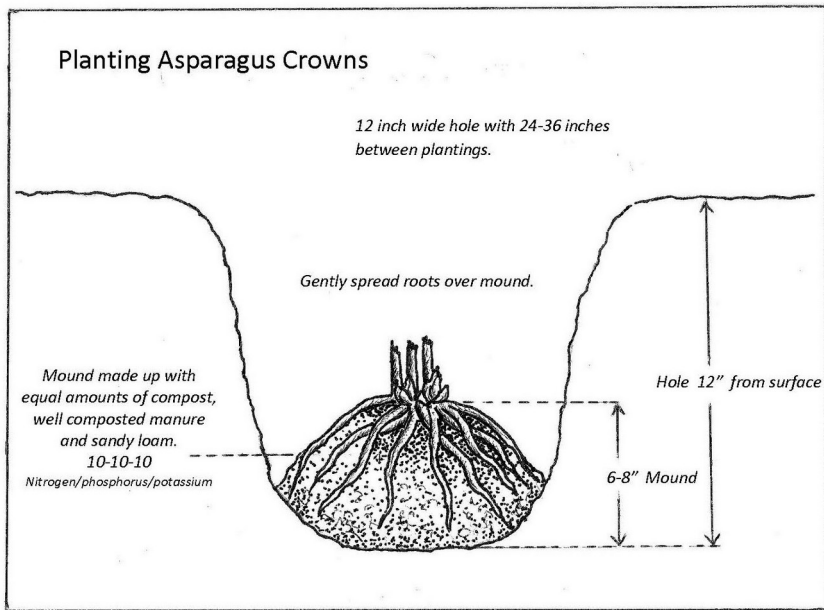


Illustration by Rebecca McCarthy

Plant crowns in a furrow or hole with the buds up and 6 inches below the soil level of the field.

Dig a 12 inch deep hole or a long furrow. Build up an 6 inch mound in the middle made up of organic compost and rich organic fertilizer with soil on top. Lay roots out on mound and cover with rich organic soil. Water well after planting.

To create stronger root systems, cover crowns with 1 1/2-2 inches of soil at the time of setting. After that furrows can be gradually filled in as the fern grows, without completely covering the growing spears, until the land is level or slightly ridged over the plant row by fall.

**Planting from Seed** - Few growers direct-seed asparagus. This method requires considerable expertise. The seed bed in the bottoms of the furrows must be more thoroughly prepared than for crowns or transplants. Irrigation may be needed for seed germination and plant emergence if dry weather persists. Weeds may become a problem before the slow-growing asparagus can be adequately cultivated.

Seed may be contaminated with fungal spores and should be surface sterilized before planting by soaking in a 3-percent solution of food safe hydrogen peroxide (also known as oxygen bleach) for 1 hour,

Plant seeds about 1 inch deep. Seed is slow to germinate and seedling emergence may require many days, depending upon soil moisture and temperature. At a soil temperature of 68° F, emergence occurs in about 15 days, but at 59° F about 24 days are required. Germination can be hastened by a pre-soak period.

Seedlings can be started indoors or in containers, and then planted outside but this process is so time consuming that the seedling aren't ready to be planted out until late in the season when dry weather often becomes a challenge.

**Best Companion Plants:** Parsley adds vigor. Tomatoes will protect from the asparagus beetle. Asparagus is a natural nematodocide. (deters nematodes) so it benefits tomatoes. Basil, cilantro, dill, cilantro, marigolds, nasturtiums, oregano, peppers, sage, and thyme are also good.

**Plants that Hinder:** Root vegetables such as potatoes is a bad idea beside asparagus as the digging for harvesting will disturb the root system of the asparagus.

## **Crop Maintenance**

As long as ferns retain any green color, they are still transporting valuable nutrients to the roots. Consequently, delaying the cutting back of the fern until late winter or early spring allows maximum transport of reserve to the storage roots. An additional advantage to allowing the fern to stand through the winter is that it can provide some protection against soil erosion and catch a snow cover, which can provide protection against crown or root damage from freezing injury.

**Moisture Requirements & Solutions:** Soaker hoses can be helpful to provide the asparagus patch with consistent, moderate water, especially during the first 2 years.

Irrigation can also improve the vigor of an asparagus planting. Although it is a deep-rooted crop, asparagus is responsive to irrigation and should be irrigated routinely throughout the summer to maintain fern vigor until early fall. Because it is a perennial and can be maintained in essentially a no-till situation, asparagus may be a good candidate for a trickle irrigation system, especially in the early years of establishment before roots have had time to penetrate soil to a large extent.

The perennial root system of asparagus becomes quite extensive and, after a few years, can penetrate the soil to a depth of 4 feet or more. Consequently, there is usually less demand for supplemental irrigation in older asparagus plantings with well-developed root systems than in newly established beds.

### Guidelines for Watering Mature Plantings

The water requirements and irrigation practices of an established asparagus planting can be divided into three periods:

*April-May.* The water requirement is low because harvest of the spears prevents water loss that would otherwise occur through development of the fern. Rainfall usually provides enough water at this time of year to prevent the need for supplemental irrigation.

*June.* The water requirement rapidly increases after the spears are allowed to develop into ferns. The increase in water requirement is often accompanied by a decrease in rainfall. In a mature bed, roots may be rather extensive and deep, making irrigation unnecessary until the end of June. However, it has been observed that following a cutting season that has been rather dry, spear emergence and subsequent fern development may be delayed. This delayed emergence following harvest may be prevented by beginning irrigation immediately after the last cutting, particularly in a dry year.

*July–August.* In an established planting, the most critical time for irrigation is generally July and August when ferns become large. A good water supply at this time allows for maximum fern growth and, consequently, maximum transport of carbohydrates to storage roots. The amount of water applied should be sufficient to wet the soil to a depth of about 2 feet. Irrigation may be detrimental after the end of August. Although asparagus is fairly cold hardy and can continue to grow well into the fall, excessive fern growth late in the season may deplete the root system of carbohydrates, which would be better used in the next spring's spear production. Withholding irrigation in the fall helps asparagus go into the dormant period necessary for successful production in the Northeast.

**Weeding Needs & Solutions:** During the early stages of planting, the asparagus bed should be as weed free as possible, particularly free of perennial weeds which can overwhelm seedlings, reduce yields, and make it difficult to harvest spears in mature beds. Soil can be prepared the year before to eliminate weed seeds in the soil before planting the asparagus.

Asparagus has been known to survive in the wild. It is therefore an excellent choice in a permaculture plan. Cultivation during the fern stage the second year and thereafter is not feasible or is very difficult because asparagus plants grow rapidly to a height of 5 feet or more. If cultivation is attempted after harvest, keep the shovels well away from the base of the plants to avoid cutting off new spears, which can be either above or below ground.

**Feeding Needs/Optimal Natural Fertilizers:** Once the planting has been established, it needs only moderate annual applications of fertilizer. Asparagus removes very small amounts of nitrogen, phosphorus, and potassium from the soil, even with high yields. In the spring before spear emergence or after harvest a general recommendation is to apply nitrogen (N), phosphate ( $P_2O_5$ ) and potash ( $K_2O$ ), each at the rate of 50 pounds per acre, and lightly incorporate them into the soil. Soils high in available phosphorus and potassium may require  $P_2O_5$  and  $K_2O$  applications every other year, but apply nitrogen every year. If no-till is practiced, broadcast the organic fertilizer, particularly the nitrogen on the soil surface, preferably before rain or irrigation. Over application of the so-called hot manures (pig, chicken, sheep) may supply too much nitrogen and result in excessive top growth and plant lodging. (*Lodging* is the bending over of the stems near ground level of crops, which makes them very difficult to harvest, and can dramatically reduce yield.)

**Pests, Diseases & Solutions:** Asparagus is susceptible to fungal development in the root and crown, known as crown rot, especially in large scale farming situations. It is recommended to treat crowns and seeds with oxygen bleach (diluted food-safe hydrogen peroxide) before planting as a preventative measure. In the home garden it is advantageous to have several asparagus patches in separate corners of the garden to leave you with back up if one patch fails. Providing plants a healthy growing environment by preparing soil well before planting will encourage vigorous plants that are less susceptible to disease.

Asparagus rust can be a potentially devastating disease if left untreated. Symptoms of the disease first appear as small orange patches on spears and on fern branches. High humidity and warm temperatures influence repeated spore production and germination. Windblown spores are spread to adjoining plants, and with sufficient moisture new infections are initiated. Individual fern needles are shed, and the entire field may turn brown. The entire life cycle of the rust fungus occurs on asparagus, with the summer orange spores giving way to black overwintering spores. Plant resistant varieties if possible. Jadam fungal sprays would be worth exploring as a solution.

The asparagus beetle and 12 spotted asparagus beetle are a problem in the Northeast. The adult beetles, which overwinter under plant refuse and debris along field borders, begin to move to asparagus as the spears first emerge in the spring. The beetles feed on the spears and lay eggs singly in vertical rows, usually near the tip of the spear. The eggs hatch in approximately 1 week, and the numerous fleshy, gray larvae move to foliage where they feed. The larval stage lasts 2-3 weeks, after which the larvae leave the plant, burrow into the soil, and pupate. Solutions include, hand picking the beetles, finding ways to interrupt the insects life cycle with non poisonous sprays such as Jadam herbal solutions and introducing or encouraging natural predators that will eat the beetles. It is worth trying a spray with a tea made from tomato greens. Installing numerous bird houses along fence lines will encourage birds to live near the fields and eat the beetles and larvae. Production practices that promote plant vigor and thorough harvesting of all spears during harvest season may help reduce the beetle populations.

Asparagus Aphids, leaf hoppers and asparagus miners can also be reduced dramatically with Jadam herbal sprays. Introducing ladybugs helps control aphids. It is especially important to avoid chemical sprays on asparagus because bees visit flowering asparagus to pollinate and can be poisoned by insecticides.

## **Harvest and Storage**

**When to Harvest/Number of days to maturity:** Two years are required to establish an asparagus field, but once into production plantings endure from 10 to 20 years. The patch will self sow which results in a permanent cycle of growth under ideal conditions,

Asparagus is harvested in the spring when new shoots come up. This happens very quickly so there is a short period of time when the asparagus shoots can be harvested and then they begin to jump ahead and turn into ferns.

The shoots that are allowed to go to fern over the summer months carry out photosynthesis and produce carbohydrates. Thus, the larger the fern and the longer it is maintained in a healthy vigorous condition, the greater is the production of reserve carbohydrate or energy for the next harvest season.

First harvest begins the third year after field planting. As a rule of thumb, harvest for 2 weeks the first year, 4 weeks the second year, and 6 weeks the third and following years. These are only general recommendations, and harvest may continue as long as spear size and regrowth are maintained. Once there is a notable increase in numbers of small-diameter spears harvest should stop. It is a common mistake for new growers to harvest too long. Over harvesting can cause a permanent reduction in vigor and health of the plants and reduce yields the following years.

### **How to Harvest:**

Shoots are cut when they are 8-10 inches tall and ½ inch or more in diameter. Cut fresh shoots at or just below soil level, leaving the roots and crown to produce more shoots. Be careful not to damage other shorter shoots while harvesting. Asparagus is harvested by cutting or snapping by hand.

The growth of asparagus is erratic because spears grow very rapidly on warm days and very slowly on cool days. In warm weather productive plantings must be harvested at least once each day. Rather than harvest twice a day, some growers harvest only once, but take all spears that are 4-5 inches or more in height. In warm weather buds begin to open at a shorter spear length than in cool weather. Closed tips are associated with high edible quality.

**Optimal Storage temperature and conditions:** Asparagus is best eaten fresh. It can store in the fridge for more than a week if the temperature is cool enough. A traditional method of storing asparagus has been to place the butt end of the spears in a shallow pan of water or on a dampened water absorbent material.

Quality quickly declines in asparagus if not cooled immediately after harvest. Both sugars and vitamin C decrease rapidly, resulting in a loss of flavor and nutritional value. In addition, if the storage temperature is above 36° F, fibers develop in the spears, resulting in a tough, stringy texture, and the tip buds begin to open.

**Optimal Preserving Procedures:** Asparagus makes excellent pickles and it can be frozen.

### **Seed Saving:**

Asparagus plants are dioecious, meaning that male and female flowers are produced on separate plants. The flowers are small, bell shaped, and whitish green. Male flowers are more conspicuous than female flowers. Following pollination of female flowers by bees, a berry, which has one to eight seeds and turns red at maturity, develops. The seeds, which are threshed from the berry when dry, are single, large, black, and generally round with one flattened side. Female plants are somewhat less productive and shorter lived than male plants because of the energy allocated to seed production. Thus, in a given planting of dioecious hybrids or plants from open-pollinated sources, the ratio of male to female plants initially is 50:50. As the age of a planting increases, the ratio of male to female plants increases.

Growers who grow their own crowns generally prefer to dig them in the spring before sprouting occurs, sometime after the middle of April to early May.

## Beans

Common, Snap - Pole Beans, Bush Beans

**Description:** The common bean was grown by Indigenous people in North America long before first contact. The Pole Bean is referred to as one of the "Three Sisters", Climbing Beans, Corn and Squash, companion plants that grow together well and are complimentary foods when eaten together. Bush beans, now known as Snap Beans, over many centuries gradually made their way North from South America, through trade and then were distributed to the old world to compliment the many varieties that came from Europe and the East. Beans can be eaten raw, in the pod off the vine, cooked or when allowed to mature fully, the seeds can be removed from the pod and dried for long term storage. Beans have been eaten worldwide by humans for millennia as an extremely varied and versatile food source. In perfect growing conditions they are very prolific and dependable. Snap beans are the variety that is routinely eaten with the pods intact.

### Growing Instructions

**Optimal Time/Temperature for Germination:** Usually seeded directly into the garden around the last frost date at two-three week intervals until mid summer to provide an ongoing harvest. Beans will germinate in 8-16 days, depending on the warmth of the soil. Beans Like full sun so plant in a location that is not shaded.

**Optimal Soil Conditions:** Well drained soil with compost – beans do not like wet feet. Snap Beans are not frost hardy and require warm soil to germinate and grow. Temperature must be above 50 degrees F (10 degrees C) but beans do not germinate well in very hot soil.

### **Seed Planting Depth, Spacing and Procedure:**

Plant Bush bean seeds 1 inch deep and 2 inches apart, thinning later to 4 inches apart. Set rows about 1 foot apart to give mature bushes enough space. Planting extra seeds and thinning later allows for seeds that don't come up or grow poor shoots.

Plant pole bean seeds at 2 inch intervals along a fence or trellis, thinning later to 6 inches apart, or plant 4 seeds around a 6 foot pole.

Bush beans will grow up to 18 inches tall on sturdy plants but pole or climbing beans need a supporting trellis and will grow up to 8 feet.

Seeds can be pre-soaked or even pre-germinated in moist paper towel before being carefully planted.

It is helpful to treat beans with a nitrogen fixing inoculant, available from many garden centres, if they are to be grown in a spot where beans have never grown before.

## **Best Companion Plants and Plants that Hinder:**

Bush Bean Companions – carrots, cucumbers, strawberries, celery – hindered by onions, garlic & fennel

Pole Bean Companions – Carrots, cauliflower, Corn, radishes, summer savoury – hindered by onions, garlic, shallots, chives, beets, kohlrabi & sunflowers

## **Crop Maintenance**

**Moisture Requirements & Solutions:** Beans need moisture but should not be over watered. As they are susceptible to fungus they benefit from drip irrigation that does not get excess moisture on the leaves.

**Weeding Needs & Solutions:** Mulch between the rows and around trellises to reduce competition from weeds.

### **Feeding Needs/Optimal Natural Fertilizers:**

Beans are not heavy feeders, they feed the soil they grow in. They benefit from some compost. As part of the legume family of plants that fix nitrogen in the soil, they are beneficial to plants that need nitrogen, such as corn.

**Pests, Diseases & Solutions:** Fungus diseases are common on bean pods, especially in damp weather. Do not tend wet plants as this can spread fungus. Discard discoloured pods and beans. Marigolds Deter Mexican Bean Beetles. Summer Savoury deters bean beetles.

## **Harvest and Storage**

**When to Harvest/Number of days to maturity:** Seed breeding has resulted in short season varieties but generally, beans need about two months to mature fully if you plan on using dried seeds. Bush beans mature 45-50 days from planting. Pole Beans mature 55-70 days from planting.

**How to Harvest:** Beans can be picked in the pod when they are pencil thickness or less or before the beans inside swell noticeably and the pods discolour. They can be eaten raw or steamed. Continued picking prolongs the harvest. You will have a regular ongoing harvest of beans with a batch every 3-4 days for three weeks or longer if you sow the seeds ongoing at weekly intervals in the spring.

Beans can be left to mature on the vine, brought in to dry for long term storage.

### **Optimal Storage temperature and conditions:**

If properly dried and stored in jars, beans will last a very long time. Dry beans can be stored on the shelf in a regular kitchen but will last longer if kept in a cool place, without moisture.

### **Optimal Preserving Procedures:**

Fresh Snap Beans in the pod can be canned or blanched and frozen.

**Seed Saving:** Seeds that are allowed to mature fully on the vine can be brought in and dried to plant next year.

## SOYBEAN

### **Description:**

Soybeans are an edible legume that are very nutritious, as they are high in protein, calcium, fiber, iron, magnesium, and other vitamins and minerals. Soybeans are also very versatile, as they can be cooked, fermented, dried, and turned into products like milk, flour, tofu, and more. Soy is a huge crop for many commercial farmers, but it can also be grown in your own backyard as long as you get a good three to five months of warm weather.

There are thousands of different types of soybeans. If you want to eat your soybeans, make sure you have an edible, green variety. If you want to make soy milk or flour, find a yellow-seeded variety. If you are planning on drying the soybeans, get a black-seeded variety.

*VARIETIES:* Midori Giant, Velvet, Manitoba Brown, Envy, Butterbean, Aoyu- most widely used as edamame (Heirloom variety /open pollinated, non hybrid)

### **Growing Instructions**

#### **Optimal Time/Temperature for Germination:**

The ideal time to plant soybeans is two to three weeks after the last frost, when the soil warms to about 60 F (15.5 C) and the air to about 70 F (21 C).

The upper part of the young plant (the hypocotyl) begins to lengthen, pulling the remainder of the seed upward. About five to fifteen days after planting, the new plant arches through the soil, and the oval seed leaves (cotyledons) open up. The cotyledons provide the seedling with food (that was stored in them) for about a week, plus they soon turn green and begin making a little additional food by photosynthesis. Later they drop off.

Seed germination and emergence is a critical period in the life of a soybean because poor emergence due to a soil crust, cold temperatures or seedling pests or diseases can drastically cut yield.

**Optimal Soil Conditions:** Choosing the right soil for your soy plants has many advantages, including that there will be fewer weeds, less erosion, and the right balance of nutrients and pH in the soil. This will produce healthier plants with better yields. The best type of soil for soybeans is well-draining loam that isn't packed too tightly. If your soil has a high clay content, mix in peat moss, sand, or mulch to ensure proper drainage.

#### **Seed Planting Depth, Spacing and Procedure:**

Direct Sow Soybeans in the garden, they have very shallow roots and don't transplant well. Sow the soybeans 1.5 inches (3.8 cm) deep into the soil, and space the beans about 3 inches (7.6 cm) apart. Plant the beans in rows that are about 30 inches (76 cm) apart.

Water the beans once they've been planted, but only until the soil is moist. Do not overwater newly planted beans, otherwise they may crack.

\* Soybeans require a lot of nitrogen. The best way to ensure they get enough is to inoculate the seeds with a nitrogen fixing agent. *BRADYRHIZOBIUM JAPONICUM* is a soil bacterium for this purpose. You can purchase *Bradyrhizobium japonicum* through catalogs, online, or in some gardening and farm supply stores. To inoculate the seed/beans, place them in a bucket and sprinkle them with the bacterium (inoculate) Use a spade or small shovel to mix the beans and coat each one. Keep the seeds out of direct sunlight and plant them within 24 hours of inoculation.



**Best Companion Plants and Plants that Hinder:**

Best companions: Corn, Squash, Potatoes, Cucumbers, Strawberry, Celery and Summer Savory. Allium Family should be avoided such as: Onions, Garlic, and Chives.

**Crop Maintenance**

Once the crops have sprouted a few inches, you should remove weaker plants to let the stronger plants flourish. To do this, cut the weak seedlings at ground level; do not disturb their roots. The remaining plants should be spaced about 4-6 inches (10-15 cm) apart.

**Moisture Requirements & Solutions:** Soybeans typically only need additional water during three stages: when they are first growing and before they erupt from the soil, when they are developing pods, and when they're flowering. During these periods, make sure to water the plants frequently enough to keep the soil moist.

**Weeding Needs & Solutions:** Soybeans do not like to compete with weeds, and will quickly be choked out if there are lots of weeds growing in the same garden. Weed the garden bed often and pull out weeds with a spade or by hand. Once the plants establish themselves and get larger, you don't have to worry about weeding so much, because the soy plants will choke out the weeds on their own.

**Feeding Needs/Optimal Natural Fertilizers:**

Soy plants need a good balance of nutrients in the soil to grow properly. It's important to add a fertilizer to the soil if the area hasn't been enriched in recent years. For soil that hasn't been enriched recently, add aged composted manure (never fresh) or compost to the soil to add more nutrients to the seedbed before planting.

**Pests, Diseases & Solutions:**

Rabbits love soybean shoots, and will devastate your crop if you don't protect the growing plants. To protect your crop from rabbits, put a fence around the perimeter of your garden. You can make a simple fence by driving a few stakes into the ground around the garden and attaching chicken wire to them. You can also purchase pre-made panels of garden fencing. Another method is to plant metal rings throughout the garden bed and cover them with horticultural fleece.

**When and How to Harvest/Number of days to Maturity:**

Soybeans start to mature in September, and are ready for harvest when the pods are green and the seeds become plump and fully grown. Typically soybeans will be ready to harvest in 70-160 days. When the seeds are ready, the pods will be between two and three inches (five to eight cm) long and plump. Be sure to harvest the beans before the pods turn yellow. To harvest, simply pick the entire pod off the plant.

**Optimal Preserving Procedures:**

It's important to blanch and shock the beans because you cannot properly digest raw soybeans. Fill a large pot with water and bring it to a boil over high heat. Fill another large pot halfway with water and fill the rest with ice. When the water comes to a boil, put the full pods into the water and boil them for five minutes. Then, remove them from the hot water with a slotted spoon and plunge them into the ice bath for five minutes. Once the pods have cooled, remove them from the cold water and place them on a clean towel. Removing the beans from the pods is easiest after blanching. Take a cooled pod in your hands and gently pinch both ends. As you squeeze, the seams of the pod will open and the beans will pop out. Place the beans in a bowl and repeat until you've removed all the beans. Be careful when you're squeezing the pod, because the beans will shoot out! Hulls (empty pods) contain a lot of nutrients Excellent for Composting!

**Optimal Storage Temperature and Conditions:**

Once the soybeans have cooled, you can eat them immediately, use them in your favorite recipes, or store them for later use. The soybeans will keep in the fridge for about a week, or for storage up to a year they can be frozen, canned or dried.

**Seed Saving:**

Allow pods to fully mature and dry before picking to save seed. Remove beans from pods, put into container and store in cool dry place.

**Notes:**

Soybeans Problems and solutions: Not seeing any pods forming on your soybean plants? If you're noticing a few pods falling off your plant, don't be alarmed, it's normal. But if you're left with no pods to harvest there is an issue. It could be environmental factors such as too much moisture that can encourage disease and stunt plant growth. Lack of water or too much shade can also be the culprit. While soybeans like it hot, extreme heat may also cause the plant to drop or not produce pods.

Empty Pods- it can take over a month for pods to fill out once they have set. If you have been waiting and still have empty pods it may be there is a soil imbalance.

## Beans, Tepary

### Description:

Tepary beans are cultivated for their high protein and soluble fiber which are advertised as aiding in the control of cholesterol and diabetes. They are highly draught tolerant and very resilient making them useful in desert environments. Plants that are cultivated today are either bush types or semi-vining.

Plants have trifoliolate leaves and short pods around 3 inches (8 cm) in length, green and lightly haired. Ripening to a light straw color, the pods hold 5-6 beans each.

### Varieties:

Blue Tepary

Brown Tepary (taste a bit earthier, used as a dry bean)

Light Brown Tepary Light Green Tepary Papago White Tepary

Ivory Coast White Tepary (slightly sweet tasting, used as a dry bean)

### Growing Instructions

#### **Optimal Time/Temperature for Germination:**

In the southwest desert plant in midsummer monsoon season (mid June to mid July). Tepary beans can be planted earlier if supplemental irrigation is available. They need that initial burst of water to germinate, but after germination do not tolerate wet conditions.

**Optimal Soil Conditions:** Most any type of soil "except" clay. Soil should be weeded and amended as needed for your soil with organic materials. Soil test prior to planting to determine if nutrients or amendments are needed. Do not over-apply nitrogen, as this may inhibit root nodulation and nitrogen fixation.

**Seed Planting Depth, Spacing and Procedure:** For small areas, plant beans 4 inches apart in rows that are 12 to 16 inches apart. Plant at a depth of 1-1.5 inches. Water plants in, should be kept moist until plants germinate and get first true leaves.

**Best Companion Plants and Plants that Hinder:** A traditional method of the Tohono O'odham Nation people was growing them along with corn, sorghum, and pinto beans. They can be grown on large mounds with corn planted in the middle, tepary beans and squash surrounding. The corn planted first and when tall enough to provide support the tepary beans, which are planted around it, then squash around them. the corn supports, the squash shades the ground limiting weeds, Tepary plants provide nitrogen fixation which feeds them. Corn, Squash and Beans are known as the three sisters.

**Crop Maintenance:** Tepary bean can be grown under irrigation. However, excessive irrigation or rainfall will lead to poor stand establishment and may later cause the plants to produce vegetative growth at the expense of seed yield.

**Moisture Requirements & Solutions:** Newly planted seeds need initial watering in to germinate. After plants are up they will not tolerate wet conditions. Only water sporadically if plants begin to show water stress (wilting). Tepary Beans actually produce better when under a bit of water stress.

**Weeding Needs & Solutions:** Planting with squash which grows out over the ground will limit weeds.

Planting beds should be weed free before planting.

**Feeding Needs/Optimal Natural Fertilizers:**

avoid heavy fertilizers.

**Pests, Diseases & Solutions:** Tepary bean seeds and plants can harbor common bean diseases, such as bean common mosaic virus.

**Harvest and Storage:** Beans are dried and shelled and stored in container as any other dried bean or legume.

**When to Harvest/Number of days to maturity:**

Plants should be ready for harvest in 60-120 days.

**How to Harvest:** Traditionally when ready to harvest, plants were pulled, allowed to dry, and were beaten or stomped on to release beans over a drop cloth. Then separating the beans from the chaff.

**Optimal Preserving Procedures:** Cool dry cupboard or cabinet. Tepary beans can be used in place of any standard dried bean. Soak the dried beans before cooking.

**Seed Saving:** Tepary beans will cross pollinate, if saving seed grow only one variety at a time to avoid crossing.

## Beets, Swiss Chard

**Description:** Both the leaves and the roots are edible. Some beets are cultivated more for the roots and some, known as Swiss Chard, are cultivated for leaves. Most common beets are purple but there are varieties in many shapes and colours.

### Growing Instructions

**Optimal Time/Temperature for Germination:** Beets love cool, moist conditions. Seeds can be sown directly in the garden as soon as the soil can be worked in spring. Continued plantings every few weeks result in a longer harvest. A late storage crop should be sown 10 weeks before the first fall frost.

**Optimal Soil Conditions:** Prefers a deeply worked, loose soil high in organic matter with a PH above 6. Best soil temperature for germination is 45 to 70 degrees f (7 to 21 degrees C)  
**Seed Planting Depth, Spacing and Procedure:** Sow seeds about 1 inch apart and 1/2 inch deep. Keep soil moist. Seeds germinate in four to ten days in best soil temperature. Thin plants as they get larger, keeping them about 1 inch apart between each root. Thinnings can be eaten whole, cooked or raw.

**Best Companion Plants:** Cabbage, lettuce, onions, kohlrabi

**Plants that Hinder:** Pole Beans, Field mustard.

### Crop Maintenance

**Moisture Requirements & Solutions:** Plants need a steady supply of water. They would benefit from drip irrigation and mulching. Plants will bolt (produce blooms and finish life cycle) in areas where the days are very long, reducing leaf and root quality because too much sun causes them stress. **Weeding Needs & Solutions:** Weed competition result in tough roots. Mulching around mature plants is recommended.

**Feeding Needs/Optimal Natural Fertilizers:** Compost, well rotted manure, bone meal and wood ashes mixed in the soil For beets that are meant to produce roots for eating, phosphates and potassium are beneficial. For beets or Swiss Chard grown for leaf production, nitrogen is beneficial.

**Pests, Diseases & Solutions:** Alkaline soil low in boron can cause internal browning of the root after long dry periods. Scabs or raised brown spots are also common in alkaline soil. These are cosmetic issues and do not make the roots inedible and can be solved with a high proportion of organic matter such as compost in the soil. Caterpillars can be picked off by hand and fed to the chickens.

## **Harvest and Storage**

**When to Harvest/Number of days to maturity:** Greens can be harvested to be eaten raw or steamed, until roots are 1-1.5 inches in diameter by pulling only a few leaves at a time per plant so that there are enough leaves left to feed the root. Optimal root size depends on the variety. There will be information specific to your beets in the catalog and/or on the seed package. Most beets are best when 2-3 inches across and become woody when over mature although there are some larger varieties that are bred for long term storage.

**How to Harvest:** Pull out the plants whole on a dry day after the first fall frost. Cut tops to within 1 inch of the root. Save any good leaves to cook and eat. Do not wash the roots as this will damage the tender outer skin and make them no longer viable to store. Leave the roots out on newspaper or cardboard for one sunny day to cure, turning roots occasionally and rubbing off loose soil.

**Optimal Storage temperature and conditions:** Beet roots store best in sand, peat or perforated plastic bags at 32 to 40 degrees F (0 to 4 degrees C) and 95% relative humidity. Roots may also keep in the garden over winter if heavily mulched before the soil freezes, and they must be harvested in spring before the plants come up and go to seed.

**Optimal Preserving Procedures:** Beet roots are a favorite for pickling. They can be cooked into Borscht and frozen. They do well in the root cellar. Beet roots that start to sprout in storage can be planted in a window mid winter to produce small amounts of fresh greens indoors.

**Seed Saving:** Beet is a biennial so it is best to allow it to stay in the ground over winter and it will produce seed in the second year. A beet seed is actually a dried fruit composed of many seeds.

## Broccoli

**Description:** A member of the cabbage family, developed for its clusters of immature flowers harvested before they bloom. The most common variety is green and grows in tight clusters with a central head but there are other varieties that don't have a central head but produce small shoots throughout the season. Can grow up to 2 feet tall and can be quite bushy.

Although broccoli is grown for its blossoms, the entire plant is edible raw or steamed.

### Growing Instructions

**Optimal Time/Temperature for Germination:** Seeds germinate in about 7 days in soil 45 to 90 degrees f ( 7 to 32 degrees C)

Although young Broccoli plants can withstand some light frost, broccoli needs about two months without hard frosts to mature fully. It is therefore helpful to start seeds in pots indoors or in a greenhouse six or seven weeks before the last spring frost. Seedlings need to be hardened off before transplanting in to the garden after the last spring frost. Some short season varieties can be direct sown in the garden a few weeks after the last frost in spring.

**Optimal Soil Conditions:** Broccoli does best in well drained, very fertile soil, mulched with straw, grass clippings or leaf mold. Do not add mulch until the soil is warm. Best condition is neutral PH.

**Seed Planting Depth, Spacing and Procedure:** Sow seeds 1/2 inch deep.

If started indoors, transplant seedlings 18 inches apart. Plant them deeply enough that the first true leaves are just above soil level.

For direct sowing outdoors, plant in hills of three or four seeds, leaving 1 1/2 feet between hills, or sow seeds two inches apart in a row. Gradually thin plants as they get larger (seedlings can be eaten raw or steamed) until the plants are 18 inches apart.

**Best Companion Plants:** Beets, Potatoes, Onions, Celery

**Plants that Hinder:** Strawberries, Tomatoes

## Crop Maintenance

**Moisture Requirements & Solutions:** Plants need to be watered weekly to have adequate moisture but they should not sit in moisture with poor drainage. Adding 4 inches of mulch when plants are mature helps keep moisture in.

**Weeding Needs & Solutions:** Roots are close to the surface so caution is advised if cultivating between rows. Mulch is recommended to reduce weeds.

**Feeding Needs/Optimal Natural Fertilizers:** Broccoli benefits from Nitrogen, phosphorus and calcium. Leaf mold provides phosphorus. Watering with manure tea or fish fertilizer ensures that they have a good supply of nitrogen. Crushed egg shells or bone ash mixed in the soil provides calcium.

**Pests, Diseases & Solutions:** Because Broccoli is a member of the cabbage family, it attracts cabbage moths. Hand picking and feeding to the chickens or allowing ducks to forage in the patch helps.

Planting your broccoli near rosemary, sage and thyme will help repel them.

## Harvest and Storage

**When to Harvest/Number of days to maturity:** Plants mature 60 to 70 days from transplanting, 80 to 90 days from direct sowing. Once flower buds start maturing they can be harvested on an ongoing basis as long as they are not cut too close to the stem, the plant will continue to produce flower buds until it gets a hard frost.

**How to Harvest:** When the first flower buds are full but not opening, cut the central head at the stem. This will result in smaller, lateral heads forming which increases the harvest. Heads can be cut as they mature. The harvest can be extended with crop covers in the fall.

**Optimal Storage temperature and conditions:** Broccoli can keep in the fridge for three to five days but it should be eaten as soon as possible.

**Optimal Preserving Procedures:** Broccoli is best eaten fresh. It can be frozen but the flavour and nutrition is compromised.

**Seed Saving:** It is important to choose heritage varieties for seed saving as hybrid varieties will not result in good seeds. If you allow some of the broccoli plants to bloom, yellow flowers will form on the buds, they will be pollinated by bees and produce seed pods which can be hung to dry once mature. The key is to have enough time before the first killing frost for seed pods to mature. It is advisable to hang the seed pods with a paper bag over them because they pop open and release seeds as they dry.



## Brussels Sprouts

**Description:** Brussels Sprouts is part of the cabbage and broccoli family therefore they have similar growing needs. Tiny cabbage heads form from the ground upward in leaf axils along the central stem.

### Growing Instructions

**Optimal Time/Temperature for Germination:** Because Brussels Sprouts take three months to mature, they benefit from starting indoors six or seven weeks before the last frost. Plantings should be timed so that they mature by the first frost.

**Optimal Soil Conditions:** Although they prefer full sun, Brussels Sprouts like cool, moist, but well drained soil rich in organic matter and nitrogen. Roots are close to the surface so caution is advised if cultivating between rows.

**Seed Planting Depth, Spacing and Procedure:** Plant and tend the same as broccoli. Seedlings should be hardened off and transplanted into the garden from two weeks before to two weeks after the first frost. In areas with longer growing seasons, they can be direct sown into the garden, 1/2 inches. As with broccoli, the goal is to have plants 18 inches apart. As the sprouts form, pull out the lower leaves (they are edible) gradually removing them to about halfway up the stock/stem to allow more plant energy to develop the sprouts/tiny cabbages. To encourage sprout growth, pinch off the top of the plant (also edible) about two weeks before the first frost date or when the lowest sprouts are about 1 inch across.

**Best Companion Plants:** Brussels Sprouts benefit from the same companions as cabbage and broccoli, and are hindered by the same plants. Thyme, celery, dill, chamomile, sage, rosemary, onions and potatoes.

**Plants that Hinder:** strawberries, tomatoes, pole beans.

### Crop Maintenance

**Moisture Requirements & Solutions:** Need moist but not swampy soil. They do not like to be allowed to dry out. They would benefit from drip irrigation and mulching.

**Weeding Needs & Solutions:** Mulching around mature plants is recommended to reduce weeds. Once the plants are large enough they are very tough and not easily overwhelmed by weeds.

**Feeding Needs/Optimal Natural Fertilizers:** Brussels Sprouts are heavy feeders and need plenty of compost or well decomposed manure worked into the soil before planting. They benefit from monthly top dressing with worm castings and manure.

**Pests, Diseases & Solutions:** Although Brussels Sprouts are subjected to the same pests as cabbage and broccoli, the problems are less severe because they mature after moths and caterpillars have gone for the winter. Crop rotation and inter-planting with companions helps to confuse insects.

### **Harvest and Storage**

**When to Harvest/Number of days to maturity:** 90 days to maturity. Once the sprouts are large enough harvest can be ongoing for a month or more, although the plant takes three months to fully mature. The harvest can be extended with crop covers

**How to Harvest:** Brussels Sprouts are a hardy plant and the flavour of the sprouts improves with a light frost. Start harvesting the sprouts when they are about 1 1/2 inches across. Moving up the stem, continue to harvest the sprouts gradually until all are picked or the plant is killed by heavy frost.

**Optimal Storage temperature and conditions:** Brussels Sprouts are best eaten fresh. Flavor and nutrition is greatly compromised with freezing. As with broccoli, they do not keep longer than five days in the fridge.

**Optimal Preserving Procedures:** Before the soil freezes, the entire plant can be pulled and hung upside down in a cool, moist root cellar and the sprouts will stay fresh for 3-5 weeks.

**Seed Saving:** Brussels Sprouts are biennial plants that produce seeds in the second year. To save seeds, allow your healthiest plants to overwinter in the garden with a thick layer of straw in colder regions. In the spring when the soil is workable, remove the straw. The plant will produce flower stalks and then seed pods. Allow the seed pods to mature until they are full and begin to turn brown. Cut off the mature seed stalks and hang to dry upside down with a paper bag over them.

## Cabbage

**Description:** Cabbage is a hearty leaf vegetable that grows forms large compact heads. Originally a native of the northern Mediterranean, cabbage prefers cooler climates. It is easy to grow and comes in a large variety of colors with varying maturing times, after hundreds of years of being hybridized in North America.

Varieties: Cannonball Cabbage, Bok Choy, Choy Sum, Napa Cabbage, Savoy Cabbage, Red Cabbage

### Growing Instructions

With careful planning, you can grow a supply of cabbage that will last you all year. While the plant is relatively hardy, it requires regular fertilizer and plenty of sun to grow well. Start your cabbages in early spring and tend to them at least a couple of times a week to keep them clean and healthy.

**Optimal Time/Temperature for Germination:** Cabbage maturities vary from 60 to 120 days. It is beneficial to grow more than one variety of cabbage. If your cabbages are maturing at different times, you'll have fresh cabbage longer.

Cabbage varieties are grouped according to when they are harvested. Spring cabbages are ready the earliest, from mid to late spring. Summer cabbages can be harvested in late summer and early fall. Cabbages categorized as fall and winter cabbages are harvested later in the fall.

If you want a variety with a longer harvesting period, you might pick the Savoy cabbage. The harvesting season for this variety starts in early fall and extends into winter and early spring of the next year.

**Optimal Soil Conditions:** Likes lots of well composted manure in moist soil rich in organic matter. Prepare soil with aged manure and compost. Till the soil of your planting bed to a depth of about 2 inches (5.1 cm) and mix in a layer of compost. Top the layer of compost and manure. Water the bed thoroughly after fertilizing it, and make sure it stays moist until you transplant your seedlings. Keep the pH of your soil between 6.0 and 6.5

**Seed Planting Depth, Spacing and Procedure:** Start seeds 6 to 8 weeks before the last spring frost. Sow your seeds .25 inches (0.64 cm) deep and 2 inches (5.1 cm) apart. Place them in a spot where they'll get plenty of sunlight, or set them under grow lamps with temperatures between 60 and 70 °F (16 and 21 °C).

Thin the seedlings so that there is only 1 seedling per cell or pot that you transplant. You can wait until the seeds have germinated, then pick the strongest seedling in each tray. Seedlings should have at least 3 or 4 adult leaves before you transplant them.

Harden off seedlings before transplanting to the garden. Do this by setting them outside in a sheltered area for an increasing number of hours each day for about a week. Once they're hardened, set your plants so that 1 to 2 inches (2.5 to 5.1 cm) of the main stem is buried in the soil.

Cabbage needs at least 6 hours of sunshine a day. The more sun your cabbage gets, the larger and faster the heads will grow. Set the seedlings in rows 12 to 24 inches (30 to 61 cm) apart. The closer together you plant your cabbages, the smaller the heads will be. If you want larger heads, set your seedlings further apart.

**Best Companion Plants and Plants that Hinder:** Nitrogen fixing legumes such as bush beans are helpful. Aromatic herbs such as dill, celery, chamomile, sage and rosemary attract beneficial insects. Coriander repels aphids. Celery plants nearby and also hyssop, thyme and wormwood will help repel the cabbage butterfly. Does well with beets, potatoes, lettuce, spinach and onions.

Avoid planting cabbage near other members of the cabbage family such as broccoli & cauliflower. Avoid growing with strawberries, or tomatoes. These crops compete for similar nutrients.

### **Crop Maintenance**

**Moisture Requirements & Solutions:** Cabbages need moist soil. Unless you've had frequent rain, water the soil around the cabbages at least once a week. Mulch after watering to keep the moisture in the soil.

**Weeding Needs & Solutions:** Be careful not to disturb the shallow roots of cabbage when weeding. Benefits from nitrogen fixing weeds such as lambs quarters, clover and vetch.

**Feeding Needs/Optimal Natural Fertilizers:** A fish emulsion or other liquid fertilizer will enable optimum growth. Add the fertilizer soon after your cabbage begins to develop new leaves, and then again when the plants start forming heads.

### **Pests, Diseases & Solutions:**

Seedlings are vulnerable to cutworms. A collar made from a plastic cup and pushed 1 inch (2.5 cm) into the ground around the seedling will protect it.

Inviting birds with birdhouses and nesting areas near garden enhances the environment and reduced pests.

Frogs and toads eat slugs – make a frog pond beside the garden or provide cool places for toads, such as overturned clay pots.

Jadam Spraying techniques with herbal tea such as tansy can control insects.

Row covers make it hard for flying insects to get on to the vegetables.

Another way to protect your cabbages from pests is to plant a trap crop nearby. If you plant nasturtiums near your cabbage patch, the caterpillars will feast on those instead of ruining your cabbage crop.

Poultry Pest Patrol With some trial and error, ducks, chickens and guinea hens can become excellent pest control around the garden. They do require supervision and some training. With strategic rotation through movable fencing within the garden to keep them out of areas with tender seedlings or softer plants like lettuce, they can be very helpful in a cabbage patch with good mulching. It is worth the effort to achieve a routine that results in pests being eaten without plants being rooted up, while your poultry flock gets fat and produces wonderful eggs from all that free food. It's cost effective and entertaining.

## **Harvest and Storage**

**When to Harvest/Number of days to maturity:** Different varieties grow at different rates. However, generally speaking, most cabbages are ready for harvest within 70 days of the date you transplanted the seedlings. It's okay to leave them a little longer before harvesting if you want the heads to grow larger. Most varieties produce heads weighing from 1 to 3 pounds (0.45 to 1.36 kg). You can harvest spring cabbages young as loose greens, which will allow for repeated cuttings. Young, small cabbages tend to be sweeter and tastier than older cabbages with bigger heads.

**How to Harvest:** Cut the cabbage head at the base. Use a clean, sharp knife to cut off the cabbage head as close to its base as possible. After cutting it, immediately move it to a shady spot or take it inside.

### **Optimal Storage temperature and conditions:**

After harvesting, refrigerate your cabbages as soon as possible. Plastic wrap or a plastic bag will help your cabbage heads retain moisture, so they'll last longer. Properly stored cabbage will last at least 2 weeks in the refrigerator, and may last as long as 2 months.

If you've harvested more cabbage than you can consume within a few weeks, store it in a root cellar or cool basement if you want to keep it fresh. Cabbage keeps well for 5 to 6 months if stored in a moist place with a consistent temperature of between 32 and 40 °F (0 and 4 °C).

**Optimal Preserving Procedures:** Cabbage is traditionally made into sauerkraut which can be stored for months in the fridge or canned in jars.

**Seed Saving:** Cabbage is a biennial, which means that it blooms in the second year.

Choose plants that have the traits you want to carry over for the following year this may mean not eating your best heads of cabbage, in order to use them for their seeds. Alternately, you can plant cabbage specifically for harvesting seeds. Allow selected cabbage heads to mature.

If you want to get your own seed from your cabbages, choose open-pollinated varieties rather than F1 hybrids, so they'll breed true. Cabbages cross easily, not only with other cabbages but with kale, kohlrabi, cauliflower, broccoli, collards and Brussels sprouts, so you'll need to protect your seed cabbages if other plants of the same species are blooming within 1,000 feet.

Set poles upright around the cabbages about 4 feet high and connect the tops with wire or heavy cord. When the seed stalks emerge in early summer but before they bloom, cover the framework with netting that's woven tightly enough that bees can't get through. When the flowers open, raise the cover long enough each morning to allow bees to enter and let them stay inside to pollinate the plants, then raise the cover to release them. Repeat while the plants are blooming, then remove the covering while the seeds mature. If no other plants that cross with cabbages are blooming at the same time within 1,000 feet, you can omit the protection and just let bees come and go to pollinate them naturally.

If your winters are mild, rarely getting more than a few degrees below freezing, cover the heads with straw or other loose mulch to protect them from freezing. If your winters are severe, pull them up with roots intact and store them in a root cellar or bury them under at least a foot of dirt and mulch, deeper in the coldest climates. You want them to be kept cool but never frozen solid and damp enough so they don't dry out but not so damp that they mold.

Dig up or uncover the cabbage heads when the danger of hard freezing is past. Plant or transplant them 1/12 to 2 feet apart, spaced in a square or grid rather than a row if you'll need to protect them from cross-pollination. Plant them deep so the heads are at ground level. Cut an "x" in the top of each head, about an inch deep, to let the flowering stock emerge easily. Tie the seed stalks loosely to poles to keep them from bending or breaking in strong wind or rain as the seeds mature. Wait several weeks for the seeds to ripen.

Pick the seedpods when they first turn brown, before they burst open and spill their seeds. Some mature before others, so pick them every few days. Lay them on a tray in the sun to finish drying. If you don't mind losing some, you can wait until the majority have turned brown, cut the whole seed stalk and lay it on a tray or sheet to dry. For the most viable seed, let the pods mature as long as possible on the plant.

Put the pods in a cloth bag and lightly pound it or crush it to knock the seeds loose, then carefully pour them out. Use a coarse sieve to separate them from larger debris or pour them from one container to another in a light breeze to let the lighter pieces of broken pod blow away.

Keep the seeds in a dark, dry place until you want to plant them.

Cabbage seeds remain viable for up to 5 years.

Cabbage seeds are an excellent addition to micro green sprouting mixes.

## Carrots

### Description:

A familiar, often bright orange root vegetable, popular cooked and raw. There are a wide variety of carrots of different shape and colour. Refined from a wild plant originating in the Middle East, most carrots will easily return to their original wild state if left to naturalize.



Carrot and Carrot Blossom

*Illustration by Rebecca McCarthy*

### Best Companion Plants and Plants that Hinder:

Companion Plants: Peas, lettuce, chives, rosemary, sage  
Hindered by: Dill and other plants in the same family.

### Growing Instructions

#### **Optimal Time/Temperature for Germination:**

Seeds can be direct sown outdoors after the last frost date. Carrot is a cool season vegetable that develops best in soil temperatures of 60-70 degrees F (15-20 degrees C) Maturation varies depending on type of carrot, ranging from 55 to 100 days.

**Optimal Soil Conditions:** Loose, well drained soil without stones. Carrots will become deformed if they have to grow around stones or through hard soil.

#### **Seed Planting Depth, Spacing and Procedure:**

Carrot seeds are very small so they are nearly impossible to space evenly. Make a furrow about 1.2 inch deep. Sprinkle seeds, trying to space about 1/4 inch apart, bearing in mind that the little sprouts can be thinned later if they're too close together. Cover lightly with finely textured soil, pat firmly and if dry, water with a gentle spray. If you water too harshly the seeds will get moved around by the water.

