

VEGETABLE CROP RECOMMENDATIONS

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VEGETABLE CROP RECOMMENDATIONS

Learning Objectives

- Review the most common vegetables produced in Idaho gardens
- Adapt recommendations to unique climate, soil, property situations and personal objectives
- Estimate fertilization requirements based on soil test results
- Demonstrate comprehension of the crops covered per their histories, growing needs, soil type/preparation tips, fertilization requirements, pest information and control, prevalent diseases, harvest and storage tips, and crop production planning

Introduction

Understanding the growth characteristics and management requirements of individual vegetable crops can be important in helping gardeners achieve superior productivity and quality. This chapter provides information about some of the most common vegetables produced in Idaho gardens.

The recommendations provided here are not the final word in growing vegetables. Every gardener has a unique situation created by his or her climate, soils, property, and personal objectives. Nothing replaces experience. This chapter is a good starting place, but each gardener should rely as much on experience as on the written word.

FERTILIZER RECOMMENDATIONS

Determining the optimal fertilizer rate for each vegetable crop can be challenging. When establishing a vegetable garden, and periodically thereafter, it is a good idea to take a soil sample and have it evaluated by a competent laboratory. If a garden space has been significantly improved, such as by the addition of topsoil, it is also wise to test the soil.

The soil test will provide the basis for fertilizer application rates. Private soil laboratories often supply recommendations along with test results. If recommendations are not provided, Extension educators can help you interpret the soil test results.

In addition to helping you decide how much fertilizer to apply, soil tests can help you choose appropriate fertilizer products. Many fertilizer formulations are available, making it possible to meet plant needs in a variety of situations. For example, if a soil test indicates low levels of nitrogen (N), but high levels of phosphorus (P) and potassium (K), an appropriate product would be high in N but low in the other nutrients, e.g., 21-0-0 (N-P-K) or 46-0-0. However, if N is high and other nutrients are somewhat low, it might be best to choose a 5-10-10 or 10-10-10 formulation. See chapter 5 to learn how to calculate fertilizer application rates.

Once a garden is in successful production, it is not essential to test the soil every year. In this case, you can follow recommendations based on average soil nutrient levels, such as those included in this chapter. If they do not prove suitable to your situation, test your soil and make adjustments accordingly.

CONSUMPTIVE YIELD

Information on consumptive yield can help you determine how much of a crop to plant. The information in this chapter will enable you to calculate planting requirements based on your family's preferences. This information is valuable and difficult to find.

NUTRITION

Nutrition information can help you create a balanced diet. United States Department of Agriculture (USDA) researchers say that every person should eat 2.5–3.5 cups of vegetables every day. Vegetables contain many critical nutrients that are difficult to obtain from other foods. Researchers are learning that the nutritional value of vegetables goes far beyond vitamins and minerals. Vegetables also include many compounds that help reduce the risk of cancer, reduce the impact of aging, strengthen the immune system, and protect memory and eyesight. Any crop that supplies 5%–20% daily value (DV) of a nutrient is considered a “good source”; any crop that supplies more than 20% DV of a nutrient is considered an “excellent source.”

SOIL TEMPERATURES

Successful planting involves many things, including placing seeds in an environment in which they can germinate and grow. Soil temperature is critical to the successful establishment and early growth of all crops. Some species, such as radishes, carrots, and beets, are categorized as cool-season crops and can germinate in soils as cold as 40°F. Watermelons and tomatoes, however, need soil temperatures of at least 60°F.

At minimum germination temperatures, most crops may emerge, but emergence will take a long time, and seedlings sometimes have more problems with diseases and pests than those growing in warmer soil. At optimal soil temperatures, seeds emerge most quickly and plants have the fewest problems getting established. Optimal soil temperatures are often 20°F–30°F warmer than minimum temperatures.

In Idaho, if we wait for optimal soil temperatures, it often is too late to grow a garden. Thus, we have to balance the needs of the seeds with the reality of where we live. Somewhere between the minimum and optimal soil temperature is usually good enough to get plants off to a healthy start.

Recommendations for planting-time soil temperatures in this chapter are within this range. You'll need to balance these recommendations against other factors, such as the need to start plants early enough to allow harvest within the normal growing season.

In Idaho, we often see large swings in temperature from day to night. Although soil temperatures do not vary as widely, they do somewhat mimic air temperatures. Thus, soil temperatures can be suitable for planting during the day, but fall lower at night. It is the daytime maximum soil temperature that is most important. If soil temperatures are within an acceptable range during much of the day, germination and emergence will occur normally.

Follow these steps to measure soil temperature:

1. Obtain a good soil thermometer (available at nurseries and garden stores).
2. Locate the exact spot where you will plant the crop of interest. Even a few feet away, the conditions can be different because of shade, structures, etc.

3. Insert the probe to the depth at which you will plant the seed (about 1 inch is a good average for all seeds) so you can test the actual location of the seed.
4. Wait 1–2 minutes for the probe to stabilize.
5. Read and record the temperature.

Take the temperature over a period of days. It's best to test at the time of day when maximum (5–7 p.m.) and minimum (6–8 a.m.) temperatures occur. With this information, you can compute an average daily soil temperature. Many publications use the daily average for making planting recommendations. (In this chapter, recommendations are based on daily maximum temperatures rather than on average temperatures.)

Beans

Snap beans (*Phaseolus vulgaris*), grown for the immature pod, originated in Central America. Both bush and pole types were widely used by native peoples. Bush beans ripen earlier, but pole bean yields are higher. There are several popular types of snap beans, including wax, flat pod, green, and purple beans. Other types of beans that enjoy some popularity include shell beans, fava beans, lima beans, and soybeans.



Bush beans are the most popular type of snap bean. Because these beans grow to a certain size, blossom, set fruit, and then stop growing, they are referred to as determinate. Bush beans provide the advantage of having all the pods reach harvestable size at nearly the same time. Pole beans, however, are indeterminate. They continue to grow and produce throughout the season and will have both blossoms and mature beans on the same plant. Pole beans provide fresh pods over a long period of the summer.

Growing Suggestions

Achieving an acceptable stand of beans begins with selection of quality seed. Bean seed that is damaged (e.g., cracked seed coats) will not emerge properly, if at all. Inspect seed for damage before purchasing.

Soil Type and Soil Preparation

Beans do best on lighter soils, but will grow on almost any well-drained soil. Do not till wet soils in preparation for planting beans.

Beans produce best in soils with sufficient organic matter. Soils low in organic matter should be amended with compost or manure (added the previous fall, if possible). Work soil well to produce a deep, friable bed. Good soil tilth helps beans develop a healthy root system.

Planting

It is best to plant beans directly into the garden 1–3 weeks after the average last killing frost in the spring, when the daytime air and soil temperatures approach 65°F. Planting into cold soils will reduce seedling emergence and vigor.

Some people soak vegetable seeds overnight before planting them to hasten germination. This practice is discouraged for beans, as it often injures the seed, resulting in poor germination and weakened plants.

Planting specifications:

- Seed spacing: 1.5–2 inches
- Final spacing: 3–6 inches
- Ounces of seed per foot: 0.13
- Row width: 18–30 inches
- Seed depth: 1.5–2 inches
- Germination: 6–14 days

Fertilizer

Beans are a legume and can meet most (but not all) of their own N needs through their N-fixing ability. If you plant beans into soils where legumes haven't grown before, it might be helpful to inoculate the seed with *Rhizobium* bacteria to stimulate N fixation. Inoculum can be purchased at garden centers.

Although beans require minimal applications of N, levels of P, K, and other nutrients must be adequate to ensure productivity. Apply fertilizer during soil preparation. A 5-10-10 or similar fertilizer formulation is usually adequate. Add the equivalent of 0.1–0.2 lb N (in combination with P and K) per 100 square feet.

Weed Control

Season-long weed control is important for beans because they are only moderately competitive with weeds. Control weeds through mechanical tillage,

hand weeding, or use of a labeled garden herbicide. Be careful when cultivating close to plants to avoid damaging the roots.

Irrigation

Beans have a shallow root system and little tolerance of drought stress. Optimal irrigation entails frequent, small applications of water. On clay or loam soils, apply 1–1.5 inches of water every 3–5 days. On sandy soils, apply smaller amounts, but more frequently.

Insects

Several insects can infest beans in Idaho, but they rarely reach population levels that require control. Spider mites can be a problem in some years when the weather is hot and dry. They are best controlled by using overhead irrigation or spraying the leaves with a hard stream of water for several days in a row. Loopers, armyworms, and Mexican bean beetles can damage leaves. In cases of severe infestation, these pests may require the use of a labeled organic or traditional insecticide.

Diseases

Many fungal, bacterial, and viral diseases affect beans. However, if good-quality seed from a reputable supplier is used, diseases rarely become serious in Idaho gardens. Seed and root rots can affect seedling emergence and early plant growth. Prevent these diseases by applying little or no irrigation during germination and early seedling growth. **White mold**, a fungal disease that rots the pods if they touch the ground, can be a problem if the soil surface remains wet for long periods of time. Allowing the soil to dry slightly between irrigations usually controls this disease.

Harvest

Harvest beans when pods are about 3 inches long and before the seed is much larger than the diameter of a pencil lead. Harvest every 3 or 4 days to prevent overmaturity. Frequent picking of pole beans stimulates the plants to produce new pods and helps to ensure a heavy yield.

Storage

Quality is highest if beans are consumed or processed immediately. However, they can be held for a few days under refrigeration and high humidity without a serious loss of quality. If allowed to wilt, quality diminishes rapidly.

Consumptive Yield

Compute household planting requirements as follows:

- 6–12 lb fresh beans per person
- 12–14 lb canned or frozen beans per person
- Each foot of row will yield 0.5 lb

Plant 12–52 feet of row per person.

Nutritive Value

Beans contain zeaxanthin, which is known to improve eye health and reduce the effects of aging. They are a good source of vitamin C, vitamin K, vitamin A, vitamin B6, folate, thiamin, riboflavin, phosphorus, and magnesium. One hundred grams (3.5 oz) of fresh green snap beans without butter or salt contain 31 calories, 1.8 grams of protein, 0.2 gram of fat, 7 grams of carbohydrates, and 2.7 grams of dietary fiber. Fresh snap beans contain 90% water.

Beets

Beets (*Beta vulgaris*) are native to the Mediterranean area of North Africa, Europe, and western Asia. The leaves have been eaten since before written history. The roots were used medicinally and didn't become a popular vegetable until French chefs began popularizing them in the 1800s. Beet powder has been used as a coloring agent in many foods, including the tomato sauce used on frozen pizzas.



Among beet cultivars, there is much room for personal preference. The roots may be round, flat, or elongated. Most are red or purple, but several other colors are now available as a result of modern breeding efforts. It is best to select cultivars that mature in 55–65 days.

Growing Suggestions

Beets are cool-weather biennials that are grown as annuals for their leaves and roots. They produce the best quality when grown in cool soil and full sun.

As beets grow and the roots start to bulge out of the soil, it may be advisable to hill soil around them. Keeping the roots covered with soil will protect texture and color.

Soil Type and Soil Preparation

Beet roots develop the best shape and color in light or organic (peat) soils. However, they will grow in almost any good soil that has a good quantity of organic matter. Add organic matter if needed, preferably in the fall. Till to mix crop residues and organic matter into the top 7–8 inches of soil. Create a fairly deep, mellow (soft) seedbed to prevent compaction around the developing roots. Avoid working soil when it is too wet.

Planting

Sow beet seeds 2–4 weeks before the average last spring frost, when the soil temperature approaches 50°F. If a continual supply is desired, plantings can be made every 2 weeks until midsummer. Soak beet seeds in water overnight before planting to hasten germination. Beets can be planted in banded rows or in nonrow groupings; give each plant about 6–8 square inches of space.

Planting specifications:

- Seed spacing: 0.5–0.75 inch
- Final spacing: 2–3 inches
- Ounces of seed per foot: 0.01
- Row width: 12–18 inches
- Seed depth: 0.5–1 inch
- Germination: 10–15 days

Fertilizer

Beets require very little fertilizer. All of the fertilizer can be applied during soil preparation. A 5-10-10 or similar fertilizer formulation is usually adequate. Add the equivalent of 0.25 lb N (in combination with P and K) per 100 square feet.

Weed Control

Beets require full-season weed control because they are never fully competitive with weedy plants. Shallow cultivation should be used when necessary, as deep cultivation close to the plants can damage the root system, reducing yield and quality. A general garden herbicide can be effective in limiting weed populations.