Seeds germinate in 6 to 21 days, depending on the variety of carrot. If you live in the north, look for carrot seeds labelled " Short Season Variety" Germination can occur in fairly cool temperatures ranging from 45 to 86 degrees F (7-30 degrees C)

## Crop Maintenance

**Moisture Requirements & Solutions:** While seeds are germinating and until the roots start to swell, the soils should be kept moist down to 1/2 inch depth. They will need periodic watering when the weather is dry.

As the carrots grow, thin them regularly (pulling out seedlings) so that the roots are always about 1 inch apart. As the carrots get larger this will provide delicious baby carrots for your dinner table. Although they are not commonly considered a cooking herb, Carrot tops are edible and are enjoyed by livestock. ( feed them to rabbits, chickens, goats)

Keep pushing soil up over the crowns (top of the carrot root) to make sure the roots don't turn green which causes them to taste bitter.

**Weeding Needs & Solutions:** Carrots do not like competition from weeds. Especially when the plants are small it is important to keep weeding. Mulching is recommended once the plants get big.

**Feeding Needs/Optimal Natural Fertilizers:**

Need Lime, Hummus and Potash. Don't over fertilize with too much nitrogen or manure.

**Pests, Diseases & Solutions:** If you have rabbits in your area, you may have them visiting and eating off the tops of your carrots. A dog in the yard will keep them away, even if you have the growing area fenced in to keep the dog from digging.

Onions, leeks and herbs such as rosemary and sage act as repellents to the carrot fly whose larva attacks the root.

## Harvest and Storage

**When & How to Harvest/Number of days to maturity:** Carrots store best when they are large and fully mature. Usually within two to three months the carrot roots will be around 2 inches across at the top. Pull them on a dry day, brush off the soil – do not wash. Cut tops to within 1/2 inch of the root. Leave them outdoors on newspaper or cardboard for one sunny day to cure, turning them occasionally and rubbing off loose soil.

**Optimal Storage temperature and conditions:** Store cured carrots in moist sand, peat or perforated plastic bags at 32 to 40 degrees F (0-4 degrees C) and 95 percent relative humidity. In areas with milder winters, roots may keep in the garden if heavily mulched (a thick layer of straw on top) before the soil freezes. Harvest before plants go to seed in the spring.

Do not store carrots close to apples or the carrots will take on a bitter flavour. Apples, pears, peaches, plums, apricots, muskmelons and tomatoes produce ethylene gas, which speeds up the aging process of vegetables.

**Optimal Preserving Procedures:** In addition to root cellar storage, Carrots can be canned or blanched and frozen.

**Seed Saving:** If carrots are left to overwinter, they will bloom the next summer and produce lots of seeds. Unfortunately most carrot varieties will go back to their wild state. The seeds from most carrots will produce small white carrots. If you find a variety of carrots that produce "true seeds", you have found a treasure so be sure to save some seeds.

## **Notes**

There is a wide range of carrot varieties available in all sorts of colours ranging from yellow to orange to purple. Refer to the seed catalog and/or the seed packet to find how many days to maturity and consider the length of your growing season when purchasing. Smaller or shorter carrots can be useful if you have shallow soil and a short growing season. Fatter carrots such as Chantenay and Oxheart are best for heavy soil and for storage. The long thin types need looser soil and steady water. If your soil tends to be heavy or compact, consider growing carrots in raised beds.



## Cauliflower

Cauliflower resembles broccoli, in that it is the immature flower stalk of the plant that is eaten, but it is usually white. There are varieties of cauliflower with colors from purple to pale green and varying flavors. Most cauliflower grows to about 14 inches in height.

As a member of the brassica family so it has similar needs to broccoli and cabbage, but it is much more temperamental; it is less frost hardy, more likely to bolt and most likely to be attacked by insects. This is why it tends to be expensive in the supermarket. It is more work to grow but because it is such a popular food and quite nutritious, it is worth the effort.

Varieties: Attribute Hybrid, Cheddar Hybrid, Depurple Hybrid, Early White Hybrid, Fioretto 60, Fioretto 85, Flame Star Hybrid, Graffiti Hybrid, Self-Blanching Snowball, Sicilian Violet, Snowball Y, Veronica Romanesco Hybrid, White Corona Hybrid

### Growing Instructions

Cauliflower does best with with little fluctuation in temperature or moisture, preferring cool-damp weather and fertile, moist soil high in organic matter.

Cauliflower requires at least 6 hours of full sun during the day.

**Optimal Time/Temperature for Germination:** 50 to 85 days to maturation, depending on the variety. Most cauliflower varieties require about 1.5- 3 months of consistently cool weather to mature properly. Ideally, the daytime temperature while the cauliflower is maturing will be around 60°F (15.5°C). This means that the proper planting time depends on your climate. There are varieties available that grow well in certain zones, such as hot season varieties for warmer areas, or varieties with shorter time to maturation in areas with short summers.

Cool climates: If your late summer temperatures are below 80°F (27°C), you can plant cauliflower for a fall harvest. Start the seeds 8 to 12 weeks before the first fall frost.

You can start your seeds indoors and transplant out to the garden, as for broccoli but start the seeds later – 5-6 weeks before the last spring frost.

Warm climates: If you have frost-free winters, you can plant cauliflower seeds later in autumn, once temperatures have dropped below 80°F (27°C). Harvest in winter or early spring.

Temperate climates: Spring-planted cauliflower is difficult to grow in most climates. Temperate coastal areas, such as California, USA and British Columbia, Canada are a few exceptions,

**Optimal Soil Conditions:** High organic matter content to enhance the soil's ability to hold moisture. Cauliflower needs high potassium and nitrogen content. A pH of between 6.5 and 7. This "sweet" pH range minimizes the danger of a cauliflower disease called clubroot and maximizes nutrient availability. Cauliflower needs boron.

### **Seed Planting Depth, Spacing and Procedure:**

Planting indoors - Plant each seed in its own peat or paper cup. The biodegradable container lets you "plant" the whole pot in your garden later without damaging the cauliflower's roots. Press the seed about 1/4–1/2 inch (0.6–1.25 cm) deep and cover it with dirt. Water regularly so the soil is moist but not waterlogged.

If starting seedlings in cooler greenhouse during winter, keep the soil at 70° F (21° C) with bottom heat from a warming plate.

Seedlings need to be hardened off before transplanting out to the garden. To do this, move the seedlings outside for one hour a day. Gradually increase this time over the course of a week.

To transplant out in the garden, if you used a biodegradable container, bury the container in the ground so the soil level is even with the rest of the garden.

If you used a non-biodegradable container, remove the seedling carefully to avoid breaking its roots. Make a small hole in the ground and bury the seedling up to its stem. You may want to make a shallow, saucer-like depression around the seedling to help the surrounding soil retain water. Firm the soil and water the seedling gently so as not to damage it with a harsh water spray.

If you must plant your seeds directly in the garden, plant them in rows 3 to 6 inches (7.5 to 15 cm) apart. Baby cauliflower can be eaten when you thin the plants as they grow. Fully mature cauliflower plants will need to be spaced about 18-24 inches apart.

Once the seedlings are growing in your garden, cover the soil with a light layer of mulch to help retain moisture and regulate temperature.

**Best Companion Plants and Plants that Hinder:** Aromatic herbs such as dill, celery, chamomile, sage and rosemary. Coriander repels aphids. Celery plants nearby and also hyssop, thyme and wormwood will help repel the cabbage butterfly.

Does well with beets and onions.

Repelled by tomatoes, pole beans and strawberries.

### **Crop Maintenance**

Blanching – This technique is used to cause the cauliflower to be whiter and have a sweeter flavor; As soon as the heads are teacup sized, gather the leaves up over the head and tie them gently with a string. Do this on a dry day after the dew has dried so that there is not excessive moisture on the buds trapped inside the tied up leaves, which can cause rot. Also make sure no caterpillars, slugs or insects are on the heads when you tie them up under the leaves.

Do not blanch colored varieties of cauliflower. Blanching is thought to reduce the nutritional value of the cauliflower as it deprives the heads of sunlight. Some prefer unblanched cauliflower which becomes greenish or purplish and has a stronger but not unpleasant flavor.

After blanching, continue caring for the plant as normal, occasionally removing the leaves around the head to monitor its growth and allow moisture to escape after watering.

**Moisture Requirements & Solutions:** Water consistently, providing 1 - 1.5 inches (2.5 - 3.75 cm) of water per week.

Cauliflower plants need *consistent* access to moisture and nutrients or their growth won't be *consistent*. If the plants' growth isn't consistent, the final product that you eat won't have as good of taste or texture.

After planting your cauliflower plants, ensure that each receives frequent watering so that its soil is consistently damp (but not waterlogged). The moisture should be penetrating roughly 6 inches (15.2 cm) deep.

Note that rainfall can contribute towards this watering goal. Thus, if you experience frequent rainfall you will need to water less.

**Weeding Needs & Solutions:** Although cauliflower should be kept fairly free of weeds, they benefit from nitrogen fixing weeds such as clover, vetch and lambs quarters.

**Feeding Needs/Optimal Natural Fertilizers:** You may also apply seaweed extract to supply boron, an important nutrient. If cauliflower doesn't have access to boron, an essential nutrient, it will begin to experience a variety of unappealing symptoms. Its head will turn brown, its leaf tips will die and its leaves will distort, and its stem may become hollow and brown. To treat this problem, boron must be introduced into the plant's soil immediately. Feed the plant with seaweed extract immediately and repeat every two weeks until symptoms disappear.

Use a technique called side-dressing to feed the maturing plant. Dig a shallow, narrow furrow parallel to each row of plants about 6 to 8 inches away from the plants' stems. Pour well rotted compost and or manure into this furrow, rake the soil, and then water.

### **Pests, Diseases & Solutions:**

Deer Love Cauliflower. In areas with deer, put a fence around your garden. To save on the cost of building an extremely high fence, put a regular fence and add willow boughs or pvc piping to create the effect of archways all along the top of your fence. It has an interesting visual appearance when done well, and deer will rarely jump over or through an archway, especially if they have antlers. Another strategy is to put a fence or trellis in an angle. Deer will not jump a fence where they can't gauge the width. An arched tunnel made with heavy duty ranch wire up against one end of the garden will make that a spot that deer cannot jump and provide an attractive growing space for climbing vegetables such as cucumber or gourds which are not a favorite for deer. They don't like getting their legs tangled up in scratchy vines. A pumpkin patch just outside the fence will also help for that reason. Deer are not interested in tomatoes or jerusalem artichokes so rows of those just outside the garden fence might confound deer. Raised beds along the garden fence will also throw deer off jumping as it makes it difficult for them to gauge a clear landing.

When cauliflower seedlings are young and fragile, they are vulnerable to a variety of garden pests, including cabbage worm, aphids, harlequin bugs, and more. This especially true in cases where cauliflower is being planted as a spring crop, as the end of the winter months usually coincide with a surge in insect populations. Staggering your plantings and planting cauliflower in more than one patch on different ends of your garden helps. Aromatic herbs such as coriander will help repel insects.

Nontoxic pest treatments include Jadam techniques, diatomaceous earth, soap sprays, and cultural practices such as controlling humidity or introducing predator insects such as ladybugs for aphids.

As with cabbage, cauliflower is loved by caterpillars and slugs. Slug traps in the garden will be needed. Dusting with ashes helps repel rabbits and deters slugs.

Row covers can help keep flying insects off your cauliflower.

Clubroot is a fungal infection that causes large growths on the roots of plants in the family Brassicaceae (which includes cauliflower, broccoli, cabbage, Brussels sprouts, and other plants). These root growths interfere with the plant's ability to absorb water and nutrients, causing it to grow asymmetrically, wilt, and eventually die. Worst of all is the fact that clubroot is contagious and can easily spread from plant to plant. To prevent a case of clubroot from ruining your entire cauliflower crop, swift, aggressive action must be taken. Pull infected plants up by their roots and discard them (don't compost them). Be sure to remove the entire root system - any fungus left in the ground can release spores and continue spreading.

To prevent clubroot from returning, use one of the following methods:

Improve the drainage of your soil by adding organic matter (clubroot thrives in moist environments).

Plant a cover crop of winter rye and till it into your soil before planting cauliflower.

Rotate your crops. Do not plant brassicas or in the same area two years in a row.

Increase the alkalinity of your soil by mixing in hydrated lime in the fall (clubroot thrives in acidic soils)

Lay thin sheets of clear, construction-grade plastic over infected soil during sunny weather. Leave in place for 1 - 1.5 months. The plastic acts as a sort of "greenhouse", trapping the sun's rays to heat the soil and kill the fungus.

Another common fungal disease of cauliflower is blackleg. Blackleg causes irregular grey lesions or holes in the leaves and is sometimes accompanied by root rot. Like clubroot, this disease is difficult to treat, so preventative cures are the best bet. In particular, crop rotation is an effective technique for reducing the chance of blackleg. Don't plant cauliflower (or another member of the Brassicaceae family) in the same location more than one year in a row - this gives any remaining blackleg fungus in the growing site a year to die off. Additionally, in the event of blackleg, remove all plant debris left over after a harvest. This dead or dying plant material can contain live fungi for months, leading to the re-infection of the next crop.

If you have any doubts about whether certain seeds are contaminated with the fungus or not, washing the seeds in hot water can help remove the fungus prior to planting.

## **Harvest and Storage**

**When and How to Harvest/Number of days to maturity:** When the head is large (roughly 6 inches (15.2 cm) across), white, and firm, it is ready to be harvested. This can be anywhere from a few days to a few weeks after blanching, depending on your climate (growth is generally faster in hot weather). Cut the head from the base of the plant with a knife.

The leaves of the cauliflower are also edible, small leaves are good raw and large leaves can be cooked like cabbage.

Unlike broccoli, cauliflower doesn't usually produce more flower heads after the first harvest.

**Optimal Storage temperature and conditions:** Cauliflower can be stored in a variety of ways. It will last for roughly a week in the refrigerator and can be frozen or pickled for long-term storage. Alternatively, cauliflower can also be stored by pulling the plant up by its roots and hanging it upside down in a cool place for up to a month.

**Optimal Preserving Procedures:** Cauliflower is best eaten fresh. The flavor and nutrient factor decreases very quickly after harvesting. There is potential for freeze dried cauliflower to be used as a gluten free flour or to add to soups and stews in winter. Because it is a challenge to grow, it is rare for gardeners to have enough extra cauliflower to require preserving it long term.

**Seed Saving:** Cauliflower belong to the Brassica oleracea species, which includes many other crop types, like broccoli, Brussels sprouts, and collards. Because of this, isolation needs to be managed thoughtfully, but because most are biennials that will not flower until their second season, a gardener can grow multiple varieties for eating while simultaneously growing one variety for seed saving.

To ensure viable seeds, save seeds from at least 5 plants. When maintaining a variety over many generations, save seeds from 20-50 plants. If you're saving seeds for genetic preservation of a rare variety, save seeds from 80 plants.

After flowering in their second year of growth, mature seed pods become dry and turn brown as the seeds inside also mature and brown. As with many of the Brassica crops, the window of time for an optimal harvest may be short as mature pods will begin to shatter and bird predation can become a problem.

Seeds can be gathered by cutting entire branches or by harvesting whole plants. Because of this species' tendency to shatter, the harvested material should be placed on drop cloths or in containers to prevent seed loss.

Branches of mature fruits can be threshed by rubbing the pods between one's hands or by hitting the brittle pods against any surface that will cause fruits to break open. If the pods are dry, they will release their seeds easily when threshed.

Store cauliflower seeds in cool, dark, and dry places and always keep them in an airtight container to keep out moisture and humidity. Properly stored cauliflower seeds will remain viable for several years.

**Notes:** Cauliflower seeds are suitable for micro green seed mixes.

## Celery, Celeriac

Celery is a Mediterranean plant that grows best in temperate climates with temperatures between 59 and 70° Fahrenheit (15-21° Celsius). Because celery is a long-season crop, it can be difficult to grow in some areas and works best when seeds are started indoors. Though a bit stubborn at times, celery plants will produce crisp, delicious stalks when grown in a temperate climate in moist, nitrogen-rich soil. Choose a type of celery that grows well in your climate zone and prepare your garden to make sure you have the best conditions for growing celery.

### **Growing Instructions:**

Leaf celery (*Apium graveolens* var. *secalinum*) Zones 5 to 8. - grows from a strong stalk and produces delicious leaves that are more flavorful than the leaves of other varieties. While there are several varieties of leaf celery to choose from, a few popular varieties include Par-Cel, a Dutch heirloom variety, Safir, which has a spicy crunch to it, and Flora-55, which is best at resisting bolting (flowering).

Celeriac (*Apium graveolens* var. *rapaceum*) Zones 8 to 9. - grows an oversized root that can be harvested and eaten in addition to the stalks. A root takes about 100 days to grow large enough to be harvested and cooked. Celeriac, which likes especially cool coastal climate conditions, comes in several varieties including Brilliant, Giant Prague, Mentor, President and Diamant.

Traditional celery (*Apium graveolens* var. *dulce*) Zones 2 – 10 - requires long, temperate growing seasons and takes about 105 to 130 days to mature enough for harvest. It does not like extreme temperatures and grows best with conditions under 75 °F (24 °C) during the day and between 50 and 60° Fahrenheit (10-16° C) at night. Some varieties include Conquistador and Monterey, which are ready for harvest earlier than most varieties, Golden Boy, which produces stunted stalks, and Tall Utah, which produces tall, vibrant stalks. VARIETIES: Pascal Celery, Golden Boy Celery, Monterey, Tall Utah

### **Optimal Time/Temperature for Germination:**

Celery is slow to germinate and grows slowly so it is best planted indoors in areas with shorter growing seasons. At a soil temperature of 60-70 degrees F (15-21 degrees C) it germinates in 10-21 days.

While preferring a temperate climate, celery also enjoys full sun if possible. However, it will grow well in partial shade as well.

**Optimal Soil Conditions:** Mix about 4 inches (10 cm) of organic fertilizer, such as manure or compost, into your soil. Celery likes extremely rich, organic soil. This will help the seedlings grow into strong, producing plants.

You may want to build a raised bed to plant your celery in. Keep in mind that some varieties of celery grow very large, harvestable roots, so make sure to build your planter deep enough if you choose to do so.

Celery varieties prefer slightly acidic soil with a pH between 6.0 and 7.0. Though celery does not require impeccable drainage like most vegetables, it does require rich, healthy soil. Evaluate the soil's calcium and magnesium levels in order to determine what type of limestone to add to your soil. If the soil is low in magnesium, add dolomitic limestone. If it is high in magnesium, add calcitic limestone. Add the limestone 2 to 3 months before planting if possible to allow the soil to absorb it. After adding, check the pH again.

**Seed Planting Depth, Spacing and Procedure:** Start your celery seeds indoors 10-12 weeks before the last spring frost. You can sow the seeds in peat pots with several seeds per cell to ensure that at least 1 will germinate into a seedling.

To speed up germination, you can pre-soak your seeds in water overnight.

Cover with about 1 inch (2.5 cm) of potting soil, but do not pat down with your fingers after sowing the seeds. Celery seeds need a lot of light to germinate. Water the peat pots to moisten the soil after planting your seeds.

Place your seeds in a warm place so that the soil stays between 70 and 75° Fahrenheit (21-24° Celsius) until the seeds germinate. This should take 2 to 3 weeks.

After germination, place the seedlings in a cooler indoor location so that the soil is between 60 and 70° Fahrenheit (16-21° Celsius). Carefully thin the seedlings so that there is only 1 per cell after they germinate.

Transfer seedlings to the garden 2 weeks before the last spring frost. Make sure that it is not too cold outside. Celery can handle a light frost, but temperatures below 55 °F (13 °C) in the day and 40 °F (4 °C) at night for longer than 1 week can harm your celery plants.

Give the seedlings plenty of space. Plant the seedlings 6 to 12 inches (15.2 to 30.5 cm) apart in rows 18 to 36 inches (45.7 to 91.4 cm) apart. You only need to dig holes slightly deeper than the depth of the peat pots cells. Pat the sides of the cells to get the seedlings to slip out without harming the roots.

Place the seedlings in the ground and cover with soil. Only cover up to the first level of foliage and pat the planting area around the seedlings lightly with your hands for support.

Water the planting area very thoroughly.

### **Best Companion Plants and Plants that Hinder:**

Sowing winter vetch before growing celery helps make the soil rich and loose with plenty of potassium. Leek and scarlet runner beans in altering rows are good companions.

Celery gets along well with tomatoes, bush beans.

Celery is helpful to cauliflower and all members of the cabbage family by repelling cabbage moths.

## **Crop Maintenance**

Some say that celery is particularly benefited if grown in a circle so that the lacy, interwoven roots may make a more desirable home for earthworms and soil microbes.

Some say that celery benefits from being trenched to cause moisture to be retained when it rains.

It is popular to blanch celery 1 week to 10 days before harvesting by covering the celery stalks with cardboard or paper, thereby depriving them of the sun to achieve a milder flavor. This process reduces the nutritional value of the final product and is not required.

**Moisture Requirements & Solutions:** Originally a wetland plant, celery can tolerate relatively moist soil conditions that other vegetables cannot. However, make sure the planting area you choose is not prone to flooding.

Celery requires constant moisture, so do not allow the soil to dry out at any time. If celery does not get enough water, the stalks will be stringy and bitter. Be sure to water several times per week and increase your watering routine during particularly warm or dry spells.

**Weeding Needs & Solutions:** To keep the soil cool and moist, add a few inches or centimeters of mulch made of leaves, grass, hay, or other plant material on top of the soil. Doing so also helps reduce the ability of weeds to infiltrate the planting area.

Once celery is large it is not easily overwhelmed by weeds. It benefits from nitrogen fixing weeds such as lambs quarters.

**Feeding Needs/Optimal Natural Fertilizers:** Apply nitrogen rich organic fertilizer, such as well rotted manure every 2 to 4 weeks. Celery plants are heavy feeders that require rich soil that must be fertilized frequently. Seaweed extract is beneficial mixed in with waterings.

**Pests, Diseases & Solutions:** The parsleyworm, larva of the swallowtail butterfly can be had picked off the foliage. Keeping birdhouses and nesting areas that robins like near your garden will result in the larva that attack your veggies getting eaten by birds.

Stem cracking may be caused by a boron deficiency. Apply seaweed extract to correct this.

## **Harvest and Storage**

**When to Harvest/Number of days to maturity:** All parts of the celery plant are edible, including roots.

You can begin to harvest the stalks when they reach 8 inches (20 cm) in height.

Once mature, celery can sit in the ground for about 1 month as long as the soil remains a cool temperature between 60° and 75° Fahrenheit (16-24° Celsius).

Harvest can be prolonged in cooler areas by covering the rows with a small poly tunnel.

**How to Harvest:** Make sure to begin your harvest by cutting from the outside stalks and working inward. This allows the innermost stalks to continue to mature.



**Optimal Storage temperature and conditions:**

Celery will last for a month in the fridge but it's flavor and nutrition degrades over time. Some recommend submerging the stalks in water to keep them crisp.

Celeriac Roots can be stored in a root cellar in moist sand over winter.

**Optimal Preserving Procedures:** Celery can be cooked into soups, stews and sauces that can be frozen. Celery can be made into pickles and combined in sauces then canned in jars.

**Seed Saving:**

Celery is a biennial plant. That means that it won't flower until the second year. Celery will winter over in milder areas and produce new stalks in the spring.

In areas with cold winters, celery can be dug up and kept in pots in a cool, moist dark area such as a root cellar, then planted back out in the garden in spring.

In the second year, the central stalk will thicken and an umbel, or umbrella shaped flower, will appear. The umbel is created out of numerous tiny florets on short stems. Each floret is a tiny white flower that collectively creates a burst of stars. Bees and butterflies are quite taken with the blooms, which resemble Queen Anne's lace.

Wait until the seeds dry and turn tan to brown before celery seed harvesting. The swollen ovaries develop a carapace that is hard when ripe and the color deepens. The seeds will have vertical ridges around the edges that are lighter in color than the rest of the seed. You know it is time to harvest when the seeds fall off at the slightest touch or breeze. Harvesting celery seeds with the most flavors relies upon careful observance to ensure the seed is ripe. When the flower head is dry and the individual seeds are hard and dark colored, cut the bloom carefully and shake the seed into a bag. Alternatively, bend the flower stalk into a bag and shake. This reduces the seed lost during cutting the head.

To save whole seeds, pick out any flower debris and make sure seeds are dry before packing them into a container. Place seeds in a glass container with a tight fitting lid. Label and date the seeds. Store the seeds in a cool, dark location for up to 5 years.

Celery seed is a popular seasoning especially for pickles. Most cooks use celery seed whole but you can also choose to grind it. Use a coffee grinder or mortar and pestle to make fresh ground celery seed, which disperses more evenly in a dish.

Celery seeds add a zesty flavor to sprouting and micro-green mixes.

**Notes:** The longer the celery grows and the darker it becomes, the richer in antioxidants and more nutritious it will be. However, it will also become more tough and fibrous.

Both celery and celeriac are reported to have a hormone that has an effect similar to insulin, making them an excellent seasoning for diabetics or for anyone on a salt reduced diet.

Celery leaves may be dried as with lovage and used in soups and stews.

## Colliard Greens



### **Description:**

Like kale, collards are non-head forming cabbages. They are quite similar genetically, but breeding and cultivating over the years has produced plants with different textures and flavor. Collards are a biennial vegetable but usually grown as an annual. The leaves are smooth and almost waxy, with pronounced veining and full of nutrition. They are quite large, with a bright to dark green color, and the stems are fibrous, tough and span 20 to 36 in. tall and 24- to 36-in. wide. True to the Cruciferous family, collard flowers have four yellow petals in the form of a cross. The flowers are edible.

### **Growing Instructions:**

The plants are fairly easy to grow and do well in cool weather. You can grow them in containers or plant them directly in the ground. In either case, they'll need loose soil and lots of sun and water. If you only pick individual leaves from your plants (and not the entire plant at once), your collard greens may continue to grow the next year. However, this will depend on the climate in your area. Collards can tolerate frosts, but if winter temperatures/conditions are severe, you may need to replant the greens next year.

### **Optimal Time/Temperature for Germination:**

Wait until late summer or early fall to plant. Collard greens are a cool weather crop. Planting in late summer or early fall so they can beat the heat and grow well. You can simply scatter the seeds, since you will thin out to save the healthiest plants later. Your seeds should germinate in about 5 to 10 days. When the soil temperature reaches 45 °F (7 °C), it is warm enough for collards to sprout. Growing zones are 6 to 11.

### **Optimal Soil Conditions:**

Pick a sunny and well-drained area that gets at least 6 hours of full sunlight per day. If you want to plant in containers, you can move them during the day to make sure that they get plenty of sun. No muddy spots or pooled water area yet the soil should not drain so much that it becomes bone dry and dusty.

For a simple test of your soil's drainage: Remove the bottom and top of a coffee can. / Dig a hole that is 4 inches (10 cm) deep in your soil. / Place the can in the hole. Pack soil around it so that it is secure in the ground. / Fill the can with water. / After an hour has passed, come back and measure how much the water has dropped down in the can. / If at least 2 inches (5.1 cm) of water has escaped within the hour, then your soil drains well and is perfect for collards.

Collard greens tolerate a range of soil pH's, with estimates ranging from 6.0 to 7.5. You can purchase a soil pH testing kit from a garden supply store. There are two main types: digital probes and paper strips. Follow the instructions included with your kit for exact details about testing. Next, loosen your soil. Take a spade and go over the soil. Go down to a depth of about 10 inches (25 cm). Remove sticks or rocks that you find. If you are using potting soil, then just dump it out in a container and break up any clumps.

### **Seed Planting Depth, Spacing and Procedure:**

Dig out rows in the soil if you are planting the collards in the ground. Use your spade to take out some dirt in long lines and mound it up on the sides. Create rows that are 24 inches (61 cm) to 36 inches (91 cm) apart. Whether you're planting them in the ground or in containers, place seeds 0.25 inches (0.64 cm) below the surface of the soil. Alternatively, you can sprinkle seeds on the soil, then lightly cover them.

Later, thin your seedlings when they are 8 inches (20 cm) to 10 inches (25 cm) high. If you planted lots of seeds there's a good chance a lot of them will sprout. Pull up the smallest or weakest, and leave just the strongest, healthiest ones. If you planted in the ground, thin the seedlings until those remaining in the soil are 18 inches (46 cm) to 24 inches (61 cm) inches apart. Save the seedlings you pull up and add them to your salads for a tasty treat. After the seedlings are several inches high, you can take the whole root ball out of the container and plant it in a hole in the ground that's slightly larger. Fill in the rest of the space with soil. Water the seedlings well when you're done. Collard greens can grow just fine in containers, so there's no need to transplant if you don't want to.

### **Companion Plants and Plants the Hinder:**

Companion plants are important since they help to keep away diseases and pests from your collard greens. They also loosen the soil, keep it moist and attract pollinators and other useful insects. Consequently, companion plants can improve the overall growth behavior as well as the yield of your collard green plants. Examples are mugwort, thyme, hyssop, mint, chamomile, southernwood, catnip, onion, potato, dill, garlic, rosemary, oregano, and marjoram.

You should also avoid growing some plant species next to your collard greens since they can do more harm than good like cabbage, broccoli, kale, cauliflower, tomatoes, kohlrabi, strawberries, leeks, and melons.

### **Crop Maintenance**

#### **Moisture Requirements & Solutions:**

Keep the plants well-watered and harvest regularly to keep them sending out new leaves. These plants need 1 to 1 1/2 inch of water weekly. Mulch will keep the soil moist and the leaves clean.

Collards do equally well in humid and dry conditions, provided the soil is kept moist.

#### **Weeding Needs & Solutions:**

The plants have shallow roots and in order to avoid damaging them, it is preferable to hand pull any weeds growing around the plants.

## **Feeding Needs/Optimal Natural Fertilizers:**

Side dress with composted manure or spread 1 cup of fertilizer to the side of your plants soil for every 30 feet (9.1 m) you have planted in row, once they are several inches high. Lightly rake the soil to mix the natural fertilizer in, then water your plants. Collard greens need nitrogen to produce healthy leaves. If you have planted collards in containers, use about 1 tablespoon (15 mL) of organic fertilizer per plant. Keep an eye on your plants. If their leaves begin to look pale instead of dark green, fertilize again in 4-6 weeks.

## **Pests, Diseases & Solutions:**

Sprinkle diatomaceous earth on the ground near your plants to stop slugs. Slugs are slimy, soft-bodied creatures that look like snails without shells. They will eat the leaves of collard greens. / Caterpillars come in many colors and sizes. The ones that will attack collard greens are likely to be an inch or two long and striped (black, white, and yellow, for instance). You can also pick the voracious larvae from the leaves by hand, rinse off with a hose; if you're reluctant to use insecticide, try deterring pests with companion plantings of marigolds or any plants in the onion family. You may not see these pests at first, but if you see holes chewed through the leaves of your plants, they are the likely culprit.

Collards are fairly hardy plants, but they can still be impacted by a few diseases. Keeping the plants in well-drained soil will prevent clubroot, which can cause plants to wither or not produce leaves. Spots on the leaves indicate a fungus, which can be treated with neem oil or sulfur. Avoiding planting collards in the same soil in successive years prevents other diseases, including: Black leg, Black rot, Yellows.

## **Harvest and Storage**

### **When to Harvest/Number of Days to Maturity:**

Ready to harvest in 40-85 days. Let a light frost cover your plants before harvesting. Collards actually taste sweeter if they are allowed to frost over before harvesting. (Generally, collards are ready to harvest anywhere between 60 to 85 days after germination.)

### **How to Harvest:**

For best results, harvest anytime after the first frost has come and gone.

You can pick collards when they are frozen in the ground. However, be gentle with the plants because their leaves become brittle when frozen. Cut the whole plant about 4 inches (10 cm) from the ground. Alternatively, pick single leaves, working from the bottom up so that new ones will grow. Either way is a fine method for harvesting collard greens, but picking off individual leaves means your plants will keep producing throughout the growing season.

### **Optimal Storage Temperature and Conditions:**

To wash, fill a large bowl with fresh water with a little white vinegar added and soak. Then rinse them with cold water as you pull them out. Cut and remove stems and the center rib of the collard greens. Then, boil water and cook the collard greens for 15 minutes. After draining well, you can add garlic or lemon juice to the collards to add a variety of flavor. Another option is steaming them so more minerals aren't lost in the water.

Collard greens that are stored in the freezer are cooked slightly and will have a softer consistency when defrosted. Collard greens that are stored in the freezer can be used for a long time. They usually stay good for between 10 and 12 months.

If you plan on using your collard greens within the next week, don't wash them before refrigeration. Introducing water to the greens can promote decay, cutting the length of their freshness down dramatically. If you are concerned that your greens are too dirty to store in your refrigerator, know that they will be stored in an air-tight bag. Any dirt and grit will not get onto the surfaces in your fridge. Be sure to push out as much air as you can before sealing. Collard greens that are not put into a plastic bag, but are put into the refrigerator, will become wilted very quickly. Like other vegetables, uncovered collard greens get dehydrated. This causes them to go limp. If you don't have a plastic bag wrap the greens in a damp cloth or paper towel and place into the crisper drawer. Actually, brown grocery bags in the crisper drawer can add to prolonged freshness. They should be used about 5 to 7 days of storage.

### **Seed Saving:**

Growing Collards for seed is a bit more involved, meaning that the first season is spent growing and maturing, while reproduction, flowering, and seed bearing occurs in spring of the second year. After it flowers, you'll notice pods that resemble green beans. Discontinue watering the collard plants and allow the pods to turn brown and dry out. Don't harvest them too early because green pods don't produce viable seed, even if they are set out to dry after harvesting. If you leave the pods on the plant too long, on the other hand, birds may swoop down and steal them or they may crack open, dropping the seeds to the soil. Collard seeds should be black when removed from the pod. Store them in a brown paper bag in a cool, dry place until you're ready to plant them. The seeds should remain viable for at least four years.

Something else to be aware of is that the collard cross-pollinates with other brassicas, so you'll need to control the plants during the pollination period. The best way to do this is to choose the collard plants from which you want to harvest the seeds, strong, productive plants are ideal and then dig up the others. As for the remaining brassicas in your garden, this won't be an issue if they're also biennial because they'll be in their first year and won't flower. For blooming varieties such as broccoli, rapini or any of the mustards, you'll need to be vigilant in keeping up with your harvest. Alternatively, plant any blossoming brassicas at least 800 feet away from your collards' seeding bed.

### **Notes for Another Relative - Chinese Cabbage**

Chinese cabbage doesn't transplant very well, so direct-sowing is your best option otherwise the cares have a lot in common. Take note that garden plants have a way of working together to promote solid growth. If you plant basil, celery, garlic, potatoes, rosemary, onions or beans, put your cabbage near them in the garden. These plants repel bugs and share nutrients. Put companion plants, and other Chinese cabbage, at least 12 to 18 inches (30.5cm-45.7cm) away from your Chinese cabbage seeds. If you are going to plant multiple rows of Chinese cabbage, leave at least a foot and a half between the rows. Closer spacing produces smaller heads, which might be beneficial if you're going to sell the cabbage at a market. Some varieties grow better with tighter or looser spacing. Check the seed packets for addition spacing information. Also, this plant is susceptible to slugs, aphids, flea beetles, and cabbage worms so you may need to install mesh screens over the plants to protect from these insects. To harvest use a sharp knife to cut the head off at the base. Leave the outer leaves and the stem and roots of the plant in the garden. Smaller heads will regrow on the plant after you chop off the head.

## Corn

**Description:** Bred into hundreds of varieties by Indigenous peoples of North and South America, corn is an annual member of the grass family. Corn is a warm-season crop, and it does best in temperatures between 60 degrees and 95 degrees Fahrenheit (which corresponds with the spring and summer growing seasons of many parts of North America). It grows 5-8 feet tall.

VARIETIES: Silver Queen, Seneca Chief, Utopia, Golden Bantam, Seneca Horizon

### Growing Instructions

**Optimal Time/Temperature for Germination:** Most gardeners plant their corn two weeks after the last frost in their area. If your area has a short warm-weather season, consider covering your planted corn seeds underneath a black plastic sheet to keep them warm and help them germinate.

After your soil temperature warms to 60 degrees Fahrenheit, it's time for planting corn.

**Optimal Soil Conditions:** Corn needs full sun for optimal growing conditions, so choose an area that gets at least six hours per day. For the soil, opt for loose, well-draining soil rich with organic matter. If your soil doesn't already have a lot of nutrients, mix in aged manure or compost.

### **Seed Planting Depth, Spacing and Procedure:**

Since corn pollination happens by wind, corn stalks need other stalks nearby in order to produce ears; plant your corn in short rows in a rectangular bed rather than one long row; this will help cross-pollination. Pollen is produced on the tassels that form at the tops of the plants. The female receptacle is the silk at the top of each ear. Every strand of silk pollinates one kernel.

Sow the corn seeds. You'll see more success with corn if you plant the seeds directly in the ground, rather than if you start corn indoors and transplant. Plant seeds one and one half inches deep, every two or three inches, in rows spaced roughly thirty inches apart.

Water. Immediately after planting, water thoroughly.

Once the stalks are about six inches tall, thin the rows so that every corn stalk is twelve inches apart.

**Best Companion Plants and Plants that Hinder:** Corn is one of the traditional three sisters planting. It likes to grow with beans and squash.

Sweet corn does well with potatoes, peas, beans, cucumbers, pumpkin and squash.

Corn is hindered by tomatoes which will compete for nitrogen and the tomato fruit worm is identical to the corn ear worm.

## **Crop Maintenance**

**Moisture Requirements & Solutions:** Corn is meant to grow quickly, so it needs a lot of consistent water to keep from wilting. Make sure to keep the soil moist; if you're having difficulties with this, mulch around the base of your corn to help retain moisture.

**Weeding Needs & Solutions:** Mulching helps prevent control weeds while plants are small. Corn grows tall and is not easily overwhelmed by weeds once it is mature. It benefits from nitrogen fixing weeds such as clover.

Corn roots are shallow so it is not advised to till between rows.

### **Feeding Needs/Optimal Natural Fertilizers:**

Corn plants are heavy feeders, which means that they need more nutrients than other plants in order to produce an adequate crop. For the best corn yield, fertilize your corn three times over their growth: first when they're ten inches tall, then in the mid season when they're eighteen inches tall, and finally when tassels start to form on their ears. Compost and well composted manure is beneficial for nitrogen loving corn.

There is an old trick of burying fish heads and discards from cleaning deep under the corn patch to provide nitrogen. This can be successful as long as the fish is buried deep enough that it doesn't attract animals that will dig up the patch for it.

Odorless marigolds planted next to corn deters Japanese beetles which attack the silks.

Growing sunflowers in alternating strips with double rows of corn between have been known to reduce fall army worm.

**Pests, Diseases & Solutions:** Raccoons Love Corn. You may have to get a dog to guard your patch. Birds are also attracted to growing ears of corn. To protect your crop, cover the ears with paper bags. This is only practical in smaller garden crops. Make sure that you do this only after fertilization otherwise, the ears will not develop corn kernels.

Electric fencing around a corn field helps deter larger foraging animals.

Corn can fall prey to many different insects, that is why is it heavily sprayed with pesticides in large scale farming operations. Common insects that attack corn include corn earworms, flea beetles, corn borers, and cutworms. You can handpick pests off of corn stalks as an organic deterrent.

Corn smut is an air borne fungus that causes an immense swelling of kernels. Cut off and burn affected corn before the kernels burst and spread spores.

## **Harvest and Storage**

**When to Harvest/Number of days to maturity:** When the husks darken and the silks turn brown, it's harvest time. Visit your crop in the morning. Ears of corn will be freshest and sweetest in the morning, before they've been exposed to long hours in the sun.

**How to Harvest:** To harvest an ear of corn, take it in your hand and sharply twist downward; it should easily release from the stalk.

**Optimal Storage temperature and conditions:**

To preserve the sweetness of your harvest, put the ears into cold water. Different varieties of corn will hold their sweetness longer than others; for instance, lower- sugar-content sweet corn varieties, like silver queen, will lose flavor quickly, while the more sugary super sweet corn varieties will stay sweeter longer.

Harvested corn will last in the refrigerator for up to five days. To lengthen the storage life, blanch ears of corn and freeze them for up to six months.

**Optimal Preserving Procedures:** Corn can be cut off the cob, pickled as a relish and preserved in jars. Corn can also be dried and ground into a flour that can be used in winter to make tortillas and corn bread.

**Seed Saving:**

If you are trying to keep a pure variety of corn, different varieties should be separated by a tall crop such as sunflowers and kept far apart. Growing varieties that mature at different times helps to prevent cross pollination.

Individual kernels can be shelled by hand, with a hand corn sheller, or with a mechanical sheller. If using a sheller, seed savers must take care to avoid damaging the kernels, especially if saving a sweet corn variety, as sweet corn seeds are especially fragile. Seed savers often shell sweet corn by hand to prevent damage to the seeds. The large, heavy seeds separate easily from the chaff through screening and winnowing.

When stored under cool, dry conditions, sweet corn seeds can be expected to remain viable for two to three years. The expected longevity for field corn seeds is at least five years.

**Notes:**

There are specific varieties grown for popping corn.

It was considered good luck to find a multi-colored head of corn and that is how it became a tradition to display dried colorful corn stalks in North American homes.



## Cucumber

**Description:** The cucumber is an old world plant that was popular with American settlers. Like squash and pumpkins, cucumber is monoecious, producing separate male and female flowers so it must be pollinated by insects, or by hand. Being tropical plants, cucumbers are exceedingly sensitive to cold temperatures. Cucumbers are high yield plants that are relatively easy to grow in a backyard garden. Bush varieties of this tasty vegetable can even be grown in containers on an apartment porch or balcony.

Varieties: Ashley, Burpless, Bush Champion, Dasher, Diva, Early Pride Seed Saving.

### Growing Instructions

The size of your space will dictate how many plants you can have. You'll want to space vining plants 36 to 60 inches (91 to 152 cm) apart. If you're growing them vertically, allow 12 inches (30 cm) between trellises.

**Optimal Time/Temperature for Germination:** Seeds germinate in 3-7 days in the preferred temperature range. Plant when the soil is at least 70 °F (21 °C). Wait until at least 2 weeks after the date of the last frost to plant your cucumbers.

If you want an early crop, start your seeds indoors about 3 weeks before you plan to plant, then transplant the seedlings to your garden.

**Optimal Soil Conditions:** Find a sunny location to plant your cucumbers. Cucumbers are a tropical vegetable, and they crave a lot of direct sunlight although they can be overwhelmed by too much sun in hotter climates. In cooler regions, choose a spot where they won't be too shaded from the afternoon sun. If you live in an area where summer temperatures routinely climb above 90 °F (32 °C), your cucumbers will likely need some shade from the afternoon sun.

Cucumbers grow roots 36 to 48 inches (91 to 122 cm) deep, so don't plant them right beside trees. Tree roots can compete with your cucumber plants for water and nutrition.

Remove weeds from the area. Cucumbers should be started in a weed-free area. It is advised that weeds can drain nutrients and water from the soil, starving your cucumbers, while they are developing.

Bring the soil's pH level as close to 7.0 as possible. Cucumbers thrive in soil with a neutral to slightly alkaline pH. You can buy a pH testing kit at any garden supply center or hardware store.

For natural fertilizer, use rich compost or aged manures. Mix them into the soil to a depth of about 2 inches (5.1 cm), then gradually cut and work them into the soil to a depth of 6 to 8 inches (15 to 20 cm). Add organic material to improve soil quality. The ideal soil for cucumbers is loose, light, and sandy. This type of soil gets warmer more quickly and retains that warmth more easily.

If you have more clay in your soil, add organic material. Dense, heavy soil can be improved with peat, compost, and well rotted manure.

## **Seed Planting Depth, Spacing and Procedure:**

In areas with shorter growing seasons you will need to start your seedlings indoors. It is recommended to use biodegradable peat pots when starting them indoors so that they can be directly planted in the garden without removing them from their pots.

If you are transplanting seedlings from regular pots, wiggle the entire structure out of the starter pot, soil and all. The soil helps protect the plant's sensitive roots. If you transplant a cucumber bare-rooted, it likely won't survive.

It is preferable to direct sow cucumbers where they will grow.

Moisten the soil before seeding. Stick your finger in the soil to check its moisture level before planting. If you feel dry soil up to your first knuckle, water the soil before seeding using a gentle hose or watering can. Watering the soil before you plant your seeds reduces the risk that you could wash them away.

Drop 3 or 4 seeds together in a group every 18 to 36 inches (46 to 91 cm). Planting several seeds together allows you to select the strongest plant.

Push seeds slightly into the soil. Cucumber seeds should be no more than 1 inch (2.5 cm) into the soil. You can also lay them on top of the soil, and then cover them over with topsoil of a similar depth.

Add mulch once seedlings sprout up. Mulch helps control weeds. It also keeps the soil warm and moist. For additional warmth, use a darker mulch. If you're using straw or wood chips, wait until the soil has warmed up to at least 70 °F (21 °C).

Give the plants plenty of room. Vining plants, in particular, require a lot of space. Cucumber vines can grow 6 to 8 feet (1.8 to 2.4 m) long. In large gardens, the vines can simply spread over the ground. If you have limited space, you may want fewer plants.)

When planting in containers, bear in mind that cucumber plants that are too crowded can become stressed. The cucumbers won't grow to size and will taste bitter. Production will also decrease. across and about 8 inches (20 cm) deep. Containers should also have several drain holes to ensure the best drainage for the plant.

**Best Companion Plants and Plants that Hinder:** Benefited by flowering herbs such as borage that attract pollinators but are not aromatic.

Corn and cucumbers are mutually beneficial. Raccoons do not like the vines and corn protects cucumber from the virus that causes wilt.

Cucumbers do well with peas and sunflowers. Radishes protect from the cucumber beetle.

They grow well in orchards as part of a food forest because they like some shade in hotter climates and the pollinators that come for the fruit will also pollinate the cucumbers.

Do not plant cucumbers near potatoes.

## **Crop Maintenance**

Growing cucumbers vertically increases exposure to sunlight, giving you a higher yield. It also keeps the vegetables cleaner. If you want to grow your cucumbers vertically, prepare your trellises before the vines start to grow.

Use 4 or 5 ft (1.2 or 1.5 m) welded wire fencing or hog wire to create a 12 to 18 in (30 to 46 cm) diameter cage. This size cage can support 2 or 3 vines. As your plant gets bigger, you can gently wrap the vine tendrils around the wire to encourage the plant to grow up the trellis.

In hotter climates, plant taller crops south of your cucumbers to provide some shade, or use a shade cloth that will block at least 40 percent of the sunlight.

### **Moisture Requirements & Solutions:**

Keep your cucumbers well-hydrated. The soil surrounding cucumber plants should be slightly moist at all times. Plan on giving your cucumbers at least 1 to 2 inches (2.5 to cm) of water a week to fulfill their hydration needs. Be especially vigilant as the plant flowers and begins to fruit. Stress from lack of water can result in bitter-tasting cucumbers. Water at the soil level. Wet leaves are at risk of developing powdery mildew. A drip irrigation system can regulate the water flow more constantly, while keeping the foliage dry.

### **Weeding Needs & Solutions:**

It is helpful to keep the weeds clear when the plants are young but once Cucumbers are established they will overgrow most weeds with their hardy vines and shading leaves.

For best results, pull the larger weeds up by hand, yanking up as much of the root as possible. If you leave the root of a mature weed behind, there is a strong likelihood that the same weed will grow back. Small weed cuttings can be left laying on the soil for fertilizer.

### **Feeding Needs/Optimal Natural Fertilizers:**

Make sure you start your cucumbers in soil with plenty of humus content, compost and well rotted manure.

Fertilize again once flowers begin to bud. Wait until runners appear on the vines and the flowers begin to bud, then add a mild liquid fertilizer or organic feed such as compost or aged manure every 2 weeks.

If the leaves turn yellow, your plants need more nitrogen. Look for a high- nitrogen fertilizer such as seaweed and add it to the water.