Irrigation

Shallow planting and problems with soil crusting mean that beets may need several light irrigations to ensure good seedling emergence. Once emerged, beets will do fine with any irrigation regime that

maintains consistent soil moisture. Apply 1.5–2 inches of water every 5 or 6 days on most soils.

Insects

Beets can be damaged by several species of caterpillars, leaf miners, and aphids. However, in most garden situations, beets can withstand these minor infestations without significant control measures.

Diseases

In Idaho gardens, beets may show mild symptoms of powdery mildew. This disease seldom requires control measures. Curly top virus, expressed as mottled or malformed leaves, may appear. Remove infected plants to minimize spread to healthy plants.

Harvest

Beet leaves can be harvested and used as a potherb at any time during the growing season. Beet roots can be harvested as soon as they are large enough to use. Roots are ready to be harvested 8–9 weeks after seeds are sown and are most tender when less than 2 inches in diameter. Harvest before roots become woody. Pull the beet and cut off the tops about 1–1.5 inches above the crown.

Storage

With tops removed, beets will keep for several months under refrigeration (just above freezing) with high humidity.

Consumptive Yield

Compute household planting requirements as follows:

- 7–12 lb fresh beets per person
- 12–30 lb canned or frozen beets per person
- Each foot of row will yield 1.25 lb

Plant 6–34 feet of row per person.

Nutritive Value

Beets, especially dark red ones, are very high in antioxidants, compounds shown to lower cancer risk, improve memory, and reduce the effects of aging. They are an excellent source of folate and potassium and a good source of vitamin C, vitamin B6, iron, manganese, P, and copper. One hundred grams (3.5 oz) of raw red beets contain 43 calories, 1.6 grams of protein, 0.2 gram of fat, 9.6 grams of carbohydrates, and 2.8 grams of dietary fiber. Beet roots are made up of 88% water.

Broccoli

Broccoli (*Brassica oleracea*) is native to the Mediterranean area, where it probably was developed from a wild cabbage species by the ancient Etruscans. The Italians seem to be the first group of people to develop a real interest in broccoli. When introduced into England, it was called “Italian asparagus.” Broccoli was brought to America by immigrants, but didn’t become a popular vegetable in the United States until the 1920s.



Many outstanding cultivars of broccoli are available for garden production. Newer hybrid cultivars often have very large, high-quality heads that mature uniformly. Some of the older open-pollinated cultivars produce multiple crops by reheading after harvest. These secondary heads are often small but provide a continuous supply for table use.

Growing Suggestions

Broccoli can be planted as seed, but there are many advantages to using transplants. Transplanting makes weed control easier, reduces seedling disease and insect problems, and improves quality by allowing harvest before hot weather sets in. Broccoli plants are easy to transplant, as long as the seedlings are hardened off before being placed in the garden.

Soil Type and Soil Preparation

Broccoli will grow in most soils, from sand to clay. Prepare the seedbed when the soil has sufficient moisture to form a ball that crumbles into medium-size fragments under finger pressure. Broccoli quality will be enhanced by working in large amounts of organic matter.

Planting

Broccoli can be direct seeded up to 4 weeks prior to average last frost. Direct seeding is recommended only for areas with a relatively long, cool spring season that will allow the broccoli to mature before summer heat sets in. Plant seeds 0.5 inch deep. With proper moisture, germination will occur in 3–10 days.

In most of Idaho, broccoli performs best if transplanted. Broccoli can be transplanted 2–4 weeks before average last spring frost. Transplants should be stocky, have a stem about the diameter of

a pencil, and be dark green and vigorous. Overly large or weak transplants will not produce large, quality heads. New transplants may require protection from wind and extreme frost events (below 25°F).

To produce your own transplants, sow broccoli seeds indoors 5–7 weeks prior to the predicted transplant date. Before setting the transplants into the garden, harden them off by setting them outside for increasing periods of time during the last 1 or 2 weeks of growth.

Transplanting specifications:

- Final spacing: 18–24 inches
- Row width: 24–30 inches

Fertilizer

Broccoli is a heavy feeder and responds positively to adequate levels of N, P, and K. Split applications work best to keep broccoli growing vigorously through harvest. Apply the equivalent of 0.25 lb N (in combination with P and K) per 100 square feet during soil preparation. A 10-10-10 fertilizer formulation (or similar nutrient ratios) is usually appropriate. Side-dress an additional 0.25 lb N when the plants are about 12 inches tall. For side-dressing, select a high-N fertilizer such as 21-0-0 or 46-0-0.

Weed Control

Early season weed control is important for broccoli. Once established, plants compete fairly well with weeds. Control weeds through mechanical tillage, hand removal, or use of a labeled garden herbicide. When tilling close to plants, tillage should be shallow in order to prevent damage to roots. Also, try to avoid damaging the large, brittle leaves of mature plants.

Irrigation

Drought stress has a marked effect on broccoli quality, making heads fibrous and strong flavored. It is important to provide consistent, timely irrigation. Optimal irrigation entails frequent, small applications of water. On clay or loam soils, apply 1–1.5 inches of water every 3–5 days. On sandy soils, apply smaller amounts, but more frequently.

Insects

Common broccoli pests in Idaho include aphids, cabbage worms, cabbage loopers, and cutworms. Aphids can be washed from the plant using a hard stream of water. Serious infestations may require the use of a labeled insecticide. Cabbage worms and

cabbage loopers damage both the leaves and the heads. Cabbage worms often inhabit the heads and become evident only upon cooking. They may require an insecticidal product for good control. Early transplanting often allows harvest before cabbage worms and loopers become a problem. Cutworms often kill new transplants by chewing them off at ground level. Placing small cardboard collars around the base of the plants often prevents this problem.

Diseases

There are no consistent, serious diseases of broccoli in Idaho gardens.

Harvest

Harvest broccoli when the center head is 4–10 inches across. However, head size is not the critical factor in determining maturity. Harvest when heads reach maximum size but are still compact and dark green, as heads quickly lose quality once the buds start to separate and turn yellow. Harvest by cutting the stem 3 inches below the flower buds. Utilize both the stem and the head. After the first harvest, broccoli often produces small lateral heads. If the central head becomes overly mature, remove it to stimulate production of these side shoots.

Storage

Broccoli head quality deteriorates very quickly following harvest. Broccoli is rarely stored and should be prepared or processed immediately after harvest. If necessary, it can be held for a few days at near-freezing temperatures in a moist refrigerator.

Consumptive Yield

Compute household planting requirements as follows:

- 3–5 lb fresh broccoli per person
- 5–6 lb frozen broccoli per person
- Each foot of row will yield 0.75 lb

Plant 4–15 feet of row per person.

Nutritive Value

Broccoli is remarkably nutritious. It contains many phytonutrients, including thiocyanates, indoles, sulforaphane, isothiocyanates, and flavonoids, which help prevent prostate, colon, urinary tract, pancreatic, and breast cancers. Broccoli is an excellent source of vitamin C and vitamin K. It is a good source of thiamin, riboflavin, folate, vitamin

E, vitamin B6, magnesium, manganese, iron, P, and K. One hundred grams (3.5 oz) of broccoli (head or bud clusters, stems, and leaves) contain 31 calories, 2.8 grams of protein, 0.4 gram of fat, 6.6 grams of carbohydrates, and 2.6 grams of dietary fiber. Broccoli heads contain about 89% water.

Brussels Sprouts

Brussels sprouts (*Brassica oleracea*) originated in Europe, principally in Brussels, Belgium.

They are considered to be one of the “newer” vegetables, having been cultivated for only about 400 years. They were first described in the literature in

1587. By 1800, they were commonly grown in Belgium and France. Some people were growing Brussels sprouts in the United States by 1800, but they have never become widely popular in this country.

Brussels sprouts resemble small cabbages but require a longer growing season than cabbage. There are two major classes of Brussels sprouts, dwarf and tall. The dwarf types mature in fewer than 100 days and grow best in the cooler regions of Idaho. The tall types require up to 100 days to mature and grow best in the cooler regions of Idaho.

Growing Suggestions

Brussels sprouts are best planted as transplants. Transplanting makes weed control easier and reduces seedling disease and insect problems. Brussels sprouts are easy to transplant, as long as the seedlings are hardened off before being placed outside in the garden.

Late in the season, tall plants may become susceptible to damage from wind. Prevent plants from tipping over by installing support stakes.

Soil Type and Soil Preparation

This vegetable is adaptable to various soil types, as long as the soil is fertile, has good texture, and is moist. Brussels sprouts quality is enhanced by incorporating large amounts of organic matter.

Planting

If producing your own transplants, sow seeds in containers 4–6 weeks before transplanting in the garden. Otherwise, purchase transplants that are stocky, healthy, and not too large (stems the diameter



of a pencil). Place them in the garden 2–4 weeks before average last frost. Protect them from wind and hard frost for the first 1 or 2 weeks.

Transplanting specifications:

- Final spacing: 18–24 inches
- Row width: 24–30 inches

Fertilizer

Brussels sprouts require high levels of fertility. Split applications of N work best to keep Brussels sprouts growing vigorously through final harvest. A preplant fertilizer application of 0.2 lb N for each 100 square feet is recommended. A 10-10-10 fertilizer formulation (or similar nutrient ratios) is usually appropriate.

When plants are about one-third their final height, side-dress with an additional 0.2 lb N per 100 square feet. For side-dressing, select a high-N fertilizer such as 21-0-0 or 46-0-0.

Weed Control

Early season weed control is important for Brussels sprouts. Once established, plants compete fairly well with weeds. Control weeds through mechanical tillage, hand weeding, or use of a labeled garden herbicide. As Brussels sprouts approach maturity, tillage close to plants should be shallow in order to prevent damage to roots. Also, it is important not to damage the large, brittle leaves of mature plants.

Irrigation

Good flavor and tenderness of Brussels sprouts depend on proper irrigation and consistent soil moisture. Optimal irrigation entails frequent, small applications of water. On clay or loam soils, apply 1–1.5 inches of water every 4 or 5 days. On sandy soils, apply smaller amounts, but more frequently.

Insects

Common pests of Brussels sprouts in Idaho include aphids, cabbage worms, cabbage loopers, and cutworms. Aphids can be washed from the plant using a hard stream of water. Serious infestations may require the use of a labeled insecticide. Cabbage worms and loopers damage leaves, but are a serious problem only if they partially defoliate the plants. They can be removed by hand or may require an insecticidal product for control. Cutworms often kill new transplants by chewing them off at ground level. Placing small cardboard collars around the base of the plants often prevents this problem.

Diseases

Serious diseases of Brussels sprouts in Idaho gardens are rare.

Harvest

As the sprouts on the main stem begin to enlarge, remove the lower leaves of the plant. Harvest sprouts as they become solid and about 1–2 inches in diameter. The lowest sprouts will mature first. To speed up sprout maturity, pinch off the tip of each plant in late August or early September; however, this may reduce the total yield of the plant by as much as one-third. Brussels sprouts can withstand cold fall temperatures. The best-tasting sprouts are those that mature after the first fall frost.

Storage

When nighttime temperatures drop to 20°F on a regular basis, dig up the plants with a little soil remaining around the roots. Put them into a deep cold frame or in an unheated dark garage. They will continue to grow until all the sprouts mature.

Harvested Brussels sprouts can be stored for 2–3 weeks in a refrigerator at a temperature near freezing and with high humidity. They should not be stored with apples or other fruits because they may become bitter due to the presence of a gaseous compound called ethylene.

Consumptive Yield

Compute household planting requirements as follows:

- 1.5–4 lb fresh Brussels sprouts per person
- 4–6 lb canned or frozen Brussels sprouts per person
- Each foot of row will yield 0.5 lb

Plant 3–20 feet of row per person.

Nutritive Value

Brussels sprouts are an outstanding source of vitamin K, which is linked to bone health. They are also an excellent source of vitamin C and a good source of thiamin, folate, riboflavin, vitamin E, vitamin B6, iron, magnesium, manganese, P, and K. One hundred grams (3.5 oz) of Brussels sprouts provide 3.4 grams of protein, 0.3 gram of fat, 9 grams of carbohydrates, 43 calories, and 3.8 grams of dietary fiber. Fresh Brussels sprouts are 86% water.

Cabbage

The wild relatives of the cabbage plant are native to the Mediterranean area of Europe. These nonheading types of cabbage were cultivated for thousands of years before people began to prefer the smaller, tender leaves packed more closely in the center of certain plants. Initially, people gravitated toward plants with large, succulent leaves. They chose these plants as their source of seed for the next year. Kale was developed by the fifth century BC. Later, selection began for small, tender leaves, and over time plants began to emerge that had cluster or “head” formation. By the first century AD, cultivated cabbage (*Brassica oleracea*) looked much like the plants we grow today.