### **Pests, Diseases & Solutions:**

Cover your plants with netting to protect them from wildlife. A fine mesh netting will keep rabbits and chipmunks away. Covering seeds and tiny seedlings with a berry basket keeps them safe from getting dug up by animals.

Once the plants get larger, you can remove the netting. A fence around your garden would better protect your cucumbers at this stage.

Squash bugs can be controlled by placing cedar boards on the ground under the plant. At night the bugs congregate under the boards and can be killed in the morning.

A spray made from chive tea or horsetail tea will help with downy mildew.

## **Harvest and Storage**

**When to Harvest/Number of days to maturity:** Pick your cucumbers at the optimal size. For higher production, you don't want to leave your cucumbers on the vine too long or allow them to get too big. The best size at which to harvest your cucumbers depends on the variety you've planted

American slicers should be 6 to 8 inches (15 to 20 cm) long. Middle Eastern varieties are best at 4 to 6 inches (10 to 15 cm), while picklers should be harvested at 3 to 5 inches (7.6 to 12.7 cm).

Pick cucumbers often. The more frequently you pick cucumbers, the more cucumbers the plant will grow. Check your plants every day and pick the cucumbers that are around optimal size for their variety.

**How to Harvest:** Use pruning shears to pick cucumbers cleanly. Take hold of the cucumber, then cut the stem about  $\frac{1}{4}$  inch (0.64 cm) above the end. Many people think they can simply pull or twist a cucumber off a vine. However, when you do this you risk damaging the vine.

**Optimal Storage temperature and conditions:** Refrigerate your cucumbers to keep them crisp. Try to use your cucumbers as soon as possible after you harvest them for the best flavor and texture. If necessary, you can keep them in the refrigerator for 7 to 10 days.

Wrap them in plastic or put them in a zippered plastic bag before refrigerating them to keep them from drying out.

**Optimal Preserving Procedures:** Cucumbers are famous for making dill pickles, sweet pickles and relish which can be preserved in jars for long term storage.

**Seed Saving:** Cucumbers are eaten as immature fruits. When cucumbers are grown for seed, harvest is delayed until the fruits reach botanical maturity. As the seeds develop, the cucumber will continue to grow beyond its market-mature size, eventually changing color and losing firmness as the seeds reach full maturity. Cucumbers can change color to yellow or orange. It is best to wait several weeks after this color change before extracting the seeds.

Cut cucumbers in half lengthwise to extract the seeds. Scoop out seeds and any surrounding pulp from the seed cavity. Place this mixture of seeds and pulp into a small bucket or jar with some water. The mixture needs to undergo fermentation for 1-3 days to remove the pulp from the seeds. The fermenting mixture should be held in an open container at temperatures between 70-80 degrees F. When fermentation is complete, decant the seeds by adding more water to the container and stirring the mixture - the pulp and lightweight seeds will float to the top and can be poured off, leaving only viable seeds which will have settled at the bottom of the container. Once the seeds have been rinsed clean, set the seeds out to dry on coffee filters or old window screens until they can be cleanly snapped in half.

Store cucumber seeds in a cool, dark, and dry place in an airtight container to keep out moisture and humidity. When stored under these conditions, cucumber seeds will remain viable for 5 years.

### **Notes:**

If you find that your area is just not suited to growing cucumbers outdoors, consider growing them inside.

Thin strips of cucumber will repel ants.

## Dandelion

**Description** A perennial member of the daisy family, dandelions are known for their bright yellow flowers, dark green leaves, and seed-spreading puffballs that children love to blow on. While they are largely considered to be weeds, they can be harvested and used in many ways with some health benefits. Dandelions are edible from root to flower. Dandelions are perennials in most climates. Leave the plant in place if you want to have it come back every year.

Young, small dandelion greens, also known as baby dandelion greens, are mild in flavor, so they are great in salads and smoothies. However, mature dandelion greens (larger ones) will taste best if you stir-fry so try sautéing dandelion greens with onions and garlic and a little bit of olive oil.

**Growing Instructions** Dandelions grow wild and you can easily harvest their seeds when the plant is in the seed phase. This is when the top of the plant looks like a puffball. Each of the little feathery strands has a seed attached to it, so you can collect these in a bag or other small container and take them home for planting. If you prefer to purchase dandelion seeds, then check your local garden center or look for seeds online. Wild dandelion greens may have a bitter taste, while cultivated dandelion greens will not be as bitter.

**Optimal Time/Temperature for Germination:** Dandelions do best when they have full sunlight for a large part of the day, so choose a sunny location in your garden or plan to place potted dandelions in a sunny window. Try going out in your yard a few times throughout the day to scope out the sunniest spot. For example, you could go outside at 8 am, 12 pm, and 4 pm and note where the sun is at by placing a few rocks on the edges of where the sun is shining. If you will mainly be using dandelions for their leaves, then growing them in partial shade is a better option. This will help to reduce the bitterness of the leaves and the number of flowers it produces.

**Optimal Soil Conditions:** Whether you're harvesting from your own yard or elsewhere, only do so if the area hasn't been treated with herbicides or other harmful chemicals. Also avoid areas that are prone to runoff from chemically-treated grounds. Additionally, steer clear of areas close to roadways or anywhere else that experiences high levels of air pollution, since dandelions can retain chemicals from car exhaust and other fumes.

Do not plant your dandelions in an area with poor drainage or a tightly packed soil, such as clay. Use a garden fork to loosen the soil before you plant if it is tightly packed. Use a loosely packed potting soil with added compost as the growing medium. Ensure your soil is between 6.0-6.5 .

**Seed Planting Depth, Spacing and Procedure:** The dandelion seed will need to be 6 inches (15 cm) apart for flowers and 2 to 3 inches (5.1 to 7.6 cm) apart for greens. Flowers will need more room than baby dandelion greens because they will have deeper roots. Measure the distance between your seeds to ensure that they will have plenty of room. Leave the seeds uncovered if you are planting indoors. You will not need to worry about the seeds getting blown out. Dandelions do best in a shallow bed. Do not plant your dandelions in an area with poor drainage or a tightly packed soil, such as clay. Use a garden fork to loosen the soil before you plant if it is tightly packed. Use a loosely packed potting soil with added compost as the growing medium.

**Best Companion Plants:** Allow dandelions to grow near early flowering fruits and vegetables because they'll attract pollinators on the look out for nectar and will increase the probability of pollination and ripening. Fruits and vegetables like broad beans, early strawberries, apricots, plums, peaches, early apples, early pears, and cherries.

**Crop Maintenance** Dandelions can regrow after the "puff-ball" seeds have been blown away.

They grow small buds along their main root, or taproot, which become new stems. This is why it's so hard to get rid of them, as a new plant can emerge from the smallest piece of root left in the ground.

**Moisture Requirements & Solutions:** Dandelions need a lot of water to thrive, so plan to water them regularly. However, do not water them too much. Water just enough so that the soil feels moist. Check the soil by poking your finger into it once every 2 to 3 days. If the soil feels moist, then they do not need water yet. If it feels dry, then give them some water.

**Feeding Needs/ Optimal Natural Fertilizers:** Can benefit from a bit of organic matter mixed into the soil, but otherwise do not need any specific fertilizer, though it will not be detrimental to their growth if they happen to receive some from nearby applications to other plants. Some examples are Down To Earth Alfalfa Meal, Epsom salt, or Kelp Meal.

## **Harvest and Storage**

**When to Harvest/Number of days to Maturity:** If left too long, dandelion flowers will convert to seed distributing puffballs. This means that you might end up with an infestation of dandelions rather than a controlled crop of them. To prevent this from happening, cut the dandelion flowers right after they bloom. Use a pair of sharp garden shears to cut the flowers at the base of the stem near the leaves. You can cut the flower from the stem after harvesting and discard the stems. Wait for winter's cold weather to turn the fibers into fructose, which will make them chewier and less bitter than a fall harvest would taste.

If possible, hold off until after heavy rains, especially if you want the roots. Expect dandelions' roots to extend deeper into the earth than most other flowers of similar size. Wait for rains to loosen the earth to make extraction of these deeper roots much easier.

Most of the medicinal benefits of dandelions come from the insoluble fibers in the root. Expect these to be highest during the fall. However, one exception to this rule: Their taraxacin levels are responsible for increasing bile production for a liver, rather than the insoluble fibers. Taraxacin levels are highest in spring, which means you should harvest them then for this exclusive purpose.

**How to Harvest:** Again, this is particularly important if you're after the roots. Keep in mind that the largest flowers will have the longest roots. Additionally, leave the smallest be in order to preserve the environment and leave food sources for insects and birds. This is especially important for future harvests. Leaving food sources for pollinating insects like bees will help keep the area full of more dandelions.

Use a sharp pair of garden shears to snip the leaves away from the base of the plant. Cut as many individual leaves as needed or cut the entire rosette of greens from the root. You may also leave the smaller leaves to continue growing if desired. You can harvest the dandelion greens when they are small for the mildest flavor, or wait until they are larger if you prefer a bitter flavor.

The roots of the dandelion should be large enough to harvest after the flowers have bloomed, but you can even harvest roots of dandelions that have gone to seed. To harvest the roots, insert a garden spade into the ground about 4 to 6 inches (10 to 15 cm) from the base of the dandelion. Dig around the dandelion to loosen the dirt and make it easier to pull up, and then pull the dandelion root out of the ground. You may be able to pull up younger dandelion roots without digging since they tend to be shallower than mature ones.

**Optimal Storage Temperature and Conditions:** If you weren't able to get rid of all the excess soil when you first harvested the dandelions, do so now. Use your fingers to rub it off. Rinse the roots under a gentle stream of water to wash the soil away. To preserve roots, you need to dry them, which will take longer for thicker roots. To speed the process up, slice the thickest ones in half. If necessary, quarter them so they're approximately the same thickness as your thinnest roots. If you have a food dehydrator, set the temperature to 95 degrees Fahrenheit (35 degrees Celsius). Place the roots inside and let them dry until they turn brittle. If you don't have a dehydrator: Lay them out on a screen or hang them individually with strings or clothespins in an area with strong air circulation. Let them air-dry until they turn brittle. This may take anywhere between 3 to 14 days, or even longer, depending on your climate.

Once they've completely dried, place your roots in a jar or some other airtight container. Seal them tightly and store them in a dry, cool environment. If sealed and stored properly, roots should last up to one year.

The roots of dandelions are often used to make tea. Chop the roots up into 0.25 in (0.64 cm) pieces and store them in a glass jar. You can also use the flowers to make a jelly. You can create a good substitute for coffee out of dandelion root. To roast, cut the roots into 1/4 inch to 1/2 inch (6-12 mm) parts. Then layer on a large cookie sheet about 1/2 inch (12 mm) deep.

Preheat your oven to 250°F (120°C) and set the sheet in, leaving the door slightly open to let moisture escape. Every 15 minutes, stir the root pieces to ensure even drying. Repeat this stirring for an hour and a half to two hours.

**Notes:**

To make a cup of dandelion tea, place 1 teaspoon of the dried root pieces into 1 cup (240 mL) of boiling water and let it steep for 3 to 5 minutes. Strain the tea and enjoy once it is cool enough to drink.

If you are foraging anywhere other than your own property, make sure you aren't breaking any rules by doing so. Don't harvest on private property. With public land, double-check with your local, state, or federal government to find out if there are any rules prohibiting you from removing vegetation or otherwise disturbing the environment.

A single dandelion head has over 300 flowers that look like petals at first glance. No wonder they spread so prolifically. So it is a shame that so many gardeners waste this free resource that nature provides us with.

(Dandelion Weed Fertilizer is actually incredibly useful)



## Eggplant

**Description:** A member of the nightshade family, eggplant is an annual from South America. It is therefore not cold hardy and takes a long time to reach maturity. Fruits may be elongated or globe shaped and they are usually dark purple. White fruited varieties are available and often promoted as "egg trees".

Varieties: Italian, Graffiti, Sicilian, White

### Growing Instructions:

**Optimal Time/Temperature for Germination:** Years of hybridization have resulted in short season varieties that can be grown in cooler areas with short growing seasons. Globe shaped fruits tend to be short season varieties, maturing in about 60 days, as opposed to 70-75 days for elongated varieties.

Start eggplant seeds indoors 6-9 weeks before the last frost is expected. Eggplants need warmth, so it is best to start them indoors and transplant them once the weather is warm enough. Aim to germinate the seeds 6-9 weeks before the last frost of the year is predicted. Eggplants should not be re-planted outdoors until the temperature is at least 70 °F (21 °C).

Altitude can affect the date of the last frost and even on being on a hill affects frost dates. If your garden is down in the bottom of a hill, the cold air can settle in and you may have a later frost than you would if you were at the top of the hill.

**Optimal Soil Conditions:** Eggplants require very high temperatures to grow and thrive in a garden. Ideally, choose a spot that gets sun for more than 6 hours per day to plant your eggplants. If this is not possible, plant eggplants in a spot that get only partial shade.

Eggplant grows best in healthy, well-drained soil. Find out what condition your soil is in by digging a hole that is approximately 12–18 inches (30–46 cm) deep and 12–18 inches (30–46 cm) wide, then fill the hole with water. If the water pools and takes longer than an hour to soak in, your soil is poorly-drained.

Fix poorly drained soil by adding an organic soil amendment. Use a gardening rake to loosen the top 8 in (20 cm) of your soil. Pour a 2 in (5.1 cm) layer of organic soil amendment on top of the soil. Use the rake to mix it into the soil evenly. Purchase organic soil amendment materials, such as sand, vermiculite, perlite, or compost, at a local garden center or hardware store.

### **Seed Planting Depth, Spacing and Procedure:**

Eggplant seeds have a better chance of growing if they are soaked thoroughly before planting. Place the seeds in a small container and completely cover them with water. Let the seeds sit overnight, then drain the water.

Eggplant seedlings grow well in 72- and 128-cell trays, which have large seed containers that accommodate root growth.

For the best results, germinate eggplant seeds in a soil-less growing medium. Fill seed trays 3/4 full with the growing medium of your choice. Vermiculite, perlite, coconut husk, and compost are all good options.

Plant the seeds 0.25 inches (0.64 cm) deep and moisten the medium. Using your fingers, push 1-2 eggplant seeds into the growing medium in each individual seed container. Make sure that the seeds are about 0.25 inches (0.64 cm) under the surface of the growing medium. Cover over the seeds and mist or sprinkle water onto the surface.

Let the seeds germinate for 5-14 days. Eggplants seeds will grow as soon as 5 days or in as long as 2 weeks, depending on the temperature they are kept at. Warmer temperatures will spur a quicker germination period. Try to maintain a temperature of at least 65 °F (18 °C) for your eggplant seeds while they are germinating.

Transplant the seedlings into pots when they reach 3 inches (7.6 cm) tall. When the seedlings are large enough they should be given their own individual pots. Fill small pots with the same growing medium you used to start the seeds and dig small holes to insert the seedlings. Gently remove each seedling from the growing tray and replant them in their new pots. The potted seedlings should be kept indoors until the outdoor temperature reaches at least 70 °F (21 °C).

Seedlings should be hardened off before transplanting out to garden.

Plant seedlings 24–30 inches (61–76 cm) apart, root-deep. Eggplants do best when they have room to spread and grow. Dig holes slightly larger than your seedlings' roots, spaced 24–30 inches (61–76 cm) in all directions.

Gently place the seedlings in the holes and fill the space around their roots with soil.

### **Best Companion Plants and Plants that Hinder:**

Flowering herbs that will attract pollinators are beneficial.

To avoid verticillium wilt, do not plant eggplant where other members of the nightshade family or strawberries have grown in the previous season.

Eggplants growing among green beans will be protected from the colorado potato beetle and benefit from the nitrogen fixing properties of the beans.

### **Crop Maintenance**

Place mulch material around the base of your plants. Mulching will help prevent the growth of weeds and keep your plants warm. Straw, compost, and grass clipping are good choices for natural mulch materials. Scatter them around the base of your eggplant seedlings in a thick layer. Be sure to use grass clipping from untreated lawns, as chemicals and fertilizers may harm your plants. Also don't use grass clippings from lawns that have pets doing their business on them.

Layer at least 1 inch (2.5 cm) of mulch to protect your plants.

The plants will grow several feet in height and should be staked for support early in the growing process. Use bamboo sticks or other suitable stakes to hold up your plants. Insert the stakes into the soil about 1–2 inches (2.5–cm) away from each seedling. As the plants grow, they will lean onto the stakes and won't disturb any surrounding plants. Insert the stakes right away after transplanting your seedlings to avoid disturbing the soil later on.

**Moisture Requirements & Solutions:** Water eggplants thoroughly once a week. To thrive, eggplant need at least 1 inch (2.5 cm) of water per week. Aim for one weekly, intensive watering rather than multiple, short watering sessions. Frequent watering promotes shallow roots, which can compromise the durability of your eggplants.

**Weeding Needs & Solutions:** Mulching will help reduce weeds in addition to retaining moisture.

Eggplant will benefit from nitrogen fixing weeds but they should be kept fairly clear of larger weeds that may compete for nutrients. The large leaves of the plant will shade out many weeds as it gets large and will be difficult to overwhelm.

**Feeding Needs/Optimal Natural Fertilizers:** Eggplant is a heavy feeder. It can benefit from a top dressing of compost and manure half way through the growing season, but the best practice is to set up the initial planting site with lots of compost and manure before planting.

### **Pests, Diseases & Solutions:**

Remove any flea beetles you find on the leaves of the plants. Flea beetles are tiny black insects that feed on plant leaves and can harm eggplant crops. Check the upper and lower leaves of your eggplants for these bugs and remove them by hand. Destroy the bugs to keep them from returning or reproducing.

If you are overwhelmed with flea beetles during the growing season, destroy your plants and cultivate the soil in the spring to destroy any larvae that may remain there.

Use row covers to protect your eggplants. Row covers are great for protecting eggplants from the cold, disease, and insects. Row covers are long pieces of mesh material that cover plants and offer them protection. Lay row covers over your eggplants and fold over the edges on each side. Use a rubber mallet to hammer garden pegs through the folded edges of the material to secure it. Lift the row covers to water your eggplants, and remove them completely when it's time to harvest.

Protect seedlings from cutworms by encircling them with paper collars that extend 1.5 inches above and below the soil surface.

Dry cayenne pepper sprinkled on plants while still wet with dew will repel caterpillars.

### **Harvest and Storage**

**When to Harvest/Number of days to maturity:** Harvest eggplants 16-24 weeks after sowing when their skin is glossy. Keep track of your planting schedule from the day you first sow your eggplant seeds. At the 16 week mark, start checking your eggplant crops to see if they are ready for harvesting. Each plant should produce 1-10 fruits.

**How to Harvest:** When the skin is shiny, cut off eggplants near the stem with sharp pruning shears.

**Optimal Storage temperature and conditions:** Not considered a good vegetable for long term storage. Eggplants are best eaten fresh, but they will keep for 2 weeks if you refrigerate them.

**Optimal Preserving Procedures:** Eggplants can be cooked into baba ganoush or added to a variety of dishes, including eggplant parmesan and moussaka, which can be frozen.

### **Seed Saving:**

Wait until the eggplant is overripe and inedible before you start collecting eggplant seeds. The eggplant should look dull and off-colored. Overripe purple eggplants turn tan or brown while white and green eggplants take on a yellowish hue. An overripe eggplant is typically hard and shriveled. Slice open the eggplant and separate the flesh from the seeds. Put the seeds in a bowl of water and wash the pulp away.

Strain the seeds, pat them dry and spread them out on a tray to dry not more than two seeds thick.

There are a number of important eggplant seed saving tips you must follow if you want viable seeds to plant the following spring. Make sure the seeds are thoroughly dry before you store them. Put them in a cool place out of the sun where the humidity can be maintained between 20 and 40 percent. The drying process may take two to four weeks. After you put the seeds in a jar for the winter, watch for moisture build up in the jar. If you see the jar sweating, your seeds are too wet and at risk of becoming moldy and useless. Add some silica gel capsules or another desiccant imminently to save wet seeds. If you choose not to store them in a jar,

You'll need to figure out a way to protect your seeds from insects. Consider a sturdy zip-locking plastic bag in this case, but ensure the seeds are completely dry. If you have ever wondered how to save eggplant seeds, you now know that it isn't very difficult. You just need to protect your open-pollinated eggplant variety from cross-pollination, harvest when the seeds are mature, and dry thoroughly.

## Endive

**Description:** Endive (*Chicory*, *Belgian Endive*) is a plants that have a bitter, buttery taste and are used in ornamental gardens and as salad greens. The lettuce-like plants produce bright heads that go to seed or bolt easily in hot weather. Endive thrives in cooler temperatures and requires ample moisture to stay healthy.

Varieties: Bossa, Coral, Coronet, D'anjou, Damsel

### Growing Instructions

#### **Optimal Time/Temperature for Germination:**

**Optimal Soil Conditions:** Choose a spot that will get at least 4 hours of sun per day. Endive plants thrive in full sunlight but they can also tolerate partial shade, especially in warmer climates. They will, however, struggle if planted in a spot with full shade. Choose a spot in your garden free of obstructions that may block out light. In general, "full sun" refers to 6-8 hours of sunlight per day, while "partial shade" refers to 4-6 hours of sunlight per day.

Improve soil drainage with an organic soil amendment. Endive grows best in well-drained soil. Aerate your soil by working an organic material such as perlite, vermiculite, or compost into it. Use a shovel or gardening rake to loosen the top 8 inches (20 cm) of the soil. Add about 2 inches (5.1 cm) of soil amendment material and work it into the soil evenly.

Consider using above-ground beds with potting soil if your garden soil is not suitable. It's much easier to work with the soil you have rather than adjusting it to fit your needs. Purchase a PH level test kit from a garden center or online to assess your soil.

Endive grows best in soil with a pH level of 5.0 to 6.8. Purchase a nitrogen-based fertilizer and rake it into the soil to raise the pH level. If you need to lower the pH level, add elemental sulfur to the soil. Add elemental sulfur to the soil about 2 months before you plant anything so it has time to take effect.

**Seed Planting Depth, Spacing and Procedure:** You can grow endive easily from seeds in well-drained soil, in a sunny place. Plant seeds directly in the ground 2-4 weeks before the last expected frost. Endive thrives in cooler temperatures. For the best results, plant it in the late winter or early spring. Aim to plant the seeds 2-4 weeks before the last frost is expected to occur. With this timing, the seedlings that emerge will have cool temperatures without suffering damage from the intense cold. Transplant the endive outside 2-4 weeks before the last frost. If you decide to plant seeds earlier than this, germinate them indoors to protect them from the cold.

Make rows of seeds that are 18 inches (46 cm) apart. Scatter endive seeds by hand in even rows on top of the soil. Keep a distance of at least 18 inches (46 cm) between each row. This will accommodate the size of fully-grown endive. Endive seeds are very thin, so distribute them in a thin layer to avoid over-planting. Cover the seeds with ¼ inch (0.64 cm) of soil. Scatter a thin layer of soil over the seeds. This will add a thin layer of protection from birds, wind, or anything else that might carry away the seeds after they are planted.

After planting the seeds, water the soil very lightly. Use a watering can to gently disperse water over the rows of seeds. Aim to dampen the soil, but not to saturate it.

Look for the emergence of seedlings after 5-7 days. It takes roughly 5-7 days after planting for endive seeds to germinate. Note that not all of the seeds you have planted will grow successfully. Keep an eye on your garden for the emergence of seedlings around this time.

Dig the seedlings out gently using your hands. Use your fingers to gently loosen the soil around each plant. Dig about 3–4 inches (7.6–10.2 cm) down and lift the soil to make sure that you remove each plant and its entire root system in full.

Alternatively, remove weaker seedlings until they have the appropriate amount of space between them. They can be eaten as microgreens

Be careful when removing seedlings from the ground to avoid damaging their roots.

Re-plant each seedling 8–12 inches (20–30 cm) apart. If endive plants are left too close together they will compete for resources and your harvest will not be as successful. Dig holes that are deep enough to accommodate the seedlings' root systems, gently place the plants in the holes and surround their roots with soil. The rows of endive seedlings should remain at least 18 inches (46 cm) apart.

### **Best Companion Plants and Plants that Hinder:**

Goes well with Radicchio, Radish, Turnips, Parsnips, Mustard Greens and Tatsoi.

### **Crop Maintenance**

Blanch endive heads before harvesting them to get a milder flavor. Mature endive plants have a bitter flavor that is unappealing to some. To get a milder flavor, blanch your endive plants about 2 weeks before harvesting them. This involves covering the heart of each plant from sunlight to slow chlorophyll production by:

Tying the outer leaves of your endive plants together with rubber bands or string to block out sun. Do not do this for wet plants, which will result in the leaves rotting.

Putting an upside-down flower pot over each plant.

Making a shelter by laying a wooden board on top of supports, directly above your plants.

**Moisture Requirements & Solutions:** Water around the base of your plants every 1-3 days as needed. Endive requires a lot of moisture to grow properly. Give your plants water every few days as required to keep the soil moist and prevent it from drying up. Be sure to pour water around the bottom of the plants and not on top of the leaves. Watering the leaves may cause them to rot, eventually killing the plants themselves.

**Weeding Needs & Solutions:** Remove any weeds from the soil before planting endive seeds. Weeds can harm your endive plants by draining the soil of resources such as moisture and nutrients. Remove weeds by gently tugging them out of the ground when the soil is moist. For stubborn weeds, use a garden trowel to dig out the root systems.

**Feeding Needs/Optimal Natural Fertilizers:** Benefits from well drained organic soil with plenty of compost to start and leaf growth is encouraged by applying nitrogen rich manure prior to planting. Application of a tea made from clean grass clippings to mature plants during the growing season will be helpful.

**Pests, Diseases & Solutions:** Similar to dandelions, slugs can be troublesome. Saucers of beer or allowing ducks to forage for short periods in the garden will help control them.

Flea beetles can be controlled with diatomaceous earth or by spraying with a tea made from catnip.

## **Harvest and Storage**

You can harvest endive leaves or harvest fully-grown endive heads at the end of their growing season.

**When to Harvest/Number of days to maturity:** Start cutting off endive leaves as early as a month after planting. If you wish, you can make use of your endive plants once they are a month old. Gently pull away endive leaves where they meet the base of the plant. For easy removal, use a pair of small, sharp scissors.

Leaves on your endive plants should be 2–3 inches (5.1–7.6 cm) long by this point.

**How to Harvest:** Harvest fully-grown endive heads by severing them with a serrated knife. Endive plants will reach maturity around 12 weeks after their first planting. Use a large serrated knife to cut through the base of each plant, just above the ground. Brace the top of the endive heads while you do this to ensure even cuts.

New leaves should begin to grow on the remaining base after about 2 weeks. Endive will regrow until the temperature exceeds 70 °F (21 °C), which will cause bolting, or until the temperature drops below freezing.

**Optimal Storage temperature and conditions:** Endive is best eaten fresh and does not store well. In the fall, plants can be dug up and stored in pots in a root cellar or cool, moist basement, then brought out to a warm sunny spot for some mid-winter greens.

**Optimal Preserving Procedures:** Pickled endive hearts can be preserved in jars for long term storage.

## **Seed Saving:**

Endive needs to be overwintered in order to produce seed. For areas with severe Winters, this requires the plant to be cut down to 2" and storing the roots in a humid location in damp sand at 30-40 degrees F until spring, when they can be replanted.

Endive can survive milder Winters with a thick layer of mulch. Allow the plant to flower and go to seed: when the seed heads are dry and the seeds feel dry and firm, spread them out on a surface to dry for at least 10 days. Either plant the seed head whole or clean them by putting them in a bag and applying pressure with a heavy weight. Store the seeds in a cool dry place for up to 8 years.

Endive seeds can be added to micro green mixes.

## Notes:

Chicory has escaped gardens and naturalized in many parts of North America with milder winters. It is recognized along roadsides and in vacant lots by its beautiful blue daisy-like flowers, which wilt almost immediately after being picked. It does not transplant well into the garden because it is a biennial and by the time it flowers it is almost at the end of its life cycle. Wild chicory is edible and it is worth gathering the seed from the wild to see how the resulting plant performs in the garden. In addition to growing for food, it can also be grown as a garden flower.

Leaving some chicory in the garden in milder climates will result in flowering, seeding and self-sowing in the second year.

Regarding varieties in the *Cichorium* family, this group of bitter greens is often confused because of the many names. Different names are even given to the same species depending on how the plant is grown, and in the case of the Belgian variety, called "endive" in North America but botanically grouped as chicory. The various names for the assorted *Cichoriums* include: Common chicory (succory, coffeeweed) Sugarloaf; Belgian (French) endive; Radicchio (red chicory, Italian chicory), of which there are several Italian-named varieties.

The common name "endive" can refer to *Cichorium endivia*, a biennial species which is usually grown as an annual leafy salad green. The species *C. endivia* is available in two leaf types, depending upon the variety. The loose leaf salad green with narrow, curly leaves is usually marketed as "endive," "curly endive," or "Frisee." Broadleaf varieties are often referred to as "escarole," "Batavian endive," "grumolo," or "scarola."

Radicchio, also called Italian chicory, this red leaf, head-forming type of chicory is popular in salad mixes and Italian cooking.

Italian Dandelion chicory – Quite similar in appearance to the leaves of dandelion weeds (*Taraxacum officinale*), this variety forms dense heads of bitter greens used in fresh salads and for cooking. It can also be marketed as leaf chicory,

Catalogna, or asparagus endive. Puntarelle – These young, tender shoots or hearts of the chicory plant lack the leafiness of mature foliage. It is also called Catalogna di galatina, ciorcia asparago, or ciorcia di Catalogna.

Common chicory – A wild variety of the European *C. intybus* species, this plant's bright blue flowers dot roadsides and fields across the United States. The dandelion-like leaves of common chicory are edible.

Chicory root – Coffee or coffee additives are made by roasting, grinding, and brewing the taproots of *C. intybus* varieties such as Magdeburg or Italian dandelion. This hot beverage originated in France during a coffee shortage in the 1800's. It has since become popular around the world. Common names include 'large rooted chicory' and 'chicoree a café'.

Chicon – These tight-headed, leafy delicacies are produced by forcing various varieties of *C. intybus* roots. Chicons are also marketed as French endive, Belgian endive, white endive, Dutch chicory, or witloof chicory.



## Fennel

**Description:** All parts of this vegetable are edible with an interesting licorice-like flavor. (member of the carrot family).

### Growing Instructions:

**Optimal Time/Temperature for Germination:** The seeds should be planted directly into the garden, around the time of the last spring frost. Fennel grows as a hardy perennial between USDA hardiness zones 5 and 10. It self-sows very easily, so if it has bloomed once, the seeds will have likely fallen to the ground, allowing it to re-emerge the following spring.

**Optimal Soil Conditions:** . You can use an almanac to determine when the last frost typically occurs in your area. Plant the fennel seeds in fertile, well drained soil. If necessary, loosen the soil a little before planting and add in some compost and a little soil for drainage.

Mix any additives into the soil in advance, making certain that it has time to neutralize before planting season. Plant your fennel during the fall in warm climates, and during the spring in cooler places.

However, in northern zones (or areas where winter temperatures regularly drop below 15 degrees F/ -10 degrees C) fennel should be treated as an annual and will need to be replanted each spring.

Verify that your soil's pH level is between 6.0 and 7.0 as fennel grows best in less acidic soil.

**Seed Planting Depth, Spacing and Procedure:** Plant the seeds approximately ten inches apart and cover them with a light layer of soil, about  $\frac{1}{8}$  inch (0.3 cm) deep. It's probably a good idea to plant a few more seeds than you need, then thin them out later. If you prefer, you can plant fennel seeds in containers 4 weeks before last spring frost. Once the seedlings have grown to height of 3 or 4 inches (7.6 or 10.2 cm), you can harden them off in a cool greenhouse or cold frame before transplanting them to the garden.

Alternatively, you can keep the fennel in a container. As fennel is a deep-rooted plant, it will require a container at least 12 inches (30.5 cm) deep, filled with light soil with some added gravel for drainage.

Fennel plants can be started from cuttings. Once a plant matures, the roots can be snipped and replanted.

If you plant more than one fennel plant in a container of this size, it will be too crowded to produce a large bulb, but you will still be able to enjoy the leaves and seeds.

**Best Companion Plants and Plants that Hinder:** Plant the fennel far away from any dill or coriander -- these plants tend to cross-pollinate, which reduces seed production and affects the taste. Be sure not to start your plants where any coriander, caraway or wormwood is growing as these will impede the fennel's growth. Consider an exclusive patch for your fennel as it is known to impede the growth of other plants.

## Crop Maintenance

**Moisture Requirements & Solutions:** Fennel grows best in full-sun. At first, you should water it regularly to keep the soil moist. Once it has established itself, you may only need to water it if there is a drought. Be careful not to over water, as this may cause the roots to rot.

**Feeding Needs/ Optimal Natural Fertilizers:** fertilizer, or nourish the soil with some homemade compost. Every spring, you should fertilize your fennel patch with a standard compost.

**Pests, Diseases & Solutions:** if Aphids are a problem, try a basil pesticide. Bring three cups of water to a boil, and then add a cup of fresh basil. Let the mix cool and strain. Then add a teaspoon of natural-based dish detergent. Spray onto affected plants.

**Maintenance Solutions:** Once the bulb begins to form at the base of the stem, hill up the surrounding soil to cover it. This shades it from the sun and prevents it from turning green. This is known as "blanching", as it keeps the bulb white and sweet (which is only necessary if you intend to eat the bulb)

Fennel can grow up to five feet tall, which leaves the thin stems susceptible to breakage. Stake your fennel to support it against the wind.

**Feeding Needs/ Optimal Natural Fertilizers:** There is no need to fertilize the soil during growing season.

**Pests, Diseases & Solutions:** Fennel is not usually affected by pests or disease, but occasionally you will spot aphids or whiteflies on the leaves. If so, you can use a pyrethrin- based insecticidal soap to get rid of them.

## Harvest and Storage

**When to Harvest/Number of days to Maturity:** You can start harvesting the fennel leaves once the plant becomes well-established. Florence fennel bulbs can be harvested once they reach the size of a small tennis ball, usually in late summer/early autumn.

**How to Harvest:** Don't take too many leaves at once though, or you might harm the plant. The fennel leaves can be used to add an aromatic, anise or licorice flavor to soups, salads and other Mediterranean-style diets. Don't take too many leaves at once though, or you might harm the plant.

Fennel bulbs will survive a frost or two, so there is no rush to harvest them as soon as the weather turns cold. However, you shouldn't allow the fennel bulb to grow too large, or it will turn bitter.

If a regular user, try planting multiple plants. Harvest one plant a week, but remember to keep watering and fertilizing the plant after harvest.

**Optimal Storage Temperature and Conditions:** To harvest, cut the fennel below the bulb at the soil line. Use immediately, or store in the refrigerator for several days.

### **Optimal Preserving Procedures:**

**Seed Saving:** Fennel seeds can be harvested as soon as they're ripe and the plant's flowers have turned brown.

The seeds are very loose, so the best way to collect them is to place a large bowl or sheet underneath the plant and shake the seed head. Alternatively, you can wrap the seed heads with cheesecloth while you're cutting the stalks and remove the seeds later. Can also thresh the seeds, slap the stalk against a hard surface.

Allow the seeds to dry completely, then store them in a cool, dark place in an airtight container. They will keep for up to six months.

**Notes:** Fennel can be an integral part of an expectant or nursing mother's diet, as nutrients that are exclusive to this plant aid in milk production.

Creating your own compost will maintain the organic integrity of your plants, and is a wonderful way to benefit the environment

## Garlic

**Description:** perennial plant of the amaryllis family grown for its flavorful bulbs. Its close relatives include the onion, shallot, leek, chive, Welsh onion and Chinese onion.

### Growing Instructions

**Optimal Time/Temperature for Germination:** If you live in a northern area that gets a hard frost, it is recommended that you plant garlic in the fall. Garlic overwinters well, and planting it early will cause the bulbs to be larger and more flavorful. However, if you live in a southern area that doesn't have cold winters, plant your garlic early spring instead.

In temperate climates, garlic can be planted in winter.

**Optimal Soil Conditions:** Garlic needs a lot of full sun, but it might tolerate partial shade provided it's not for very long during the day or growing season. The soil must be well dug over and crumbly. Sandy loam is best.

If you're planting garlic in the fall, plan to plant it 6 - 8 weeks before the ground freezes. (cover the area with 6 inches of straw to protect the garlic during the winter) If you're planting garlic in the spring, plant it as soon as the ground can be worked in February or March. (mulch it to retain soil moisture)

Lime is not needed unless your soil is strongly acidic. Ideal soil pH is 5.5 to 6.7.

**Seed Planting Depth, Spacing and Procedure:** Break the fresh cloves from the head and be careful not to damage the cloves at their base where they attach to the garlic plate. If the base is damaged, the garlic will not grow.

Plant the larger cloves. The smaller cloves take up just as much space in the planting bed, but they produce much smaller bulbs. If in rows, garlic should be kept 30cm apart.

Divide the bulb into individual cloves, keeping the papery skin intact. Plant the cloves 4 inches apart and about 2 inches deep. Make sure that the flat root side is pointing down and the tapered side is pointing up - otherwise the garlic will grow in the wrong direction. Cover the planted garlic cloves with soil and pat gently.

Suitable toppings include hay, dry leaves, straw, compost, well rotted manure, or well rotted grass clippings.

**Best Companion Plants and Plants that Hinder:** Asparagus and garlic can't cohabitate in the same garden. Also not with beans, parsley, sage, and strawberries.

## **Crop Maintenance**

You should see the garlic scapes emerge from the ground in early spring. Cut off any flower shoots you see, since if they're left to grow they'll take energy away from the bulb formation and result in smaller bulbs.

**Moisture Requirements & Solutions:** Water the garlic every 3 to 5 days throughout the growing season. When you see the soil get dry and dusty, that means it's time to water. Garlic plants don't need to be water during the fall and winter.

**Weeding Needs & Solutions:** Keep the garlic bed weeded so that the garlic doesn't have to compete with other plants for nutrients and water.

**Feeding Needs/ Optimal Natural Fertilizers:** The planted garlic needs a complete fertilizer at the time of planting. If the garlic shoots look yellowish or limp in the middle of the growing season, you can dress the plants with fertilizer to help them perk up.

**Pests, Diseases & Solutions:** Fungal root diseases can be a problem for garlic. Never over-water.

Insects, mice, and other creatures may come to eat the garlic or make a nest among the plants. Beware the following pests:

Aphids seem to enjoy garlic leaves, and the flower buds. They're easy to get rid of — simply rub your fingers over them and squash them or apply a pesticide. Many people tend to plant garlic underneath roses to deter aphids; the roses benefit from the aphids being drawn away.

Mice and other small creatures sometimes nest in mulch. If you have a problem with mice in your area, consider using plastic mulch or landscaping fabric.

## **Harvest and Storage**

**When to Harvest/Number of days to Maturity:** Garlic bulbs are ready to be harvested when you can feel the individual cloves in the bulb, and the leaves turn yellow or brown.

**How to Harvest:** Use a spade to dig around the garlic bulbs without breaking through the cloves. Brush off excess dirt. You can leave the garlic stem attached to the bulb

**Optimal Storage Temperature and Conditions:** Before you use the garlic, it's necessary to let it cure. During this time the skin will dry and the bulb will become firm. Store the harvested garlic in a cool, dry place for curing. The ideal temperature is 80°F (26.7°C).

You can cut off the stem and cure the garlic bulbs individually in a storage bin. Make sure they get plenty of air circulation. Another common way to cure and store garlic is to leave the stems attached and braid them, then hang the garlic in a cool, dry place.

You can also cure your garlic by hanging the cloves upside down in a warm, shaded area with the leaves attached.

The cloves should be firm to the touch, and easy to pull apart. Pick out a few large bulbs to plant either in the fall before the ground freezes or in early spring.

Garlic cloves can be kept in oil or vinegar. However, to avoid the potential for bacterial growth, keep in the refrigerator and consume quickly.

**WARNING: Extreme care must be taken when preparing flavored oils with garlic or when storing garlic in oil. Do not store garlic in oil at room temperature. Garlic-in-oil mixtures stored at room temperature provide perfect conditions for producing botulism toxin (low acidity, no free oxygen in the oil, and warm temperatures). The same hazard exists for roasted garlic stored in oil.**

**Seed Saving:** Planting true garlic seed broadens the potential for the species, reduces diseases bred into cloned garlic and increases plant vigor. Watch for the flowers' ovaries to swell, which happens as the seeds develop. A blossom's ovaries are at the base of the flower. Watch for the flowers' ovaries to swell, which happens as the seeds develop. A blossom's ovaries are at the base of the flower. Harvest the seeds when the umbels and ovaries dry completely, generally 45 to 60 days after pollination. Cut each scape with scissors. Put the cut umbels in a paper sack, and shake the sack to release the seeds.

**Notes:** You can always try planting garlic you bought from the grocery store, but you'll have a much higher chance of having a successful crop if you buy garlic cloves, or seeds, from a plant nursery that stocks varieties that grow well in your area. Shop online for a wider selection of garlic and choose one to your liking. Some strains are stronger, some are hardy during cold temperatures, and so on.

The garlic stocked in grocery stores is often shipped in from faraway places, so it won't necessary be a strain that works with your climate and soil type.

Garlic sold in grocery stores has usually been treated with chemicals to make it last longer on the shelf. It's harder to grow treated garlic than untreated garlic.

After harvest, don't freeze garlic bulbs. They will turn to mush and be unsuitable for reuse.

## Ginger

**Description:** Perennial rhizome which grows annual stems about one meter tall bearing narrow leaf blades and bear flowers having pale yellow petals with purple edges.

### Growing Instructions

Gardeners who plan on starting their own plant should select an organic rhizome or one that has been obtained from their local health food store.

These are less likely to have been sprayed with chemicals (pesticides or herbicides) that will keep them from sprouting and limit one's success. If gardeners suspect this could be the case, they will need to soak their rhizome for a few hours in lukewarm water to remove the chemicals.

Choose plump, healthy pieces that have greenish eye spots that sort of resemble roots on their nodules for best results. Make sure there is no mold.

**Optimal Time/Temperature for Germination:** Culinary gingers can be started indoors in cooler climates and gradually moved outside full time when temperatures consistently reach above 50 °F (10 °C).

As a tropical plant, ginger grows best in warm and sunny climates in a deep but well draining soil loam that is high in organic matter. The optimum soil pH for growth of ginger is between 6.0 and 6.5 and the plant requires a minimum temperature of 15.5°C (59.9°F).

Gardeners in warmer areas may choose to sit their pots outside in the spring instead. These plants will sprout on their own, but it may take them longer to get started than those started indoors.

**Optimal Soil Conditions:** Ginger grows perfectly fine in ordinary potting soil and also in most yards. However, if drainage is a problem in one's yard, sand can be added for better results.

Soil should be hilled 3 to 5 times during the growing season. Any exposed rhizomes should be covered with soil and weeds should be removed from the bed.

**Seed Planting Depth, Spacing and Procedure:** The entire root can be planted as it is or gardeners may choose to cut their rhizome into pieces measuring between 1 and 2 inches long, each of which should have an eye of its own. These plants reach anywhere from two to four feet in height and should be grown in dappled sunlight, which mimics their native environment. Culinary ginger will also perform well if it has bright sunshine in the morning and bright, dappled shade in the evening.

Growing ginger in full sun can cause the plants to struggle and the leaves to turn brown at the tips. If you are growing these plants in containers, it is best to use a large plastic pot. This will allow the edible rhizome to reach a much larger size than it would have otherwise done in a smaller container. Using plastic pots helps hold in moisture, which in turn causes the root to become plumper.

**Best Companion Plants and Plants that Hinder:** Ginger has no negative effects on any other plant.

### **Crop Maintenance**

**Moisture Requirements & Solutions:** These perennials should be watered regularly and not allowed to dry out completely, because they like damp soil. Do not stop watering the plant until the leaves have died back. Until this point, the ginger specimen should be watered just enough to keep the soil from completely drying out.

**Weeding Needs & Solutions:** Provide weed cover, insect repellent and natural mulch.

**Feeding Needs/ Optimal Natural Fertilizers:** As with most plants, ginger benefits from light applications of fertilizer during the growing season. It can also be watered with spoiled milk to improve the nutrient quality of the soil and increase the plumpness of the rhizomes.

**Pests, Diseases & Solutions:** This plant is largely resistant to humidity as well as insect pests and diseases.

### **Harvest and Storage**

**When & How to Harvest/Number of days to Maturity:** Wait a full season or two before harvesting your homegrown ginger for culinary purposes. This allows the rhizome plenty of time to fatten up before being used. If one wants fresh ginger before that point, small portions can be sliced off using a handheld spade.

**Optimal Storage Temperature and Conditions:** Ginger goes dormant during the cooler months, even in its native habitat. Gardeners should be aware of this fact and not get stressed out if their plant dies back to the roots.

During the dormancy period, rhizomes can be left in their containers in a location where the temperature will not drop below 50 °F (10 °C). Alternatively, the dormant rhizomes can be dug up and stored in a warm location. This method is ideal for gardeners that wish to recycle the same pots for winter growing or if their specimens are in areas where winter temperatures may result in the death of the plant.

**Seed Saving:** Growing from rhizomes mean that you get a pretty hardened off 'root' to cook with. It will store for a longer time, however using seeds mean a softer root that is more gentle on the palate. Bacteria can be present from any seeds you harvest and can remain in the soil, so over winter it and dig the resulting crop through to clear any build up. Also rotate your crops.

The one benefit of growing from seed over using the rhizomes are that you can eat it soft. So harvest it in the first six months after germination! Do not wait until it has become a hardened rhizomes. Instead eat it while it is pink and soft. This is one of the true pleasures of growing your own food. You can tweak it to get it just right, but eating fresh baby ginger is a really unusual pleasure and a real crowd pleaser when you pull it off!

**Notes:** Culinary ginger should not be mistaken for the family of plants collectively known as gingers, which are fragrant blossoming specimens that are often grown as ornamentals in tropical and subtropical regions.



## Gourds & Luffa

**Description:** Gourds come in dozens of species, each with its own unique shape, color, and size. Gourds come in three general types: ornamental gourds (cucurbita), utilitarian gourds (lagenaria), and vegetable sponge gourds (luffa). Also consider including a few different kinds of edible gourds.

Ornamental gourds are brightly colored and oddly shaped, typically used as decoration. They have orange and yellow flowers. Utilitarian gourds are green while growing, and then dry a brown shade. These gourds are most often used for tools and utensils because of their tough shell. Vegetable sponge gourds have a shell that can be peeled off, revealing a center that can be used as a sponge. These have yellow flowers while growing. While not all gourds are edible, many are. You can eat Butternut Squash, Cushaw, Festival Squash, Golden Acorn, and more. Some other edible gourds include: balsam apple, Chinese okra, Hercules war club, and young Luffa.

**Growing Instructions** Trellises are wood or wire constructs built to hold plants off the ground, and in the case of gourds, are used primarily to encourage unique shapes. You do not need a trellis to grow your gourds, as they will grow fine on the ground. However, gourds that grow on the ground will have a flat side where they lay, while gourds that grow on trellises will maintain their rounded shapes. If you decide to use a trellis, set it up prior to planting your gourds, and then stake the plants to it over time.

Large, heavy varieties (like bottle gourds) will require a combination wood and heavy wire trellis in order to support them without falling over. Small gourd varieties can be grown using a large tomato cage as the trellis. Luffa (vegetable sponge gourds) almost always need to be trellised. Using trellises can help prevent your gourds from getting diseases.

Gourds should be planted outdoors in full sunlight, with plenty of space to sprawl. Although they can be grown in pots, this will significantly limit their size and overall production. If you're planting your gourds without a trellis, choose a space with plenty of square footage for growth. Otherwise, stake your trellis out in a wide area with plenty of sunlight and little shade.

**Optimal Time/Temperature for Germination:** Gourds will grow in most climate zones, but they grow the best in hot weather. If you're in a location that receives freezing temperatures throughout most of the winter, you will have to start your gourds as seeds indoors prior to sowing them outside. Gourds take about 180 days total from planting. Keep in mind that if you're in a cold area, you'll need to start your seeds 6-8 weeks before the last frost. Gourds grow best in temperatures between 75 and 85 degrees Fahrenheit.