Cabbage cultivars vary widely. Maturity times vary and heads may be globular or flat; smooth or savoy; and green, red, or purple. Some cultivars produce heads that store for many months under proper conditions. Choose cultivars based on personal preferences and growing conditions.

Growing Suggestions

Cabbage can be either transplanted or direct seeded. Transplanting is best in short-season areas. Also, transplanting makes weed control easier and reduces seedling disease and insect problems. Cabbage is easy to transplant, as long as the seedlings are hardened off before being placed outside in the garden.

To achieve best quality, cabbage must be supplied with consistent growing conditions. Any fluctuation in rate of growth, caused by stress, nutrient deficiencies, or lack of water, can cause the heads to split.

Soil Type and Soil Preparation

Cabbage is adaptable to various soil types, as long as the soil is fertile, has good texture, and is moist. Begin seedbed preparation when the soil has sufficient moisture to form a ball that crumbles into medium-size fragments under finger pressure. Cabbage quality is enhanced by working in organic matter.

Planting

If direct seeding, plant extra seeds and thin to a final stand. Plant cabbage 3–5 weeks prior to average last frost or as soon as the soil is dry enough to be worked.

Transplants can be purchased or grown from seed. If producing your own transplants, sow seeds into containers 4–6 weeks before transplanting to the garden. Otherwise, purchase transplants that are stocky, healthy, and not too large. (Stems should be the diameter of a pencil.) Large cabbage transplants may bolt (produce seedstalks instead of heads) if subjected to several weeks of 40°F–50°F weather. Transplant to the garden 2–4 weeks before average last frost.

Planting specifications:

- Seed spacing: 1.25–1.5 inches
- Final spacing: 1–2 feet
- Ounces of seed per foot: 0.01
- Row width: 24–30 inches
- Seed depth: 0.25–0.5 inch
- Germination: 4–10 days

Transplanting specifications:

- Final spacing: 18–24 inches apart

Fertilizer

Cabbage is a heavy nutrient user and needs a good supply of most nutrients, especially N, P, and K. Split applications work best to keep cabbage growing vigorously through harvest. Apply 0.25 lb N (in combination with P and K) per 100 square feet before planting. A 10-10-10 fertilizer formulation (or similar nutrient ratios) is usually appropriate. Side-dress an additional 0.25 lb N, using a 21-0-0, 46-0-0, or similar high-N fertilizer, when the plants show signs of heading.

Weed Control

Early season weed control is important. Once established, plants compete well with weeds. Control weeds through mechanical tillage, hand weeding, or use of a labeled garden herbicide. Once plants reach full size, tillage activities close to plants should be shallow in order to prevent damage to roots. Also, avoid damage to the large, brittle leaves of mature plants.

Irrigation

Head size and tenderness depend on proper irrigation and consistent soil moisture. Optimal irrigation entails frequent, small applications of water. On clay or loam soils, apply 1–1.5 inches of water every 3–5 days. On sandy soils, apply smaller amounts, but more frequently.

Insects

Common pests of cabbage in Idaho include aphids, cabbage worms, cabbage loopers, and cutworms. Aphids can be washed from the plant using a hard stream of water, although they may crawl under the outer leaves of the head, where they are difficult to reach. Heavy infestations may require use of a labeled insecticide. Cabbage worms and loopers usually do the most damage to the outer leaves of the head and are a serious problem only if they consume large portions of the outermost layer. They can be removed by hand or may require an insecticidal product for control. Cutworms often kill new transplants by chewing them off at ground level. Placing small cardboard collars around the base of the plants often prevents this problem.

Diseases

There are few, if any, serious diseases of cabbage in Idaho gardens.

Harvest

Cabbage is ready to harvest 50–65 days after transplanting. The heads should be solid, but must be picked before they crack. Soft heads have poor quality. Heads may split during hot weather if the water supply fluctuates.

Reducing irrigation or twisting the mature heads part of the way around to sever half the roots will allow mature cabbage to stay in the garden longer without losing quality. Plants harvested early in the summer and left with as many leaves as possible often develop small heads where the leaves meet the stem. These heads are edible and should be picked when firm.

Cabbage can withstand very light frosts before harvest. However, temperatures below 30°F may result in injury that will eventually cause the head to break down.

Storage

For storage, place mature cabbage heads in a pit, trench, outdoor cellar, or cool storage room. The temperature should be as near 32°F as possible and definitely 40°F or below. Humidity should be high. Stored cabbages will last well into winter.

Consumptive Yield

Compute household planting requirements as follows:

- 4–5 lb fresh cabbage per person
- 6–12 lb processed cabbage per person

- Each foot of row will yield 0.8 lb

Plant 5–21 feet of row per person.

Nutritive Value

Cabbage contains thiocyanates, indoles, sulforaphane, isothiocyanates, and flavonoids, which help prevent cancer and lower “bad cholesterol.” It is an excellent source of vitamin C and vitamin K, as well as a good source of thiamin, vitamin B6, folate, iron, and manganese. One hundred grams (3.5 oz) of cabbage supply 1.3 grams of protein, 0.1 gram of fat, 5.8 grams of carbohydrates, 25 calories, and 3.8 grams of dietary fiber. Fresh cabbage consists of 92% water.

Cantaloupes

Evidence exists that cantaloupes (*Cucumis melo*) were cultivated from Egypt to Iran and northern India as early as 2400 BC. Dried and roasted melon seeds have been a favorite throughout the Middle East and China for several thousand years. During the fifteenth century, Arabs brought melon seeds to southern Spain, where the fruit became popular. From there, Columbus took them on his second voyage to the New World and they were planted in Haiti. Cantaloupes were soon being grown in Central and South America, where the native populations enjoyed the new fruit. By the 1600s, cantaloupes were being grown in parts of North America. They didn’t become a popular crop in the United States, however, until after the Civil War.



Most cantaloupe cultivars are suitable for production in the south-central and southwestern regions of Idaho. In all other areas, it is important to select early maturing cultivars. In short-season areas, early cultivars of standard netted muskmelons may mature to a quality harvestable state. Most crenshaw, cassava, honeydew, or Christmas-type melons require a longer season than is usually available.