Starting gourds indoors simply involves planting the seeds in individual containers, setting up a few grow lights, and watering on a daily basis.

**Optimal Soil Conditions:** Plant your seeds a least 8-10 feet apart in order to properly prevent diseases from forming and spreading.

It isn't too tricky to get soil under the proper conditions for gourds, which makes them easy to grow in most locations. The soil needs to be well-drained and warm. They like plenty of moisture with a bit more clay than sand (meaning they may not thrive in sandy soil). See if pH is somewhere between 5.8 and 6.4, which is the best range for gourds. If your pH is too high, incorporate peat moss to increase the acidity.

If the air is warm but the ground is still cold, the gourd plants won't grow well.

**Seed Planting Depth, Spacing and Procedure:** Gourds are infamous for their tough outer seed shell, which is partly responsible for their long germination period. To prevent your seeds/gourds from rotting because they took too long to germinate, you can scarify them to speed the process. Use an emery board (paper nail file) or a smooth sandpaper to scratch up the outer surface of the seeds. This shouldn't take too long; the rough paper should just roughen the coating of both sides of the seed. Then place them in a bowl of lukewarm water and allow them to soak. This should be done for a total of 24 hours, in order to help speed up the germination process. After soaking for 24 hours, remove the seeds from the water and lay them out to dry on a piece of wax paper. Giving them time to completely dry out will prevent them from rotting before even sprouting.

It's a good idea to give your seeds a head start (even if you're in a warmer area) by planting them in starter sets indoors. Fill small seed trays with your prepared soil, and place a single seed in each slot. Give daily watering until you're ready to transplant the sprouts outdoors, typically after the last frost of the winter.

Make sure the seeds get plenty of light to keep them from getting too leggy (excessively long and straggly stemmed) later on.

Use a small trowel or shovel to prepare your rows and hills, or small mounds of earth for the gourd seedlings. If you're planting many gourds at once, make sure to follow the seed packet spacing directions strictly. Gourds typically need to be planted several feet away from each other in order to thrive. Keep your rows near your trellis if you're using one.

Place each small seedling or seed into its own individual hill; don't group several in the same space. Cover up the seeds with ½ inch of dirt, and cover seedlings to the base of the new growth. You should plant the seeds horizontally and flat.

**Best Companion Plants and Plants that Hinder:** Avoid potatoes but nasturtiums and marigolds are welcome with most vegetables.

## **Crop Maintenance**

**Moisture Requirements & Solutions:** At planting, water the gourd seeds heavily so as to reduce the risk of transplant shock. Gourds like plenty of moisture, so make sure the soil is damp by adding water on a daily basis if necessary. Give your gourds extra water when the weather is particularly dry or hot, to maintain a high level of moisture in the soil

**Weeding Needs & Solutions:** Remove weeds as they sprout, as these will steal valuable nutrients and growing space from the gourds. If you're using a trellis, as the gourds grow in size you can use a bit of string to secure them to the posts and give them plenty of room for growth. Add a layer of mulch to the garden plot to lock in moisture and block out new weeds.

**Feeding Needs/ Optimal Natural Fertilizers:** When the leaves die, simply cut them off; this will make room for new healthy leaves to grow. When leaves turn yellow that indicates the lack of chlorophyll, meaning too much or too little water. Unfortunately the plants do need to be fertilized, as most planting soil lacks essential nutrients.

**Pests, Diseases & Solutions:** If insects on the flowers, remove them by hand, as using a pesticide will affect growth of your plant. Or, you can use soapy water or neem oil. Keep an eye out for insects such as cucumber beetles, corn earworms, aphids and stink bugs, as well as larger animals, including deer, mice, squirrels, chipmunks, and groundhogs. These are all considered pests, and can chew, eat, damage, and kill your gourds.

## **Harvest and Storage**

**When to Harvest/Number of days to Maturity:** If weather is suitable for the gourds with a long enough growing season (at least 120 days) you will get a good amount. When your gourds have reached their full size, the vine they're growing on will start to die off on its own. At this point your gourds are ready for harvesting, but you'll make the job a lot easier on yourself if you leave them to cure on the vine. Give them several weeks to a month for the curing process to occur; as you check in on them, you'll notice them getting lighter and lighter. Unless you notice animals and bugs eating the gourds, there's no fear of rotting or going bad.

If you're harvesting edible gourds, they'll need to be removed from the vine when they're still young. If you have to cut the gourds early, wait till the vine at the top of the gourd has turned completely brown and dry. Turn the gourds occasionally and move them around to keep them from touching.

**How to Harvest:** The curing time varies from gourd to gourd depending on its size (and therefore water content). Check the gourds on a weekly basis to tell if they're ready. Feel the skin and check the firmness of the gourds; if they are at all soft or squishy, they are rotten and should be thrown out. When the skin feels hard and slightly waxy to the touch, they are likely ready to be cut. Shake the gourd as the final test to see if they are fully cured; if they are ready, they'll sound like a rattle with the seeds banging around on the inside. Use a pair of scissors or shears to cut the gourds from the vine.

**Optimal Storage Temperature and Conditions:** Although it is not required, you can treat the shell of the gourd to change its appearance and to help it last longer. Wash the gourd with a bit of dish detergent and warm water to kill off any bacteria. You can then use a bit of sandpaper or steel wool to shine the outside of the gourd, and add a layer of wax or shellac to finish off the shine. You can decorate gourds by painting the outsides as well. Most will hang them with twine for curing so it's less rotations to do.

The process of treating a luffa (vegetable sponge) gourd is slightly different than ornamental and utilitarian gourds. To remove the shell you will have to soak it for 24 hours after curing. A malleable sponge will be found in the center when the shell is peeled away.

**Seed Saving:** Your gourd will last for many years with the seeds inside, but if you would like to save the seeds for the next year's planting, you may do so. Cut the gourd open to remove the seeds from the inside. You can keep the shell of the old gourd, and you'll have the seeds to create plenty of new gourds as well.

**Notes:** If you're growing ornamental gourds, it is common for growers to train them into interesting shapes and structures. There are two general ways to train the shape of a gourd: bending over time, and by giving it a mold. You can slowly bend parts of a gourd as it grows, if you want a winding snake-like gourd in the end. You can also create a mold for your gourd by placing the small fruit inside a breakable vessel of some sort (like a vase). When the gourd has grown, it will fill the container and match its shape; you simply have to break the mold to remove it when done.

\*The gourd plant should produce both male and female flowers. The female flower will need to be pollinated by the male. Usually, bees or other insects do this. However, sometimes that doesn't happen. You may have to step in and help by manually pollinating them by hand.

## Horseradish

**Description:** Pungent root vegetable that is commonly used to impart a zesty, hot flavor to foods. Horseradish is a hardy perennial. 1-2 horseradish plants will probably be enough for most households. A little goes a long way.

### Growing Instructions

**Optimal Time/Temperature for Germination:** Can be grown in cold climates, full sun, or light shade after last frost. Like carrots or potatoes, horseradish roots are ready to go straight into the ground.

**Optimal Soil Conditions:** Horseradish takes roots quickly and flourishes in cool conditions, and it can quickly spread throughout your garden if you don't check its growth. When watering horseradish, it's only necessary to keep the soil around the roots slightly damp. Don't drown them.

**Seed Planting Depth, Spacing and Procedure:** Use roots that are pre-cut and ready to plant or most gardeners start horseradish from crowns, (the uppermost part of the plant) as the plant grows from the roots. Loosen the soil about 12 inches deep where you decide to plant the horseradish. Make the hole wide enough to accommodate the entire length of the root, as it should be planted at an angle. Space the horseradish 18-20 inches (46- 51 centimeters). Although the crown of the horseradish can produce a new plant, best results will be achieved by replanting the root system.

**Best Companion Plants and Plants that Hinder:** Designate a unique space such as a barrel, hanging planter, or terracing to keep it from overtaking other plants. Unlike more temperamental plants, horseradish doesn't require direct sunlight to thrive, although it will help it grow faster. Avoid planting horseradish near walls or fences or beneath trees that might strangle root growth.

### Crop Maintenance

**Moisture Requirements & Solutions:** Roots are very good at retaining moisture and therefore only require watering once or twice throughout the week. Water horseradish plants more frequently in the hot summer months when the soil tends to be drier. Be careful not to over water horseradish, as this is one of the few conditions that can be harmful to its survival.

**Weeding Needs & Solutions:** As the horseradish grows, it will begin to sprout tall leaves known as "suckers" and various types of weeds. Keep these pruned down to prevent them from spreading. A healthy horseradish plant should have only 3-4 leaf stalks, any more may cause unintended spreading and irregular shaped roots should they be allowed to continue growing.

**Feeding Needs/ Optimal Natural Fertilizers:** Do not fertilize more than once per growing season. Fertilize during the spring with a high-phosphorus, low-nitrogen fertilizer. Fertilizing is optional, as the compost you used to plant the horseradish should provide sufficient nourishment, but can help the roots grow larger. Keep an eye on the progress of developing horseradish plants and use a fertilizer if the plants' growth seems stunted or if soil health is poor.

**Pests, Diseases & Solutions:** The growing season for horseradish is one year from fall to fall. Horseradish weeds can also spread undesirably to other plants. Some weeds take the form of tall, spiked stalks that grow white flowers. This is a common sign that the horseradish has survived the harshest winter weather. The horseradish flea beetle is a serious pest on horseradish foliage. This mix deters many common garden pests. Take a handful of spearmint leaves, two horseradish roots (with tops), and a few scallions. Chop roughly and cover with water. The next day, strain the mix and add a tablespoon of cayenne pepper and two tablespoons of natural-based dish detergent. Spray where needed.

### **Harvest and Storage**

**When to Harvest/Number of days to Maturity:** A cold-hardy vegetable, horseradish reaches its peak in size and flavor after it has been through a frost (Delay fall harvest until late October or early November, or just before the ground freezes). It usually takes around one year for a horseradish plant to reach maturity after its initial planting, so if you first planted the root in fall it should be ready to harvest by the following fall. A harsh frost will often kill off the foliage that grows at the crown of the plant. This is a good way to know when the horseradish is ready to be pulled

**How to Harvest:** Use a shovel or trowel to gently loosen the soil beneath the plant's leaf stalks. Once the root is visible, take hold of it and pull until the entire root system has been removed. Fully-grown horseradish plants will be between 6-10 inches in length, so dig deep to keep from damaging the root. If you know you want to continue growing horseradish, let a few root segments remain in the soil when you harvest.

**Optimal Storage Temperature and Conditions:** Snip away the green leaf stalks on the horseradish crown. These can be thrown away or used as compost.

Cut the horseradish into small, thin sections that can easily be used later for cooking or other purposes. Unused horseradish can be stored in a plastic sandwich bag and will keep in the refrigerator for 3 months or longer. Wash and dry horseradish roots thoroughly before using them to prepare food.

**Seed Saving:** Its weed-like flowers produce seeds. If you decide to replant the harvested horseradish, cut the plant roughly 3-4 inches beneath the crown (around the root's midpoint) and return the root portion to the soil, keeping the crown portion to use in the kitchen. The roots will reestablish themselves on their own, and you can resume regular watering and weeding.

**Notes:** If you don't want the horseradish plant to return after a harvest, you'll need to make sure that all traces of the plant's roots have been removed from the soil, otherwise, they will continue to take up growing.

Younger tender horseradish leaves can be eaten raw or cooked.

Fresh horseradish can be grated, ground or pulsed in a blender and added to recipes for a pungent, spicy flavor. Horseradish pairs well with hearty meats and fish like steak, prime rib, tuna and salmon.

Try using horseradish in food or tea as a medicinal herb to clear clogged sinuses.

## Kale

Kale (*Brassica Oleracea*) is a leafy green vegetable that belongs to the Brassica family, a group of vegetables including cabbage, collards and Brussels sprouts and is one of the most nutritionally dense foods you'll find. Kale is often called a "superfood" because it is packed with nutrients such as calcium, potassium, beta-carotene, and other antioxidants. Kale is a hardy biennial (it flowers on the second year of growth and completes its life-cycle), but it is usually grown as an annual.

### Varieties/Description:

#### 1 Brazilian Kale

Brazilian Kale is small to medium in size, growing on heads averaging 30-45 centimeters in height, and consists of broad, flat, and rounded wide, dark green leaves. The leaves have frilly, serrated edges and prominent white veins span across the center of the leaves. Brazilian kale is crisp and tender with a bitter-sweet, green taste that is reminiscent of the flavor of cabbage.

#### 2 Curly Kale/Scots Kale

Curly Kale or Scots Kale is a common type of kale that you will find in nearly all grocery stores. It has dark green and tightly wound curly leaves and a hard, fibrous stem. This variety of kale tends to have a bright, peppery flavor that can be quite bitter.

#### 3 Lacinato Kale/Dinosaur Kale

Lacinato Kale grows 2 to 3 feet tall and has dark blue-green leaves with an "embossed texture"; its taste is described as "slightly sweeter and more delicate than curly kale. Because of its taste, "slightly bitter and earthy", it has been called "the darling of the culinary world" It is also known as Tuscan kale, Italian kale, dinosaur kale, kale, flat back kale, palm tree kale.

#### 4 White Kale

White Kale is a short compact plant that produces contrasting white midribs within its frilly green leaves. The central leaves of the plant's rosette become completely white when fully mature, giving it a "flower-like" look. White kale is rather strong flavored with a chewy texture. Its taste is reminiscent of cabbage with a robust earthy finish. Once cooked, White kale's texture softens and its flavor becomes sweet and nutty.

#### 5 Red Russian Kale

Red Russian kale grows in a large loose rosette shape that ranges from .3-.5 meters tall. This variety is easily recognized by its richly colored burgundy stems and purple tinted leaves. They are flat and toothed like an oak leaf with an overall dark green color and deep red veins. Red Russian kale offers a mild nutty flavor that is slightly sweet and earthy with a hearty texture.

When choosing Red Russian kale look for fresh, bright, firm leaves.

## 6 Siberian Kale

Siberian kale has hardy white stems that run from the base of the root through the leaves. The leaves of Siberian kale are large and flat with edges that have a ruffled shape. Leaves have a delicate texture and are bluish green in color. This kale variety is exceptionally tender and offers a mild cabbage-like flavor. Their texture is much more delicate and flavor mild when compared to that of the more well-known European (Oleracea) varieties of kale. Similar to carrots and other root vegetables Siberian kale will develop a sweeter flavor as the temperature drops and after exposure to frost

## 7 Chinese Kale/Gai Lan

Chinese kale is a vegetable crop that originated from China. It is also known as Chinese broccoli, Kailan, or Gai-lan. Similar to traditional sprouting broccoli, this oriental vegetable has tender edible stems, leaves, buds and flowers. It is a fast-growing crop that is a great source of antioxidants and vitamin C.

Young leaves, stems and flower head bolts are widely used in Chinese cuisines, usually as a stir-fry dish. It is also cooked in soups, steamed, or eaten as fresh greens. Chinese kale can be slightly bitter, but generally has a sweeter and nuttier taste than common broccoli.

## 8 Redbor Kale

Redbor Kale can be distinguished from other kale varieties simply by its deep red and maroon color. The Redbor kale has frilly, curled leaves that have deep purple stems and veins running throughout. Some plants are entirely magenta, though at times, others may have leaves that are tinged with green.

Growing between 18 to 24 inches in length, the Redbor kale offers a mild cabbage-like flavor and crisp texture. When cooked it becomes tender and nutty with a mild earthy sweetness.

### Sea Kale

Sea kale plants grow large in size and form clumps of spreading leaves, averaging sixty centimeters in height. The silver-grey, deeply lobed leaves grow in a rosette pattern and have fleshy wavy-edged leaves with a velvety texture. Sea kale also bears many small, fragrant, four-petaled white flowers and globular, pea-sized green pods containing one edible, light green seed inside. In addition to the leaves, pods, and flowers, the leafstalks connect to an extensive underground root system that can grow to be firm, starchy, and thick. Sea kale is crisp and chewy with a bitter, green, and slightly nutty taste.

## 9 Baby Kale

Baby kale is simply the term for the delicate leaves of a young, immature kale plant. Almost any kale variety can be harvested at this young stage when the leaves are more mild and tender, though still hardier than most lettuce varieties. Both the petite stems and leaves of Baby kale are edible, with a chewy yet succulent texture and a slightly peppery flavor, similar to arugula.

## 10 Premier Kale

Premier kale leaves are medium green, smooth with scalloped edges. The midribs and stems are white and tender. It is popular among market growers for bunching at 4-5", baby leaf and microgreens.

The tender young leaves can be eaten raw in salads, prepared in soup such as minestrone and ribollita, added with pasta, boiled, sautéed, or baked as kale chips. The broad mature leaves are deribbed and usually blanched first, and then sautéed with other, flavorful ingredients such as anchovies.

## 11 Walking Stick Kale

Walking stick kale is also known as Jersey kale and walking stick cabbage, generally grows to a height of 8 to 10 feet, but it can reach 18 to 20 feet. The tuft of leaves at the top make the plants top heavy, and, if not staked, the stalks tend to bend over, creating a naturally-grown cane handle at the root end. Their dense, fibrous stalks take to sanding and varnishing after they dry, and they make sturdy walking sticks.

Walking Stick Kale leaves have a chewy texture and a very robust cabbage flavor, especially when eaten raw. When blanched in water the flavor slightly mellows, but the fibrous stems remain tough and should be removed.

## 12 Tronchuda Kale /Portuguese Kale

Portuguese Kale has tender, sweet leaves that are increasingly popular in stir-fries and soups. Typically, the kale often grows up to 2 feet tall. Although it is cold hardy like other kale varieties, it is more heat tolerant than other types of kale.

Native to Portugal, this loose-headed member of the cabbage family resembles Swiss chard, with its large, blue-green oval leaves and thick white ribs. In other words, the leaves look like large collard leaves but with many white veins. It is easy to grow and has a milder flavor than other cabbage

## 13 Black Kale

Large palm tree-like fronds are a characteristic of Black kale. They grow from a sturdy central stalk, and are smallest at the top gradually growing in size towards the base.

The crinkly leaves are deeply veined and a dark greenish-purple, almost black color. With a blade-like shape, Black kale leaves are narrower than most other varieties and have a thin tender stem. The chewy texture easily softens when cooked, and offers subtle green cabbage flavor that has a tangy bite with a sweet earthy finish.

## 14 Purple Kale

Purple Kale produces serrated and ruffled vibrant purple leaves that are variegated in shades of dusty green. This attractive vegetable offers a very robust cabbage flavor more intense than that of green or black kale. Its leaves have a chewy semi-crisp texture that softens with cooking, but the fibrous stems remain tough and should be removed.

### **Kale Growing Instructions:**

- Keep your plants well watered. Along with cool temperatures, kale also enjoys moist soil. Keeping the soil moist will also help keep the leaves sweet and crisp.

- 1 Side dressing (fertilizing along the rows) with compost throughout the growing season will help keep your kale producing. You can do this approximately every 6-8 weeks.
- 2 If you're having issues with dirt sticking to and rotting your kale leaves, you can put mulch (such as straw or grass) around the kale once it is at least six inches high.



### **Optimal Time/Temperature for Germination:**

If you're planting during the cool season, find a spot where your kale will receive full sunshine.

If you are planting during the warm season, or in a warmer climate, plant kale in partial shade. Seeds will germinate in cool soil, but they sprout best when the soil temperature is around 70 degrees. If you're starting them inside, then do so 5-7 weeks before the last expected frost. If you're direct sowing the seeds outside, do so 2-4 weeks before the last frost and/or anytime at least 10 weeks before the first frost of the next season. No matter when you plant, the soil temperature must be at least 40 degrees or higher for good germination.

Outdoors/direct sow: You can directly sow seeds in the garden starting 2 to 4 weeks before the last frost date or as soon as the ground can be worked in the springtime.

Indoors: Sow seeds in small pots filled with a mix of soil. Place the seed at least ½ inch deep. Keep the soil around the seedling evenly moist throughout its growth, but allow the top layer of soil to dry between watering.

\*If you are planting from starts (that you started 4-6 weeks ago or purchased), put them in the ground 1-2 weeks before the last expected frost date. But only do this if the starts are big enough to survive the weather (they will have at least four true leaves\*\*and the next two leaves will be beginning to form. The plant will usually be approximately 3-4 inches high by this point.)

### **Optimal Soil Conditions:**

Kale likes average fertility soil to grow fast and produce tender leaves. Enrich the soil with compost and amendments such as blood meal, cottonseed meal, or composted manure into the ground before planting.

### **Seed Planting Depth, Spacing and Procedure:**

Kale prefers loamy, well-drained, moist (but not soggy) soil of average fertility. Surprisingly, it isn't a fan of soil that is too rich in nitrogen, so it will do best with a pH between 5.5 to 6.8. If your soil is too acid, try adding some wood ash to sweeten it.

Light, sandy soils and very heavy clay soils will "negatively"\* affect the flavor of kale, but it still has the potential to grow in these environments.

Plant seedlings 12 to 15 inches apart in rows 18 inches to 24 inches apart. The space for direct sowing is much closer. If direct sowing your kale seeds, plant them ½ inch deep and approximately 3 inches apart and then thin plants to 12 inches apart when they are 4 to 5 inches tall.

No matter the shape of the stem, set (plant) the transplants perpendicular to the ground so they will grow straight up, and place them deep enough to support the plant, but no further than the base of their first leaves. We often plant kale 12 to 15 inches apart and then stagger the rows or plant on a diagonal so we can shrink the space between rows.

Experiment with what works best in your garden.

**Best Companion Plants and Plants that Hinder:** Kale enjoys companion plants such as beets, celery, herbs, onions and potatoes, but does not enjoy being planted near beans, strawberries or tomatoes.

## **Crop Maintenance**

**Moisture Requirements & Solutions:** Kale likes a nice even supply of water, about 1 to 1.5 inches per week

**Weeding Needs & Solutions:** Mulching around and between plants helps keep weeds down and keeps water from splashing mud/dirt up on leaves. Leaf, straw or grass are good choices for mulches.

**Feeding Needs/Optimal Natural Fertilizers:** Use seasoned, well-rotted compost for soil amendments.

**Pests, Diseases & Solutions:** Clubroot disease...Keep ph level between 6.5 to 6.8.

Watch for outbreaks of grey-green cabbage aphids, which often gather in cluster within the folds of frilly kale leaves. Treat small problems with insecticidal soap. Pick off and discard badly infested leaves. Cutworms, cabbage loopers and cabbage worms enjoy munching on kale, but kale is relatively good at resisting disease. Giving your plants the nutrients they need and picking off any withered leaves will help reduce insects found in your garden.

## **Harvest and Storage**

### **When to Harvest/Number of days to maturity:**

Kale is usually ready for harvest 70-95 days from seed and 55-75 days from transplanting, depending on the variety you are planting. Check the seed packet for specific times.

3 You can begin to cut individual leaves off the kale when the plant is approximately 8 to 10 inches high, starting with the outside leaves first.

4 If you decide to harvest the entire plant, cut the stock two inches above the soil and the plant will sprout new leaves in 1 to 2 weeks.

– Make sure to harvest kale leaves before they become too old and tough. If you can't eat the kale leaves fast enough and they begin to turn brown, pull the old leaves off, and compost them, to free the plants of insect attractants and unnecessary energy drains.

5 You can also pick kale regularly and store it in the fridge for up to a week. If you choose to do so, keep it lightly moist and place it in a bag, but unsealed, in the crisper

- Kale leaves are sweetest in the fall, after they've been touched by a light frost, but can be picked anytime before frost as stated above. Pick the oldest leaves from the lowest section of the plants, discarding those leaves that appear yellowed or ragged. Pick your way up the stalk, taking as many leaves as you like, as long as you leave at least 4 leaves intact at the plants top (or growing crown). Kale will produce new leaves all winter in growing zones 7 to 10 and will bolt in spring (producing yellow flowers)

### **Optimal Storage temperature and conditions:**

1 Kale can be kept by loosely packing a plastic bag (without sealing the bag) and refrigerate up to a week.

2 Wash leaves and remove tough ribs, thoroughly dry. Cut leaves in a usable size for you. (I cut across leaves about 2 inch wide) Pack into vacuums sealer bags to freeze. Should be used within 3-6 months. For longer freezer storage you must blanch the leaves before freezing.

3 May be freeze dried or dehydrated for shelf storage.

**Seed Saving:** Kale is a biennial, though mostly grown as annual. The plant must winter over and flower the second season to get seeds. Choose healthy robust plants to winter over. Only one variety at a time to avoid cross pollination. Leave the plant alone as it grows taller (bolts), you can enjoy eating some of the leaves as it grows. It will flower and as the flowers fade it will begin setting seed pods. The plant will become even larger and may flop over without support. When half or more of the seeds pods appear brown and crispy, it's time to chop down the stalks and harvest the seeds. Waiting for all of the seed pods to dry up will run the risk of some pods breaking open and spilling seeds where you may not want them. Shake branches over large container, let seeds and chaff fall. Separate seeds from chaff and dispose of chaff. Seeds will be viable for many seasons.

Notes:

*\*\*When any seed first emerges from the soil it has a set of two leaves called cotyledons. These are part of the seed and are its first food source. As the seedling grows, it forms two more leaves which look very different from the cotyledons. These are the first "true leaves" which look more like the plant's adult leaves, but obviously smaller. Once the true leaves emerge, the cotyledons become unnecessary and eventually wither and fall off.*

## Kohlrabi

### Description:

Kohlrabi is a brassica, in the cabbage family. Popular in Germany and India, the kohlrabi is a crisp and versatile vegetable. This hardy biennial is often grown as an annual. It is easy to grow in mild climates, making it a unique and delicious addition to any garden. Increasingly popular, kohlrabi is also available in different varieties, all easy to grow, with slight variations in look and time to maturity. The biggest difference is whether or not you pick a green or purple variety.

### Varieties:

Green kohlrabi varieties include the Korridor and the Winner, which mature quickly, in about 50 days, compared to about 60 for some other varieties. Bright lime-green in color, they make an attractive addition to a garden bed.

Purple kohlrabi varieties like the Azur Star and Kolibri are particularly bug-resistant, because of the purple leaves on the plant, which keep the insects away. Taste-wise, you won't notice much difference.

Storage varieties like Kossak, Superschmelz, and Gigante are, as you might guess, much larger than the regular varieties of kohlrabi. They'll last longer in the cellar or the fridge, prepared correctly. Taste-wise, these varieties are all very similar.

### Growing Instructions

**Optimal Time/Temperature for Germination:** Kohlrabi should be planted in full sun, close to other roots, like potatoes, beets, onions. Kohlrabi are big drinkers and feeders, which means they'll need a good amount of water and fertile well draining soil. Kohlrabi is a hardy grower that should be planted about a month before the last frost in spring. Ideally, you want the plant to mature before the temperature gets much over 75 F, which means you'll want to plant it early, among your earliest sows, probably, in an area with a very hot summer. Kohlrabi will mature in 50-60 days. Seeds will germinate in 3-10 days.

If you live in a place with warm winters, it's also common to plant kohlrabi in late autumn to harvest in early winter. The plant should be able to withstand autumn frosts.

If winter's running long, you can start kohlrabi in pots indoors then plant them after they have hardened and move the plants outside about a month before the last frost.

### **Optimal Soil Conditions:**

Fertile well draining soil. Kohlrabi should be planted in well-tilled soil enriched with compost. It's hardy in most conditions, though it excels in soil with a pH between 5.5 and 6.8.

### **Seed Planting Depth, Spacing and Procedure:**

Plant Kohlrabi in straight rows. Kohlrabi seeds should be sowed in moist soil about a 1/2 inch (1.3 cm) deep and an inch apart, a single seed in each hole. Use your finger to make a small indent in the ground, then cover the seeds loosely with soil. Leave at least an inch between each plant, which you'll thin out later.

Kohlrabi should be planted in rows, which should be spaced about a foot apart to give them room to spread out and mature. Seeds will germinate in 3-10 days.

**Best Companion Plants and Plants that Hinder:** Plant close to other roots, like potatoes, beets, onions. Kohlrabi should be kept in a separate part of the garden from pole beans, tomatoes, and strawberries.

### **Crop Maintenance:**

Thin successful seedlings about 5–8 inches (12.7–20.3 cm) apart. After a couple of weeks, the plants should be about 6 inches (15.2 cm) tall and you can start thinning out the most successful of them to give them room to grow. Carefully dig up the plants and re-space them, so they're about 8 inches (20.3 cm) apart, moving some to other places in the garden if necessary.

The greens of young kohlrabi can be eaten raw, in salads, or can be thrown into stir-frys as any field green. It's a unique and nutrient-rich way of spicing up a meal.

### **Moisture Requirements & Solutions:**

Water deeply and frequently. Kohlrabi need lots of water, and do well in relatively mild or Mediterranean climates. If the soil is dry, under-watered kohlrabi will become woody and unpleasant to

eat. If the split striations on the bulb start to look dry, increase your waterings. When watering, water the soil around the base of each bulb, don't water on top of the plants, which can increase the possibility of rot. This goes for most cabbage.

Kohlrabi are big drinkers and feeders, which means they'll need a good amount of water and fertile soil. Good drainage is also helpful in avoiding rot and blight in your kohlrabi plants, so make sure you've got an area of the garden that doesn't collect water too much.

### **Weeding Needs & Solutions:**

Weed carefully and regularly. When you see your starts coming up, weed around them very carefully, paying special attention to milkweed, thistle, and any other local weeds. Kohlrabi are easily beaten out in the beginning, and have a shallow root structure, since the bulb is above ground. The most critical time for kohlrabi is in the first couple of weeks. Let them flourish, then thin them out.

**Feeding Needs/Optimal Natural Fertilizers:** Mulch plants with compost. Once the plants are 4–5 inches (10–13 cm) tall, you should provide them a bit of structure and to help hold them up and inject some nutrients into the soil. This can support nitrogen. Pack some compost around the base of kohlrabi. It will be the big difference between healthy-looking big bulbs and woody inedibles.

**Pests, Diseases & Solutions:** Keep an eye out for rot, as well. “Cabbage yellows” is easy to recognize, due to the yellowish- brownish color the leaves will take on. Remove infected plants entirely.

Watch closely for cutworms. Kohlrabi and other cabbages are susceptible to cutworms, making it important that you stay on top of these pests as your plants mature. You'll notice holes in the leaves and egg clusters on the underside of the leaves. If you find this, move swiftly. Wash leaves with egg clusters on them thoroughly, removing the eggs as you find them. It's common to “collar” the leaf stems of the kohlrabi by tying them up to get the leaves off the ground. This can help to keep the infestation at bay. You can use *Bacillus thuringiensis* (or Bt) if you've got a serious problem.

Kohlrabi is susceptible to pests such as flea beetles. It is easy to deter these beetles by covering kohlrabi plants with a thin row cover.

### **When to Harvest/Number of days to maturity:**

Kohlrabi is usually ready to be harvested after about 45-60 days. The length of time that it takes to grow depends on growing conditions and which variety you are growing.

### **How to Harvest:**

Harvest Kohlrabi by pulling up the entire plant. Kohlrabi is usually ready to be harvested after about 45-60 days. The stem should be about 2–3 inches (5.1–7.6 cm) in diameter, and the bulbs will be big and healthy-looking. The bulbs of different varieties will grow to different sizes, so you'll partially be using your judgment. If you let them go too long, kohlrabi will become slightly woody and unpleasant.

**Optimal Storage temperature and conditions:** Store in refrigerator. Can be stored for several weeks.

**Optimal Preserving Procedures:** Slice to desired thickness, about 1/2 inch, blanch in boiling water drain and let dry. Spread slices in single layer on parchment lined baking sheet or silicone sheet pan and Freeze. Transfer frozen slices into airtight container or vacuum seal and store in freezer.

### **Seed Saving:**

Kohlrabi belongs to the *Brassica oleracea* species, which includes many other crop types, like broccoli, Brussels sprouts, and cauliflower. Because of this, isolation needs to be managed thoughtfully, but because most are biennials that will not flower until their second season, a gardener can grow multiple varieties for eating while simultaneously growing one variety for seed saving.

**VERNALIZATION:** Vernalization can happen in the field or in storage. Overwinter cabbage in the garden if you will have 10-12 weeks of cool weather (around 50 degrees F) without regular temperatures below 35 degrees F.

When plants cannot be successfully overwintered in the garden, they can be vernalized in storage. Before the first frost, dig up the entire plant, roots and all. Trim off outer leaves but keep the growing point intact. Replant these trimmed plants in containers filled with slightly moist potting mix or sand. Then, find a place to store your plants. The optimum storage conditions for kohlrabi vernalization ranges from 34-39 degrees F and 80-95% relative humidity. A traditional root cellar is ideal but garages, sheds, and other unheated structures work well in some climates.

In the spring, when the soil can be worked, replant kohlrabi in your garden. Space plants at least 36 inches apart.

**ASSESSING SEED MATURITY:** After flowering in their second year of growth, mature seed pods become dry and turn brown as the seeds inside also mature and brown. As with many of the Brassica crops, the window of time for an optimal harvest may be short as mature pods will begin to shatter and bird predation can become a problem.

**HARVESTING SEED:** Seeds can be gathered by cutting entire branches or by harvesting whole plants. Because of this species' tendency to shatter, the harvested material should be placed on drop cloths or in containers to prevent seed loss. Branches of mature fruits can be threshed by rubbing the pods between one's hands or by hitting the brittle pods against any surface that will cause fruits to break open. If the pods are dry, they will release their seeds easily when threshed.

**SEED STORAGE:** Store kohlrabi seeds in a cool, dark, and dry place in an airtight container to keep out moisture and humidity. Properly stored kohlrabi seeds will remain viable for several years.

**Notes:** Enjoy Kohlrabi raw or cooked Kohlrabi have a crisp texture and a mild flavor that makes them a versatile and nutrient-rich food for your table. It's like a cross between a cabbage and an apple, sweet and savory at the same time. Roast it up with other root vegetables, bake and mash kohlrabi, or serve it in a mixed vegetable sauté.

Kohlrabi is eaten in Germany as a bar snack, dressed with salt, cut into slices, and served raw. It's maybe the best possible way to eat this crunchy vegetable, served with a mug of beer.

## Lettuce – Head, Leaf, Arugula

**Description:** Annual or biennial from the family Asteraceae and is a self-pollinating plant grown for its leaves which are used as salad greens, sandwiches, and wraps. The plants can vary greatly in size, shape and leaf type but generally, the leaves of the plant form a dense head or loose rosette.

Arugula, Belgian Endive, Butterhead, Dandelion, Frisee, Lamb's lettuce, Oak Leaf, Purslane, Romaine, Tatsoi, Bok Choi, Rodicchio are just some of the varieties to grow. (oftentimes commercially produced lettuce receives many pesticide and fungicide sprays, but you'll find that no spraying is required in your home garden.)

### Growing Instructions

**Optimal Time/Temperature for Germination:** Lettuce is a cool-weather vegetable, which means that it thrives when the temperature is cooler. You can begin planting lettuce seeds when the temperature reaches 35 degrees Fahrenheit (1.7 degrees Celsius). The seedlings can tolerate a light frost, but if the temperature falls below 26 degrees Fahrenheit (-3.3 degrees Celsius), you should cover the plants so they won't die. Growing range Zones 2-11 Spring and fall planting are better seasons.

**Optimal Soil Conditions:** Ensure that the soil has a pH balance between 6.0 and 6.8. The ground needs to be well-drained and full of nutrient-rich soil that is full of compost or aged manure. Lettuce plants do well in steady amounts of nitrogen, so apply blood meal or compost tea to the soil before adding the seeds.

If you are unsure what your soil's pH is, you can purchase a soil testing kit from your local garden supply store. You will need to scoop up soil, place it in the provided container, and add a specific number of drops of the testing chemical. Shake the container for a certain amount of time, and compare the results with the test's color-coded chart.

You can also contact a local university's extension office to get your soil tested at its facility. This typically is a fee-based service, but you may receive more in-depth results.

**Seed Planting Depth, Spacing and Procedure:** Lettuce plants have a short root system, so you don't need to dig a deep trench. Insert the seeds .25 to 1 inch (.6 to 2.5 cm) deep. Cover the seeds with .5 inch (1.3 cm) of soil. Place an additional 3-4 inches (7.6 to 10.2 cm) of organic compost or mulch. This will keep the seeds moist and prevent weeds from forming. If you are planting several varieties of lettuce in your garden, make sure you plant the varieties a minimum of 12 feet (3.66 m) apart to prevent cross-pollination. If you want a steady crop of lettuce, plant new lettuce seeds every 10 to 14 days. You can continue to grow and plant seeds until heavy frost occurs.



**Best Companion Plants and Plants that Hinder:** This vegetable plant can act as a cover for radish. It helps it conserve soil nutrients and moisture. Marigold is found in most gardens because of its pest repelling attribute. It is a low-maintenance flower and won't need to be monitored frequently.

Anything from Brassica family (cabbage, broccoli, brussels sprouts, cauliflower) should be planted in another area. Their roots secrete a hindrance to lettuce's growth and seed germination.

### **Crop Maintenance**

Thinning is simply removing certain seedlings to allow your plants to spread out. Leaf lettuce seedlings should be 4 inches (10.2 cm) apart while heads of lettuce should be 6 to 8 inches (15.2 to 20.3 cm) apart.

If you're growing organic lettuce heads, such as iceberg, aim for 12 to 14 inches (30.5 to 35.6 cm) apart. Single-leaf lettuce plants should be 4 inches (10.2 cm) apart.

**Moisture Requirements & Solutions:** Make sure you keep the lettuce plants watered. If the plants become too dry, the lettuce becomes bitter to the taste.

**Weeding Needs & Solutions:** Regular weeding can be done as part of the thinning and harvesting process.

**Feeding Needs/ Optimal Natural Fertilizers:** Can feed with compost or manure to soil. Use a fertilizer that's high in nitrogen starting around three weeks after planting.

**Pests, Diseases & Solutions:** Lettuce is prone to a rabbits as well as few insects, including slugs, aphids, and cabbage worms. You need to reapply the sprays after each watering or rainfall. For rabbits, mix 2 tablespoon (29.6 ml). of cayenne pepper, 2 tablespoon (29.6 ml). of garlic powder, 1 tsp. of liquid detergent, and 20 oz. of warm water. Shake the mixture, and let it sit outside for 1 day. Spray the mixture to the lettuce leaves. Plastic toy snakes or pieces of old garden hose laid around the garden will scare rabbits.

You can use traps for slugs and purchase ladybugs to eat the aphids. Slug traps can be made by filling a small bowl with stale beer; the slugs are attracted to the beer and drown. A mixture of 1 teaspoon of yeast, 2 teaspoons of flour and 2 cups of water will also work to drown slugs. For cabbage worms, you can apply a spray that is 1 part vinegar to 3 parts water. Add 1 tablespoon (14.8 ml). of liquid detergent, and place all ingredients in a spray bottle. Spray the leaves all over to get rid of the worms.

### **Harvest and Storage**

#### **When to Harvest/Number of days to Maturity:**

It may take as long as 80 days after planting to harvest. Begin when the outer leaves are about 6 inches (15.2 cm) long. This ensures that the plant will survive after the leaves are removed. You can use your hands to tear off the leaves anywhere on the stalk once the leaves are long enough.

Continue to harvest lettuce leaves until you are left with a center stalk. It may take as long as 80 days after planting to harvest.

**How to Harvest:** You can use your hands to tear off the leaves anywhere on the stalk once the leaves are long enough. Continue to harvest lettuce leaves until you are left with a center stalk. It may take as long as 80 days after planting to harvest.

If you're harvesting heads of lettuce, cut the head 1 inch (2.5 cm) away from the soil. A new head will form in its place.

**Optimal Storage Temperature and Conditions:** Lettuce should be stored at a temperature of 41°F (5°C) or less and be free of evidence of previous temperature abuse. (may be wrapped to protect it from other refrigerator odors and dehydration. It should be loosely wrapped in plastic film or placed in a perforated bag.)

**Seed Saving:** Make sure the seed is completely dry, or it will rot or mold in storage. Remove as much of the chaff as possible. Store in a paper envelope, labeled with the variety and year. Place the envelopes into an airtight container, such as a canning jar. Store in a cool, dark, dry place.

**Notes:** If you're limited in space or don't have access to a garden, you can plant your lettuce seeds in a hanging basket or in containers and align them along your windowsill.

You can begin to grow your lettuce seeds inside if the weather is too unpredictable or if it's more convenient. Place the seeds at the same depth you would in a garden, but place them in some potting soil within a container. Transfer to garden when the lettuce have 4 leaves.

Lettuce is commonly grown from seeds. But it also can be regrown from scraps. This won't provide as large of a harvest as your initial planting, but it is an inexpensive and easy way to get more lettuce.

To do this, cut off the bottom of the lettuce, leaving only about an inch of leaves on the base. Put the base in a shallow dish of water by a sunny window. Change the water every couple of days. You should see some root and leaf growth in about a week. Harvest the leaves in two weeks. At this point, they'll likely be as large as they will grow and will only degrade from there.

### **Growing Lettuce Hydroponically:**

If you get these basics down, you can have home-grown lettuce all through the year. Tom Thumb is a good option if you're trying to take up a little less room, Bibb lettuce is a little bit of an easier variety to grow, and Romaine works well but takes a bit more time. Consider the slightly different requirements and tendencies that your particular type has.

There are many different kinds of hydroponic systems that you can grow plants in, including drip systems, NFT systems, ebb-flow systems, aeroponic systems, and many more. Water culture systems, in which plants float directly on top of water while their roots grow down and absorb nutrients, are the most effective and simplistic.

You have a lot of different media options to choose from, including: rockwool, coco fiber, vermiculite, pine shavings, river rock, sand, and many more. All of these options have positive and negative aspects, but picking any one of them will allow you to grow lettuce without a problem.

Rockwool is the most popular medium choice and is both sterile and porous. If you go with rockwool, be careful to keep it from becoming too saturated. This can lead to root suffocation, stem rot, and root rot.

Grow rock is another popular option that has a neutral pH and holds moisture well. This medium is reusable if cleaned thoroughly, which can be beneficial for growing hydroponically in your home, but might be tedious on a larger scale.

Purchase a large storage container or fish tank to use as a nutrient reservoir for your lettuce. Choose a container with a large surface area, but also make sure it's at least 8 inches (20 cm) deep so that the plant roots can grow downward without trouble.

### **Growing Lettuce Hydroponically Continued**

Do not use a metal container as your nutrient reservoir. Metals can corrode or oxidize, releasing chemicals that can disrupt the supply of nutrients to your plant.

Prepare net pots and floating platforms. There are several different materials, such as a Styrofoam or the lid of your reservoir container, that you can use to set up a stable way for your plants to sit above the water with their roots submerged. Drill holes into polystyrene planks that are about twelve inches apart. Drill as many holes and get as many net pots as will accommodate each seedling that you have.

You'll need to have a system in place that creates air bubbles or recirculates the water in your reservoir so that the plant roots don't suffocate. Keeping an aquarium pump in your reservoir will prevent this issue.

Buy nutrient combinations at gardening stores that are specifically for growing hydroponic plants.

Lettuce typically requires high levels of potassium, calcium, and magnesium. Follow the nutrient kit directions for mixing the nutrients with water and put the mixture in your container. Some lettuce types are more sensitive to nitrogen than others, so make sure that the nutrients that you purchase are for the right kind of lettuce.

Before putting your hydroponic system to use, you'll need to use an egg carton or plugs, which are small cells, to create a stable initial environment for your plants. Fill your plugs with your medium of choice and with your hydroponic seeds.

In order to get your lettuce started, water your nursery every other day and keep it in a well-lit or naturally sunny area where it is between 65° and 80° Fahrenheit (18.3-26.6° Celsius). Grow these until the seedlings are 2 inches (5 cm) tall and have about 4 leaves.

Carefully, without tugging, take your individual seedlings from their cells to the net pots. Align each net pot with the holes you drilled into the floating platform or lid of the container, and then place them in your reservoir.

Unlike other plants, lettuce neither requires a long duration nor an intense amount of exposure to light in order to grow. You have other options, but fluorescent lighting is the best because it requires a low initial investment, consumes a small amount of power, and produces a low amount of heat. Give the plants 10-14 hours lighting per day.

Keep the temperature around 55° Fahrenheit (12.7° Celsius) at night and around 75° Fahrenheit (23.8° Celsius) during the day. If the lettuce gets too hot it will bolt, or flower, which isn't good because this will create a bitter taste in the lettuce leaves.

Test the pH with an inexpensive paper strip test and make sure it's slightly acidic to almost neutral for the best possible production.

Purchase both up and down pH adjusters that, when added to your reservoir, will be able to bring the pH back to the correct level.

After 5-6 weeks, your lettuce should be fully grown and ready to pick and eat! To make sure that your lettuce plants continue to produce large amounts of healthy lettuce, pick the outer leaves and leave some of the inner ones attached to the plant. It won't take much time for those inner leaves to replace the ones you picked.

### **Growing Lettuce Hydroponically Continued**

Avoid picking all of the leaves from each plant at once. Pick leaves from one plant one day and another plant a few days later. This will allow you to enjoy the right amount of lettuce at a time, instead of going through periods of not enough production or too much production. If the lettuce is fully grown and you don't want to eat it right away, keep the plants rooted and store them in a humid, nearly freezing environment to ensure freshness for up to a month.

Hydroponic gardens should be well ventilated to help your plants get the CO<sub>2</sub> they need and prevent the growth of molds and bacteria. Leave a door or window open near the plants, or consider installing a vent with an exhaust fan if you are growing your lettuce in an enclosed space. Place your hydroponic garden under a ceiling fan, or set up an oscillating floor fan nearby and set it on low.

Make sure any nearby windows are covered with a fine-mesh insect screen. Check the screen for holes and tears. Any vents should also be screened.

Algae tend to flourish in the damp conditions of a hydroponic garden. However, algae cannot grow without direct sunlight. If your lettuce is exposed to direct sun during the day, put a shade over the plants.

If you are having issues with water-borne molds and other diseases, sanitize your equipment with a 2% bleach solution or a commercial sanitizer such as GreenShield. Sterilize all pots, reservoirs, tanks, and any other equipment that contains or supplies water that will come into contact with the plants. Replace any contaminated growing media.

If you follow the instructions, your lettuce will be free of pesticides. Check the water level daily; your lettuce will not grow if the roots are not getting water.

If you want to grow your hydroponic lettuce in a hanging basket or window box, be sure to choose a lightweight growing medium, such as vermiculite, so that the container doesn't get too heavy.

## Malabar Spinach



### Description:

Malabar spinach is a member of the Basellaceae family. This plant isn't a true spinach, but its foliage does indeed resemble that green leafy vegetable. Also known as Ceylon spinach, climbing spinach, gui, acelga trapadora, bratana, libato, vine spinach, and Malabar nightshade. *Basella alba* is a green leaf variety while the red leaf variety belongs to the *B. rubra* species, which has purplish stems. The leaves of Malabar are in dark green and have a shape of the heart. The appearance of the leaves is slightly glossy.

### Growing Instructions

#### Optimal Time/Temperature for Germination:

This is a vine type of plant that thrives in hot temps, even exceeding 90 F. (32 C.) Cool temperatures cause Malabar spinach to creep. It is grown as an annual, but grows like a perennial in regions that are frost free. Malabar spinach is planted in the spring and harvested through the fall.

Scarify the seed with a file, sandpaper or even a knife to speed germination, which will take three weeks or longer at temperatures between 65-75 F. (18-24 C.). Direct sow Malabar spinach seeds in grow zone 7 or warmer, two to three weeks after the last frost date. If you live in a chillier zone, start the seeds indoors at about six weeks before the last frost. Wait to transplant until the soil has warmed and there is no chance of frost. Transplant the seedlings spaced about a foot apart.

#### Optimal Soil Conditions:

Malabar spinach will grow well in a variety of soil conditions but prefers a moist fertile soil with plenty of organic matter and a soil pH of between 6.5 and 6.8. Malabar spinach plants can be grown in part shade, which increases the leaf size, but it much prefers hot, humid and full sun exposures. Malabar

spinach also needs constant moisture to prevent the blossoming, which will turn the leaves bitter ideally an area with a warm, rainy climate for optimal Malabar spinach care and growth.

#### Seed Planting Depth, Spacing and Procedure:

To grow from seed, plant ¼" deep and 12" apart when soil temperatures reach 65°F – 85°F. Be sure to keep the area well-watered to allow roots to form.

Cuttings call also be rooted in water and then planted. To grow from cuttings, trim the cutting to about 6" and cut it just below a node. Pot the vine in a growing medium or potting soil, and allow it to root. Alternatively, plant directly in the desired area where it will re-root.

**Best Companion Plants and Plants that Hinder:**

Reduce the risk of fungal problems by growing cherry and currant tomato varieties over the summer months. Try combining the vine spinach with dark-leaved basil or beets, Swiss chard with pink or red petioles, and blue-leaved kale for a dramatic edible planting. The red-stemmed type is complemented by annuals with red or pink flowers or foliage, such as coleus, zinnias, or cosmos.

**Crop Maintenance**

Malabar spinach can be treated as a ground cover or vine trellised. Two plants are sufficient for most families through the summer and fall growing season. It can even be grown up the same trellis as peas, truly utilizing the garden space. Grown as an ornamental edible, the vines can be trained to climb over doorways, archways, or a ladder. In warm areas, vines often reach 10 to 20 feet or longer. To prune Malabar spinach, simply cut the thick, fleshy leaves while retaining some stem.

**Moisture Requirements & Solutions:**

Malabar spinach is a tropical plant and needs consistent moisture throughout the growing season. It would benefit from drip irrigation. For best flavor keep soil evenly moist. In the warmest areas of the low desert, it may need water every day. Malabar spinach will go to flower and set seed (which can make it bitter) if it doesn't receive enough moisture.

**Weeding Needs & Solutions:**

Give enough amount of compost and aged manure to the plant so that it receives proper nutrition and weeds to stay pulled near plant bases.

**Feeding Needs/Optimal Natural Fertilizers:**

Fertilizers that are high in nitrogen help the leaves to grow healthy. Try fertilizing your plants with neem seed meal, oyster shell flour or crab meal which will strengthen their resistance to nematodes.

**Pests, Diseases & Solutions:**

When watering Malabar spinach plants, remember to water from below and not from above. Watering from above will keep the leaves wet and encourage the spread of fungal diseases. Malabar spinach is usually resistant to most garden pests, which is why it's regarded as a very low maintenance plant. However, one common pest that tends to attack it is the root-knot nematode. Root-knot nematodes can stunt the plant's growth and vigor, also causing leaf chlorosis, which is the yellowing of leaves and stem. If you notice your plant suffering from these symptoms, check the soil to see if the roots are swelling since the problem could most likely be nematodes. There are many different types of organic nematicides that can kill the harmful nematodes attacking your plant, but they can also kill the beneficial nematodes.

A common disease that attacks Malabar spinach is fungal leaf spots found on spinach, beets or Swiss chard. If you notice oval or circular grey spots with darkish brown or purple rings appearing on the leaves, it could be due to this pathogen. Remove the leaves immediately and don't cook or eat any leaves with the spots. Do not compost the leaves as well since the pathogen will survive in the soil and can do so for up to two years. To get rid of it, you might want to use an organic fungicide.

## **Harvest and Storage**

### **When & How to Harvest/Number of days to maturity:**

Harvest the leaves at any point during the growing season once the vines have at least 8-10 leaves. Cut leaves from the outside first, being sure to leave at least 6 leaves to allow the plant to grow. For longer vines, allow individual Malabar spinach vines to get longer before harvesting. To encourage branching and a bushier plant, cut back stems earlier. It could take 40 to 50 days to your harvest. Always clip the leaves as per your kitchen requirements. Continuously harvest the plant as per your kitchen needs.

### **Seed Saving:**

At the end of the season, Malabar spinach sets flowers, and those flowers turn into deep purple berries (drupes) with seeds inside. Dry the berries whole and plant the seeds the following year. Malabar spinach often reseeds itself from dropped berries as well. Allow volunteer seedlings to sprout, and then transplant them where you want the seedlings to grow in your garden.

### **Optimal Storage temperature and conditions:**

Malabar spinach is best enjoyed soon after harvesting, and does not store well.

Once you have a good crop to harvest, using Malabar spinach is just like using regular spinach greens. Delicious cooked, Malabar spinach is not as slimy as some other greens. Found frequently in soups, stir-fries and curries, Malabar spinach holds up better than regular spinach and doesn't wilt as rapidly. Although when cooked it tastes much like spinach, Malabar spinach raw is a revelation of juicy, crisp flavors of citrus and pepper. It is delicious mixed in with other greens in tossed salads. However, you use Malabar spinach, this discovery is a boon for those of us that love our greens, but find the warm days of summer a bit too hot for their taste. Malabar spinach has its place in the kitchen garden, providing cool, crisp greens for the long, hot summer days.

### **Notes:**

The purple flesh of the 'Basella rubra' berry has a vibrant color and can be used to make a rich-colored dye.

Leaves of crushed Malabar spinach are applied locally for treating pimples, boils, snakebites, scalds, wounds, bruised, inflammation, and burning sensation.

Some people have found it to be invasive as it can self sow and grow from stems laying on the ground in warm moist climates with no winter.

## Melons – Muskmelon, Watermelon, Cantaloupe

**Description:** Melons are annuals and belong to the Cucurbitaceae family with different types varying in size, shape, color, texture, and sweetness. Melons requiring similar conditions for planting and growing are watermelon, honeydew, cantaloupe and muskmelon. (grown in summer for harvest by early autumn.)

### Growing Instructions

**Optimal Time/Temperature for Germination:** Pick a spot outdoors where your seedlings will get full sunshine and plenty of warmth during the day. The ground temperature must be above 70 degrees F (21 degrees C) before you begin planting, or else the seeds will not germinate.

If you live in an area with long winters and short summers, it's best to start growing melons indoors until it is warm enough to transfer your seedlings outside. If you plant indoors, place seeds in containers of compost and peat moss. Transplant your seedlings outdoors once the weather is consistently warm.

**Optimal Soil Conditions:** Pick a spot outdoors where your seedlings will get full sunshine and plenty of warmth during the day. The ground temperature MUST be above 70 degrees F (21 degrees C) before you begin planting, or else the seeds will not germinate.

**Seed Planting Depth, Spacing and Procedure:** You'll likely need at least a 4x6 foot (1.2x1.8 m) area to grow your melons, so be sure you've cleared sufficient space for your plant beds by removing any sticks or rocks in the vicinity. Prepare the soil in your plant beds by breaking it up with a shovel or a tiller.

In most temperate locations, you should begin planting in sometime between late May and early June. You must wait until after the last expected frost of spring and allow the wet soil to dry before planting seeds.

Each mound should be approximately 1 foot (0.30 m) (30 cm) high, and between 2–3 feet (0.61–0.91 m) (60-90 cm) wide. Leave about 1–2 feet (0.3–0.6 m) (30-60 cm) of space between each mound, and space rows about 4 feet (1 m) (120 cm) apart to ensure your melon vines have plenty of space to grow. Your seeds should be planted between 4-6 inches (10-15 cm) below the surface of your dirt mounds. If you are planting seedlings that you started growing indoors, or if you purchased seedlings from a nursery, plant 2-3 seedlings per mound. Saturate the area with water when you are finished planting.

Especially if you live in a cooler climate, covering the area where you are planting melons with plastic mulch or black landscaping fabric will help preserve the heat in the soil and keep your seedlings warm. You can also cover your plant rows with floating row covers to preserve heat while protecting your seedlings from pests.



**Best Companion Plants and Plants that Hinder:** Because other members of the Cucurbitae family are all attacked by cucumber beetles, planting watermelons next to these crops are not recommended nearby: cucumbers, summer squash/zucchini, pumpkins winter squash. Potatoes can attract melon aphids so avoid also. Tomatoes and peppers can lead to space issues. Aster, sunflower family, and roses attract the highest number of aphids. Lavender and borage are good companion plants for melons because of their continuous or intermittent blooming.

### **Crop Maintenance**

**Moisture Requirements & Solutions:** Your melon plants need at least 1-2 inches (2.5-5.1cm) of water per week, so make sure you water them more often if the weather is very hot and dry. Keep the mounds well watered to the roots. Be careful not to over water your plants, as this can cause your melons to rot. If water is standing on top of the soil, add some mulch around the melon plants to help absorb it. Water your plants less frequently as your melons begin to ripen, as this will allow your fruit to develop more flavor and sweetness.

**Weeding Needs & Solutions:** Plastic mulches are widely used for heat-loving melons.

**Feeding Needs/ Optimal Natural Fertilizers:** Soil pH 6.0 to 6.8, ensures sufficient calcium levels in your garden. Once correct, fertilize your plant beds using compost or a natural fertilizer so melons are planted in a nutrient-dense environment. You can also make your own compost tea to use. Composted manure (or other compost) is also great for them.

**Pests, Diseases & Solutions:** There are many different aphid species. The one that attacks watermelon is the melon or cotton aphid. The following plants can either deter the aphids or can serve as trap plants to distract the aphids from attacking the watermelon plant garlic, catnip, dill, mint, nasturtiums. Both spotted and striped cucumber beetles harm watermelons so plant corn, broccoli, radish, marigolds, and tansies.

### **Harvest and Storage**

**When to Harvest/Number of days to Maturity:** You'll know your melons are ready for harvest when you can smell the melon through the skin. If your melons aren't ripe yet, you can keep them unrefrigerated for up to 2 days. Leave melons uncovered on a counter or tabletop. Alternatively, keep melons in a closed paper bag to accelerate the ripening process. Signs of an unripe melon may include shiny skin, pale coloring, and a light mass.

**How to Harvest:** Once they've been picked from the vine, melons will get softer, but not sweeter.

**Optimal Storage Temperature and Conditions:** If you don't eat your melons shortly after harvest, they can be stored in the refrigerator for up to 12-15 days.

Melons need both moisture and cold to stay fresh, which can be difficult to achieve. The best approach is to refrigerate whole melons in perforated bags to keep them moist without letting them dry out. Buy perforated plastic bags or make one by poking about 20 small holes in an ordinary bag with a pen or hole punch. Melons may sustain chilling injury if they are kept at a temperature under 50 °F (10 °C). This will likely result in browning of their rinds, loss of sweetness, dryness, and fast deterioration. Check the temperature setting in your refrigerator to ensure that it is higher than 50 °F (10 °C).

If the melon was cut in pieces, keep it in the fridge for no more than 3 days before discarding it. If you can't use ripe melons before they go bad, freeze them to add to cocktails or frozen drinks in the future. Use a melon baller to make round melon balls, or cut melon pieces into cubes for storage. Melon pieces can be kept for up to 12 months in the freezer. Store melon pieces in freezer bags or airtight plastic containers. Note that the flavor and texture of melon may deteriorate after freezing. Mark the date on the bag or container when you freeze it to remember when you have to discard the melon.

**Seed Saving:** Don't plant seed from right from the fruit. You have to wash the seeds with soap to remove the sugary contents, dry on a paper for a week then you can plant.

**Notes:** Try an alternative melon growing method, such as planting them next to a tall, sturdy trellis. When the plants start to vine, wrap them around the trellis. When melons grown on the vines, they won't be lying directly on the ground.

Bacteria can begin to grow on cut melon if it is not refrigerated. This may lead to spoilage and food poisoning. Be sure to throw out any melon left out at room temperature for more than 2 hours instead of storing it.

If you're not sure how long the melon has been left out for, it's better to be on the safe side and toss it in the trash. Wash melon before cutting or eating it by running it under water and scrubbing it with a clean vegetable brush. Do not use soap.

Always cut melon with a clean knife on a clean cutting board to prevent the spread of bacteria.

## Mushrooms

**Description:** Plants that lack chlorophyll and get its nutrients from organic matter like trees, leaves, dead wood, and waste. "They are nature's decomposers, organisms that recycle all the dead animals and plants that accumulate during the course of a normal life and death cycle. Without mushrooms, and other fungi, the earth would be awash in plant and animal debris. Our soils would not be replenished with fresh humus and our forests would be piled high with leaves, branches, and fallen logs," from Reishi Mushrooms by Terry Willard.

Examples of produce part of stores are Cepe, Chanterelle, Button, Morel, Porcini. Medicinal orientals are Enoki, Oyster, Reishi, Shiitake, Tree ear.

Most hobbyists start out with Oyster, the easiest type to grow, but once you learn the tools of the trade you can try your hand at dozens of species.

**Growing Instructions** To get started, buy them online, in a home gardening store, or in a home brew supply store in the form of "spawn": spores or root-like mycelium stored in sawdust, grain, or agar. You can buy the spawn alone or as part of a complete oyster mushroom kit. Any oyster mushroom variety will work, but blue grey oysters and pink oysters are especially easy and quick to grow. Mushroom spawn deteriorates over time. Put it in substrate as soon as possible, and refrigerate it if you can't use it immediately.

**Growing outdoors** 'Plug Spawn' is a slow but easier alternative. Drill holes in the side of a newly fallen hardwood log (avoid softwood or pine because it will inhibit the growth), insert the plugs, and wait for damp weather.

If your kit came with a large bag of straw, that's a ready-to-go substrate, or material that provides nutrients and a place to grow. If you only have a small container of mushroom spawn, you'll need to make your own substrate, and heat it so only beneficial microbes can grow. Here are two ways to make a substrate:

spawn in sawdust: cut corrugated cardboard into a few inches square equal size pieces, put the cardboard into a bucket and weigh down, add boiling water to submerge, cover with lid and cool for 8 hours, wash hands, squeeze out as much water as you can.

**Spawn in Grain:** Choose a straw like rye or wheat, cut into 3-4 inch (7.5-10 cm) lengths using a shredder or weed whacker in a garbage can, tie in a pillowcase or nylon mesh laundry bag, submerge in pot of water on stovetop, heat at 160-170 degrees Fahrenheit (70-75 degrees Celsius) for 1 hour, drain well and let cool to below 80 Fahrenheit (27 Celsius).

**Seed Planting Depth, Spacing and Procedure:** To minimize competition from other spores, wash your hands first and inoculate (adding the spawn to the substrate) as soon as the substrate is ready.

**Mushroom kit with Included Substrate:** Sterilize the syringe and inject spawn into the grow bag through the small hole, or into the tray of substrate at several points.

**Cardboard Substrate:** Stack the cardboard squares inside a food-grade plastic bag. Sprinkle a little spawn between each layer as you stack. (Break up the spawn by hand if it's in a solid clump.)

**Homemade Straw Substrate:** Wipe a table with 70% isopropyl alcohol. Spread the straw out on the table and break up the spawn over it, mixing thoroughly. Transfer to food-grade plastic bags until they are full but not compressed.

There's no exact ratio of spawn to substrate, but you can start with a mix that is 2 or 3% spawn by weight. Adding more spawn helps the colony grow faster and resist contamination.

Tie the top of the plastic bag closed. Punch holes into the sides of the bag every 3 inches or so (7.5 cm), plus a few more in the base to allow for water drainage. The mushrooms need ventilation to grow quickly and reliably, or carbon dioxide build-up will interfere. (Most bags included in mushroom kits already have holes, or an air filter system that makes holes unnecessary.)

**Crop Maintenance** Choose a location with steady temperature. The spawn is ready to colonize the substrate with mycelium. Most strains do this best at temperatures between 60° and 75°F (16–24°C). Even small variations in temperature can decrease mushroom yield or encourage contamination, so try to find a room that stays at this temperature 24 hours a day.

Mycelium can grow at any light level except direct sunlight. Some growers find they get better results with low light on a daylight cycle (real or simulated). However, if you are using straw, too much light can cause grain to sprout and interfere with mushroom growth. The ideal temperature depends on the strain. If your spawn came with instructions for a growing environment, follow them.

It takes two to five weeks for the white, feathery "roots" called mycelium to spread throughout the substrate. During this time, all you need to do is check on the moisture level every few days. If the substrate feels dry to the touch, mist it through the holes in the bag. If you see standing water inside the bag, poke more drainage holes in the base.

Mycelium is white. If you see large patches of another color, mold has contaminated the bag. Throw the bag away and wipe the area down with isopropyl alcohol before trying again.

Next step is to move the bag to a fruiting environment. Once the mycelium has formed a thick mat inside the bag, it is ready to fruit (produce mushrooms).

Mushrooms will not fruit without light. Provide at least enough to read by during daylight hours. Use indirect daylight, a grow light that mimics daylight, or (less effective but cheaper) a cool white bulb.

The fungus needs fresh air to clear out carbon dioxide, which prevents fruiting or leads to small mushrooms. Open the top of the bag and ventilate the area with a light cross breeze. Lower the temperature, ideally to 55–61°F (13–16°C). Increase humidity to at least 80%, ideally to 90–95%, by running a humidifier or hanging plastic sheets around the grow bag. This part doesn't have to be perfect, but other conditions can affect the yield, shape, and color of your mushrooms.

**Moisture Requirements:** Water lightly. Over or under watering are common problems at this stage. To prevent drying without soaking the mushrooms, lightly spray the inner walls of the bag once or twice a day.

If the growing mushrooms turn brown, or new mushrooms start to grow on an older mushroom's surface, the substrate is probably too dry.

If the caps of the mushrooms feel clammy or sticky, the substrate is probably too wet

## **Harvest and Storage**

**When to Harvest/Number of days to Maturity:** Oyster mushrooms take about three weeks for the first fruiting, but can take up to six weeks depending on the variety and growing conditions. After the first harvest, you'll usually get at least one more, spaced anywhere from three to fourteen days apart. Most other species take a bit longer to grow.

**How to Harvest:** Mushrooms start as tiny "pins," then grow rapidly over the next few days if conditions are right. Once they have reached full size, press down on the substrate with one hand, then use the other to twist the stalk off at the base. You may eat them immediately or dry them for later use.

Continue harvesting mushrooms. Most spawn is good for at least two productions and some will continue growing for three or four months. Keep the substrate lightly moist and continue picking mushrooms until they stop appearing.

If you're not sure what a fully developed oyster mushroom looks like, wait until the edges of the first mushroom go wavy. This is slightly past optimal harvesting point, but still edible. Pick the other mushrooms just before they reach the size of the first.

Tiny, aborted mushrooms are common in some strains. Leave them in place without picking them.

**Optimal Storage Temperature and Conditions:** Chop and use in cooking recipes or boil in a little bit of water for tea.

To dry mushrooms get a box fan, two or more air conditioner filters (not fiberglass or plastic) and bungee cords. Clean and slice the mushrooms and lay them in the pleats of the air filter. Place the other filter on top, and keep alternating mushrooms and filters until you've used them all. Strap the filters to the front of the fan and run the fan until they are dry. Depending on temperature, humidity, and thickness of slices it can take anywhere from 24 hours to three days.

**Notes:** The basic process for growing oyster mushrooms works for most mushroom species, but you will need to make adjustments. When you buy spawn, check the instructions or ask the seller for the following information so you can adjust your approach.

Preferred substrate (some species need a specially prepared compost), ideal temperature during colonization, ideal temperature and humidity levels during growth.

Keep conditions clean.

Not all types of spawn need casing. Ask the seller or an experienced grower for advice.

Casing is a layer of sterile material on top of a tray of substrate, usually a mixture of peat moss and ground limestone. Keep the casing moist so water gradually leaches through to the substrate, without making the substrate soggy.

Do not ventilate the area until the tiny "pins" have appeared on the surface of the casing. Ventilating too early will trigger fruiting before the pins have broken through, growing mushrooms underneath the casing.

If you get serious about a mushroom growing hobby, prepare a room with fans or an air duct for ventilation, plus a heating system and/or air conditioner to control temperature. Record temperature and humidity changes using a thermometer and hygrometer.

Temperature can vary significantly between the ceiling and floor of a room. If you're growing on multiple shelves, put a thermometer at each level.

Strong drafts can be fatal to some mushroom types. Protect the spawn from direct wind. Get rid of substrate after harvest.

Making your own mushroom spawn goes to an intense level such as a mostly sterile environment. Before you begin, remove all rugs and curtains that could trap dust. Clean all surfaces with mild disinfectant, including the ceiling. Cover all openings with plastic sheeting, and make an "antechamber" at the entrance with a second layer of plastic.

You can ask a nearby mycological association for local advice. There are several species we can eat but the best way to know is to check a mushroom guidebook, or ask someone who knows about collecting mushrooms for eating.

**Warnings:** It is illegal in most countries to cultivate, transport, possess, or consume psilocybin mushrooms (magic mushrooms). Breaking any of these laws could lead to major jail time. Mushrooms produce airborne spores which can cause respiratory problems in sensitive or allergic people. Wear a respirator while near the growing mushrooms if you are concerned about this.

## Mustard Greens

**Description:** a Cruciferous vegetable with a peppery flavor and come in different varieties ranging in color, texture, and shape of leaves from different regions of the world:

Ruby Streaks, Red Giant, Scarlet frills, Southern Giant Curled, Golden Frills, Amara, Garnet Giant, Red Splendor, Suehlihung No. 2.

(Turnips are in the Brassicaceae (mustard) family and their edible green tops are similar to mustard greens)

### Growing Instructions

**Optimal Time/Temperature for Germination:** Mustard greens thrive in cooler temperatures but do not grow well in summer. Aim to start seeds about four weeks before the last frost. The plants can tolerate frost, which actually contributes to a sweeter flavor to the greens.

**Optimal Soil Conditions:** Mustard greens grow best in moist, rich soil. To prepare the soil for planting, spread compost over the planting area, about 3 to 6 inches thick. Carefully turn the compost into the ground with a digging fork, loosening the soil. If you're having to grow in red soil, make sure you add some river sand and compost to it in order to make more airy and fertile. Otherwise, red soil gets hard easily after few weeks.

Purchase seeds, plant them, then uproot and replant the seedlings that emerge. Given the quick growth cycle of mustard greens, you can replant them every two or three weeks to keep up production.

**Seed Planting Depth, Spacing and Procedure:** Plant seeds just under the soil, about a half an inch apart. Once the seedlings sprout and grow their first leaves, gently unearth them and pull them apart into clumps. Replant the seedlings approximately 12 inches apart. While this replanting of the seedlings is not necessary, doing so will allow greens to grow faster and yield more.

**Best Companion Plants and Plants that Hinder:** In your rotational planning, mustard should be counted as a cole crop if doing a four-year (or longer) rotation plan so caution as you would the cabbage, cauliflower, broccoli. Celery, swiss chard, spinach, and onion may be friendly.

### Crop Maintenance

**Moisture Requirements & Solutions:** Mustard greens require 2 inches of water per week to thrive. Factoring in rainfall, make sure that they receive adequate hydration. Be sure to keep the soil evenly and consistently watered.

**Weeding Needs & Solutions:** Carefully remove any weeds you see growing around your plants. While mustard greens do not require a lot of room to grow, the influx of weeds can cause unnecessary disturbance, particularly to fragile seedlings. To remove weeds, softly dig them out with your hands, ensuring that the roots are removed as well.

**Feeding Needs/ Optimal Natural Fertilizers:** Enrich your soil the way nature intended, with all-natural nutrients, composts and soil-enhancing organisms like your everyday earthworm's castings.

**Pests, Diseases & Solutions:** To ensure the successful growth of your mustard greens, protect them from bugs that might feed on them (cabbage worms, cabbage loopers, and flea beetles). Cover plants with row cover fabric, available for purchase at most gardening centers. Since the insects can't reach the plant under the fabric, they can't feed on it, or lay eggs to reproduce.

Make sure that you keep track of the temperature and moisture levels in your covered rows. Enclosed growing areas can get too hot for greens, so it is important to monitor the plants closely. Avoid getting the leaves wet every time you water your mustard greens. This will help to reduce the risk of your mustard greens getting downy mildew.

If open to atmosphere another option if bugs are eating them is to melt some butter and mix it with some chili powder; use a paint brush and essentially paint the entire plant. This will create a clear, greasy layer that bugs will find poisonous. When it comes to harvesting them, simply put them in some hot water and shake them around to get the grease off.

If the damage is from very small caterpillar-like creatures that are the color of the leaves and difficult to see, neem will help.

## **Harvest and Storage**

**When to Harvest/Number of days to Maturity:** Mustard greens should be harvested when the leaves are still young and tender; older leaves will have a bitterer flavor. You can start to pick the leaves after 4 weeks, when they should be about 3 to 6 inches long (7.6-15.2cm).

**How to Harvest:** You can harvest greens by snipping off outer leaves from the plant, and then leaving it to continue growing. Alternatively, you can unearth the entire plant and harvest all of the leaves at once.

Discard any yellow leaves that you find on the plant.

When you're growing mustard greens and let them flower, they provide winter forage for bees and other pollinators.

**Optimal Storage Temperature and Conditions:** Pick all your mustard greens and refrigerate them. Leaves can be kept in the crisper drawer for up to a week. Beyond that, you can freeze the greens to be used for cooking later on.

### **Seed Saving:**

When the environment gets too hot, the plants will begin to seed and grow a flower stalk, signaling that no new leaves will grow. At this point you can either dig up the plants, or leave them there to seed. Once the seed pod developing on the plant has dried, you can collect the seeds. Be sure to collect them before the seed pod splits open; seeds that spill onto the soil will likely be dispersed and grow into new plants later on.

Dry your seed heads in a paper bag, then shake the bag until the seeds fall out of the pods. Sift or use a fan to blow off the chaff.

**Notes:** Perhaps avoid reheating cooking mustard greens, may convert to nitrites if you cook, cool, and then reheat.



## Okra

**Description:** grows in an elongated, lantern shape vegetable. It is a fuzzy, green colored, and ribbed pod that is approximately 3-5 inches in length. This vegetable is more famously known by its rows of tiny seeds and slimy or sticky texture when cut open. It's from the Mallow family.

### Growing Instructions

**Optimal Time/Temperature for Germination:** Okra is a vegetable that keeps on giving all summer long. When you harvest a pod, another grows in its place. It's related to the hibiscus plant and produces similarly beautiful flowers. Okra grows best in hot climates, but even if you live in a Northern region, you can grow okra by starting it from seed indoors and transplanting when the weather warms up. You'll want to plant the okra seeds in early spring, after the last frost of the year, when the temperature doesn't dip below 55 degrees at night. If that doesn't happen until late spring or early summer where you live, then it's better to start your seeds indoors 2-3 weeks before the last frost. When the seedlings are sturdy and the weather warms up, you'll transplant them to your garden patch.

To start seeds inside, plant the seeds in peat seed starter and keep them well-watered. Put them in a warm, sunny room or use grow lamps to keep them warm during the germination period. Keep the temperature between 65 and 70 degrees Fahrenheit.

**Optimal Soil Conditions:** Okra grows best in full, hot sun. If you try to grow it in a shady spot, it won't produce much fruit, if it lives at all. Okra should be planted in a location that gets at least 6 hours of full sun every day and okra really gets going at summer's peak, when the sun beats down on the garden at its hottest.

It grows best in a soil with a pH level between 6.5 and 7.0. You can work in limestone or bone meal to increase the soil's pH. If you'd prefer not to change the pH level of your soil using any drastic measures, you can simply work in plenty of compost, which will drive the pH towards neutral, or 7.

Okra grows well in very rich soil that's packed with nutrients. You can enrich your soil using compost, till the soil to a depth of 12 inches (30.5 cm) and work in 4 inches (10.2 cm) of compost or fertilizer using a garden rake so that it's evenly distributed.

Neglecting to add nutrients to the soil may result in okra plants that don't produce a lot of fruit. Try using organic composts like well rotted cow manure and mixing it into your soil. You can also use the peels from vegetables, fruits and add crushed eggshells and any plant trimmings to the soil to enrich it.

**Seed Planting Depth, Spacing and Procedure:** If you want to speed the germination of your seeds, you can soak them overnight the night before planting, or freeze them to crack the shells. If you're transplanting seedlings, do not break their tiny taproots. If they get crushed, the seedlings will not grow.

Sow your seeds 4 inches (10.2 cm) apart at a depth of  $\frac{1}{2}$  inch (1.3 cm). Plant them 1 foot (0.3 m) apart in rows 3 feet (0.9 m) apart. Dig holes large enough to hold the root balls and gently pat the soil around the base of the plants. Water the garden to help set the soil.

**Best Companion Plants and Plants that Hinder:** Soil wilt diseases impact okra; do not plant okra where members of the solanaceous family have already grown (potatoes, tomatoes, etc.) or brassicas (cabbage, broccoli, etc.).

### Crop Maintenance

When the seeds you planted have sprouted and grown to 3 inches (7.6 cm) high, thin out the smaller seedlings and leave the strongest ones standing. Thin them so that the remaining seedlings are spaced 1 foot (0.3 m) to 2 foot (0.6 m) apart, in rows 3 feet (0.9 m) apart. If you transplanted seedlings that you started indoors, you can skip this step.

**Moisture Requirements & Solutions:** Okra should be given at least an inch per week of water. Water every morning to thoroughly moisten the soil, except after heavy rains. Okra can withstand a bit of drought, but it grows much better when given plenty of water throughout the summer.

It's best to water okra in the morning so that the plants have time to dry before nightfall. If the water stands in the garden bed overnight, it could cause the plants to start rotting. When you water okra, try not to get water on the leaves. When the sun starts beating down on the okra plants, the water will act as a magnifying glass and burn the okra leaves.

**Weeding Needs & Solutions:** While the okra is still young, cultivate the bed to eliminate any weeds. Then cover the area around the seedlings with a heavy layer of mulch, such as pine straw. This will prevent additional weeds from sprouting and taking over the bed.

**Feeding Needs/ Optimal Natural Fertilizers:** Since okra needs plenty of nutrients to grow, it's a good idea to continue adding compost throughout the summer. You should side dress the okra with compost three times: once after thinning the seedlings, once after the first pods begin to grow, and a third time halfway through the growing season. To side dress, simply rake in a few inches of compost around the plants, so that the soil there gets enriched.

Okra is a self-fertilizer, but is also able to be pollinated by insects. Sometimes the flower does not open, yet inside it is self-pollinating and a day later or so the wilted petals fall down without opening and still the fruit grows.

**Pests, Diseases & Solutions:** Aphids, stinkbugs, and corn earworms all like to feast on okra plants. The plants are hardy, and usually won't fail on account of pests, but it's a good idea to keep their populations low to get the most out of your okra crop. Inspect the stems and leaves regularly for holes, yellow leaves and other signs of pest infestation. You can pick the bugs off by hand or spray the leaves with soapy water to keep the pests away.

### Harvest and Storage

**When to Harvest/Number of days to Maturity:** About 8 weeks after planting the okra, the pods will start to grow. Once you see the first okra pods emerge and mature, you can start regularly harvesting them. Use a scissors or a hand pruner to cut the okra pods just above their caps, where their thick stems meet the branches of the plant. Once you make a cut, another okra pod will emerge from the same spot. Keep harvesting the okra throughout the summer until the growing season slows and the plants stop producing new pods.

**How to Harvest:** Harvest the pods when they are 2 to 3 inches (5.1 to 7.6 cm) long. Harvest the okra every other day, and every day in warm climates and during the peak of the season, to encourage fast regrowth. You may even need to harvest twice per day to keep up with growth at the peak of the season. If the pods get too big, they will become woody and tough. Okra's taste and texture are best within a few days of harvest.

You might want to wear gloves and long sleeves when you harvest the okra. The leaves and pods are covered with spines that can irritate the skin.

**Optimal Storage Temperature and Conditions:** You can pickle okra the same way you pickle cucumbers, using a salty brine. Pickle okra right after you harvest it for best results.

If you simply have too much to eat, or you want to be able to enjoy okra during the winter, freezing it is a good option. To freeze okra, blanch it for 3 minutes, plunge it into an ice bath to stop it from overcooking, then chop it into bite-sized pieces. Place the pieces on a tray and freeze them until firm, then transfer them to a freezer bag for long-term storage.

**Seed Saving:** Take okra seeds by cutting the okra itself.

Pick out a plant that blooms early and produces lots of well-formed pods. Choose one with 3-5 pods. Tie a small ribbon around the plant that you have chosen. This is the plant that you will use for seeds. The ribbon helps to distinguish it from your other plants, so that you don't accidentally pick the fruit while harvesting at the end of the season.

Use your fingers to split the pod down the side or twist it until it breaks open. Because the pods are dried out, most of the seeds should just fall out of the pod. For seeds that are stuck in their compartments, simply use your fingers to remove the seeds.

Place the seeds in a bowl or on a plate. Throw away any that are bruised or damaged. If you find that some seeds are still damp, place them on a clean cloth or paper towel and set them aside. Store the damp seeds in a cool, dry place for up to one week to allow them to finish drying. You can use a mason jar, plastic container, or baggie. Keep the seeds in a cool, dry place like a kitchen pantry or in the refrigerator.

The dried seeds can be viable for up to 4 years.

## Onions, Leek, Chives, Shallots

**Description:** a vegetable that is the most widely cultivated species of the genus *Allium*. The common onion's close relatives include garlic, scallion, leek, chive, and Chinese onion.

**Growing Instructions** you can grow spring onions from seeds, bulbs, from other onion, and in the yard, a small pot, or even in water. It is most frequently a biennial or a perennial plant, but usually treated as an annual and harvested in its first season.

**Optimal Time/Temperature for Germination:** There are three different categories of onions: short-day, long-day, and day-neutral. These categories are based on what plant hardiness and growing zone you live in. If you choose the wrong type of onion for your area, you may not get a very successful crop.

If You live in Zone 7 and warmer, choose short-day onions, such as Red Burgundy, Red Creole, and Vidalia. If you live in Zone 6 and colder, choose long-day onions, such as: Alisa Craig, Copra, and White Sweet Spanish. (14-16 hours). You can grow day-neutral onions, such as Cabernet and Candy, in any growing zone (12-14 hours).

If by seed, start indoors 8-10 weeks before the last frost date. It will allow them to germinate into healthy seedlings before you transplant them outside. A container should be about 4 inches (10.16 centimeters) deep, and have some drainage holes. Fill with dampened seed starter mix and sprinkle the seeds over it. Mist them lightly with water, and then cover them with a 1/8 inch (0.32 centimeters) thick layer of seed mix. Gently pat the soil with your hand when you are done. Cover the seeds with a humidity dome, or cover the seeds in starting mix and plastic.

Keep them someplace warm, about 70 to 75°F (21 to 24°C). If it is too cold where you live, place the containers on a heat mat. Expect to see the seedlings emerge after 7 to 10 days.

Take off the humidity dome or plastic cover and move the seeds to a cooler spot. Keep the soil moist, and remember to fertilize it. The best type of fertilizer is diluted fish emulsion or compost tea.

**Optimal Soil Conditions:** Start hardening them 4 weeks before the last frost date. During this time, slowly introduce the seedlings to the outside. Start by placing them outside in a sheltered spot for several hours, then bringing them back inside for the rest of the day. Increase outdoor exposure little by little every day until you are able to leave them outside overnight. Wait until the seedlings are at least 4 inches (10.16 cm) tall. This will ensure that the young plants are strong enough to tolerate the outdoor environment.

Transplanting the seedlings outside right away will send the seedlings into shock and could possibly kill them. Spread a 1½ inch (3.81 centimeters) thick layer of 5-10-5 fertilizer over the soil. Mix the fertilizer into the soil to a depth of about 8 inches (20.32 centimeters).<sup>(5)</sup> Make sure that the soil is soft, and free of clots.

If you can, try adding some organic material into the soil, such as rotted manure or compost intended for gardening.

**Seed Planting Depth, Spacing and Procedure:** Space the seedlings 3 to 4 inches (7.62 to 10.16 centimeters) apart.

Use a fork to loosen a hole in the dirt, place the seedling into the hole, and then push the dirt back. Once you have transplanted the seedlings, give them enough water to dampen the soil.

**Best Companion Plants and Plants that Hinder:** Cabbage, carrots, chard, lettuce, peppers, and tomatoes are friends with onions while Beans and peas aren't. Chamomile will improve growth and flavor.

### **Crop Maintenance**

**Moisture Requirements & Solutions:** Onions need a lot of water. In fact, they need about an inch a week. If you aren't getting rain, you will need to water the onions regularly.

If you're not sure when to water them, check the soil to see if it's moist. While the plants are leafing, it needs to always be moist. However, once a week should be sufficient as long as they get a good soaking. Once the bulbs start getting larger (when the plant part stops growing), the bulbs need to be kept much drier.

**Weeding Needs & Solutions:** You can add a layer of mulch around the plants. The mulch will suppress weeds coming up. It can be things like bark pieces, grass clippings, or straw, as well as inorganic materials such as stones, plastic, or brick chips. You can also just use grass clippings from your yard.

Organic materials also improve the soil over time. Mulch helps the soil retain water, as well. However, you'll need to remove the mulch once the bulbs start to enlarge. You should see them start pushing up the soil a bit. The bulbs need to be drier, and mulch retains too much moisture.

**Feeding Needs/ Optimal Natural Fertilizers:** The leaves are not the only part of the onion that will stick out of the soil; the bulbs will too. If the bulbs are not developing out of the ground, you may want to brush some of the soil away from them, so that only the roots and the bottom part of the bulb are in the soil. This will help the bulbs dry faster. Consider adding some nitrogen to the water to keep the onions healthy. You only need to do this until mid-July, however.

**Pests, Diseases & Solutions:** Generally, onions repel spider mites but a species that likes them is the two-spotted spider mite (red mite). Plant cilantro around your onions to fend them off. Treat infection with Neem oil.

### **Harvest and Storage**

**When to Harvest/Number of days to Maturity:** Onions take 100-175 days to be ready for harvest. Begin harvesting when the bulbs are 2 to 3 inches (5.08 to 7.62 centimeters) in diameter. Bend the plants to the ground to avoid top rotting of the bulbs (pink neck). Give the bulbs 5 to 6 days to dry and turn brown.

Trim the leaves down to 1 to 2 inches (2.54 to 5.08 cm) but if planning to rope braid to dry, leave longer.

**How to Harvest:** Pull the bulbs out of the ground. Once the outer layer of the onion bulb's skin has dried, it's ready to harvest. Place the bulbs in a container, such as a box, bag, or wheel barrow to store the onions you have harvested. Make sure the container is warm, dry, dark, and well ventilated.

**Optimal Storage Temperature and Conditions:** Spread the bulbs out on a screen to provide ample circulation. Let them cure in a shed or garage. A porch that doesn't get a lot of sunlight will also work.

If you cure the onions in direct sunlight, the skins will soften and invite bacteria. If you cure them someplace damp and humid, they may start to rot.

If you are not braiding your onions together and hanging them up, you will need to store them properly in a bag or box. You can store them however you want, as long as they are kept cool and dry. Good air circulation is a must. Here's a few popular ways to store onions.

Store the onions in an onion bag, and hang the bag up. Store the onions in a shallow box. Use newspaper to keep the bulbs separate. Store the onions in nylon stockings. Tie a knot in the stocking between each bulb. Hang the stocking up. When you want to get an onion, simply cut below or above a knot.

**Seed Saving:** Watch for flowers and then seed heads to form during the late summer of the second season. Most of the flowers will be dry, and the seeds will begin to fall out on their own.

Many seeds will fall out on their own. For the rest, place them in a bag, pound the whole bag against a hard surface. If you have many seeds, you may be able to use the wind to separate them from stems and other matter. Use a large bowl and toss them in the air, or pour them from one container to another in a light breeze. The wind should sift the lighter stems away and leave the heavier seeds to fall.

There's no harm in having a little bit of stem or seed head in your seeds unless you are sprouting them. If you plant it along with the seeds, it will just decompose.

Label the seeds with the year you saved them, or plant them immediately in a mild climate. To prolong the seeds viability, put them in a paper envelope to absorb the moisture and keep them in an airtight container in the fridge.

For onions you will eat, you will harvest the same year that you plant. If you want seeds, you will have to wait a second year. If you want both seeds and onions to harvest, plant extra plants for two years running.

**Notes:** The most reliable way is plant onion sets (these are tiny onion bulbs). Plant these on the surface of prepared soil no more than about 5mm deep (just deep enough to get the roots into the soil). Keep an eye on them until they are established, as they tend to shove themselves out of the ground as they put down roots. Birds can also be nuisance pulling them up in their search for insects and grubs.

Green onions can be ready in 20 to 30 days after planting.

## Parsley

**Description:** A biennial vegetable used both for its roots and leaves. A vegetable is defined by a plant or part of it which can be used for human food, but which is not a fruit or seed. Parsley root gives a strong flavor to soups and salads or done like mashed potatoes. It comes in two general varieties: curly leaf and flat leaf (Italian parsley).

### Growing Instructions

**Optimal Time/Temperature for Germination:** Fill a large cup or bowl with warm (not hot) water. Add a splash of dish soap, and stir the mixture to help it to dissolve. Place all of your parsley seeds into the mixture and allow them to soak for one hour. The heat of the water and the dish soap will help to break down the notoriously tough outer casing of the parsley seeds, helping them to grow faster than they would without soaking. Using a small strainer, pour the soapy water out and run the seeds under lukewarm water. This should remove any traces of the soap, and prepare them for the next step. Fill a bowl with very warm water (near 105 degrees Fahrenheit) and place the seeds in the water. Leave these to soak overnight to continue the germination process. After 24 hours soaking in the water, remove the seeds with a strainer and lay them out on a piece of wax paper to dry. When they have been fully dried, they are ready to be planted.

**Optimal Soil Conditions:** Parsley works well in any garden or pot, as it doesn't have strict growing conditions under which it thrives. Choose an area that gets at least partial sunlight, either in its own plot or between other garden plants. If you decide to pot your parsley, place it on a windowsill that gets morning sunlight.

Soil that is relatively loose, full of compost/nutrients, and has a pH level between 6 and 7 is perfect for parsley. Test the pH of the soil, and incorporate peat moss into it if the soil is too basic. To create the perfect soil mixture, mix 50% potting soil with 50% compost for nutrients. This will create a light and airy soil mixture that will make it easier for the small root-system of the parsley to attach itself to. The root formation broadens in the 2<sup>nd</sup> year.

**Seed Planting Depth, Spacing and Procedure:** If you want to speed up your planting time even further, you can plant your parsley ahead of time in small containers and move them to their final destination after sprouting. 6-12 weeks prior to the last frost before Spring, plant your parsley seeds into small containers and water them daily. This should give them enough time to begin sprouting, increasing their time to full bloom when planted outdoors or in a larger pot.

Wait until all possibility of frost has passed and sow the seeds directly in the garden if you did not start them indoors. Typically, the seeds should be planted at the very beginning of Spring, around March or April.

Using a small trowel, make the rows in your garden approximately 10 to 12 inches (25.4 to 30.5 cm) apart and long enough so that the seeds can be sewn in 3-inch intervals. The seeds/sprouts need only be covered with ½ inch of dirt, so these holes/rows need not be very deep.

Transplant seedlings started indoors into your garden after the last frost and when the plants are at least 3-inches tall. Place the seeds so that each plant is at least 8 to 10 inches from the other plants. This will give the parsley plenty of space to grow, which it will take full advantage of late Spring.

**Best Companion Plants and Plants that Hinder:** A symbiotic relationship occurs between Parsley and asparagus when planted on the same soil. They help each other grow and parsley keeps asparagus beetles away from Asparagus. Corn, beans, and peppers really like parsley.

Plants like lettuce, carrots, mint, onions and garlic should not be planted with Parsley. (chives are an exception to that rule and contributes greatly to the growth of parsley.)

### **Crop Maintenance**

**Moisture Requirements & Solutions:** Water your parsley deeply at least once a week to encourage the development of a long taproot. You may need to water more frequently during extremely hot and dry periods. If you're planting your parsley in pots indoors, give them enough water so that the soil is just barely moist. Consider setting up a drip system if you're unable to water the parsley regularly

**Weeding Needs & Solutions:** Weeds can easily blend in with the parsley, but they take up valuable nutrients and block out sunlight. Mulch around the plants to help the soil retain its moisture and discourage weed growth. Further, pull any weeds on sight and dispose of them far away from your garden.

Along the way, seedlings will need to be thinned out so that there is only one plant every 8 to 10 inches. Once the seeds start to develop into plants, go through with a pair of scissors and snip out some of the smaller or less healthy looking plants right down to the soil. If you want to transplant these seedlings to a different location, then you can carefully dig them up using a small spade.

**Feeding Needs/ Optimal Natural Fertilizers:** Fertilize once a month using a general purpose fertilizer to sustain production for the season. You can also add compost to the soil to help keep it full of nutrients, giving your parsley an extra boost.

**Pests, Diseases & Solutions:** Hot, dry weather may cause your parsley plants to turn brown. If this happens cut the plants back, removing any dead plant matter, and water them generously. Remember parsley is a pest repellent and will also attract insects to prey on pests.

### **Harvest and Storage**

**When to Harvest/Number of days to Maturity:** When the parsley sprouts out with sets of three leaves that are fully developed, it is ready to be picked. If your parsley flowers, the plant is done producing flavorful leaves and should be pulled.

**How to Harvest:** Harvest the parsley slowly throughout the season by cutting the outer stalks of the plants just above ground level to encourage additional growth. Harvesting the leaves from the top of the plant will reduce your yield.

**Optimal Storage Temperature and Conditions:** Freeze leaves for later use or dry them to store in airtight containers. Use your stored parsley within a year for optimal flavor. As a crunchy food, the dehydrator makes a good snack like kale does.



**Seed Saving:** Seeds eventually form when the flowers fade, typically in the late summer or in autumn. They look like tiny footballs and collecting seeds work well with a little dish or paper bag to help catch the seeds. Gently roll the seeds between your finger and thumb to free them from the dried stem. Label and date your seeds.

**Notes:** The roots of parsley plants are also edible. Depending on the variety of parsley you grow, the roots may be similar to parsnips or carrots. Raw or cooked, the roots are great in soups, stews and vegetable mixes.

Flat leaf parsley tends to have a slightly stronger flavor than that of curly-leaf parsley,

**CAUTION:** Be absolutely sure you are harvesting parsley seeds from a parsley plant and NOT poison hemlock seeds from a poison hemlock.

## Parsnips

**Description:** a member of the family Apiaceae. It is a biennial vegetable usually grown as an annual. Its long taproot has cream-colored skin and flesh, and, left in the ground to mature, it becomes sweeter in flavor after winter frosts.

### Growing Instructions

#### **Optimal Time/Temperature for Germination:**

Parsnips seeds take at least 3 weeks to germinate.

Soil temperatures must be steadily above 50 °F (10 °C) to grow parsnips. Wait until March, April, or May, or whenever daily temperatures are between 50– 70 °F (10–21 °C), to sow parsnip seeds. This is when the seeds germinate best.

Parsnip seeds don't germinate as well if temperatures frequently exceed 80 °F (27 °C)

Parsnips require full sun to grow and anything more than 6 hours of sun per day is considered full sun. Don't choose a planting site that gets any less than that or the parsnip seeds won't germinate.

#### **Optimal Soil Conditions:**

Parsnips need light soil that's rich in organic materials to flourish. If your garden has heavy soil, dig it up thoroughly to break up chunks of soil and clumps of organic material.

Avoid planting parsnips in clay or rocky soils.

To test soil drainage, dig a hole 12 in (30 cm) deep and 8–12 in (20–30 cm) wide. Fill the hole with water and let it drain completely. Wait 12 hours, then fill it with water again and time how long it takes for the water to drain. If the soil is well- draining, the water should all be gone in 2-3 hours tops.

Hardiness zones are 2–9

Add an even layer of compost no more than 1 in (2.5 cm) thick to the top of the soil. This acts as fertilizer to provide the parsnips with more nutrients.

The soil should have good levels of nitrogen, phosphorus, and potassium. Avoid adding clumps of fresh organic matter, such as manure, to the surface. This can cause misshapen roots. Make sure any compost you use is well broken up. Check soil pH for slightly acidic of 6-7. Work peat moss into the top 2–3 in (5.1–7.6 cm) of soil to decrease the pH if it is not acidic enough or work lime in to increase the pH if it is too acidic.

#### **Seed Planting Depth, Spacing and Procedure:**

Sow seeds in  $\frac{1}{2}$  to  $\frac{3}{4}$  inch (1.3-1.9 cm) deep. This is the ideal depth for germination. Push 2 or 3 seeds into the soil every 1 in (2.5 cm) or so to help ensure enough germination. Cover each seed hole up lightly with soil or compost.