Growing Suggestions

Cantaloupe plants have separate male and female flowers on the same vine and are cross-pollinated. For this reason, they need insects to pollinate the flowers. It is important to protect pollinators in the garden when growing cantaloupes.

Cantaloupes require full sun all day long to produce the sweetest fruit. Any shade will not only result in inferior flavor, but may delay maturity, making production in marginal climates even more difficult.

Cantaloupes are a warm-season crop. It is critical to be patient in waiting for warm, late-spring weather before planting them in the garden. It helps to provide warm growing conditions by planting next to a south-facing structure, planting on black plastic, and/or using row covers.

Soil Type and Soil Preparation

Cantaloupes are adapted to most soils, but grow best in a fertile, mellow soil with large amounts of compost. During tillage, incorporate organic matter, if needed. Cantaloupes will grow faster and mature earlier in sandy soils.

Planting

Cantaloupes can be either direct seeded or transplanted. Direct seeding usually results in healthier, stronger plants. Transplanting often provides the advantage of slightly earlier maturity. Direct seed 1–2 weeks after average last frost and when daytime maximum soil temperatures are near 70°F.

Transplanting cantaloupes into the garden requires special attention to details. Use transplants that are healthy and at the right stage of growth. Transplants that are too old, etiolated (“spindly”), slow-growing, or have been stressed at any time for water or nutrients seldom produce a vigorous plant. A root-hardening response common to this family of plants slows or prevents new growth on less-than-ideal transplants. Acceptable transplants have only one or two true leaves (don’t count cotyledons), are succulent and growing rapidly, have dark green color, and are short and compact.

Timing of transplanting is usually 2–3 weeks after average last frost and only when the forecast is for mild weather. Once a healthy transplant has been placed in the garden, it must be protected from intense sunlight, wind, and near-freezing or freezing temperatures.

Planting specifications:

- Seeds per hill: 3–5
- Distance between hills: 3–4 feet*
- Final stand per hill: 2–3 plants
- Ounces of seed per foot: 0.05

- Row width: 4–6 feet
- Seed depth: 1 inch
- Germination: 5–14 days

*Hill spacing for transplants is the same as for seed.

Fertilizer

Cantaloupes are heavy feeders and respond positively to adequate levels of N, P, and K. Split applications work best to keep cantaloupes growing vigorously throughout the season. Add the equivalent of 0.25 lb N (in combination with P and K) per 100 square feet during soil preparation. A 10-10-10 fertilizer formulation (or similar nutrient ratios) is usually appropriate. Side-dress an additional 0.3 lb N (21-0-0, 46-0-0, or similar formulation) at the time the plants begin to form running vines.

Weed Control

Cantaloupes do not compete well with weeds at any stage of growth. Consequently, season-long weed control is required. Control weeds through mechanical tillage, hand weeding, or use of a labeled garden herbicide. At all stages of growth, tillage activities close to plants should be shallow in order to prevent damage to roots. Avoid damage to the vines during weed-control efforts.

Irrigation

Cantaloupes require average amounts of water as compared to other crops. They produce the sweetest melons if not overirrigated during the latter part of the season. Once plants are established and growing, applications of 1.5–2 inches of water every 5 or 6 days are usually adequate. On very sandy soils, you may need to supply water more frequently.

Insects

Cutworms are a common pest of cantaloupes in Idaho. They emerge from the soil at night and cut down newly emerged seedlings or transplants. Consistent problems with cutworms may require application of a labeled soil insecticide. Spider mites occasionally become problematic. They are best controlled by using sprinkler irrigation because they tend to avoid leaves that are frequently wet. Occasionally, an application of a miticide may be necessary.

Diseases

Repeated production of watermelons, cucumbers, cantaloupes, and squash can result in the buildup of

a soilborne disease called fusarium wilt. This fungus causes plants to remain small, become weak, turn yellow, develop burned leaf edges, and eventually die early. Crop rotations of at least four-year intervals provide partial control. Cantaloupes are also very susceptible to root rots that result from poor soil drainage or overirrigation.

A few viral diseases occasionally appear on cantaloupes. Symptoms include malformed leaves and fruit, mosaic color patterns on the leaves, and general yellowing or stunting. Plants showing these symptoms should be removed to prevent them from competing with healthy plants.

Powdery mildew, identified by white, powdery fungal growth on the upper leaf surface, often appears in Idaho gardens. No control is necessary if it appears during the last month of the season because it will do little or no damage to the crop. If it appears earlier, it may be necessary to apply a labeled garden fungicide.

Fruit rots can occur if melons sit on damp soil for extended periods of time. Prevent this problem by irrigating properly and by planting on plastic mulch or suspending the developing fruit above the soil.

Harvest

Cantaloupes must ripen on the vine for maximum quality. Ripe netted cantaloupes form an abscission layer where the stem meets the fruit, allowing the fruit to separate from the vine when it is ripe. When the stem is nearly loose, the cantaloupe is said to be at the full slip stage and is ready to be harvested. Slight softening of the blossom end, a change in the background color of the melon from green to yellow or tan, and a strong cantaloupe smell are additional indications of ripeness.

Storage

Cantaloupe fruits can be held for a few days at room temperature. Held for too long, they quickly soften and become susceptible to fruit rots.

Consumptive Yield

Compute household planting requirements as follows:

- 8–10 lb fresh cantaloupe per person
- Each foot of row will yield 1 lb

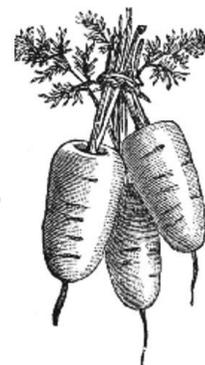
Plant 8–10 feet of row per person.

Nutritive Value

Cantaloupes are very high in vitamin A, which is a powerful antioxidant, protects vision, and helps maintain healthy mucus membranes and skin. They are also an excellent source of vitamin C and a good source of niacin and vitamin B6. One hundred grams (3.5 oz) of cantaloupe contain 1.8 grams of protein, 0.2 gram of fat, 8.2 grams of carbohydrates, 34 calories, and 0.9 gram of dietary fiber. Fresh cantaloupe fruits are 90% water.