Even the freshest parsnip seeds struggle to germinate, which is why it's best to sow them somewhat thickly. (Parsnip seeds older than 1 year may not germinate.)

### **Best Companion Plants and Plants that Hinder:**

Parsnips can infest with pests. The proximity of parsnips to carrots and celery will do a lot of harm than good. The best thing to do is to keep parsnips away from your garden. Can situate some chives plants close by though.

### **Crop Maintenance**

#### **Moisture Requirements & Solutions:**

Parsnips require consistent moisture from when they are germinating until harvest time. Water your plot of parsnips about once a week if there is no rainfall that week or whenever the soil starts to dry out. Be careful not to let the soil dry out and crust over.

When the parsnips start sprouting, reduce crowding. Pull up and discard any seedlings that are within 2–4 in (5.1–10.2 cm) of their neighbor.

#### **Weeding Needs & Solutions:**

Keep the soil weed free while you wait for seedlings to grow. Check on the planting site regularly and gently remove any weeds that you see growing. Avoid hoeing or digging weeds up or you could hurt the parsnips.

#### **Feeding Needs/ Optimal Natural Fertilizers:**

Add an even layer of compost no more than 1 in (2.5 cm) thick to the top of the soil. This acts as fertilizer to provide the parsnips with more nutrients. Grass clippings, leaves, and straw are all good choices for mulching.

#### **Pests, Diseases & Solutions:**

Watch for swallowtail-butterfly caterpillars that like to feed on parsnips. If you see any caterpillars crawling on the foliage, pick them off by hand and discard them. They are green with black stripes and yellow spots. This is typically all it takes to control them and keep your parsnips safe. Carrot fly larvae cause parsnip roots to rot. To protect your plants from the flies laying their larvae, cover them with horticultural fleece or put 2 ft (0.61 m) high barrier cover made of clear polythene around the plot to keep out the low-flying female carrot flies. (Once carrot fly larvae get into your parsnips and cause them to rot, there's nothing you can do.) Prevention is the only way to deal with this problem. Your garlic and onion spray will be one of your handiest defenses against garden pests.

### **Harvest and Storage**

#### **When to Harvest/Number of days to Maturity:**

Parsnips can take around 120 to 180 days (4-6 months) from planting to harvesting. You can leave the plants in the ground after that; parsnips can sustain frost.

#### **How to Harvest:**

Harvest when roots are 1 in. (2.5 cm) in diameter. This is usually in late fall. Dig up the roots with a tilling spade, a shovel, or a spading fork. Note that parsnip foliage can cause skin irritation for some people, so wear gardening gloves and a long-sleeved top to be safe.

You can expect to harvest about 1 lb (0.45 kg) of parsnips per 1 ft (0.30 m) of planting row. Individual parsnip roots can weigh more than 1 lb (0.45 kg) each.

**Optimal Storage Temperature and Conditions:**

If you don't want to harvest all the parsnips in fall, you can cover the soil in mulch and overwinter them in the ground. Harvest them in the spring before the tops start to sprout. To ensure you get the whole root, loosen the soil with a fork before harvesting. Then, gently ease the roots out of the soil. Cut off all but a few inches of foliage. Parsnips can be stored in root cellar conditions between 32 and 35 degrees Fahrenheit with a humidity between 90 and 95%. Keep them in damp sand or sawdust, and they should last for four to six months.

**Seed Saving:**

Propagate your own plants by allowing some to go to seed in their second year: In the late summer, cut the mature seed heads off the plant. Place them in a single layer in a warm, dry spot with good air circulation to dry completely. Once the seed heads are dry, break them open and separate out the seeds. Store the seeds in an airtight container. They are best planted within a year, as germination can decrease as they age.

## Peas

**Description:** Cultivated annual plants having compound leaves with terminal leaflets modified into tendrils and edible seeds enclosed in an elongated pod. Commonly grown peas include English peas, snow or sugar peas, and sugar snap peas available in both bush and climbing varieties. There are also black-eyed, crowder (field), and chick peas (garbanzo). Legumes (lentils) are also of the Pea family.

### Growing Instructions

#### **Optimal Time/Temperature for Germination:**

One method is to moisten a paper towel and fold it into quarters. Slide pea seeds into the paper towel's folds. Place the seeds in a warm location, such as a sunny windowsill, with a temperature of approximately 64 degrees Fahrenheit (17.8 degrees Centigrade). Monitor the moisture level of the paper towel and pea seeds, adding water as needed to ensure a humid environment.

Watch for shooting out roots. Peas have delicate roots and don't tolerate being transplanted from pots well so it's best to grow them from seed directly in the garden. Sprinkle the newly germinated peas on upturned soil and cover or net for pests. (birds like the sprouts.) Should you plant seed before germination and depending on the type of peas you've planted, expect the first sprouts to appear within 1 to 2 weeks in the ground.

Most peas prefer full sun. Observe your yard throughout the day, and note which areas get good sunlight. Since afternoon sunlight can be intense, go for a spot that gets lots of light in the morning, but is partly shaded later in the day.

Optimal temperatures for pea plant growth in the outdoor garden range from 65-to-75 degrees Fahrenheit (18.3 to 23.8 degrees Celsius).

#### **Optimal Soil Conditions:**

An ideal pH for pea plant growth is 5.5 to 6.5. (you should add an acidifier to your soil at least 3 months before planting to ensure it has time to take effect.)

The most accurate way to test soil temperature is with a soil thermometer, which is an inexpensive tool available at most garden centers. Insert the thermometer about 3 to 4 in (7.6 to 10.2 cm) into the soil to take a reading. You could also use average air temperatures to estimate soil temperature. To find an average air temperature, add together a day's high and low temperatures, then divide by 2. Find the average air temperature for the last 3 days. The soil temperature should be roughly equal to that number. Using this strategy, you can use forecast temperatures and predict when the soil will be warm enough to plant. In general, the best time to plan is mid-spring, or mid-May for temperate climates in the Northern hemisphere.

To test pH, mix 1 part each of soil and distilled water, insert a test strip into the mixture for 20 to 30 seconds, then compare the strip's color with the kit's color key. Beans and peas need slightly acidic soil. If your soil's pH is greater than 6.5, add an acidifier, such as sulfur. If your soil is too acidic, add an alkaline amendment, such as lime.

Apply mulch to peas grown in high-temperature areas to cool the soil and reduce water loss. Peas fail to germinate well in very cold or overly warm soil.

Use a hoe or garden spade to dig into and turn over the soil. Lightly water the soil beforehand to make it easier to till. Turn all of the soil in the area where you plan on planting your vegetables.

Beans and peas thrive in well-draining soil. If you have dense soil, add at least 10 to 15 lb (4.5 to 6.8 kg) of sand or well-aged manure and compost when you till.

Try digging a shallow hole, then water it for about a minute with your hose. If the water sits in a puddle and doesn't really drain, you'll need to amend it with organic matter or sand. You can also pick up a handful of soil and form it into a ball. If it holds a compact shape and doesn't crumble much, your soil is dense. Peas prefer soil that is fertile, well drained and high in organic matter.

### **Seed Planting Depth, Spacing and Procedure:**

Plant 2 to 3 oz. (56-to-85 g) of seed for each 100 feet (30 m) of row. Push your finger into the soil, pull it out, then place a seed into the hole. Plant your seeds in rows; if you have multiple rows, leave about 2 to 3 ft (0.61 to 0.91 m) between them. Plant pea seeds 3 in (7.6 cm) apart. Climbing varieties need the support of poles, bean teepees, trellises, or a fence. Insert individual 6 ft (1.8 m) bean poles into the soil by each seed hole, or tie bamboo sticks together to construct teepees.

Don't cover the planted seeds with soil until you've added the supports. The holes will help you keep track of where to place the supports because peas have sensitive roots so you'll need to erect the supports when you plant the seeds. Doing so after they've sprouted could injure your plants. Fill in the holes, then press down gently on the soil where you planted each seed. You don't want to pack the soil; just pat it down with your hand to encourage germination. Water the planting site just enough to get the soil moist but it shouldn't be waterlogged. Check your soil's moisture daily, and avoid letting it become dry.

Since too much moisture discourages germination, just get the soil damp, and don't water it before planting as you might with other kinds of plants. Additionally, avoid planting bean and pea seeds right after heavy rain.

**Best Companion Plants and Plants that Hinder:** do not grow onions in with peas and beans. However scattered chamomile is helpful to ailing garden plants.

### **Crop Maintenance**

#### **Moisture Requirements & Solutions:**

Monitor pea plants for flower drop or stringy pea pods. These are signs of too much heat and/or not enough water. Peas are prone to a few diseases, but watering moderately and keeping foliage dry can help ensure your plants stay healthy. To test the soil, push your finger into the ground. If the soil feels dry and doesn't stick to your finger, it's time to water your plants.

### **Weeding Needs & Solutions:**

For permanent plantings, you can lay down landscape fabric over the soil and mulch to act as a weed barrier but not mulch right at the base of the plant.

### **Feeding Needs/ Optimal Natural Fertilizers:**

Peas don't require much fertilizer, and they can absorb nitrogen from the air. Frequent or heavy applications will lead to abundant foliage, but fewer pods. Since beans and peas can extract nitrogen from the air, avoid using a nitrogen fertilizer. Too much nitrogen will lead to fewer pods.

Legumes don't need a lot of fertilizer, but a light application after they've spent lots of energy to bloom can help sustain their growth.

### **Pests, Diseases & Solutions:**

a) Any spraying mixture that contains cayenne, cinnamon, cloves, pepper, liquid dish soap, or rosemary as a main ingredient is the best defense against aphids.

b) This will also help you fight ants, aphids, and gnats: Peel one orange and add the peels to two cups of water. Boil this and let it sit overnight. Add a 1/4 teaspoon of castille soap and stir. Strain out the orange peels and add the mixture to a spray bottle.

Wet bean and pea leaves can promote disease. The best way to prevent disease is to keep your plants' foliage as dry as possible. Water earlier in the day so the sun can dry any moisture on the leaves, and don't prune leaves or harvest pods when your plants are wet. Watch pea crops for pea aphids, army worms and cutworms, pea weevils, fusarium wilt, pea enation mosaic (virus transmitted by aphids), powdery mildew, root rot and damping off. Check your plants regularly for insect larvae, beetles, slugs, and other pests. If you only find a few here and there, just pick them off of your plants. Inspect your plants regularly for white fuzz, discolored spots, and other signs of disease. If a branch is affected, cut it off, throw it away, then wash the nearby foliage with soap labeled for plants. If fuzz or mold is all over a plant, pull the plant up and throw it away.

Nasturtiums lure away aphids and marigolds ward off pests and even nematodes and beetles.

### **Harvest and Storage**

**When to Harvest/Number of days to Maturity:** Peas usually take 50-to-70 days from germination to harvest. Consider staggering your planting if you plan on growing lots of plants. For instance, plant 5 one week, another 5 a few weeks later, then another 5 a few weeks after that. You'll space out your crop instead of getting overwhelmed with a big harvest all at once.

You should have your first harvest about 2 months after germination. For legumes with edible pods, such as sugar snap peas and green beans, it's best to pick the pods before the seeds inside fully develop. The pod should be crisp, firm, and tender, and the seeds inside should be small and immature.

Field peas like the dry beans should be left until the seeds develop completely. They'll be ready to harvest when the pod easily opens. Avoid harvesting pods while the plant is wet. Wait for morning dew to evaporate to pick pods, and don't water them right before harvesting.

Start the process all over again, and replant pea garden next year. Wet seeds will go bad, so don't wash the seeds before storing them. For best results, choose another spot in your garden for next year's crop. Don't grow in the same spot 2 years in a row. Rotate crops each year to prevent soil exhaustion and disease.

Some bush types may ready in 8 weeks, while other types can take as long as 20 weeks to reach the harvesting stage. If you are purchasing seeds, be sure to check how long they take on the packet.

For edible pod legumes, the more pods you pick and the sooner you pick them, the greater your yield will be. The right time to pick pods depends on the species, so check online or read seed packages to find out when to harvest for your specific varieties.

### **Optimal Storage Temperature and Conditions:**

Shell the peas with helpers to work quickly, rinse and transfer the peas to blanching, as peas start losing their freshness once exposed to air and the skins toughen. If you don't have helpers, shell only a few at a time, blanch, then shell some more, blanch those ones, etc.

### **BLANCHING**

Bring a large pot of water to the boil. Fill a large bowl with ice cold water and toss in a few ice cubes. Set to one side for dunking the peas into once blanched.

If you are doing a lot of peas, you'll need to blanch them in batches. The peas should be kept inside a colander with handles that overlap the pan or in a muslin/other cloth bag and lowered into the boiling water. Otherwise, you'll find it really hard to retrieve them all fast enough when the blanching time is up.

Blanch for 3 minutes. Keep an eye on the pot in case it tries to boil over. Remove the peas and plunge them straight into the bowl of ice water to stop cooking instantly. Drain and the faster the peas get to the freezer, the greater the chance of them staying fresh and whole. If they stand too long at room temperature, they risk turning mushy.

Place the blanched peas into resealable bags or suitable freezer containers. Pack them in as tightly as you can, to eliminate the air space. Leave about 1/2 inch/1.5cm at the top to allow for expansion during freezing.

Gently press down to remove excess air from the packages. Pouring ice cold water over the outside of the package can help eliminate more air. Seal, label and date.

Use the same procedures for the storing of podded peas except remove the tips and strings and then blanching 1 minute for thin snow peas and 1 1/2 to 2 minutes for juice sugar snap pea pods instead.

### **Seed Saving:**

Let some of the pods to mature until they're just about ready to fall off naturally. Open them up and collect the seeds, then store the seeds in a cool, dry place until next spring. (old pea seeds may not germinate as well or at all so sow last year's left over seeds more thickly than directions call for.)



## Pepper – Sweet Peppers, Chile Peppers

### **Description:**

All types of peppers are a part of the Capsicum family, which includes sweet (red and green Bell, Pimiento) to hot and spicy (Cayenne, Jalapeno, Anaheim, Serrano, Black, Ghost, Chili). The Banana and Cherry come both sweet and hot.

### **Growing Instructions**

#### **Optimal Time/Temperature for Germination:**

Sow the seeds in March. Once the plants get true leaves (leaves that come up after the first two open up) then you can plant each seedling into a pot and can repot several times to ensure the plants have a continuous growing time. Once the plant is established you need to decide where to plant them.

If growing in pots you need to give them a large pot of at least 10 to 12 inches (alternatively plant them in soil or growbags in your greenhouse) If you are keeping them outside, plant them out when all risk of frost has gone, usually end of May.

Soaking your seeds can help to break down the seed covering and expedite the growing process of the peppers. Place the seeds in a cup of water and leave them for 2- 8 hours, or until they sink to the bottom of the cup.

Make a cup of weak chamomile tea to disinfect the seeds and break down the seed coats. Mix two tablespoons of hydrogen peroxide with a cup of lukewarm water to soak the seeds in if chamomile tea is unavailable.

Should you sow your seeds in a tray or old plastic or cardboard milk jug with holes poked in the bottom, fill the bottom of the seed tray with pebbles or small rocks and then cover with potting soil. Plant seeds half an inch apart just under the surface of the soil, and water well. Use any large light to help the seeds grow. Peppers need a lot of sunlight, but the seeds can't get enough sun from a window indoors. (it doesn't have to be a hot light but place it as close to the seedlings as possible.)

Once each seedling has two pairs of true leaves, transplant them from their starter trays into 2-4 in. (5-10 cm) pots with potting soil. Keep the plants under light until they grow 4-6 in. (10-15 cm) tall.

About two weeks before you plan to transfer your delicate plants outdoors, gradually expose the plants to the outdoor climate. Start by placing your seedlings outdoors or a few hours each day, in an area protected from direct sunlight and wind. Slowly extend the number of hours the plants stay outside as they continue to grow. Avoid leaving the peppers outside overnight until you're almost done hardening them off.

Place doming caps of your own making over young plants if the weather is cold and rainy.

### **Optimal Soil Conditions:**

Grow the largest peppers in full sunlight, but they can grow in a bed that has a little shade. Avoid planting peppers in an area in complete shade. If your soil is very rocky or tends to flood in the rain, consider using pots or building a raised bed for your peppers.

Peppers grow best in a soil with a pH between 6.2 and 7.0. Error on the high side of the pH scale, however, as peppers can withstand slightly alkaline conditions.

Soil amendments improve aspects of the soil's physical condition, including its pH level. If your soil is typically acidic, consider working some lime into it a few months before planting, then conducting a second pH test to ensure you're in the desired range. If your soil is too alkaline, use peat moss or garden sulfur.

### **Seed Planting Depth, Spacing and Procedure:**

Different varieties of peppers take different amounts of time to grow, so check your pepper species to find out. Hot peppers take the longest - about 12 weeks until maturity - while bell peppers take about 8 weeks to reach maturity.

Peppers don't grow in cold or frosty soil, so wait to plant them until the weather has warmed enough. Plant peppers outside at least one month after your last day of frost for the best temperature of soil.

You can look up the last frost date in your area on the Internet or in a farmers' almanac. Choose a date that you feel matches the temperature requirements of outdoor soil for you peppers, and count back 8-10 weeks from that date; this is when you will start your seedlings. End of May is typically a good time to plant peppers, meaning that you start your seeds in early March.

Mix compost into your soil and remove any rocks and separate any large chunks in the dirt. Space each plant between 18–24 inches (45.7–61.0 cm) apart and insert stakes to help the plant stand up if necessary. Space rows of peppers about 10–15 inches (25.4–38.1 cm) apart. Straw and grass clippings make great mulch for pepper plants, about two inches thick to all of the soil between and around each pepper plant.

### **Best Companion Plants and Plants that Hinder:**

Peppers benefit most from tomatoes, cucumbers, lettuce, and most herbs. Corn can do well with peppers and beans and peas keep nitrogen levels low so they can produce more. Don't recommend planting broccoli, potatoes, and strawberries nearby though.

### **Crop Maintenance**

Some people pinch out the growing tips when the pepper is around 30 to 40cm tall which encourages the pepper plant to become bushy. If you are growing a taller variety then you may need to stake the plant.

Hot temperatures over 90 °F (32 °C) can hurt your pepper plants. Plant your peppers in an area where other taller plants will shade them during the hottest time of the day if high temperatures are a possibility.

**Moisture Requirements & Solutions:** You need to water your plants little and often. Once the plants start to flower you need to feed them a weekly high potash feed.

**Weeding Needs & Solutions:** Hand pick any weeds that may be present to prevent them from overrunning your pepper patch.

**Feeding Needs/ Optimal Natural Fertilizers:**

Choose a fertilizer such as fish emulsion or compost tea to spread an even coating. Keep feeding the pepper plants with a high potash feed as this will help new flowers set so you get more peppers. Other fertilizers include fish meal, chicken manure, or a pre-mixed fertilizer available for purchase at a local gardening center.

**Pests, Diseases & Solutions:**

You will need to protect young plants from slugs and snails and peppers can get gray mold or blossom which is often caused by irregular watering. If you see red spider mite then just spray mist your plants. And if you see white fly then spray the plants with soapy water. You can place a cardboard collar around the base of each stem to protect plants from cutworms. Crop rotation and resistant cultivars are the best defense against most pepper diseases

**Harvest and Storage**

**When to Harvest/Number of days to Maturity:** Usually, peppers take around two months to mature enough. It can take 4 to 5 months for a plant to produce but it depends on the climate and the plant species.

**How to Harvest:** You can pick peppers as they come, usually late summer, it depends on how large you want them, you can pick them green or you can also let them ripen on the plant. Use scissors to cut the pepper at the top of the stem because pulling on your peppers can damage the fragile stalks and roots. If you are expecting a frost, be sure to pick all even if it is a bit under-ripe. A frost might damage any leftovers.

**Optimal Storage Temperature and Conditions:** One nice thing about bell peppers is that they don't need to be blanched before freezing. Wash, slice, place on parchment paper to freeze them on a cookie sheet and after getting frozen, put them in an airtight bag or container and date.

**DRYING BLACK PEPPERCORNS:** Pick all the spikes at the same time, even if some aren't fully mature yet. Keep in mind you'll end up with a mix of green, black, and white peppercorns. Leave the spikes intact without removing any berries. Place the spikes out in the sun in a single layer. This initial 'first drying' is optional but recommended as it helps break down some compounds in the plant to create a better black color in the final peppercorn. This step may vary the most between different growers in different parts of the world, when it is done at all, it can last anywhere from a few hours to a few days. If they're outside, they'll need constant supervision to prevent birds from eating the riper berries. If you're making a small batch at home, it's easier to place them next to a window.

Blanch the berries in boiling water 5-6 minutes to kill microbes. Put the pepper spikes inside a fine mesh sieve, or (for large batches) a clean, food-safe cloth bag on the end of a stick. Lower the container into boiling water and leave it for several minutes. Blanching improves the flavor, color, and scent of the pepper and can help the berries dry more quickly. Lay them on a clean dry surface in direct sunlight. Keep the layer as thin as possible, with minimal overlap of berries. Gather the peppercorns after several days of drying (at least 2-3 days in very hot, dry weather or as many as 12 days in cool, humid weather).

As an alternative to blanching, you could use an oven with a low- temperature "warm" as long as not greater than 160 degrees Fahrenheit (70 degrees Celsius). Some dehydrators go up to 145 Fahrenheit. Often this takes less than a day. If you are drying pepper for your own use, the exact water percentage doesn't matter. Just take out the pepper when they turn into black peppercorns.

Some people dry the intact spikes, which makes it easier to remove the dried peppercorns afterward. To do this, you'll need a way to hang the spikes in the air and revolve them regularly to dry them on all sides. Clean and sort the dry peppercorns. In a typical harvest, only about 1/3 of the green berries end up as usable black peppercorns. Remove any stems or leaves that you see and toss out any peppercorns that are broken or the wrong size/color. Store in clean, airtight containers for 3 to 4 years in a cool, dark area.

### **Seed Saving:**

You can plant peppers from the seeds found inside and 70% of the seeds will germinate. Plant them as soon as you open the pepper to retrieve the seeds.

(If you choose to buy transplants, select seedlings that are dark in color with strong stems. Also avoid transplants that already have peppers growing on them, as these tend to produce less in the long run.)

### **Notes:**

Avoid getting peppers in your nose, eyes, or any other openings or cuts, which is a very painful experience. Protect your hands from burns with gloves in preparing to freeze. (pepper spray is made from chili peppers.)Description: All types of peppers are a part of the Capsicum family, which includes sweet (red and green Bell, Pimiento) to hot and spicy (Cayenne, Jalapeno, Anaheim, Serrano, Black, Ghost, Chili). The Banana and Cherry come both sweet and hot.

## Potato

### Description:

A delicious starchy tuber. Growing potatoes isn't difficult, but it's important to grow them in acidic soil, to give them lots of sun and water, and to grow them in winter in warmer climates, because they do best in cool climates.

### Growing Instructions

#### **Optimal Time/Temperature for Germination:**

Potatoes can be planted in fall and grown over the winter in warm climates where the ground doesn't freeze. In cooler climates where the ground does freeze in winter, potatoes should be planted two weeks after the last frost.

Use small but healthy potatoes for seed potatoes. Potatoes won't start growing until the soil temperature reaches 45° F (7° C), so don't plant the seed potatoes before the last frost.

Potatoes will grow fastest when they're grown from a seed potato, which is a potato that has been allowed to sprout. Two weeks before your set planting date, lay out your seed potatoes somewhere that gets plenty of light, and that's between 60 and 70° F (15.5 and 21° C). Leave the potatoes there in the light to sprout until it's time to plant.

If your seed potato is larger than a chicken egg, you can cut it in half or thirds. There should be at least two eyes or sprouts per piece. You can grow any variety of potato you like, but make sure you're using spray-free potatoes that haven't been treated with a sprout-inhibitor.

#### **Optimal Soil Conditions:**

Potatoes love full sun, and will do best in an area that gets several hours of light each day. You can also plant potatoes anywhere you like, including directly in the ground or in garden beds. The best kind of soil for growing potatoes is loose soil that's slightly acidic. The ideal pH is between 5.0 and 7.0, and you can increase the acidity by tilling aged manure, mature compost, or high-potash fertilizer into the soil.

Tilling the soil will also break everything up and ensure the soil is nice and loose for the potatoes. Potatoes grown in rows in the ground will produce good yields, as long as the soil is of good quality.

#### **Seed Planting Depth, Spacing and Procedure:**

When the potatoes are sprouted and it's time to plant, use a shovel or spade to dig 4-inch deep (10-cm) trenches in the garden bed. The rows should be just deep enough to hold the potatoes. Space the rows so they're 3 feet (0.91 m) (91 cm) apart. Place the seed potatoes directly into the trenches with the sprouts facing upward toward the sky. Space the potatoes 12 inches (30 cm) apart. When you've filled the rows with seed potatoes, cover the potatoes with 4 inches (10 cm) of soil.

### **Best Companion Plants and Plants that Hinder:**

Hindered By: turnips, pumpkins, cucumbers, rutabagas, sunflowers, tomatoes, squash and raspberry.

Beneficial: Beans, corn, eggplant, cabbage, peas, horseradish and parsnips all make excellent companion plants for potatoes. Marigolds are beneficial.

Potatoes are a good companion crop for beans, because they repel Mexican bean beetles. Potatoes return the favor to cabbage and peas by helping with growth but are an antagonist to asparagus.

### **Crop Maintenance**

When the potato plants reach a height of 6 inches (15 cm), add more soil around the base of each plant. This is called hilling, and it will protect the potatoes from sunburn and support the plants as they grow. (hill the potatoes again every time the plants grow another 6 inches.)

Potatoes that are exposed to sunlight produce a toxic chemical called solanine, which appears as a green layer on the outside of the tuber.

### **Moisture Requirements & Solutions:**

Potatoes like plenty of water, so it's important to keep the soil moist, but not soaking wet, while they grow. Make sure the plants get about 2 inches (5 cm) of water each week, especially when they're flowering.

Only stop watering the plants when the foliage starts to turn yellow and die back, as this means the potatoes will be ready to harvest soon.

### **Weeding Needs & Solutions:**

Potato plants will do better when they don't have to compete with weeds. As weeds grow up in the garden bed, pull or dig them out by hand to ensure the potatoes get all the nutrients they need.

### **Feeding Needs/ Optimal Natural Fertilizers:**

The best results are given by decomposed manure, which contains almost all the necessary macro- and micro elements for the plant.

### **Pests, Diseases & Solutions:**

Lower the soil pH to get rid of scab which is a common disease evidenced by lesions on the potatoes. Your potatoes may develop scab if the pH of the soil is too high so add sulfur to the soil to lower its pH.

Potato beetles should be picked off by hand. Aphids can be sprayed off with a sharp stream of water. Alternatively, you can remove these pests with a natural insecticide, like neem oil, which can be found at your local garden shop.

Be sure to wait three years before planting potatoes in a previous location to avoid potato blight. Overcrowding can also be an issue for potatoes, so be sure to give them plenty of space.

## **Harvest and Storage**

### **When to Harvest/Number of days to Maturity:**

Depending on the type of potatoes you planted, your potatoes will be ready for harvest anywhere between 60 to 100 days from the planting date. When your plants are about 10 weeks old, they'll start to flower. When flowering stops, wait another two weeks, and then harvest your new potatoes by digging them out of the ground. New potatoes are ones that have been picked before they were allowed to fully develop.

New potatoes are smaller and have a more tender skin than mature ones. People will often harvest some new potatoes to create more room for the rest to mature

As the potato plants mature, the foliage will begin to yellow and die as the plants approach the end of their life cycle. When this happens, remove brown foliage with garden shears or scissors.

### **How to Harvest:**

Once all the foliage has died and you've given the potatoes two weeks to mature, you can dig out the potatoes. Use a small shovel to gently dig down into the soil to unearth the potatoes. This will ensure you don't puncture or bruise any with the spade.

### **Optimal Storage Temperature and Conditions:**

After you dig up the potatoes, transfer them to a garage, covered porch, or somewhere else that's cool, dry, shaded, and well-ventilated. Leave the potatoes there for at least three days and up to two weeks to cure. This will give the skins time to mature, and help the potatoes keep for longer.

The ideal temperature for curing potatoes is between 45 and 60 F (7 and 15.5 C). Do not cure new potatoes, as they should be eaten within a few days of harvesting.

When the potatoes have had time to cure, use a cloth or vegetable brush to remove excess dirt from the skins. Do not wash the potatoes with water, as this can cause them to spoil faster so never wash it until ready to eat it. Transfer the potatoes to burlap or paper bags for storage. Move the potatoes to a root cellar or other place where they'll be protected from light, heat, and moisture.

The ideal temperature for potato storage is between 35 and 40° F (1.6 and 4.4° C). The potatoes should last for several months under these conditions.

### **Seed Saving:**

You can grow potatoes from potato seeds. However, because most potatoes on the market are hybrids, you're better off buying heirloom seeds from a garden center. Plant the seeds inside in the wintertime to give the plant plenty of time to grow, since potatoes grown from seed take longer than those grown from seed potatoes.

**Notes:** you should not eat potato leaves.

## Pumpkins

A larger member of the winter squash family that is native to North America, pumpkins are one of the oldest domesticated plants. They are widely grown for food, as well as for aesthetic purposes. Pumpkins are mostly thought of as giant orange fall decorations, but they come in many colors and sizes.

There are many different varieties, but for the home grower's purposes they fall into three main categories: Pie pumpkins, which are meant to be eaten. Large decorative pumpkins that can be carved into jack o lanterns. The seeds in these pumpkins are edible, but the flesh is not flavorful. Small decorative pumpkins.

### Growing Instructions:

**Optimal Time/Temperature for Germination:** Pumpkin seeds do not germinate in cold soil, so they need to be planted after the chance of frost has passed. Plan to plant pumpkins in late spring or early summer for a fall harvest.

In climates with long winters it is helpful to plant seeds indoors and transplant into the garden in spring. With proper care, the pumpkin plants should sprout within about a week.

### **Optimal Soil Conditions:**

Choose soil with good drainage. Clay-based soils don't absorb water quickly, and aren't as conducive to growing pumpkins so in such cases sand would need to be added. Choose a spot that doesn't have standing water after heavy rains. To give the plants an extra boost, prepare your soil beforehand by composting it. Dig large holes where you plan to plant and fill them with a compost mixture one week before planting.

### **Seed Planting Depth, Spacing and Procedure:**

Pumpkins grow on vines and need a good amount of space to thrive. Choose a place in your yard with 20 or 30 feet (6.1 or 9.1 m) of open space, such as along the side of your house, or along the fence in your backyard.

Pumpkins prefer full sun. Don't choose a spot under a tree or in the shadow of a building.

Plant your seeds in hills which helps improve soil drainage and allows the sun to heat the soil faster, speeding up germination. To make a hill, dig a hole where the hill will be, about the depth of the blade of the spade, and about one foot in diameter. Fill the hole with compost and well rotted manure and cover it with the removed topsoil, then shape it like a shallow volcano, making an indentation in the centre where the seeds will go. Space the seeds or transplants evenly around the indentation. Plant the seed 1–2 inches (2.5–5.1 cm) deep and within a few inches of one another. It is helpful to plant four seeds per hill, in case one doesn't sprout.

Plant pumpkins in widely spaced apart. If your pumpkin variety grows along creeping vines, space the hills in the same row 12 ft (3.7 m) apart, and space the rows 6 to 10 ft (1.8 to 3 m) apart, depending on variety size. "Bush-type" varieties that grow on shorter vines need 8 ft (2.4 m) of space in all directions.



**Best Companion Plants and Plants that Hinder:** Pumpkins are aided by lambs-quarters, radishes and nasturtium. Legumes, such as beans are nitrogen fixers in soil and will help the pumpkins. They were traditionally planted with corn as the vines make it difficult for foraging animals to get to the corn. Do not plant pumpkins with other heavy feeders or plants that will be overgrown by the vines.

### **Crop Maintenance**

As pumpkin vines develop, they can be pruned to strategically focus the energy of the plant towards the developing fruit. For areas with winter, about three weeks before the first fall frost, begin pinching off growing tips, flowers and new fruits, as they will not mature before the end of the season. Pumpkin flowers, like squash flowers can be cooked and eaten.

**Moisture Requirements & Solutions:** Pumpkin plants need a lot water, but they shouldn't get too much. Make a habit of watering them when the soil seems a little dry, rather than adding more water to wet soil. Deep, infrequent watering is ideal.

When you do water the plant, use a lot of water and let it soak deep into the soil. Pumpkin plants' roots run several inches or feet down, depending on the stage of growth, and it's important that the water reaches them. Pumpkins would benefit from a soaker hose.

Try not to get water on the pumpkin leaves. This encourages the growth of a fungus called powdery mildew, which can cause the leaves to wither and the plant to die. Water in the morning, rather than at night, so any water that gets on the leaves has time to dry in the sun.

When the pumpkins themselves begin to grow and turn orange, decrease the amount of water you use. Stop watering entirely about a week before you plan to harvest the pumpkins.

**Weeding Needs & Solutions:** Plan to weed a few times a week, especially when the seedlings are small. As the pumpkins mature the large leaves will create shade that reduces weeds and the vines will easily overgrow them. Keeping larger weeds clear of the main hill will leave more nutrients for the developing plants however lambs-quarters is a weed that is helpful to pumpkins. Mulch around your pumpkins to keep weed pressure down and conserve soil moisture. It will also help later to have the pumpkins sitting on mulch and not dirt.

**Feeding Needs/Optimal Natural Fertilizers:** When the plants first sprout (in about a week or two), adding fertilizer encourages health pumpkin plant growth. As a member of the winter squash family, pumpkins are heavy feeders. Cover the planted seeds with compost. If you composted the soil before planting, you can skip this step. If not, add a thin layer of compost or mulch in the areas where you planted seeds. The compost will help keep weeds out and nourish the seeds.

### **Pests, Diseases & Solutions:**

Check the pumpkin leaves and blossoms for beetles, which eat plant tissue and ultimately kill the pumpkin plant. Scrape them off the plant a few times a week. Radishes planted with pumpkin and other members of the squash family will help to repel the striped cucumber beetle.

Aphids are pests that threaten a lot of garden plants. They can be found on the undersides of the leaves, and if you don't take care of them, they'll kill the plants quickly. Nasturtium can be planted with the pumpkins as a trap crop. Insects feed and lay their eggs on the plant which can be removed and destroyed.

## **Harvest and Storage**

**When to Harvest/Number of days to maturity:** Pumpkins typically take 95 to 120 days to mature. The pumpkins should be bright orange in colour (depending on the species) with a hard shell. Their stems and often the vine itself should be starting to dry out and wither.

### **How to Harvest:**

Use a pair of shears to cut the stem, leaving it a few inches long. Don't break off the stems, since this will cause the pumpkins to rot.

### **Optimal Storage temperature and conditions:**

Store the pumpkins in a cool, dry place. Keep them away from humidity, damp, and direct sunlight. They do not need refrigeration. Pumpkins keep for many months after they have been harvested.

Washing before storage can discourage mold and fungi. Oxygen bleach (food grade Hydrogen peroxide) is safe for cleaning produce and can be purchased at many grocery stores. Use a 50/50 mixture of water and oxygen bleach that is labeled as 3 hydrogen peroxide solution. Spray or soak the pumpkins in the 50/50 mix, rinse, and dry.

**Optimal Preserving Procedures:** Pumpkin can be cooked and processed in canning jars as a pie filler that will store long term in the pantry.

### **Seed Saving:**

Use a sharp knife to carefully cut open your pumpkin by cutting a circle around the stem. If you're not using your pumpkin for decorative purposes, you can also just cut it in half for easier access. Then, dig in with your spoon and scoop out all the seeds and place them in your strainer. Don't worry about getting pulp mixed in with the seeds; you'll separate them in the next step.

Rinse the pumpkin seeds in the strainer under cool, running water to get rid of the pulp. Some pulp will be stubborn and stick to the seeds, so you may need to use your hands to rub it off completely. The end goal is to have clean seeds without any orange residue.

Prepare your cookie sheet by placing a layer of paper towels, paper plates, or waxed paper on top. Then, dump your clean pumpkin seeds onto the sheet in a single layer, breaking up any clumps of seeds. Keeping individual seeds separate will help them dry completely.

Set the cookie sheet with seeds aside in a cool, dry area to allow the seeds to fully dry. The drying process should take about a week, but the total time will vary depending on how cool and dry your space is.

Keep an eye on your seeds until they are all completely dry. Stir them at least once a day and flip seeds over to allow them to dry on both sides. Break up any clumps that form and continue allowing them to dry in a cool, dry area.

If mold appears, you likely don't have a cool or dry enough storage spot and need to move them to save the non-molded seeds.

You'll know your seeds are completely dry once they're white in color on all sides and they feel papery. Place the dry seeds into a sealable envelope, label it with the date and the pumpkin variety, and store the seeds in a cool, dry place until it's time to plant them.

Pumpkin seeds will germinate at 60 F, so avoid storing your saved seeds in an area that will exceed this temperature at any point. If needed, you can store your seeds in your refrigerator in an airtight container. Stored in a cool, dry place, dried pumpkin seeds can successfully last one year.

If you save seeds from a large pumpkin or two, you'll likely have many more seeds than you need for next year's garden. There could be hundreds of seeds in each one. Save your extras to roast in the oven for a delicious (and nutritious) crunchy snack.

**Notes:**

There are four main types of pumpkins: Pepo, Moschata, Maxima and Mixta. These large groups are further divided in dozens of species.

In general, pumpkins belong to the plant family called Cucurbitaceae, or cucurbits for short. Cucurbits contain four sub-groups with all the different pumpkins we use for Jack-o'-lanterns, pumpkin pies, and winning prizes at county fairs.

Cucurbits include a total of around 960 distinct species of plants, including melons, summer squash, cucumbers, winter squash, decorative gourds, and all varieties of pumpkins.

<u>Name</u>	<u>Main Skin Colors</u>	<u>Sizes</u>	<u>Main Uses</u>
Pepo	Orange, green	Small and medium	Carving, pies, cooking
Moschata	Tan, yellow	Medium	Pies, carving,
Maxima	Orange, blue and blue-green	Small to Large	Carving, winning prizes
Mixta	Orange, blue, red, multi-color	Small to medium	Decorative, cooking

VARIETIES

Baby Pam - excellent for pumpkin pie with a smooth-skinned fruit also suitable for painting or carving. You'll find dark orange inside and outside.

Early Sugar Pie - a classic New England style variety for pies. It has a string-less interior with bright orange flesh that also carves well.

Winter Luxury - a popular pepo heirloom weighing around 6 lbs. with a netted, buff-orange skin and sweet flesh.

Orange Princess - a fast-growing variety with slightly flattened fruits and deep-orange flesh and fruit averaging 5 lbs. each.

## Radicchio (Italian Chicory)

**Description:** An easy to grow biennial that can be harvested in the first year. Around 1 foot tall and 1 foot spread. Part of the Chicory family of vegetables. Available in a variety of colors.

### Growing Instructions

**Optimal Time/Temperature for Germination:** Depending on Variety, radicchio takes 80 and 100 days to grow from seed to harvest. If starting indoors, plant around one month before last frost.

The best temperature to grow radicchio is between 60 and 75 degrees F. temperature and between 45 and 55 degrees Fahrenheit nighttime temperature. Radicchio grows best in moderate to cool climatic zones and prefers full sun but will survive less optimal conditions.

**Optimal Soil Conditions:** Radicchio grows best with rather neutral soil conditions with a pH. of 6.5 to 7.5 and well drained, organically rich soil.

### **Seed Planting Depth, Spacing and Procedure:**

It is recommended that seeds are started indoors in areas with shorter growing seasons. When planting in seed trays, allow at least 3 inches between seeds in starter pots. Plant seeds 1 inch deep. Place seed trays in a sunny window or under grow lights. Germination should take 14-20 days.

If starting outdoors, or when transplanting seedlings, wait till after last frost. Be sure to "harden off" seedlings before planting out in garden. If planting in garden, allow at least one foot between plants as they get large. For seedlings, dig a hole 6 inches deep, add compost and enough rich hummus so that the seedling will be level with the top of the hole. Water after transplanting. Will also survive in large containers.

**Best Companion Plants and Plants that Hinder:** Radish helps repel pests and is a good use of space around the radicchio. Endives are also in the Chicory family so they will compete for nutrition and attract the same predatory insects.

### Crop Maintenance

**Moisture Requirements & Solutions:** Requires regular watering to keep soil moist but not swampy. The root system is shallower than those of its endive cousins, so they benefit from regular, though not deep, watering. Irregular watering in hot weather can increase the bitter flavor of the leaves.

**Weeding Needs & Solutions:** Regular weeding close to the plants will encourage growth.

### **Feeding Needs/Optimal Natural Fertilizers:**

Requires rich organic soil. Top dressing with compost or worm castings in the middle of the growing season will be helpful.

**Pests, Diseases & Solutions:** Slugs can be picked off by hand or trays of beer can be placed near the plants. Slugs will crawl in and drown in the beer. Empty trays daily or they will smell.

## **Harvest and Storage**

**When to Harvest/Number of days to maturity:** The outer leaves are perfectly edible, but it's that interior core that is most prized. It takes two to three months to develop mature heads. It can be blanched by placing an inverted pot over the plant (even a paper bag can be used), or the outer leaves can be bound at the top, forming a tight cocoon in which the heart can blanch. Taking this extra step increases the whiteness of the veins and the overall sweetness of the final product.

### **How to Harvest:**

You can harvest one large radicchio head per plant. Cut off head and leave plant in the ground. If growing season is long enough, a second head will grow.

### **Optimal Storage temperature and conditions:**

Best eaten fresh but can be stored in the fridge for a short time.

### **Optimal Preserving Procedures:**

Not suitable for long term storage but it is worth experimenting with bringing potted plants into the house in winter. Mid-winter sprouting can be encouraged by cutting plant back, covering with a paper or hemp bag to reduce light, and placing the pot in a cool dark place such as a basement or root cellar to cause a period of dormancy. Do not allow the pot to completely dry up but do not soak. The pot can be brought out and exposed to sun and warmth in a window. Sprouts will appear that can be eaten raw or cooked as fresh mid-winter vegetables.

### **Seed Saving:**

Radicchio is biennial, which means that it may not produce seeds in the first year. You may have to mulch a few plants so they survive over winter and then allow them to bloom in the second year.

In order to save seeds, leave the head on one or two plants and allow to bloom. Collect mature seed pods as soon as possible on a dry day. Radicchio seed develop mildew very easily.

You can harvest as early as two weeks after the flowers open. You can pull the whole plant, roots and all and allow it to dry upside down in a well-ventilated area protected from the elements for further seed development. You can also cut the seed stalks off as they mature and place them in a paper bag for drying.

If you don't need to collect large quantities of seed, you can pull off the individual white tufts, to which the seeds are attached. Put the tufts into an envelope or jar so you won't lose the tiny seeds.

To clean the seeds, shake the seed heads into a large bowl or bag to loosen the seed. The seeds are small and light, just barely heavier than the chaff so the best way to clean them for long term storage is to rub them through seed screens. The right size will have the chaff fall through and the seeds will stay on top. If you are only storing until the following season, you can probably get away with storing your seeds with the fluff, and just planting the seeds and fluff together the next year.

### **Notes:**

Can be eaten raw in salads and cooked with risotto.

## Radish

**Description:** Radishes are a root vegetable that matures incredibly quickly (with some varieties taking only 3 weeks from seed to maturity), and they are very hardy. Their peppery flavor adds a kick to soups and salads, and they take up very little space in the garden.

The most familiar radish is red but they come in a variety of colors.

### RADISH VARIETIES

Spring radishes are the types that people are most familiar (like the Cherry Belle radish, which is red on the outside and white on the inside). You want to make sure that you're growing these in spring or fall. They tend to be the fastest growing radish, as well.

Typically the summer radish is similar to the spring radish but tends to grow more slowly, taking around 6-8 weeks to mature.

The winter radish is much larger and starchier than the spring and summer radishes and takes longer to grow. It's best to sow it in late summer for a fall or winter harvest. Winter radishes include Daikon and Champions. Daikon can grow to 18 inches (45 cm) long and takes 60 days to mature, and includes some extra-spicy varieties.

### Growing Instructions

Because radishes grow so quickly, you can "inter-crop" them between slow-growing vegetables to make row markers. You can also "succession plant" them by sowing a new row each week, to spread your harvest over a longer period.

**Optimal Time/Temperature for Germination:** Radishes are a cool weather crop best planted in spring and autumn. Growing radishes during the hot summer months may cause them to bolt. (bloom and go to seed) You can plant your first crop a full 2 weeks before the last frost in spring, as radishes endure frost well. A typical spring radish germinates in about 5 days and is ready for harvest in 3 to 4 weeks.

Stop planting radishes when hot weather shows up. This basically means that if you're having consecutive days of 60 °F (16 °C) or above you should hold off on your radish planting until it gets cooler.

**Optimal Soil Conditions:** Radishes prefer loose soil that is free of stones and includes lots of organic matter. Add compost to soil before planting.

### **Seed Planting Depth, Spacing and Procedure:**

Plant radish seeds 1/2 inch (12.5 mm) deep and 1 inch (25 mm) apart. Rows should be planted about 1 foot (30 cm) apart. If you're planting a large radish you will want to plant the seeds about 1 inch to 1 1/2 inch deep.

As they germinate, thin the successful seedlings to about 2 inches (5 cm) apart, allowing more space for bigger varieties.

The greens of all radishes are edible, with larger greens being better cooked, so you can eat the young tender radishes and greens in salads as you thin them out.

**Best Companion Plants and Plants that Hinder:** Radishes work well as companion plants, because they keep a lot of the bugs off the regular plants and they grow more quickly. Plant them alongside carrots, parsnips, squash and cabbages.

### Crop Maintenance

**Moisture Requirements & Solutions:** Keep the radish beds moist, but not soaked. Watering radishes frequently and evenly will result in quick growth; if radishes grow too slowly, they will develop a hot, woody taste. If you don't water them evenly (for example, not watering for a few days and then drowning them) the radishes can crack.

If your radishes end up tasting too hot or too pungent, it likely means that the soil is too dry or the temperature of the soil is too hot (above 90 degrees Fahrenheit). To protect your roots and cool the soil, add 2 to 3 inches of organic mulch. Water your radishes 2 to 3 hours at a time and then wait until the soil has dried to at least a 4 inch depth.

If the radish root is pithy and woody the temperature of the soil has likely been too high and the watering spotty. Make sure that the roots are covered with soil or warmth to keep them cool and that you are watering evenly. Also, make sure that you are harvesting your radishes as soon as they're big enough, so that they don't grow too big and crack.

**Weeding Needs & Solutions:** Keeping the radishes clear of weeds can help prevent some pest problems.

**Feeding Needs/Optimal Natural Fertilizers:** Add compost to the radish bed as they grow to help retain moisture.

**Pests, Diseases & Solutions:** There are different kinds of fungi that can kill your radish or make it taste really bad. Usually there are obvious signs of a fungus problem that you can watch out for and subsequently deal with. Crop rotation, removal of infected radishes, clearing up nearby plant debris and making sure your bed is well drained helps with most fungal problems.

If your leaves are looking faded and you find that there are tunnels and grooves in the roots, you might have root maggots. These tiny critters are small, gray/white, legless worms. Flies lay their eggs in the soil beside the plant. To get rid of them, add lime or wood ashes to the base of your radish plants. Wait to plant your radishes until the weather is drier so that you avoid the maggot's life cycle.

If you have tiny holes appearing in the radish leaves, you might have flea beetles. These little critters are bronze or black beetles 1/16th of an inch long. If you find you have these, spread diatomaceous earth, a type of soft, sedimentary rock that crumbles easily into a fine, off-white powder. This can act as a natural bug killer. You should also cultivate the ground often, so that you disrupt the beetles' life cycle.

If your radish plants have whitish or yellowish spots, have deformed leaves, or if the plants are wilting, you might have Harlequin bugs. These bugs, which are black with yellow or red or orange markings, suck the fluids out of the radish's plant tissue. Pick out and destroy all the bugs and the egg masses. To help keep them out of your garden, keep it clear of the places where bugs breed, like crop residue and weeds.