Carrots

The use of carrot roots (*Daucus carota*) as food began about 5,000 years ago in the area now known as Afghanistan. Drawings found in Egyptian pyramids from about 2000 BC. show what seem to be purple carrots. Early Egyptian writings discuss various medical treatments using carrots and carrot seeds.



By the tenth century, Arab merchants traveling throughout Arabia, Asia, and Africa brought home the seeds of purple carrots. Other early carrot cultivars consisted of a range of colors such as purple, white, light yellow, green, red, and almost black.

Purple and yellow varieties are believed to have been brought to southern Europe in the twelfth century by Moorish invaders. By the thirteenth century, carrots were being grown in German and French farms and gardens. Flemish refugees brought various colors of carrots to England in the fifteenth century. It wasn't until the 1500s that Dutch plant breeders used mutant yellow carrot seeds to develop an orange cultivar. With continued improvements, the orange carrot was made sweeter and its popularity spread.

Soil Type and Soil Preparation

Carrots grow best in loose loamy, sandy, or organic soils. Heavy clay soils can cause misshapen roots, but this problem can be improved by the addition of organic matter. For an ideal seedbed, create a 12-inch-deep mixture consisting of one-fifth garden soil, two-fifths sand, and two-fifths compost or peat moss. Spring application of manure to carrots often results in branched, short, or malformed roots. If you apply manure, it is best to do so in the fall. Applications in the spring must be light, using only well-aged manure. Soil tillage must be deep and

create a mellow seedbed. Avoid working overly wet soil, which may become compacted and cloddy. Before planting, rake the soil surface to create a smooth, firm surface.

Planting

Plant carrots up to 2 weeks prior to the average last killing frost and when daytime soil temperatures approach 50°F. A salt or pepper shaker can be used to scatter seeds in the row. In small gardens, carrots can be grown in banded rows or groupings in raised beds.

Because carrots require shallow planting, the soil often dries out and crusts, making it difficult for seedlings to emerge. Keeping the soil moist after planting is critical. It may be necessary to irrigate lightly several times a day until seedlings emerge. Other methods for maintaining soil moisture and preventing crusting include covering seeds with a light layer of compost, (sifted) grass clippings, sawdust, or vermiculite. Clear plastic or damp burlap placed over the seedbed will also speed germination by warming the soil, preventing crusting, and keeping the soil moist. Remove the cover as soon as the seedlings emerge.

Coplanting carrots and radishes often helps carrots overcome soil-crusting issues and provides a good stand. Once the radishes are harvested (pull carefully to avoid damaging the carrots), the carrots will be well spaced and off to a good start.

As the carrots grow, thin them to 1–2 inches apart in the row. In group plantings, thin to provide 3–4 square inches per plant.

Planting specifications:

- Seed spacing: 0.5–0.75 inch
- Final spacing: 1–2 inches
- Ounces of seed per foot: 0.02
- Row width: 15–24 inches
- Seed depth: 0.25–0.5 inch
- Germination: 10–17 days

Fertilizer

Carrots require only moderate levels of fertilizer to produce an acceptable crop. All fertilizer applications for carrots can be made during soil preparation. A 10-10-10 or similar fertilizer formulation is usually appropriate. The equivalent of 0.25–0.3 lb N (in combination with P and K) per 100 square feet will provide adequate levels of nutrients.

Weed Control

Carrots require early season weed control, but compete well with weeds once full size. Cultivation or use of a labeled garden herbicide can limit weed populations.

Irrigation

Shallow planting and problems with soil crusting mean that carrots may need several light irrigations to ensure good seedling emergence. Once emerged, any irrigation regime that maintains consistent soil moisture is adequate. Carrots tolerate a wide range of soil moisture conditions, as long as they do not get dry enough to cause wilting. Application of 1.5–2 inches of water every 5 or 6 days will work on most soils.

Insects and Other Pests

In Idaho, carrots have few serious insect problems, other than occasional soil pests such as wireworms or carrot rust flies. Carrot rust fly larvae tunnel into and damage the roots. If this is a consistent problem, remove all carrot residue from the garden after harvest and avoid the practice of overwintering carrots in the ground.

Root-knot nematodes (microscopic wormlike creatures) can be a serious pest of carrots. They cause the roots to be bumpy and deformed, with a proliferation of tiny feeder roots. Nematodes are very difficult to manage or control. The best advice is to avoid growing a garden in infested soils. If this is not feasible, crop rotation will help minimize damage.

Diseases

Powdery mildew, identified by a white, powdery fungal growth on the upper leaf surface, is an occasional problem with carrots in Idaho gardens, but it seldom requires control. Although not common, aster yellows occasionally becomes problematic. It is caused by a bacteria-like organism. Infected plants are stunted and yellow and the roots become “hairy” due to the growth of many secondary roots. There is no cure for this disease. If infected plants are found, it is best to remove and destroy them to prevent it from spreading to healthy plants.

Harvest

Carrots can be harvested as soon as the roots are the size of a little finger. Beginning harvest early allows for a long harvest window. The highest-quality roots are harvested after fall frost when the carrots become sweeter.

Storage

Carrots can be stored throughout the fall and winter in a pit, storage cellar, refrigerator, or covered row. Once out of the soil, carrots store best if the tops are removed. Storage temperature should be as near 32°F as possible. Maintain high humidity.

Consumptive Yield

Compute household planting requirements as follows:

- 5–10 lb fresh carrots per person
- 10–25 lb canned or frozen carrots per person
- Each foot of row will yield 1 lb

Plant 5–35 feet of row per person.

Nutritive Value

Carrots contain the antioxidant falcarinol, which may have anticancer properties. Carrots are well known as an excellent source of vitamin A. They are also a good source of niacin, thiamin, vitamin B6, folate, vitamin C, vitamin K, manganese, P, and K. One hundred grams (3.5 oz) of raw carrots provide 0.9 gram of protein, 0.2 gram of fat, 9.6 grams of carbohydrates, 41 calories, and 2.8 grams of dietary fiber. Fresh carrots are 88% water.

Cauliflower

Cauliflower (*Brassica oleracea*) probably originated in Asia Minor in the fifteenth century, but was used almost exclusively in Italy until the sixteenth.

At that time it was introduced into France and eventually became a part of diets throughout Europe. Cauliflower came into common use about a century before broccoli, but wasn't grown in North America until the late 1600s.

There are many outstanding cultivars of cauliflower available for garden production. Newer hybrid cultivars include those that are **self-blanching**, meaning they produce leaves that are folded over the head to keep curds white, flavorful, and attractive.