If the leaves of your radish plant turn a dull yellow, if they curl and become brittle, your radish plant might have contracted Aster yellows, a mycoplasma disease spread by Leafhoppers. If

this is the case, remove the infected plant or plants, and control the leaf-hopper population by keeping down the weeds and plant debris.

## **Harvest and Storage**

**When to Harvest/Number of days to maturity:** Radishes are typically ready to harvest when their roots are about 1 inch (2.5 cm) in diameter. Check your seed packet for your variety's expected size at harvest and time to maturity. You can also push back the dirt and see if a bulb has grown. If so, pull a few radishes and taste them. That will let you know if they're ready to be harvested.

Unlike many root vegetables, radishes cannot be left in the ground, as doing so will cause them to become tough and pithy.

**How to Harvest:** To harvest, lift the entire plant out of the ground with your hand.

**Optimal Storage temperature and conditions:** Brush the soil off your radishes using your hand, and then store them in a cool, dark place for up to 2 weeks. Wash them with water before eating them.

**Optimal Preserving Procedures:** Radishes are best eaten fresh. For a taste of radish in winter, radish seeds can be added to winter sprouting mixes.

## **Seed Saving:**

Radish seed saving requires nothing more than leaving the pods on the plants until they are brown and mostly dried. Keep an eye on them if the weather is turning wet so they don't mildew. If this is looking imminent, I suggest abandoning the radish seed saving in lieu of harvesting the pods and eating them before they go bad. Once the pods are browning, you can pull the entire plant up and upend it in a brown bag. Hang the bag with the plant seed dangling down into it and allow the seeds to mature naturally. Once they are completely mature, the pods pop open and the seeds drop into the bag. You can also allow seed pods to mature in a cool, dry area and then winnow or sift them to separate the seeds from the chaff. Seeds will store for up to five years in a cool, dry area. Keep in mind that if you are collecting radish seeds from hybrid varieties, the chances of obtaining exact replicas of the parent plant in the successive planting season is nil as radishes cross pollinate readily.

Regardless, the resulting radish will still be a radish. If you want to be a purest, select only those seeds from dedicated heirloom plantings.



## Rhubarb

**Description:** Rhubarb is a vegetable originating from China, but in North America it is one of our oldest garden plants, commonly used in deserts. Ruby red rhubarb is a cool season perennial that will return for up to 20 years once established. Its tart, fresh flavor is sought after by cooks looking for something special to make into pie and other desserts. Rhubarb should be planted in a sunny area and given plenty of nutrients to grow healthy and strong.

### Growing Instructions

**Optimal Time/Temperature for Germination:** Rhubarb is a cool-season plant that requires temperatures that drop below 40 °F (4 °C) in order to stimulate growth. (zones 3-8) The northern states in the US as well as Canada are good places to grow rhubarb.

Rhubarb wilts during the heat of hot southern summers. If you live in a southern region where it regularly goes above 75 °F (24 °C), it will be difficult to grow this plant.

### **Optimal Soil Conditions:**

Rhubarb is best planted in an area in full sun although it will tolerate part shade. Look for a spot that drains well, since rhubarb won't do as well if water sits around its base. To determine whether soil drains well, dig a hole and fill it with water. If the water sits in the hole, the soil there doesn't drain well. If it immediately soaks into the ground, the soil is great for planting rhubarb.

### **Seed Planting Depth, Spacing and Procedure:**

Rhubarb is best grown from roots (crowns), not seed, since the seeds take a long time to get established and there's no guarantee they'll ever germinate. Go to your local nursery and buy rhubarb roots, or get some from a neighbor. Because rhubarb is very prolific once established, most gardeners will be happy to share.

Dig 4–5 inch (10.2–12.7 cm) holes 3–4 feet (0.9–1.2 m) apart. Rhubarb plants can grow to become quite large, so it's important to give them plenty of space. Plant your rhubarb at the back of the garden or in a spot on its own so that it can come up year after year and spread out without being disturbed by tilling.

Plant the roots 2 inches (5.1 cm) below the surface of the ground. Place the roots in the holes and gently fill them in with compost-rich soil. Water the roots after planting.

It is helpful to put a layer of mulch over your rhubarb bed in the spring and fall. Use hay and cow manure to keep weeds from growing and continue to nourish the rhubarb plants. Leaf mulch or ramial wood chips also make good mulches.

## **Best Companion Plants and Plants that Hinder:**

Columbines help protect rhubarb from red spider.

Rhubarb leaves contain oxalic acid. They can be boiled in water to make a spray. When rhubarb tea is watered into holes before sowing plants of the cabbage family to prevent clubroot. It is also useful to combine with Jadam wetting agent and spray on roses to protect against greenfly and black spot.

## **Crop Maintenance**

Healthy Rhubarb will produce seed stalks in the summer. It is important to cut these off as they will reduce the productivity of the plant.

**Moisture Requirements & Solutions:** Your rhubarb bed should stay moist and well-drained throughout the heat of the summer. Water every time the soil begins to look dry.

**Weeding Needs & Solutions:** When it is first establishing it is helpful to remove any major weeds but Rhubarb, with its large leaves and deep roots, will quickly shade and crowd out weeds. It can even out compete hardy grasses.

## **Feeding Needs/Optimal Natural Fertilizers:**

Rhubarb will grow even when neglected and is a common sight on the edges of roadsides in rural areas, having escaped many gardens over the years. But if you feed well composted manure to your rhubarb it will get huge and beautiful. It is recommended that after the first year has passed, use a light application of high-nitrogen fertilizer to encourage the rhubarb to come back healthy. Do this after the ground has started to thaw.

## **Pests, Diseases & Solutions:**

Rhubarb isn't prone to getting many pests, but you may notice a beetle called the rhubarb curculio on the stalks. This beetle is light gray and about half an inch long. Pick off the beetles by hand and remove and dispose of leaves with eggs on them.

## **Harvest and Storage**

### **When to Harvest/Number of days to maturity:**

Rhubarb needs a year to get fully established, so you'll need to wait until the second year before harvesting any stalks.

Harvest stalks when they are mature. They should be 12 to 18 inches (30.5 to 45.7 cm) long. Continue harvesting throughout the summer - the season should last 8 to 10 weeks.

### **How to Harvest:**

Harvest rhubarb in late May or June by cutting the stems off with a sharp knife at soil level. It is best to harvest several times, removing a few stems from each plant each time. Harvesting the crop slowly allows the remaining stems to draw on the energy of the plant. Always leave at least two stalks per plant so that it can store up energy for next year. This will ensure that you have a harvest next year.

Stop harvesting when the stalks start growing up thin

**Optimal Storage temperature and conditions:**

If you aren't going to use it immediately, store it in an airtight food storage bag in the refrigerator. It will keep this way for up to a week.

**Optimal Preserving Procedures:**

Rhubarb freezes really well. Cut the rhubarb stalks into chunks and partially dry them on a cookie sheet so they don't stick together before putting them in freezer bags.

Rhubarb jam can be made into preserves in glass jars and it goes especially well with strawberries. Stewed rhubarb is considered a pioneer staple as it provided badly needed vitamins in the winter months.

Modern dehydrators can be used to make strawberry rhubarb fruit leather, a healthy snack for kids, which will keep in sealed containers in the pantry up to 9 months if it doesn't get eaten before then.

**Seed Saving:**

Growing rhubarb from seed is not common because it is much easier to grow from roots which are readily available.

Saving rhubarb seedpods is easy. Clip the stalks with snips or break the brittle branches off by hand. Hover the branches over a cookie sheet and run your fingers down the stalk, brushing the seeds onto the cookie sheet. Dry the seeds on the cookie sheet for a week or two, then package them up and put in a dark, cool place for storage.

## Rutabagas

Rutabagas are a root vegetable in the mustard family and are a cross between turnips and cabbage. Since they grow well in cool weather and can be harvested into winter, they tend to be popular in northern countries. Another name for them is Swedish turnips or swedes. Rutabagas are large oval or slightly elongated bulbs with firm yellow flesh. The leaves of rutabaga plants, which are edible, are similar to turnip leaves but are thicker, like cabbage or kale leaves. Rutabagas often do not flower, but when they do, it is a small, yellow Brassica flower, with four petals that form a cross and give them their designation as cruciferous vegetables. They are typically planted in spring, but they can be planted in fall in warm climates.

Rutabaga Varieties  
Altasweet: Mild, less peppery flavor; matures in 90 to 100 days  
American Purple Top: Popularly grown variety with large bulbs; matures in 90 to 100 days  
Laurentian: Heirloom variety with uniform, sweet bulbs; matures in 90 to 120 days  
Pike: Similar to 'Laurentian' but a little hardier; matures in 100 to 120 days

### Growing Instructions

Rutabagas are biennials grown as an annual crop. Hardiness Zones 3 to 9. They may go to seed in their first year if they are planted early in the spring. In cooler climates, rutabagas are direct seeded in late spring, after the danger of frost, so that they will mature in the fall. In warm climates, they are usually seeded in the fall and grown over winter. They will not sweeten if they mature during hot weather.

Plant the seeds about 1/2 inch deep. Thin the seedlings when they are about 3 to 4 inches tall, so the bulbs will have room to fill out. You can toss the thinned greens into a salad or stir-fry.

Rutabagas do best in full sun, which means about 6 hours of direct exposure per day. They will tolerate partial shade. Rutabagas prefer a slightly acidic soil pH in the range of 6.0 to 6.5. Good soil fertility will help them grow throughout their long season; amend the soil before planting if it is poor. Most importantly, make sure the soil is well-draining so the bulbs don't rot. Proper watering is vital for good root development. Give your rutabagas at least 1 inch of water per week; give them more during particularly hot, dry weather.

Rutabagas grow well in a range of temperature and humidity conditions. In dry areas, they are prone to cracking and will not develop their sweetness if they're not given enough water. Rutabagas are sweetened by a little frost. You can harvest them in the fall (or late winter in warmer climates) or you can leave them in the ground with a thick layer of straw mulch and harvest as needed.

If you start with soil that is rich in organic matter, you won't need any additional fertilizer. A side dressing of compost, applied mid-season, will give your plants the boost they'll need to get through to fall.

## **Pests, Diseases & Solutions:**

There are several insects, such as flea beetles, that will chew on and damage the leaves of rutabagas. If you plan to use the greens, a row cover will protect them. Root maggots cause more of a problem because they damage the bulbs. The row covers will help with these, as well, by preventing the moths from laying their eggs on the leaves.

Rutabagas are less susceptible to disease than many other Brassica plants, but you should still rotate your crops to help prevent problems. The main disease that ruins crops is club root. If your plants get club root, it is recommended that you wait six years before grow any Brassica plants in the same area again

## **Seed Saving**

Follow seed saving instructions for turnips. Separate from other rutabaga varieties or member of the same species such as Siberian kale by 1 mile.

Separate turnips from other plants in the Brassica Rapa family. Plants are biennial so will require overwintering with mulch or trim leaves to 2 inches above the bulb and store them in a root cellar in either damp sawdust or sand.

Replant in spring and wait for them to flower; when pods dry out they are ready.

## **Harvest and Storage**

Rutabaga plants grow about 12 to 24 inches tall and 9 to 12 inches wide. The bulbs can become the size of a softball, or larger. However, they are best when harvested smaller, at 3 to 5 inches in diameter. Larger bulbs tend to get tough. The greens can be harvested any time after they reach 4 inches tall. If you don't harm the top of the bulb, the greens will continue to regrow.

Although rutabagas are related to turnips, they have a different flavor altogether. Rutabagas are sweeter and almost buttery when cooked. You can use them for baked dishes, like casseroles, soufflés, and even pies. They are also excellent as a side dish when mashed or baked like fries. And, of course, they are wonderful roasted and are great in soup.

Raw rutabagas are crunchy and juicy. You can slice, cube, or grate them into all kinds of dishes and snacks. The bulbs can be stored in the refrigerator or any cool, dark place for months. Just be sure to remove the leaves before storing the bulbs.

## Salsify

Salsify and scorzonera are root vegetables that are part of the dandelion branch of the daisy family tree, and both, naturally, are easy to grow. Salsify, though, has a white root while scorzonera has a black root. Salsify is known as oyster plant or oyster vegetable thanks to its oyster-like flavor. Salsify and scorzonera are related to dandelions.

### Growing Instructions

Choose a space with well-drained loamy or sandy soil that receives full sun and where the soil contains rich deposits of organic material. The pH level should be between 6.0 and 6.8. If you are planting your salsify in the spring, be prepared to provide shade when summer temperatures are above 85°F (29°C) to prevent the roots from becoming stringy and tough.

Salsify grows from seed, and the seeds germinate in about a week, but they can take up to three weeks before they are ready to transplant. If you are starting your seeds indoors, you should transplant your salsify about two weeks before the last frost date in your area. This means you need to start your seeds indoors five to six weeks before the last frost date in your area.

If you intend to sow your seeds directly in your garden, sow them three to four weeks before the last frost date in your area.

For a winter or spring harvest, wait to sow your seeds until mid to late fall after temperatures have cooled to below 85°F (29°C). If you have harsh winters, cover the soil with a layer of straw 2 feet thick.

Because salsify is a root plant and the roots grow approximately 12 inches deep, the soil needs to be thoroughly worked to at least that depth. All rocks need to be removed, and clumps of soil need to be broken up completely.

Obstacles like rocks and clumped soil cause the roots to fork. Work the soil in the fall for spring planting or at least two weeks before fall planting. Add compost as you work the soil, but avoid adding manure as too much nitrogen causes the roots to split.

If you are starting the seeds indoors in peat pots, space them 1/2 inch apart and cover them with 1/2 inch of soil.

Transplant the seedlings when they are 3 inches to 4 inches tall. Create ruts that are 18 inches to 24 inches apart and deep enough for the roots of the seedlings. Break the peat pot away from the soil around the roots and loosen the soil if necessary, but don't remove it entirely. Space the seedlings 3 inches to 4 inches apart and cover them so that just the tip of the top of the root shows above ground.

If you sow the seeds directly in the garden, create ruts that are 1 inch deep and 18 inches to 24 inches apart. Space the seeds 1/2 inch apart, and cover them with 1 inch of soil. When the seedlings are about 2 inches tall, thin them so that they are 3 inches to 4 inches apart.

**Best Companion Plants:** Carrots, Potatoes, Sweet potatoes, Turnips, Swede

### **Crop Maintenance & Harvest**

Keep your salsify watered evenly to prevent the roots from splitting.

Salsify has almost no problem with disease or pests, but, because salsify grows slowly, it can be overshadowed by faster growing weeds. Consequently, you will need to keep your salsify well weeded. Keep in mind, though, that salsify resembles small twigs when it first sprouts, so if you have started your seeds directly in your garden, be careful not to uproot them as you weed.

About midway through the growing season, add compost around the plants, again, avoid using manure.

You can use the lighter colored, lower part of the leaves in salads, and the flowers also are edible.

When harvesting the roots, be careful not to break or damage them as that will reduce the amount of time you can store them. Place a shovel or a harvesting fork into the ground beside the plant deeper than where the root would grow and tilt the shovel or fork to lift up under the plant.

Root crops aren't the best choices for container gardens. You will need to choose a container deep enough to accommodate the long roots and has bottom drainage.

VARIETIES: Sandwich Salsify, Western Salsify, Yellow Salsify, Goats Beard

### **Seed Harvesting:**

Just before the head spreads out, you'll notice two signs: the green seed head leaves will begin to loosen up and may even start to shrivel and the 6 inches or so of stem under the seed head will turn from a green to a yellowish, lighter color (presumably the drying process).

When the seeds are fully mature, the head will unfold (think dandelion). If you cut off the pappus, then you'll have a tidy collection of brown seeds (see Denmark). When fully spread out, the seeds will fall out easily, so should should cut off the head gently and quickly.

Ideally, you should have up the cut flowers to dry for a few days in a place where falling seeds will be caught. This year, I'm just rubbing the seeds off into small paper bags to dry.

If the flower has fully opened the seeds rub off very easily; however, if you cut off the flower head before then, it can take a bit of effort to get all the seeds out.

## Scallions

Scallions are a type of onion, but they have a milder taste with a little bit more bite. They can be eaten raw in salads and on sandwiches, cooked in stir-fries and other dishes, or they can be used as an ingredient for flavor.

VARIETIES: Nabechan, Parade, Evergreen Hardy White, White Spear

### Growing Instructions:

Can be grown from seed or as a cutting. Scallion seeds should be planted in the fall to get a head start on growing before spring arrives. You'll need about six weeks for your seedlings to mature and then be ready for planting out into the garden after it has warmed up sufficiently during early April.

A row spacing of 16 inches is recommended to allow for good air circulation among plants while still ensuring an adequate amount of space between rows. Planting depth-wise, scallions should be planted about half as deep as the height of your seedlings.

Watering is a crucial step in keeping them healthy, and a daily watering schedule will help ensure that they are never under-watered or over-watered. What you want to do is water them thoroughly so that each plant can absorb between one and two inches of water before needing more for another day or two. If it has been raining heavily, then allow an extra day without watering since rainwater should be adequate.

Some gardeners like to mulch their rows with straw after planting. This helps keep moisture levels high while also suppressing weeds from growing alongside your precious vegetables. Mulching too soon could inhibit growth though, so it is best to wait until your plants are at least six inches tall before mulching.

Another factor that can affect scallion growth is the amount of sunlight they receive. If you have a lot of sun, then thinning out some rows may be necessary to allow for better light penetration since taller plants will shade those in the front row. But if you find yourself with not enough sun, then try planting them alongside a north-facing wall or fence to give them more light during daytime hours when there isn't any direct sunshine on your garden area.

If you decide you want to use cuttings instead to cut back on the time it takes for your scallions to grow, all you need is some new growth from the stem of an established plant. Using a sharp knife or pruner, cut off about three inches below where the leaves meet the stem on each side and then place in damp soil with at least one inch above ground level. In order to make sure your plants are healthy before moving them onto their permanent home after they've grown roots, be sure to water frequently so that the soil stays moist. Once rooted, transplanting should only take a few minutes.



**Harvesting:**

Cut the plants about an inch from the base of the scallion's leaves. It is not necessary to remove the tough outer skin before eating them, but you can if desired.

Chop and cook with other vegetables or enjoy raw on a salad for added color! Try using these versatile scrumptious greens as part of your diet this year!

**Seed Saving:**

Only choose mature scallions that have started to flower. These will look round and fluffy. Chop the flowers off and place them in a paper bag. Allow the flowers to dry for several days and shake them occasionally. The seeds should fall out of the petals once they're dry enough!

Store these in an airtight container until ready to use next year! You can also plant some scallion seedlings now, if you want more plants sooner rather than later.

If you've got second year (overwintered) scallions, now is the time to save seeds. After the blooms mature, each of those little black dots you see is a scallion seed. Cut the stems, place flower heads in a paper bag for a few days up to a few weeks to dry, then shake each stem about inside the bag to release the seeds.

You can spread some seeds now for fall scallions (no need to dry the seeds, if this is your goal) or spread a bunch even later in the fall for early spring growth.

## Spinach

**Description:** A cool-weather loving green, spinach is a fast-growing relative of beets and Swiss chard. You can plant spinach in either spring or fall, or both if you want to produce a biannual harvest.

Spinach tastes delicious raw or cooked and is absolutely packed with iron, calcium, antioxidants, and essential vitamins like A, B, and C.

VARIETIES : Giant Noble, Bloomsdale, America, Matador, Strawberry Spinach, Good King Henry Perennial Spinach

### Growing Instructions

#### **Optimal Time/Temperature for Germination:**

(Zone 3-9) Spinach is extremely cold-hardy and fares well in these mild to cold climate zones. This cold-weather crop prefers temperatures between 35 and 75°F (1 and 23°C).

For an early harvest, plant your spinach four to six weeks before the last spring frost. This early crop can "bolt" (grow leggy and bloom), so harvest before you reach 14 hours of sunlight a day for best results. Some cultivars are less likely to bolt than others.

For a late harvest, plant six to eight weeks before the first fall frost for a more reliable fall crop.

In warmer areas spinach can be overwintered. To do this plant spinach in autumn for a small late autumn harvest, followed by a dormant winter period with an early harvest next year.

Savoyed varieties are characterized by their dark green crinkly leaves. They are best for planting in the fall because they become especially crisp in cold weather.

Smooth-leafed spinach grows upright and produces leaves lighter in color than those produced by savoy spinach. It grows quickly.

#### **Optimal Soil Conditions:**

Though spinach prefers a mild climate and will not do well in extremely hot temperatures, because it will bolt (go to seed) it does like full sun. Spinach will produce in partial shade, though the yield may not be as impressive, nor the plants as productive. Because spinach is a small plant that does not grow extremely deep roots, you will not need a large growing space if you are only growing spinach.

If you live in a particularly hot climate, consider using cold frames or heavy row covers to keep the soil cool during hot summer days. Also be sure to sow extra seeds and water twice daily if growing in hot weather.

Spinach prefers a slightly acidic soil with a pH between 6.5 and 7. You can add limestone to the soil to adjust the pH level manually. Evaluate the soil's calcium and magnesium levels in order to determine what type of limestone to add to your soil. If the soil is low in magnesium, add dolomitic limestone. If it is high in magnesium, add calcitic limestone. Add the limestone two to three months before planting when possible to allow the soil to absorb it. After the limestone is incorporated, check the pH again.

### **Seed Planting Depth, Spacing and Procedure:**

To prepare the growing area make sure to remove any rocks or hard clumps of soil before adding organic fertilizer. You can use a bow rake to check for and remove any unwanted objects.

Pull any weeds or voluntary plants that are growing in the planting area. These may compete with young spinach plants and crowd them and/or transfer disease to them.

Sow seeds ½" (1cm) deep and two inches (5cm) apart. Make sure the rows are spaced at least eight inches (20cm) apart if planting in rows. Doing so allows the seeds to mature without having to compete for space. Make sure to buy fresh seeds for planting each year, as they do not stay viable for long.

Seeds can be sown in pots indoors and transplanted out in the garden for an early start. If you are transplanting seedlings, space spinach plants about 12 to 18 inches (30.5 to 45.7 cm) apart. This allows the seedlings to grow and expand their roots without competing with each other for space. It is recommended that you grow spinach from seed if possible as seedlings are difficult to transplant and the roots can be damaged in the process.

Cover the seeds with soil and pat lightly. The soil does not need to be compacted over the seeds; in fact it should be rather light and fluffy. Just be sure that the seeds are not exposed to the air and are entirely covered by soil.

Water the planting area thoroughly. Make sure to use a watering can or a light shower setting on your hose. A strong setting can disrupt the newly planted seeds or even wash them away.

**Best Companion Plants:** Plant early Radishes with spinach to help to mark the row and will come up and be pulled before the spinach matures fully.

Because of its saponin content, spinach is a useful pre-crop and does well planted with strawberries.

### **Crop Maintenance**

As your spinach plants grow into seedlings, thin them lightly to prevent the plants from competing for space. You want the plants to be spaced far enough apart that the leaves of neighboring plants barely touch, if at all. Remove plants several times during growth to keep this balance, saving the tender young leaves for eating.

Cover the soil with a shade cloth if temperatures climb above 80°F(26°C). Spinach does not do well in hot weather. If temperatures begin to climb, you can cover the soil with a shade cloth to lower the temperature of the soil and keep the plants cool.

Spinach is a cold-hardy crop that farmers often maintain over the winter for an early crop next year. During winter, protect your spinach plants in a "low tunnel" of row cover over a simple PVC frame, with ventilation to prevent overheating on sunny days. The spinach plants will be semi-dormant during the darker months, requiring infrequent watering and no fertilization. Once longer daylight hours trigger growth in late winter, provide water-soluble fertilizer and care for the growing spinach as you would at other times of year.

**Moisture Requirements & Solutions:** Spinach likes a moderately moist habitat, but will not do well in soil that floods regularly or does not drain well. If you cannot find an adequate plot in your garden you can make a raised vegetable garden bed or plant your spinach in a container or raised bed.

You want the spinach to grow in soil that is continually moist but not overly drenched. Depending on the climate, you should water your spinach crop on average once or twice per week. Spinach would benefit from a soaker hose system.

**Weeding Needs & Solutions:** To reduce weeds, spread mulch over the planting area. Cover the soil of the planting area with a few inches of hay, straw, leaf, or grass mulch to prevent weeds from sprouting. Pulling unwanted weeds may harm the fragile spinach roots, so mulch is a good alternative for weed control.

#### **Feeding Needs/Optimal Natural Fertilizers:**

Spinach likes soil rich in organic matter such as well rotted manure, alfalfa meal, soybean meal, cottonseed meal, blood meal, or any other high-nitrogen fertilizer. Be sure to mix a few cubic feet of organic material into the soil to ensure adequate richness.

If your spinach plants are growing slowly, you may want to add more nitrogen-based fertilizer.

**Pests, Diseases & Solutions:** Making a tea from Garlic and spraying it on Spinach helps control disease. It is important to plant spinach in a fenced area that cannot be accessed by foraging animals such as deer.

#### **Harvest and Storage**

**When to Harvest/Number of days to maturity:** As soon as the leaves grow big enough to eat (usually about three or four inches in length and two or three inches wide), you can harvest your spinach leaves. It generally takes about six to eight weeks from planting to harvest.

In the springtime, make sure to harvest spinach leaves before they begin to bolt. Once the plants bolt, the leaves become bitter.

#### **How to Harvest:**

Harvest the spinach by carefully removing the outer leaves. Either pinch at the base of the petiole with your fingers or use gardening shears to snip the base of the petiole.

Alternately, you can harvest the spinach by pulling the entire plant out of the ground. Because spinach does not have very firm roots, it is easy to pull a plant out of the ground entirely.

Removing the outer leaves is preferred to uprooting the entire plant as doing so allows the inner leaves to grow larger, ultimately producing more mature spinach than if the plant is entirely uprooted.

**Optimal Storage temperature and conditions:** Spinach is best eaten fresh.

**Optimal Preserving Procedures:** Spinach does not preserve well although there is some potential with modern freeze drying techniques as an additive to stews and soups for winter nutrients.

**Seed Saving:**

Keep one or two of the female plants, and let them dry out completely. Once spinach seeds begin to ripen on a plant, a combination of mature and immature seeds will almost always be present. Plants should be harvested when at least two-thirds of the seeds are mature.

Gently pull the dried stalks (so you don't dislodge the seed) and continue drying for 10 days.

Remove the seeds by running a gloved hand along the length of the stalk with a container placed underneath to catch dislodged seeds.

Roll the seed clusters between your fingers. The seeds will separate.

When stored under cool, dry conditions, spinach seeds can be expected to remain viable for six years.

## Squash, Summer and Winter



### Description:

Squash comes in a wide variety of sizes and shapes ranging from the round of pumpkins to the elongated of zucchinis, because it can cross pollinate and has been widely cultivated for centuries.

Squash is a member of the Cucurbita species so it is a cousin of cucumbers and has similar needs and behavior. Extensive vines produce tendrils that allow it to climb walls, old buildings, fences, or trellises. It can also trail along the ground and grasp on to any weeds available. The five lobed leaves and stems produce hairy trichomes, which are often hardened and sharp enough to irritate the skin.

Archaeological investigations have found evidence of domestication of Squash going back over 8,000 years from the very southern parts of Canada down to Argentina and Chile. As one of the traditional indigenous three sisters plants, squash has a rich history in North and South America. The dynamic of the tangled vines and irritating trichomes, makes squash an excellent companion plant to deter foraging animals from crops such as corn although, as a heavy feeder, extra watering and fertilization must be provided. Planting nitrogen fixing legumes along side is a good strategy.

Squash species are monoecious, with unisexual male (staminate) and female (pistillate) flowers on a single plant and these grow singly, appearing from the leaf axils. The stem directly behind the blossom provides the most obvious clue to the flower's gender. Male squash flowers have a straight, narrow stem that is usually 2 or more inches long. Female blossoms have a swollen stem that resembles a miniature version of the mature fruit. This swollen area is the ovary that develops before the flower begins to open, so you can determine the flower gender as soon as the buds begin to form.

Pollinated female flowers produce fruits are large and fleshy. To encourage fruit production they can be hand pollinated with feathers.

When a plant already has a fruit developing, subsequent female flowers on the plant are less likely to mature, a phenomenon called "first-fruit dominance", and male flowers are more frequent. The excess male flowers can be eaten and the vines can be pruned to allow more energy to go into producing larger fruit over a long time. Alternatively, picking immature fruit will cause more fruit to be produced which results in an ongoing harvest of smaller fruit.

There are two types of squash; summer squash and winter squash.

Summer squash has been cultivated to grow quickly and be harvested while immature, when skins are soft and edible. Winter squash has been cultivated to be left on the vine to mature fully until the seeds are hard and the skins are tough and unpalatable. The tougher skins allow winter squash to be successfully stored for months in root cellars over winter, unlike their more tender counterparts that do not store for more than a few weeks. Winter squash are generally larger and take longer to mature than summer squash.

## Summer Squash

Varieties of Summer squash include zucchini and patty pan.

### **Growing Instructions:**

#### **Optimal Time/Temperature for Germination:**

Summer squash needs an average of 60 days to mature. They are not frost hardy and need warm temperatures to sprout.

**Optimal Soil Conditions:** Requires well drained, rich, organic soil with plenty of compost and some manure. It is ideal to prepare the hills in the fall and allow the compost and manure to overwinter in the soil.

**Seed Planting Depth, Spacing and Procedure:** Direct sow seeds in the ground after all danger of frost has passed, usually in early spring. Later planting can be successful, depending on the length of the growing season. Start about two to three seeds in an area that should be spaced 24 to 36 inches (61-91 cm.) apart. You can put four to five seeds in hills that are located 48 inches (1 m.) apart. Make sure to plant these seeds about an inch (2.5 cm.) deep into the soil.

#### **Best Companion Plants and Plants that Hinder:**

Squash is one of the Three sisters indigenous traditional companion planting strategies which includes corn, squash and beans.

Two or three icicle radishes planted in each hill will help repel insects.

Nasturtiums help repel squash bugs.

Potatoes and pumpkins inhibit each other.

### **Crop Maintenance**

Bush varieties will need a large area to spread out. Vining varieties will send vines and tendrils in all directions. You can rearrange your summer squash plant tendrils so they keep growing near or on the hill, but once the tendrils take hold, don't pull them or you might disrupt the growth of the plant. Vines can be trained to trellises and fences, but it is important to harvest fruit before it gets too large for the vine to support.

Once fruits start to form caution is advised because damage to vines reduce or stop production.

### Hand Pollinating:

Male squash flowers develop and open first; the first few flowers on a new plant are usually male, with the female blooms beginning to open days, or even weeks, afterward. These male flowers drop off once they shed their pollen, so your squash may lose its first flower flush without setting fruit.

Male and female blooming begins to overlap once the squash is actively in full flower, which allows for pollination and fruiting to occur. Both male and female squash flowers open in the morning and close in the late afternoon or evening.

Squash pollen is sticky and does not travel through the air on its own. Although bees and insects usually pollinate the female flowers, hand pollination can improve squash yields. It's especially helpful in urban areas with few bees or if both male and female squash flowers are dropping from the plant without setting fruit.

Rubber band the male flowers closed on the day they bloom so they don't shed their pollen. Pick these flowers the following day when the female blooms open. Remove the male petals and rub the anthers inside the female flowers to pollinate them. You can also use a small paint brush or a feather to transfer the pollen.

Alternatively, pick male flowers the day they bloom and keep them in a vase of water overnight. Then, pollinate the female flowers the next morning.

**Moisture Requirements & Solutions:** Provide good drainage and don't spray the leaves when watering, which can encourage leaf mold. Squash vines benefit from drip irrigation as they shouldn't be over watered but need moisture to support fruit production.

**Weeding Needs & Solutions:** Squash seedlings need some space around them so that they don't have to compete with weeds but once they get big they will actually climb all over anything else and aren't hindered as much by weeds. It's good to keep large weeds that compete out of the main spot where the squash plant grows, although nitrogen fixing weeds like clover and lambs quarters can be helpful.

Gardening fabric or mulches can be helpful to keep down weeds and provide clean resting spots for maturing fruit.

**Feeding Needs/Optimal Natural Fertilizers:** Best fertilizer combination of 5-10-10 nitrogen-phosphorus-potassium. Before planting seeds, pile up hills with 2/3 organic compost and 1/3 well composted manure, then top with organic soil. Refrain from fertilizing during flowering and fruit production, unless the plants are growing poorly. In such case, top dress with worm castings. Too much fertilizer can cause blossom drop or reduced fruiting.

### **Pests, Diseases & Solutions:**

Dark gray squash bugs lurk under the leaves and suck the plant's juices. Vine borers are a caterpillar or a small moth that bores into the stems, killing the stem beyond the damage. Watch for their eggs under the leaves and along the ground. Bugs can be picked off by hand, especially early in the day when they are sluggish. Seriously affected vines that are covered in aphids or bug eggs can be cut off and disposed of. Floating row covers can help with this problem, though you'll have to remove them when your female flowers show up so they can be pollinated. If your growing seasons allows it, you can avoid the bugs by planting squash earlier or later in the season. Tobacco ash, if placed with the seed when it is planted, is said to repel squash bugs.

Aphids can be controlled with soap spray or water and as a last result, use neem.



"Powdery mildew" causes leaves to have a milky appearance. In the second half of their growing, spray the plants with a mixture of one part milk to six parts water every two weeks to fend off this disease.

### **Harvest and Storage**

**When to Harvest/Number of days to maturity:** Frequent harvesting of immature fruit will encourage more fruit to form. Immature fruit has more tender skins that are more edible and great to chop up for stir fries. More mature fruit has tougher skin which lends well to baking. More mature fruit has hard seeds that must be scooped out whereas immature fruit has few or small seeds that can be eaten.

**How to Harvest:** Cut fruit off carefully with scissors or a knife without damaging the vine or knocking off flowers. Flowers can be harvested and eaten for example, in tempura. If you harvest blossoms as an edible, select the extra male flowers as soon as they open, leaving the female flowers to produce fruit. Be sure to leave a few male flowers to pollinate the female blooms.

**Optimal Storage temperature and conditions:** Can keep in the fridge for about a week, but best eaten fresh off the vine.

**Optimal Preserving Procedures:** Summer squash can be preserved long term, featured in a relish or as a pickle.

**Seed Saving:** Keep your squash isolated from other varieties of the same species. Pick a fully mature fruit (hard rind, even for summer squash) with the traits that you deem desirable from a range of plants. Try to save only from open-pollinated varieties. Note: It's actually very easy to hand-pollinate squash flowers because they have large, easily recognizable male and female flowers. Otherwise you need to isolate by at least 1/2 mile.

Cut the squash and scoop the seed. Scrape all the seeds into a jar, don't worry about goop. top off with water and leave to ferment drain off the fermented water. Power rinse the seeds to remove tenacious goop. Lay seeds out to dry.

Completely dry seeds can be stored dry, dark and cool place. Recommend a small mason jar with a silica gel pack stored in a basement refrigerator.

## **Winter Squash**

Winter squash has the same growing needs as summer squash. Because it takes longer to mature it is helpful to plant seedlings indoors and transplant out to the garden in areas with shorter growing seasons.

The advantage of winter squash is that it can be stored for months in a cool dry place.

It helps to choose varieties based on the length of your growing season and the space you have available. Some squash grow on vines that take up a lot of space. For smaller gardens it's advisable to grow a bush variety. Refer to the seed package and/or the catalog for information about the type of squash you are purchasing.

*Butternut squash.* Bottle-shaped with a light brown rind. Has a natural resistance to squash vine borers. They will store for six months or longer.

*Buttercup squash.* Similar to butternut squash, but matures faster than butternut or hubbard. It is good for areas with a shorter, cooler growing season. Each plant will likely grow vigorously and produce heavy crops of squat, green fruits. This type stores for four to six months.

*Hubbard squash and kabocha squash.* Often grouped together due to their similarities. Range from medium-sized to giant. They have drier flesh than most other winter squash. Their color varies by variety, and all varieties will store for four to six months.

*Delicata squash and dumpling squash.* Delicate squash are cylinder-shaped and dumpling squash are pumpkin-shaped. Both produce small, ivory-colored fruits with green stripes that turn orange when stored. Good for cool climates. Mature quickly and will store for three to five months.

*Acorn squash.* Ribbed, round fruit with a gold or green rinds. Mature quickly and will store for at least three months. Good for short growing seasons.

*Spaghetti squash.* Full of stringy fibers that look like pasta. The oblong fruits have smooth rinds that vary from tan to orange, and they will store for three to six months.

## **Growing Instructions**

**Optimal Time/Temperature for Germination:** Seeds require warm soil to sprout. In areas with shorter growing seasons they can be started early under grow lights and then transfer them to the outside when all threat of winter has passed. It is recommended to use biodegradable pots for seedlings so that they can be planted right in the ground without having to take the seedlings out of the pots and disturb the roots. Squash plants don't like to be transplanted.

**Optimal Soil Conditions:** Squash like warm conditions with soil that is fertile, well-drained, and has a pH of 6 to 6.5 To get good growth and production, you'll need to add lots of organic matter to your garden. Rotted manure and compost are the best for getting your plants the nutrients they need. Dig them in deeply so that the squash's roots will penetrate easily.

Squash are often planted in "hills." These help the squash grow by warming the soil more quickly and increasing drainage. Even in well-drained areas, hills can give your plants a boost by providing warm soil as they begin growing.

Hills don't always literally mean a raised area. If you have fast-draining soil and a drier climate, you might actually make depressions, with a wide ridge around them, to hold water. Add some extra compost/manure to the area under your hills, too.

### **Seed Planting Depth, Spacing and Procedure:**

Plant six seeds per hill about an inch (2 cm) deep in a sunny spot. You want each hill to be part of a 3-ft wide row (they need their space). Leave about 5 to 6 feet (2 meters) between hills. Loosen the soil for up to a foot below the surface to ensure adequate drainage – you can mix in manure or compost at this step, too.

They should appear in about 10 days. If you have a short season, you can get a jump on your growing time by planting them indoors, but if you plant too early and the squash become root bound in their pots, it will actually stunt their growth. Once your plants have put on a few leaves (this is called "germinating"), cull all but two or three at the very most per hill, leaving only the most vigorous plants. There simply isn't enough room for all of them to grow to adulthood. Upon planting, water them well.

At this stage, you may want to set up row covers to protect your little plants from insects and make sure they grow to full capacity.

**Best Companion Plants and Plants that Hinder:** Same as summer squash.

## **Crop Maintenance**

You'll know if the flower has been pollinated if it wilts and that swelling grows visibly in the next couple of days. At this point, all you have to do is keep your vines watered and weeded, and watch out for bugs or disease.

As your squash begin to grow, you can carefully put a bed of straw under them if you like, to keep them off the ground and free of blemishes and rot. However, rot shouldn't be a problem if you don't over water or the squash isn't forming in a wet depression.

### **Moisture Requirements & Solutions:**

Give your plants about 1 inch (2.5 cm) of water a week. In most climates, this is enough to keep your plants going strong. However, if you live in a particularly dry climate you can use flood-style irrigation every 2-3 weeks.

Remove the weeds so they don't steal your water; a lack of water can stunt your plants, and weeds will use the nutrients you took all that trouble to dig into your soil.

A drip system is nice but if you don't want to do that, simple trenches between the hills will help you get the water where you want it once the vines start getting rampant.

Watering in the early morning allows the water to evaporate; this is good because water standing on leaves can create good conditions for disease.

You don't want wet soil all the time; during a warm summer without rain you'll probably water every few days or so. Watch for wilted leaves, that means they definitely need a drink.

On hot days, it is normal for leaves to wilt a little bit during the heat of the day, but they will often firm back up in the evening. That said, if leaves are wilted early in the day before it is too hot, your plants need more water.

**Weeding Needs & Solutions:** Same as summer squash.

**Feeding Needs/Optimal Natural Fertilizers:** Same as summer squash.

In about a month, you can add a side dressing of fertilizer to the vines – about 10 inches on either side. Don't dig too close or you'll damage the roots they send down at each leaf node.

**Pests, Diseases & Solutions:** Same as summer squash.

## **Harvest and Storage**

**When to Harvest/Number of days to maturity:** Winter squash takes 80-90 days to mature.

Winter squash are generally ripe when you can no longer pierce the skin with your fingernail. The surest thing is to leave them on the vine until the vines start to die back, but you should definitely get them in before frost. That being said, immature fruits don't store well, so be sure to keep them growing for as long as possible. You'll likely get three to five squash per plant.

**How to Harvest:** Clip them off the vines with clippers and leave as much stem as you can, at least around an inch. Don't lift them by the stem; if it comes off the squash will rot. Take care not to damage the skins as that would create an entry point for rot.

**Optimal Storage temperature and conditions:** Cure the squash for storage. This means leaving the better storing varieties in a warm place for 3-5 days so that the skins will harden up further, protecting them from fungus and bacteria. Butternut, Hubbard and related types (*C. maxima* and *C. moschata*) benefit from curing. Acorn and Delicata-type squash are not good storers, and trying to cure them can actually make them last less time, so you'll want to keep them cool from harvest, and use them within 2-3 months.

A "warm" place should be 70 to 80°F (21 to 26°C). Before this stage, you may wish to clean them off with a damp, clean cloth to get rid of any dirt that could fester on the plant. A 50/50 solution of water and oxygen bleach (3% foodgrade hydrogen peroxide) can be mixed in a spray bottle and used to prevent fungal rot and prepare the squash for curing and long term storage.

The curing process seals the skins and dries the stem, leaving them ready for use.

Keep your squash in a cool place. It shouldn't be too dry or too wet. A cool room of a house, an unheated sun porch if it doesn't freeze, a cool cellar if it's not too damp or musty, are all possibilities – even under your bed could work.

Keep your eyes open for signs of rot, or you might find a fermenting puddle where your squash were. Checking every week or two should be sufficient.

**Optimal Preserving Procedures:** Squash is best long term stored as a fresh, cured vegetable. Although in the case of pumpkin type squashes pie filling can be made and preserved in jars to make pies in winter.

### **Seed Saving:**

Common hybrid varieties have been engineered to retain selected characteristics. This hybridization, unfortunately, breeds out the plants' innate ability to adapt to inhospitable or challenging conditions. Saving heirloom squash seeds for future propagation can be a bit of a challenge since some squash will cross pollinate, resulting in something less than appetizing. There are four families of squash, and the families don't cross pollinate, but members within the family will.

Only plant members of differing families nearby. Otherwise, you will have to hand pollinate squash to maintain a "true" squash for squash seed collection.

### **Squash Families:**

*Cucurbit Maxima* – Buttercup, Banana, Golden Delicious, Atlantic Giant, Kobacha, Hubbard, Turban

*Cucurbita Argyrosperma* - Crooknecks, Cushaws

*Cucurbita Moshata* - Tennessee, Sweet Potato squash, Butternut and Butterbush

*Cucurbita Pepo* – Acorn, Delicata, Pumpkins, Scallops, Spaghetti squash

Regarding hybrid varieties, often the seed is sterile or doesn't reproduce true to the parent plant, so don't try squash seed harvesting from these plants. Don't attempt to save any seeds from plants that are afflicted with disease, as this will likely pass to the next year's generation. Select the healthiest, most bountiful, flavorful fruit to harvest seeds from. Harvest seeds for saving from mature fruit towards the end of the growing season.

When seeds are ripe, they generally change color from white to cream or light brown, darkening to a dark brown. To remove squash seeds from the fruits, simply split the squash in half by shallowly cutting through the rind from top to bottom on both sides and separating the two halves. Cutting through the center of the fruit can damage seeds. Next, scoop out the seeds, massaging them free from the pulp as much as possible. Transfer them to a wide-mesh strainer—or any other container with openings large enough for pulp and strings to pass through. Running the seeds under a strong stream of water will help dislodge the seeds from the pulp.

Another method for separating seeds from the pulp: Scoop the seed mass out of the fruit and place it in a bucket with a bit of water.

Allow this mix to ferment for two to four days, which will kill off any viruses and separate the good seeds from the bad. Good seeds will sink to the bottom of the mix, while bad seeds and pulp float. After the fermentation period has completed, simply pour off the bad seeds and pulp. Spread the good seeds on a screen or paper towel to dry. Allow them to dry completely or they will mildew. Once the seeds are absolutely dry, store them in a glass jar or envelope. Clearly label the container with the variety of squash and the date. Place the container in the freezer for two days to kill off any residual pests and then store in a cool, dry area; the refrigerator is ideal. Be aware that seed viability decreases as time passes, so use the seed within three years.

## Sunflowers



*Photo by Rebecca McCarthy*

### **Description:**

The annual Sunflower can grow anywhere from two to fifteen feet tall depending on the variety, and their seeds can be harvested as food. They grow on a hairy, sturdy, upright stem and can hold a single flower or be branched with multiple flowers. Rough, hairy, oval to triangular leaves grow along the stem. Sunflowers face to the direction of the sun's movement so consider this when planting. To grow sunflowers from last year's crops (unless the variety you bought was a hybrid) the Heirloom varieties are best for saving seeds which can then be planted as normal.

### **Growing Instructions**

#### **Optimal Time/Temperature for Germination:**

Sunflowers do not like cold weather so avoid frosts. Climates with long hot summers are perfect for growing sunflowers. Plant sunflower seeds at the beginning of summer after the soil has completely warmed. This usually occurs between mid-April and late May. Hardiness zones are 2 to 11.

#### **Optimal Soil Conditions:**

Find a plot with full sun and sheltered from the wind. Plant sunflower seeds along a fence, the side of a house, or behind a row of sturdy trees. If possible, plant your sunflowers on the north side of your garden. This prevents the large sunflower stalks from shading other plants in your garden. Sunflowers prefer a slightly acidic to somewhat alkaline soil with a pH between 6.0 and 7.5. However, sunflowers are relatively resilient and can grow in most types of soil so that is not too much of a problem for sunflowers. Well-drained soil with lots of peat, compost, or manure will help them to grow tall and strong.

You want the soil to be loose and light when sowing your sunflower seeds. If your soil is low in nutrients or drains poorly, mix in three to four inches of compost.

## **Seed Planting Depth, Spacing and Procedure:**

Sprouting them before planting might improve your chances of keeping them alive. Mist several paper towels in water with a bit of plant food mixed in. The towels should be wet but not soaked and difficult to handle. Place a couple of seeds in the towel with space between them and fold the paper towel up so that they are covered. Give the paper towel a few more drops of water and place it in a resealable plastic bag. Seal it most of the way, with just a small, ~1" gap at the center. Set the bag in the sunlight and give the seeds time to germinate and then plant so birds may not fly off with the planted seeds.

Though sunflowers are extremely resilient, the one thing that can harm them is flooded soil. Be sure that your plot has proper drainage, or opt to build a simple planter box instead. If necessary, build a raised garden box out of cedar boards, which come in 8-foot lengths. Cedar is a good choice for a garden bed because it won't rot when exposed to water.

Dig one-inch deep holes, spaced six to 18 inches (45.7 cm) apart, depending on the varietal size. You can simply use your hands to dig these small holes. If planting in rows, make sure to allow about 30 inches (76.2 cm) of soil between each row.

Sunflowers need a lot of space to grow healthily. For large sunflower types, allow 18 inches (45.7 cm) of space between seeds. For medium-sized sunflower types, allow 12 inches (30.5 cm) of space between seeds.

Place a few seeds in each hole and cover with soil. You can stagger your planting over a few weeks to experience blooms at different times throughout the summer. Since sunflowers are annuals, meaning they flower once per year, staggering your seeds will allow you to enjoy blooms over a longer time.

It is best to leave sunflowers where you plant them. Transplanting does not work well with sunflowers. It is better to plant fewer sunflowers if you don't have much room because the more they are forced to compete for nutrients, the less strong each plant will be.

## **Best Companion Plants and Plants that Hinder:**

Good companion plants are tomato, cucumber, onion, pepper, garlic, shallots, chives, cabbage, kale, broccoli, cauliflower, brussels sprouts, lettuce, peas, lavender, mint, rosemary and basil.

Bad companion plants are potato, corn, fennel, hyssop, pumpkin, melons, and zucchini.

## **Crop Maintenance**

### **Moisture Requirements & Solutions:**

Water thoroughly after planting and fertilizing. Make sure you wet the soil, but do not drench or flood the seeds. Water the plants thoroughly once or twice a week. Sunflowers have deep roots and prefer infrequent, heavy watering to frequent, shallow watering. Adjust your watering routine on particularly hot or cloudy weeks. Your sunflowers should bloom in mid to late summer, between two and three months after planting. If your sunflowers are drooping and the soil is dry, that's often a sign they need more water.

### **Weeding Needs & Solutions:**

Keep the area around the sunflowers weed-free, and do not use chemicals or sow grass seeds near them. Once the seedlings are tall enough to mulch without breaking them, cover the soil with a layer of seed-free straw or other mulch to retain moisture and prevent weed growth. Top up the mulch after heavy rain. If you're growing sunflowers as a seed crop or to display in flower shows, mulch with 1.5 inches (4 cm) of well-rotted manure or compost once the plants are 20 in. (0.5 m) tall.

### **Feeding Needs/Optimal Natural Fertilizers:**

Mix a thin layer of fertilizer after planting the seeds. Choose an organic fertilizer when possible and spread it over the seeding area to promote strong stalks.

### **Pests, Diseases & Solutions:**

Though relatively free of insect susceptibility, a small gray moth may lay eggs in the sunflower face. Simply pick out the small worms to remove them. Sunflowers also can contract mildew and rust. If either of these issues occurs, spray your flowers with a natural fungicide. To avoid such diseases, provide adequate air circulation around your plants.

Deer and birds love sunflower plants and squirrels may take off with planted seeds. Birds may peck at the seeds right after they are sown. Place netting over the seeding area for prevention. Later on, if you have birds picking the seeds out, place poly spun garden fleece over the sunflower heads to prevent that. Also, perhaps netting can prevent animals from eating them or even build a nice, painted wooden fence with a gate around the bed, then attach chicken wire or wire fencing to the inside of the wooden fence. You will have a beautiful sunflower patch with a beautiful fence protecting it. Apply a hot seed spray to your sunflower. These sprays are non-toxic and can keep the squirrels from eating the sunflower seeds or you can sprinkle cayenne pepper directly onto the blooms.

### **Harvest and Storage**

Sunflowers typically will reach their flowering maturity around 80 to 120 days after the seeds germinate. If you want edible seeds, cut the flower heads off when they begin to droop, or when the back of the head begins to turn yellow. Hang them upside-down by the stem in a dry, breezy place and cover with cheesecloth or a paper bag to catch seeds as they fall out.

### **When to Harvest/Number of days to maturity:**

The only sure way to tell whether the seeds are ready to harvest is to pull a few out and open them. If the seed kernels inside the shell are plump, they're ready for harvesting.

### **How to Harvest:**

To enjoy the flowers in a vase, cut the stalk at an angle in the morning before the flower fully opens. Change the water in the vase every other day to keep the flowers looking fresh.

For delicious roasted seeds, soak overnight in water and salt. Then drain and place on a baking sheet. Roast in a low-heat oven (between 200°F and 250°F / 90 to 120°C) until slightly browned.



### **Optimal Storage temperature and conditions:**

To make sprouts - gather some raw, unsalted, hulled sunflower seeds. Hulled sunflower seeds (those without shells) will sprout more quickly.

Gather unhulled sunflower seeds, collect these in a bowl and allow them to soak overnight. In the morning, toss the seeds then pour them into a strainer. Try to pick out hulls as you go. Do not worry if some hulls remain.

Place the sunflower seeds in a large, open-mouth jar such as a canning jar or something slightly larger. Fill the jar with water so that the seeds float on top. During this period, the seeds should begin to sprout.

Wait until the seeds have nearly doubled in size and the sprout has begun to emerge. When sprouting sunflower seeds, always periodically check them so that you do not allow them to soak for too long.

Rinse and return them to the jar. Make sure to cover the jar again. Let them sit in the jar, in a warm or room temperature location with no direct sunlight, for one to three days until they've finished sprouting. Rinse them and return them to the jar one or two times a day until they are done. When they've started to sprout and look like little V's, they're ready to eat.

Rinse the sprouts you plan to eat and store the remaining sprouts in your refrigerator to enjoy later.

### **Seed Saving:**

If a sunflower plant drops seeds, they can grow on their own the next year. If it is an heirloom variety and not cross-pollinated with a different variety, they will retain all of the characteristics of the mother plant. Or you may end up with a hybrid, which can be interesting but may not produce seeds that you would want to snack on. Sunflowers can be propagated by taking cuttings and rooting them, but the easier method is simply to collect some of the seeds and store them in a dry, cool location until spring planting time.

### **Notes:**

If you live in a windy area or your stalks lack strength, consider staking the plants with wood or bamboo stakes to support the weight of the plant.

To fix a broken sunflower snapped at the base, if the damage is not too severe, use velcro tape and wrap the damaged parts together so they're snug but not too tight. Remember to take it off once it has healed or you might strangle the plant.

Some popular varieties, large and small are:

Mammoth - can reach a height of 9 to 12 feet (2.7 to 3.7 meters).

Autumn Beauty - variety produces large flowers that grow up to six inches in diameter.

Bronze and mahogany flowers on large stalks that can reach seven feet.

Sunbeam - medium sized variety at about five feet tall and produces flowers about five inches in diameter. Sunbeam flower petals are long and asymmetrical, and the flower center is often yellow.

Teddy Bear - miniature variety caps out at three feet tall.

## Taro

**Description:** (*Colocasia esculenta*) A Tropical plant with a starchy root similar to a potato. Popular as a houseplant with light green large heart shaped leaves. It is also known as an "elephant ear". Prefers a warm, moist environment and plenty of sun. Rarely flowers and produces seeds, so most commonly grown by planting a tuber or a corm.



### **Optimal Time/Temperature for Germination:**

Zones 8-10 As a tropical plant, that takes more than a year to mature, it has to be grown indoors in zones with cold winters. Purchase tubers from a seed supplier or garden supplier. May be easier to find at specialty markets that carry international foods from Asia or Latin America. Make sure you get the edible variety of Taro as there are some inedible varieties.

### **Optimal Soil Conditions:**

Well drained but moist loamy soil (not muddy) with plenty of organic matter. Optimum soil PH is 5.5 to 6.5 which is slightly acidic.



### **Growing Instructions**

#### **Seed Planting Depth, Spacing and Procedure:**

Taro rarely blooms or sets seed. There are two options for propagation - by offshoots from the mother corm. Offshoots are separated from the main plant when they are at least 15 cm in height.

- by chopping the dark top section of the taro tuber into small pieces, leave for a day to allow surfaces to dry and replant.

Plant tubers in a trench 6 in (15 cm) and 40 in (100 cm) apart, and the plants should be placed 15–24 in (38–61 cm) along the rows. Cover with 2-3 inches of soil. The plant can become as large as 3 feet tall and 3 feet wide so allow sufficient space between plantings.

Makes a good container plant. Dig a hole about 6 in (15 cm) deep and place the tuber into the soil. Cover it with 2–3 in (5.1–7.6 cm) of soil.

Taro is often grown commercially in wet beds, similar to rice, to produce larger tubers. Can be grown in a bucket or a big jar with proper water circulation and air flow to prevent diseases. Taro needs consistent irrigation and a well-drained rich soil with plenty of organic matter. Fertilize two or three times during the growing season; potash is particularly important.

**Best Companion Plants and Plants that Hinder:** It is best to grow Taro in a separate container or garden bed as it has very specific needs.

### **Crop Maintenance**

As a tropical plant, needs temperature above 60 °F (16 °C) although it can grow in part shade. Plant coverings for short temperature drops can help. Can survive temperatures as low as 50 °F (10 °C) for short periods of time, but not frost hardy.

Regular weeding will increase yield. After several months, once well established, taro will produce its own ground cover that will keep weeds down.

**Moisture Requirements & Solutions:** Moisture loving - Prefers a location where water collects, such as a low area in your garden, otherwise extra watering or a soaker hose will help. When there is little rain, taro will need daily watering and benefits from misting of the leaves.

**Feeding Needs/Optimal Natural Fertilizers:** Fertilize two or three times during the growing season; potassium is particularly important but they do not benefit from too much nitrogen.

**Pests, Diseases & Solutions:** Spider mites can be treated with neem oil. Encourage beneficial nematodes to allow them to hunt down and kill any of the root knot nematodes that can attack taro roots.

Because the plant is moisture loving, mildews and blights must be prevented by not allowing stagnant water and removing damaged leaves. Keeping the soil constantly moist without over watering will reduce the stress to the plant and make it more resistant to diseases.

### **Harvest and Storage**

**When to Harvest/Number of days to maturity:** 12-18 months till maturity. Can harvest 2-3 times per year from mature plants. Decrease watering just before harvest time to force the taro to direct its nutrients to the tuber. Harvest when the main corms begin to push out of the soil surface and leaves yellow and die down.

**How to Harvest:** To harvest the plant, break and loosen the tuber and its suckers manually. Pull the tuber out by hand, then wash it to remove any roots and soil.

**Optimal Storage temperature and conditions:** Can refrigerate for up to 2 weeks but better to eat immediately after harvesting.

**Optimal Preserving Procedures:** Doesn't keep more than a month after harvesting. Better to leave in the ground.

**Seed Saving:** Rarely blooms or sets seed. Save some tubers and re-plant after harvesting

**Caution – DO NOT EAT RAW** Due to the presence of calcium oxalate crystals which can irritate the mouth. Must be well cooked to destroy oxalate crystals. Leaves, stems and root are edible. Roots can be boiled, steamed, baked, or fried like potatoes.

## Tomatillo

**Description:** Tomatillos are not the same as tomatoes, but they are related and just as easy to grow. Although they are not frost hardy, they can be very prolific. You can grow tomatillos in a garden in your back yard or using containers. Tomatillos have a tangy, citrusy flavor and they are most often used to make green salsa.

VARIETIES : Verde, Plaza Latina, Amarylla, Purple



### **Optimal Time/Temperature for**

**Germination:** Start seedlings in pots of soil 6 to 8 weeks before the last frost.

### **Optimal Soil Conditions:**

Tomatillos need to be in soil with good drainage and have full sun for a good part of the day. Select an area that drains well or use an above ground planter. Plant your garden in a sunny area of your yard or position the planter so that it will get lots of sun.

Tomatillos also grow well in containers, so you might consider planting tomatillos in terra cotta pots.

### **Growing Instructions**

**Seed Planting Depth, Spacing and Procedure:** Fill a small terra cotta pot with soil and make a hole 0.25 inches (0.64 cm) deep. Place 1 seed into the hole. Start as many seeds as you want to grow. Place the pots in a sunny windowsill or under grow lights for 14 to 16 hours per day. The seedlings will be ready to plant in the ground or transfer to a larger pot when there are 5 to 7 leaves on each plant and the root system is well developed.

Water the plant well the first time. After that, water it about once per week or whenever the soil starts to feel dry.

Purchase tomatillo plants if you don't have time to germinate. Choose at least two healthy looking plants that are not wilted or brown. Tomatillos will not bear fruit unless you plant them side by side. Place them next to each other in containers or in your garden. The wind will carry the pollen from plant to plant. You do not need to do anything to make this happen. Space plants 3 feet (0.91 m) apart. Tomatillos grow about 3 to 4 feet (0.91 to 1.22 m) in height and about 3 to 4 feet (0.91 to 1.22 m) in width, so it is important to give the plants plenty of room to grow. Plant the plants so that they have 3 to 4 feet (0.91 to 1.22 m) between them and other plants. Make sure that the rows are 3 to 4 feet (0.91 to 1.22 m) apart as well.

Dig a hole that is deep enough to completely cover the roots. The holes will need to be about 4 to 6 inches (10 to 15 cm) deep to accommodate the plants. You can check to see if the holes are deep enough by placing the plant into them. The top of the soil on the plant should be level with the ground.

**Best Companion Plants and Plants that Hinder:** Similar to tomatoes.

### **Crop Maintenance**

Tomatillo plants produce lots of fruit, and the stems may sag into the soil from the weight of the tomatillos. To avoid sagging stems, place a cage or build a support around the each of the plants.

The stems will take root if they sit in the soil long enough. Check the plants regularly and lift any sagging stems up and over the support or use this dynamic to propagate more plants. Tomatillos will easily spread with new shoots. Once the plant has reached the desired size you can pinch them back to control growth.

### **Moisture Requirements & Solutions:**

Tomatillos require regular watering, but it is not necessary to keep them saturated. Plan to water them well once per week, or twice per week during extra hot or dry weather. To reduce the risk of mold developing, try to avoid getting water on the leaves and stems of the tomatillos. Water at the base of the plant instead. They would benefit from a soaker hose system.

**Weeding Needs & Solutions:** Weeds can be reduced with organic mulch such as straw.

### **Feeding Needs/Optimal Natural Fertilizers:**

When planting seedlings, to enrich the soil before you cover the roots of the plants, mix in some organic mulch, such as grass clippings. Another option is to mix a bag of all-purpose fertilizer into the garden soil before planting, spreading per instructions on the product.

### **Pests, Diseases & Solutions:**

Tomatillos are part of the nightshade family which makes them susceptible to the same issues as tomatoes, potatoes, tobacco, peppers and eggplants.

Cutworms - These are worms whose larvae feed on the inside of tomatillos, and on the stems and leaves. Root-knot nematodes - These insects feed on the roots, which causes the plants to wilt.

Tobacco budworms - The larvae of these worms eat the inside of tomatillos.

Whiteflies - These flies eat the underside of tomatillo leaves.

Black spot - This disease causes black spots on the leaves and fruit. Tobacco mosaic virus. This disease causing wilting, decreased size, and reduced yield.

Organic solutions include removal of affected plants to prevent the disease from spreading, finding and removing worms or bugs by hand, avoiding moisture on leaves which may result in the need for planting under shelter in rainy areas or in a greenhouse in cooler areas.

### **Harvest and Storage**

#### **When to Harvest/Number of days to maturity:**

You'll know the tomatillo is ripe when the fruit has filled out the paper lantern wrapper and the paper begins to split/dry at the base. You should start to see the first fruits with split husks at around day 65 of your plant's life cycle. Harvest immediately when you notice split husks.

Once the tomatillos start to turn yellow, the fruit will lose its tanginess and will no longer be ideal for making salsa and other dishes where this flavor is desired. Make sure to harvest your tomatillos while they are still green.

**How to Harvest:** Pick regularly as they ripen, as you would tomatoes.

**Optimal Storage temperature and conditions:**

Use or store fresh tomatillos as soon as possible. Tomatillos will keep at room temperature for up to 1 week after you harvest them. Can also store them in a refrigerator for up to 3 weeks, with the husks on and in a paper bag.

**Optimal Preserving Procedures:**

Tomatillos make excellent salsa which can be preserved in mason jars.

To freeze, remove husks, wash well to remove the waxy, sticky layer on the fruit, and place them in plastic freezer bags.

**Seed Saving:**

Like tomatoes, tomatillo fruits contain many seeds. In ideal growing conditions, tomatillos grow profusely from fruit left in the garden or compost that isn't hot enough, taking over large growing areas. It is advisable to collect all fruit to avoid having too many "volunteers". Even if you do this, you will often find that tomatillos appear in your garden from the previous season. This makes tomatillo an excellent garden plant for sustainable food production.

To harvest seeds, start by choosing the best looking ripe tomatillos from your most healthy, open-pollinated tomatillo plants. Open-pollinated varieties produce offspring that is true-to-type, versus hybrids where the next generation may not exhibit the same characteristics as its parents. It is advisable to pick from 4-5 of the top tomatillo plants in order to help ensure some degree of genetic diversity.

Remove the wrappers. Cut up the fruit into wedges and pop them into a blender. The seeds are small and won't be damaged by the blade. Then pour this slurry into a tall container and add water. Mix with a spoon or chop stick. The good, viable seed will sink down to the bottom of the container.

Pour off the floating green slurry and any floating seeds, adding water and pouring again until the water is clear and the seeds at the bottom are all that's left. Then sieve out the seeds and lay them out evenly on a coffee filter or thin cloth to dry in a dark place, with good air circulation. Mix them up as they dry so they don't dry all stuck together.

You'll know they are dry enough for storage when the seed breaks instead of bends under pressure.

**Notes:** Tomatillo varieties include green or purple. The garden catalog, seed packet or plant tag will give info on growing conditions to help you determine the plant will grow well in your area. You may also consider where you want to plant, such as in the ground or in containers. Purple tomatillos grow especially well in containers and the fruits they produce are smaller than green tomatillos, so this might be a good option if you have a limited area to grow tomatillos.

## Tomato

**Description:** A member of the Solanaceae family, tomatoes are a bushy or vining plant that produces fruit that is eaten. Although the color can range from yellow to purple, the most popular tomato varieties are bright red. They also come in a variety of shapes and sizes with grape size varieties being more popular as container plants and larger sizes for outdoor gardens.

Tomatoes need to be regrown and replanted every year. They do not survive the winter.

### Determinate vs. Indeterminate:

It is important to understand that some varieties of tomatoes are classed as determinate, which means that it will be bushy, reach a certain height and only produce a single crop of fruit. These are often the earlier tomatoes that are good to grow in shorter growing seasons. They don't need to be pruned and they don't need as much trellising.

Indeterminate varieties of tomatoes grow tall and vining, producing fruit as long as the season allows. These types of tomatoes require sturdy trellising and there are strategic ways to prune them to encourage the plants energy to going into larger fruit if desired. Indeterminate varieties can take longer to mature but they are excellent in greenhouses where the growing season can be extended in Northern climates.

There are also semi determinates that have the qualities of both types of tomatoes.

The seed packages and catalogs will indicate whether the tomatoes are determinate or indeterminate and they should give information on the number of days to maturity.

### Growing Instructions

Require full sun for optimal fruit production. Find a spot that receives 6 to 8 hours of sunlight each day.

**Optimal Time/Temperature for Germination:** All tomato varieties are very frost tender and should be started indoors in areas with frost. Start seeds indoors six to eight weeks before the last frost.

### **Optimal Soil Conditions:**

As heavy feeders, Tomatoes need a growing medium rich in organic matter. If you don't make your own compost, use store-bought compost that includes granite dust and topsoil. You'll need about 5 to 8 pounds per square foot (25 to 40 kilograms per square meter). Turn compost into the top 3 inches (6 to 8 cm) Note – tomatoes are one plant that does not require annual rotation. They are happy growing in the same place every year.

Monitor the soil pH. Tomatoes thrive in mildly acidic soil. Highly acidic soil can leach calcium from the plant and lead to blossom end rot. Keep the soil pH between 6.0 and 6.8. If your soil tests above 6.8, water your tomatoes with a mixture of equal parts cold coffee and water. You could also add a mulch of pine needles. If your soil tests below 6.0, use either dolomite lime or calcium sources like crushed eggshells or calcite.

### **Seed Planting Depth, Spacing and Procedure:**

Sow seeds in flats or containers, ¼ inch deep and ½ inch apart. Use a simple seed starting medium. Seeds germinate in four to seven days in moist, warm soil ranging from 70-85 degrees F (21-19 degrees C) Once they have their first true leaves, thin them or transplant them so that they have at least 1 inch of space all around. About three weeks later, transplant the seedlings into larger containers, burying them as deep as the seedling leaves. Use a more fertile medium when potting up seedlings with worm castings and compost. NOTE – planting deep is important as it will cause them to produce more roots and become stronger. After the last frost date, the seedlings can be hardened off and planted out in the garden. They can be planted with several inches of the stem, up to the first true leaves, in the soil once again to cause more roots to develop and make the plant stronger. Plant tomatoes between 18 inches to three feet apart, depending on what size is indicated on the seed package.

When planting the seedlings out in the garden, dig a hole wider and deeper than the root ball, fill the hole with compost or fertile soil. At this point it is helpful to add something with calcium such as eggshells or crushed oyster shells.

It is a good time to put stakes or trellises in when the plants are small and there is less chance of damaging the plant in the process.

Tomatoes of the determinate variety do well in containers on decks and balconies. Hanging baskets can be adapted to upper-story apartments by hanging them from the window sill for small varieties like cherry tomatoes.

Cage or stake indeterminate tomatoes to add support and keep the fruit off the ground. Tomato cages can be homemade and should be at least 48 inches (1.2 m) tall. Cages need to be sturdy to survive wind and the weight of all the fruit. Remove leaves and secondary stems as the plant grows to focus more energy on fruit production.

Tomato stakes for indeterminate tomatoes should be at least 0.5 x 2 inches (1.3 x 5 cm) wide and 6 to 8 feet (1.8 to 2.4 meters) long. Pound stakes about 12 to 24 inches (30 cm to 60 cm) deep, at least 2 inches (5 cm) away from the plant. Secure the plant to the stake using loosely knotted, double-looped strips of cloth or garden twine that won't strangle the plant. Stakes can be made of bamboo, scrap wood, electrical conduit, or iron bar.

### **Best Companion Plants and Plants that Hinder:**

Tomatoes and asparagus are mutually beneficial in adjacent rows as the asparagus repels nematodes and the tomatoes repel asparagus beetles.

Marigolds help repel nematodes that can attack the roots of tomatoes. Carrots and tomatoes are mutually beneficial together and a good use of space. Flowers that attract pollinators but are not heavy feeders are helpful with tomatoes. Calendula, zinnias and nasturtiums are helpful and are attractive around tomatoes.

### **Crop Maintenance**

**Moisture Requirements & Solutions:** Tomatoes are susceptible to fungus so choose a spot that is not low lying or a place where water collects. In areas where there is a lot of rain it is helpful to plant tomatoes in a sunny spot but under the eaves of a house or outbuilding where they will not get rain on their leaves. Tomatoes benefit from soaker hoses. Watering in the morning is helpful

Water based on weather. Do not allow soil to become too dry but do not let it get swampy. Watering need will increase when weather is hotter.



**Weeding Needs & Solutions:** Plants benefit from an organic mulch when they are about 1 foot tall and when the soil has become warm. This helps hold in moisture and reduces competitive weeds.

**Feeding Needs/Optimal Natural Fertilizers:** After the fruit has set, water the plants about every two weeks with manure tea or fish fertilizer solution. (Nitrogen)

**Pests, Diseases & Solutions:** Good Air circulation around tomatoes helps prevent mold and mildew so use a fan if growing in a greenhouse, or allow a cross breeze by opening vents during the day.

For cutworms, when planting out seedlings, surround each stem with a collar that extends above and below the soil level by 1.5 inches.

Blossom end rot is caused by draught or soil calcium deficiency. Adding eggshells to the soil when planting the seedlings helps to prevent this.

#### Calcium deficiency treatment for blossom-end rot

Bring about one gallon (about 4 L) of water and a tablespoon (15 mL) of lemon juice to a boil. Add 6 tablespoons of bone meal to the water. Stir well. Don't worry about completely dissolving the solution. Cook covered for 30 minutes. Allow it to cool.

Feed 1 quart (about 1 L) of solution to each plant at the leaves and roots. Repeat the treatment a second time in 3 to 5 days.

Tomato horn worms can be picked off by hand.

Keeping the plants well staked so the fruit doesn't end up sitting on the earth helps to keep slugs and other worms that eat the fruit away.

Never plant tomatoes within 40-50 feet of a walnut tree because the walnut tree exudes juglone which causes walnut wilt and kills the tomato plants.

#### Harvest and Storage

**When to Harvest/Number of days to maturity:** Depending on the variety Tomatoes can be an ongoing harvest all summer with the majority coming to fruition in the fall. When they are somewhat soft, fragrant and full colored, they are ripe.

**How to Harvest:** Tomatoes can be picked when ripe as you would any fruit but if there is a risk of frost, tomatoes can be picked green. Keep them on the vine and hang the vines in a window. The tomatoes will ripen in the house. Tomatoes taste best when ripened outdoors in the sun.

**Optimal Storage temperature and conditions:** Store ripe fruit at 40 degrees F (5 degrees C)

**Optimal Preserving Procedures:** Tomatoes are famous for canning and sauces. They also keep well in the freezer.

### **Seed Saving:**

Tomato seeds can stay viable for up to 10 years when fermented, dried, and stored in a cool, dry place. You can store them in your refrigerator or freezer in an airtight container for extra protection.

Fermenting the tomato seeds isn't the only way to preserve them. You can omit the fermentation steps and simply clean and dry the seeds. If you dry your tomato seeds without fermenting them, they will only last 1 to 2 years. This is a good seed-saving option for those who plan to use their seeds quickly.

Cut each tomato in half and squeeze the seeds, juice, and pulp of your tomatoes into a container. Make sure the seeds are completely covered with pulp and juice so they can properly ferment. Avoid adding water to the mixture if possible, as dilution can slow the process. A jelly-like sac surrounding each tomato seed prevents germination until the seeds are exposed to soil, which is great, except that the sac can harbor disease. Experienced seed-savers use fermentation to rid the seeds of their sacs before drying and storing them for future use.

Once the seeds, pulp, and juices are all squeezed out into a bowl, label the bowl "tomato seed ferment" with the date and set it aside to let the fermentation begin. You can cover the container with a lid or cheesecloth to keep fruit flies away and to help contain the ferment's unpleasant smell.

Leave your seeds to ferment for 1 or 2 days and check on the process once or twice daily. Fermentation times longer than three days can negatively impact the seed's viability. After fermentation, the mixture of seeds, pulp, and juice should have a thin layer of mold over it. This may look and smell gross, but it's a sign that the fermentation process is working.

If there is no layer of mold after 2 days of fermentation, don't worry. It may not have had time to develop yet, but that doesn't mean the ferment didn't work. Check to see if the seeds have all settled at the bottom of your container with layers of watery juice and then pulp on top. If these layers are present, your ferment is complete. Pour out excess liquid from your tomato slurry, including all pulp, juice, and mold that may have formed in your container.

You'll strain the mixture again in the next step, so there's no need to completely separate the seeds yet. Just pour off what you can without sacrificing seeds to make the straining process easier. Dispose of unneeded pulp, juices, and mold in your compost bin. Now pour the seed mixture through a cheesecloth or a fine-mesh sieve into a separate large bowl or bucket to completely separate all seeds from the liquid. You can spray any stubborn pulp with your water faucet.

Rinse the seeds thoroughly under running water to get rid of all of the pulp and juices possible. Again, you can dispose of the unneeded pulp in your compost bin. Drying tomato seeds completely after fermentation will allow them to stay viable for up to 10 years. To do this, you can flip the strainer over and empty the clean seeds onto paper plates.

Spread the seeds out so they have room to dry. Set them aside until they are completely dry (about a week) in a relatively cool, well-ventilated area. To stop the seeds from clumping together, shake the plate daily and rub away any clumps that do form. If you're drying multiple tomato seed varieties, make sure you label them and avoid mixing seeds to prevent cross-contamination. That way, you'll know exactly what you're planting when it's time to garden.

When your tomato seeds feel dry and papery you'll know they are completely dehydrated. Then, place seeds into an appropriately labeled sealable envelope for future plantings. If you are saving seeds from multiple different tomato varieties, place each variety into a different envelope and label it to avoid any mix-ups.

## Turnips

**Description:** A versatile, low maintenance root vegetable, with edible leaves that does best in cool weather. Can be planted in spring or fall.

### Growing Instructions

**Optimal Time/Temperature for Germination:** Start from seed outdoors as soon as soil can be worked in spring. Can start in the spring or fall. germination usually takes anywhere from 7 to 14 days. Roots can usually be harvested after five to ten weeks.

Soil temperature needs to be an average of at least 40 degrees Fahrenheit (4 degrees Celsius) for the seeds to germinate, but temperatures between 50 and 70 degrees (10 and 21 degrees Celsius) Fahrenheit encourage the most rapid growth. Fall turnips are typically sweeter than spring turnips, and they are also less likely to attract root maggots. For fall turnips, sow the seeds in midsummer, roughly two months before the first expected frost of winter.

**Optimal Soil Conditions:** Similar to radish. Loosen the soil with a rake or shovel to a depth of 12 to 15 inches (30 to 38 cm), then mix in a 2-inch to 4-inch (5-cm to 10-cm) layer of compost and a few handfuls of well rotted manure.

Grow in full sun, at least six hours of direct sunlight daily. Need naturally loose, well-draining soil for root growth. Turnips prefer soils with a pH of 6.5.

**Seed Planting Depth, Spacing and Procedure:** Spread the seed across the prepared soil as evenly as possible. Cover the seed gently with 1/4 inch (6 mm) of soil for spring turnips or 1/2 inch (1.25 cm) of soil or plant the seeds in rows spaced 12 to 18 inches (30 to 45 cm) apart.

**Best Companion Plants and Plants that Hinder:** Since turnips are mainly a root vegetable they partner well with plants that take up space above ground. Do not partner them with plants of the same family (Brassica cabbage family) as they are susceptible to the same insects. They do well in a row in front of pea trellises.

### Crop Maintenance

When the seedlings reach a height of 4 inches (10 cm), pull the weakest ones so that the strongest have more room and resources. "Early" varieties should be thinned out so that they are 2 to 4 inches (5 to 10 cm) apart, while standard or "maincrop" varieties should be 6 inches (15 cm) apart. Seedlings that are thinned out can be eaten. If you only want to grow turnips for their greens, however, you don't need to thin them out.

**Moisture Requirements & Solutions:** Seedlings need to be evenly watered. Turnips need 1 inch (2.5 cm) of water per week. Any less will cause the roots to become tough and bitter, but too much more can cause the turnips to rot. During seasons of average rainfall, you may not need to do any additional watering. If the season is a dry one, though, you should water the turnips by hand.

**Weeding Needs & Solutions:** When the plants reach a height of 5 inches (12.7 cm), add a 2-inch (5-cm) layer of mulch around the greens.

**Feeding Needs/Optimal Natural Fertilizers:** Turnips can do well in a rich organic soil without added fertilizer but a monthly application of mild, organic fertilizer can help strengthen the turnip root. Choose a fertilizer high in potassium and phosphorus rather than one high in nitrogen for best root growth.

Boron spray as a foliar fertilizer: Add two ounces of borax to five gallons of water. Add several drops of dish soap to help the solution disperse evenly. Spray very lightly and evenly and do not drench your plants with this solution. Use only once in the growing cycle when the plants are mature.

Turnips benefit from compost tea once a month during the growth cycle.

### **Pests, Diseases & Solutions:**

To prevent ants from damaging produce, create borax and sugar ant traps. Put holes in the bottom of egg cartons and put the borax sugar mix in them. Leave them in the garden closed and out of the way so that pets can't get into them, and place your borax ant killer traps strategically around your garden. Ants go in carry the borax and sugar back to the nest. This also works for ants in the food storage areas.

Keeping the soil pH above 6.0 can prevent most problems with mildew and other fungi, like club root.

### **Harvest and Storage**

**When to Harvest/Number of days to maturity:** Greens can be eaten raw or cooked. You can harvest greens as soon as they are large enough to pick. Generally, this is when the green reach a height between 4 to 6 inches (10 to 15 cm) you can harvest greens as soon as they are large enough to pick. Generally, this is when the green reach a height between 4 to 6 inches (10 to 15 cm) As long as the growing points or nodes are not removed, the greens should regrow after harvesting them.

Do not remove too many leaves if you plan to eat the roots. Roots can be pulled any time after they have reached a diameter of 2-4 inches. Do not allow them to grow too large, since overripe turnips have a woody taste and texture. You should be able to harvest mature, ripe turnips after five to ten weeks. "Early" varieties only require five weeks, while main crop varieties need six to ten.

Late sowings should be left in the soil as late as possible because sugar content increases with frost. Both the root of the vegetable and its greens are edible.

**How to Harvest:** Check the root size by lightly brushing away soil on top of one plant to reveal the root below. If that one plant appears ready for harvest, most of the others will likely be ready, as well.

**Optimal Storage temperature and conditions:** When packed and stored in a cool place, harvested turnips will usually last for three to four months. Consider keeping them in a basement, root cellar, or shed and covering them with straw.

Twist off the tops, leaving 1/2 inch (1.25 cm) of stem before storing the turnips. Do not rinse off any soil since it can actually help protect the roots while they remain in storage.

Depending on how cold your region is, you might be able to leave your fall crop in the ground until early winter by covering them with a thick mulch, but pull them out before the soil freezes and hardens.

Can also be stored in the refrigerator.

**Optimal Preserving Procedures:** Turnips are not good canned or frozen as this affects the flavour and nutrition. They are best eaten fresh.

**Seed Saving:** To grow turnip seed you can leave them in the ground over winter or, in cooler regions, you need to dig roots in the fall and store them in a root cellar, fridge or cold room. Plant them out in the spring and they will produce seed in the second season. Hang seed pods to dry in paper bags to catch seeds that fall.

## Watercress

**Description:** A water plant, grown for peppery, nutritious greens. Watercress has naturalized and grows wild along many streams and in boggy meadows throughout North America.

### Growing Instructions

**Optimal Time/Temperature for Germination:** Sow indoors six weeks before the last frost. Ready for harvest 50 days after sowing.

**Optimal Soil Conditions:** Need cool weather and plenty of water. Best grown in low wet areas of the garden where other plants that don't like wet feet will not grow. pH should be 6.5 and 7.5.

### **Seed Planting Depth, Spacing and Procedure:**

Pre-germinate seeds in moist papertowel then sow in growing medium such as peat moss, two seeds per pot, or small pots set in a tray of water. Place the seeds 1/4 inch (.64 cm) deep in the potting mix, allowing three to four inches (7.6 to 10.2 cm) between each seed. Position the seedlings where they will receive roughly six hours of natural light each day, but try to avoid harsh, direct sun.

You can keep the containers indoors or when the weather is regularly between 55°F and 75°F (13° and 24°C) where you live, you can place the container outside during warmer months. Transplant outdoors in a moist, shady spot. After all danger of frost has passed, seeds can be direct sown into the wet soil along a stream bed or into the wet part of a garden.

You can also start growing from mature watercress purchased at a supermarket or farmer's market. Cut the ends, then soak the base of the stalks in water for a few days to encourage root growth and proceed to plant them in soil as you would from seed.

Watercress can be grown in a container plant with running water such as a fountain, or on the edge of a fish pond.

### Container Planting Suggestions:

Choose a large container or planter with drainage holes that is at least 6 inches (15.2 cm) deep. Add a layer of landscaper's cloth at the bottom of the container to keep the potting mix from escaping when you water. Add pieces of broken pots or small pebbles to the bottom layer of the container to allow for good drainage. Plastic pots don't dry up as quickly as terra cotta.

Use a soilless mixture that drains well and contains peat moss and perlite or vermiculite. Leave approximately two inches (5 cm) of space to the top rim of the container and water the mix well.

**Best Companion Plants and Plants that Hinder:** As it is a water plant, Cress is a good plant to grow in wet areas where others won't survive. In home ponds and fountains, avoid planting watercress in a spot near inedible or poisonous water plants with similar leaves, to prevent confusion and potential harm.

### **Crop Maintenance**

**Moisture Requirements & Solutions:** Watercress thrives along the edges of running fresh water. For seedlings soak the potting mix deeply enough so that water fills the drainage tray below roughly halfway full, but doesn't rise higher than the growing container. Replace the water in the drainage tray with fresh water every two to three days.

Make sure the tray never dries out. Check it daily to see if you need to add more water.

You need to water container plants often or set up a soaker hose. Its soil should be wet at all times. You can put excess water in the tray or bucket to keep the plant wet and put in a fish tank bubbler so the water does not go stagnant.

**Weeding Needs & Solutions:** Keep weeds pulled in the watercress bed as they will take over due to the extra moisture.

**Feeding Needs/Optimal Natural Fertilizers:** Water soluble fertilizers such as kelp powder or manure tea will benefit mature plants. Can be sprayed on the leaves.

**Pests, Diseases & Solutions:** No pests or diseases of note.

### **Harvest and Storage**

#### **When to Harvest/Number of days to maturity:**

Leaves are best to pick in Spring or fall. Once the plants have grown roughly five to six inches (12.7 to 15.2 cm) in height use kitchen or gardening scissors to trim the top four inches (10.1 cm) of the plant as needed.

#### **How to Harvest:**

Pick the outside shoots and use raw or cooked.

Avoid taking more than a third of any plant when cutting to allow the plants enough foliage to continue growing.

Periodic harvesting helps encourage new growth

#### **Optimal Storage temperature and conditions:**

Can be kept in the fridge for a few days but best eaten fresh.

#### **Optimal Preserving Procedures:**

It may be worth experimenting with dehydration or freeze drying as a nutritious pot herb during winter.

#### **Seed Saving:**

Once established, Water Cress will self sow and come up on its own every year. Develops small curved seed pods that form from the tiny flowers. The seedpods shatter easily so seed harvesting is a challenge.

Harvest seed pods by gently rolling seed pods in fingers after drying them. Store in a cool, dry place.

**Notes:** If you are able to confirm identification with a local, it would be worth trying to find a wild variety to transplant a small piece into your garden. Be sure to take only what you need and wild harvest gently, without destroying the patch. Be prepared to avoid leeches when harvesting wild water cress.

## Wheatgrass

**Description:** Wheatgrass is the freshly sprouted first leaves of the common wheat plant. It is used as a food, drink, or dietary supplement.

### Growing Instructions

Wheat has been cultivated for millennia and there are many hybrid varieties. In modern times wheat has been extensively genetically modified. It is extremely important to find Non GMO wheat berries for sprouting and growing. In addition, there are sources of wheat varieties that are better suited to sprouting for wheat grass. Organic seed suppliers and health food stores are good sources for non GMO wheat berries that are well suited to growing wheatgrass.

**Optimal Time/Temperature for Germination:** Grown from wheat seed or wheat "berries", wheatgrass can be easily grown indoors at any time of year and is an excellent source of winter greens.

**Optimal Soil Conditions:** For indoor sprouting be sure to use food safe organic matter without chemical fertilizers.

### **Seed Planting Depth, Spacing and Procedure:**

Soaking seeds aids faster germination. It is advisable to rinse wheat berries before sprouting to remove dust from shipping.

Measure out enough seeds to create a light layer on the seed tray you use to grow the grass. For a 16" x 16" tray, use about two cups of seeds.

Soaking: Pour cold water into the bowl of seeds. Add about three times as much water as you have seeds. Cover the bowl with a lid or plastic wrap and place it on the counter to soak for about 10 hours, or overnight. Drain the water from the seeds and replace it with more cold water again, about three times as much water as you have seeds. Let it soak for another 10 hours.

Repeat the process one more time, for a total of three long soaks. By the end of the last soak, the seeds should have sprouted roots. This means they are ready to plant.

Sprouting: Line the seed tray with a food safe cloth, to prevent the wheatgrass roots from growing through the holes in the bottom of the tray. Spread an even one-inch layer of organic compost or potting soil in the seed tray. Spread the seeds in an even layer, slightly spaced out across the top of the compost or potting soil. Lightly press the seeds into the soil, but don't completely bury them. Water the tray lightly.

Covering the seedling tray with a damp cloth or plastic will help retain moisture. It's important to make sure the seeds don't dry out in the first few days after you plant them. Keep them damp as they root themselves in the seed tray. Lift the cover and water the tray thoroughly in the morning so that the soil is wet, but not completely waterlogged. A spray bottle is recommended for watering and adding moisture to a cloth cover.

Place the tray in a window with no direct sunlight.

On the fourth day after planting, remove cloth cover to prevent the seeds from sprouting through it. Continue watering the sprouted grass once a day.

Once the shoots are mature (about 6 inches tall) a second blade of grass will begin growing out of the first shoot. This is called "splitting" and means that the grass is ready for harvesting. After cutting off the first harvest, leaving roots and about 1 inch of grass stem intact, keep watering the wheatgrass to produce a second crop.

**Best Companion Plants and Plants that Hinder:** Best grown as an independent crop, although wheat is an attractive plant as a backdrop or accent in edible flower gardens. Chamomile, only in small proportions benefits wheat. Corn benefits wheat.

Wheat is suppressed in the vicinity of cherry trees, dogwood, conifers and maple trees. Root exudates of sorghum are poisonous to wheat. Tulip, Canada Thistle and bindweed adversely affect wheat.

### **Harvest and Storage**

**When to Harvest/Number of days to maturity:** Usually ready to harvest after 9 or 10 days of growth.

**How to Harvest:** Use a scissors to harvest the grass by clipping it just above the root and collecting it in a bowl. The harvested grass is ready to be juiced.

Rinse wheatgrass and place in a blender or juicer. Optional to strain out solids and put in compost.

**Optimal Storage temperature and conditions:** Keeps in the refrigerator for about a week but best used when fresh. Wheat berries can be stored in an airtight container for one year.

**Seed Saving:** Allow the wheatgrass to mature fully and set seed in late summer. Wait until the wheatgrass becomes yellow in color and completely dried out before harvesting the seed.

Gather the ripe seed heads into 2-inch diameter bundles. Tie the bundles with string 3 inches below the seed heads. These are called wheat sheaves.

#### To separate wheat berries from chaff:

Sever the bundles 3 inches below the string using a pair of pruning shears. Set the wheat sheaves upright and leave them for five days to dry out.

To gather the seeds from the sheaves, hold the sheaf just below the string with the seed head upside-down inside a 5-gallon bucket. Beat the seed head against the inside of the bucket to knock the seeds loose. Repeat until all the sheaves have dropped their seeds. Winnow the seeds outside on a warm, breezy day or using an electric fan. Pour the wheat seeds into a wire-mesh colander. Rub the seeds lightly against the mesh to loosen the papery outer hull surrounding each wheat seed. Toss the seeds in the colander while allowing the wind to blow the papery husks away.

Pour the winnowed wheatgrass seed into a sealable plastic container for storage. Seal the top and place the container in a cool, dry place such as a refrigerator or cupboard. Store the wheatgrass seeds for up to one year before sowing them. Wheat berries contain oils that can go rancid over time.

**Notes:** Wheatgrass is packed with essential vitamins and nutrients. It takes a lot of wheatgrass to make just a few shots of wheatgrass juice. If you plan to make wheatgrass a part of your daily diet, you'll need more than one tray of seedlings growing at a time. Mature dried wheatgrass is very attractive in dried flower arrangements.

**Caution,** some people are seriously allergic to wheat and wheatgrass. Be sure to ask about food allergies before offering someone a beverage that is fortified with wheatgrass.



## Yams

**Description:** A root vegetable originally from the tropics. Often confused with sweet potatoes, yams have rough, dark brown skin that is often compared to tree bark, and their flesh is dry and starchy like a regular potato.

### Growing Instructions

**Optimal Time/Temperature for Germination:** Not cold hardy. Wait until a few weeks after the last frost to plant your slips. Yams require a long growing season, so they will not reach maturity in areas with a short growing season.

**Optimal Soil Conditions:** To ensure that the roots don't meet resistance as they expand, make sure that the soil is very loose and well-drained where you want to plant the yams. When the ground starts to dry in the springtime, till the soil approximately 8 to 12 inches deep and remove debris (i.e. rocks, root pieces, etc.). Spread compost or manure over the soil and till it approximately 8 inches into the ground, to improve the soil's structure. Rake the area, spray it with water, and let it sit for 2 or 3 days before planting.

**Seed Planting Depth, Spacing and Procedure:** Yams aren't grown from seeds like most other vegetables - they grow from slips, which are derived from the sprouts of adult yams. To grow sprouts, cut a yam in half and submerge one portion in a glass of cool water. Insert toothpicks at three points around the middle of the yam and suspend it over the container, half-submerged in the water. Make sure the yam you choose looks healthy. If you notice discoloration or lesions on the skin, your yam could be diseased, which will transfer to the sprouts.

The growth process requires warmth, so place the glass near a heat source. If possible, position the glass near a window so that the sprouting yam gets sunlight as well. Otherwise, place it near a heater.

Refill the water in jars or glasses if necessary to keep the submersion level of the yam consistent. Wait for sprouts to form on the yam; this will take a few weeks. Once sprouts are leafy, take each one and gently twist it off of the yam. Each yam can produce up to 50 sprouts.

To root the slips, lay each sprout in a shallow container, with the bottom half of the stem submerged in water. Allow the leaves to hang out over the rim of the container. Over the course of a few days, you should see roots emerging from the bottom of each sprout.

When the roots are about an inch long, they are then slips that are ready to be planted. Ensure that you have enough room to accommodate the slips that you'll be planting. Large tubers need a lot of space to grow, as do the vines of the plants, which grow vigorously. Ideally, you should leave approximately a meter of space between each plant.

Dig holes about 4" or 5" deep and 3" wide (approximately 10 or 12 cm deep and 7-8 cm wide). Place slips in the holes (dug about 8 to 10 inches apart), positioned with the roots pointing down and the leafy tops above the soil. Very gently fill the holes with soil, being careful not to jostle or bruise the slips too much. Press soil down lightly to get rid of any air pockets.

## **Crop Maintenance**

Yam plant vines are not sturdy and require support in order to produce a large yield. Keep an eye on the plants and stake the mounds approximately 4 weeks after the vines first emerge. Use bamboo canes as support for these yam vines, which can grow up to 10 ft.

**Moisture Requirements & Solutions:** Newly planted slips should be watered every day the first week, every second day the second week, and less and less as they grow. Be generous in hydrating them but avoid water logging. Yams thrive in sunlight, so if the soil gets dry, adjust the watering schedule accordingly.

**Weeding Needs & Solutions:** Yams don't like competition from weeds as they are heavy feeders when developing roots. The crop yield is reduced by the presence of perennial weeds such as johnsongrass, bermudagrass, alligator weed, and yellow and purple nutsedge.

Some other major weeds affecting sweet potatoes include pigweed, common cocklebur, common lambsquarter, common ragweed and Pennsylvania smartweed.

Cultivating in the fall and removing weeds as they come in can help control these weeds.

Before growers plant and if weeds are actively growing, they can apply something like diluted vinegar concentrate to clear the planting area.

**Feeding Needs/Optimal Natural Fertilizers:** Fertilize every two to four weeks during the growth period. Yams do well with organic fertilizer that is low in nitrogen, an element which can compromise root development, and is high in phosphorus. Organic sources of phosphorus are phosphate rock and compost.

### **Pests, Diseases & Solutions:**

Yam mosaic disease. Caused by aphids, this condition results in yellow and light green discoloration on the leaves. To prevent this disease, keep the growing area free of weeds and use disease-free slips. If you notice diseased plants, remove them immediately.

Dry rot disease. This condition causes light yellow lesions on the outer skin, eventually turning the entire yam black. Use disease-free slips to prevent dry rot. If your yams have this disease, soak them in hot water for an hour post-harvest to lessen the effects.

Mealy bugs. This insect looks like a white, cotton-like oval. Mealy bugs can hinder growth and attract ants. Treat mealy bugs by removing infected plants and using neem oil.

White scale insects. These insects create tiny white scales on the skin of yams and can slow growth. Treat infected plants by removing affected parts as much as possible and treating with plant safe soap with natural insect repellent.

## **Harvest and Storage**

**When to Harvest/Number of days to maturity:** Yams they require over 4 months of warm temperatures to reach maturity. They should be harvested when the tops of plants start to go yellow and wither. Harvesting generally occurs in autumn.

**How to Harvest:** Use a pitchfork or similar gardening implement to gently dig into the soil and remove the tubers from under the surface. Start digging a safe distance from the stem. Be careful not to pierce the skin of the yams when removing them from the ground.

Refrain from washing yams after harvesting. Instead, sort yams into boxes or baskets to cure them before storage. Curing can be done in approximately 2 weeks. To do so, place yams in a warm, dark place with some ventilation and leave them undisturbed. This process will allow bruising and wounds on the yams to heal, and seal out rot bacteria.

**Optimal Storage temperature and conditions:** Can be kept for several months. Store yams in a cool, dry spot like a kitchen cabinet.

**Optimal Preserving Procedures:** Saving roots is the best option. Yams are best left in the ground as long as possible and eaten fresh.

**Seed Saving:** In traditional yam cultivation tubers for sprouting are part of the crop. The yam crop stays in the field for 8 to 10 months and the tubers are ready to grow in another 2 to 3 months after harvest when dormancy is broken. As mostly farmer-saved seed tubers are used, farmers will normally select and plant their good seed tubers and sell any left over.