Growing Suggestions

Cauliflower is considered the most delicate member of the cabbage family. It can be difficult to grow because it requires cool temperatures, constant moisture, and high levels of fertility. In hot weather,

cauliflower will not head up well and it is less tolerant of cold fall temperatures than cabbage.

Cauliflower is typically transplanted rather than grown from seed. There are many advantages to using transplants, including simpler weed control, fewer seedling disease and insect problems, and improved earliness. Early cauliflower usually has better quality because it is harvested before the arrival of hot summer temperatures. Cauliflower plants are easy to transplant, as long as the seedlings are hardened off before being placed in the garden.

If growing a cultivar that is not self-blanching, it is essential to protect developing curds from sunlight to maintain white color and good eating quality. The most common method is to tie the largest inside leaves over the heads. Large rubber bands work well to secure the blanching leaves.

Soil Type and Soil Preparation

Cauliflower grows well in most soils, from sand to clay. It does well in Idaho soils that have been modified with extra organic matter. Soil preparation should include the addition of organic matter in the form of manure or compost.

Planting

Transplanting is the best way to establish cauliflower in Idaho. Transplant cauliflower 2–3 weeks before average last spring frost. At the time of planting, transplants should not be too large. They should be stocky, have a stem about the diameter of a pencil, and be dark green and vigorous. Overly large or weak transplants will not produce large, quality curds.

To produce your own transplants, sow cauliflower seeds indoors 5–7 weeks before the expected transplanting date. Before setting the transplants into the garden, harden them off by setting them outside for increasing periods of time during the last 1 or 2 weeks of growth.

Transplanting specifications:

- Final spacing: 18–24 inches
- Row width: 24–30 inches

Fertilizer

Cauliflower is a heavy feeder and responds positively to adequate levels of N, P, and K. Split applications of N work best to keep cauliflower



growing vigorously through harvest. Apply the equivalent of 0.25 lb N (in combination with P and K) per 100 square feet during soil preparation. A 10-10-10 fertilizer formulation (or similar ratios) is usually appropriate for this preplant application. Side-dress an additional 0.25 lb N (21-0-0, 46-0-0, or similar product) when the curds begin to develop.

Weed Control

Early season weed control is important for cauliflower. Once established, plants compete fairly well with weeds. Control weeds through mechanical tillage, hand weeding, or use of a labeled garden herbicide. At all stages of growth, tillage activities close to plants should be shallow in order to prevent root damage. Also, try to avoid damage to the large, brittle leaves of mature plants.

Irrigation

Improper irrigation detracts from cauliflower curd quality, making curds fibrous and strong flavored. It is important to provide consistent, timely irrigation. Optimal irrigation entails frequent, small applications of water. On clay or loam soils, apply 1–1.5 inches of water every 3–5 days. On sandy soils, apply smaller amounts, but more frequently.

Insects

Common cauliflower pests in Idaho include aphids, cabbage worms, and cutworms. Aphids can be washed from the plant using a hard stream of water. Serious infestations may require the use of a labeled insecticide. Cabbage worms damage both the leaves and the curds. They often inhabit the curds and become evident only upon cooking. They may require an insecticidal product for good control. Early planting often allows harvest before cabbage worms become a problem. Cutworms often kill new transplants by chewing them off at ground level. Placing small cardboard collars around the base of the plants often prevents this problem.

Diseases

There are few or no serious diseases of cauliflower in Idaho gardens.

Harvest

Harvest cauliflower when the curd is 4–8 inches across, bright white, and compact. Once the curd becomes loose, called **ricing**, quality quickly declines.

Storage

Cauliflower can be stored for a longer period than broccoli, up to a week or more if held at near-freezing temperatures and high humidity. Quality for freezing is best if processing occurs soon after harvest.

Consumptive Yield

Compute household planting requirements as follows:

- 3–5 lb fresh cauliflower per person
- 8–12 lb frozen cauliflower per person
- Each foot of row will yield 1 lb

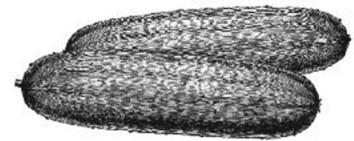
Plant 3–17 feet of row per person.

Nutritive Value

Cauliflower is a nutritious food. Along with many of the brassica crops, it contains diindolylmethane, which serves to enhance the immune system. Cauliflower is an excellent source of vitamin C and a good source of folate, vitamin B5, vitamin B6, vitamin K, iron, manganese, P, and K. One hundred grams (3.5 oz) of cauliflower curds contain 1.9 grams of protein, 0.3 gram of fat, 5 grams of carbohydrates, and 25 calories. Fresh cauliflower curds are 92% water.

Cucumbers

It is believed that cucumbers (*Cucumis sativus*) are native to



India and likely have been cultivated in western Asia for more than 3,000 years. The Romans probably introduced this vegetable to Europe. Agricultural records show that the French were cultivating cucumbers in the ninth century, and by the fourteenth century they were being grown in English gardens and farms. Cucumbers didn't arrive in North America until Columbus brought them in the late fifteenth century.

Growing Suggestions

Cucumbers can be planted with cantaloupes, watermelons, and squash without fear of cross-pollination. The flavor of cucumbers is not affected by the pollen from these related crops.

Cucumber plants have separate male and female flowers on the same vine and are cross-pollinated. For this reason, they need insects to pollinate the

flowers and produce fruit. It is important to protect pollinators when growing cucumbers.

Cucumbers do best where they will receive at least 8 hours of sunlight daily.

It is essential to pick fruits every day or every other day to maintain plant productivity. Once cucumber fruits reach mature size with fully developed seeds, they send a hormonal signal to the plant to stop production of new fruits.

Soil Type and Soil Preparation

Cucumbers are adapted to most soils, but grow best in a fertile, mellow soil with large amounts of compost. During tillage, incorporate organic matter, if needed. Cucumbers grow faster and mature earlier in sandy soils.

Planting

Cucumbers can be either direct seeded or transplanted. Direct seeding usually results in healthier, stronger plants. Transplanting often provides the advantage of earlier maturity. Direct seed 1–2 weeks after average last frost and only when daytime soil temperatures are near 70°F.

If transplanting, use transplants that are healthy and at the right stage of growth. Transplants that are too old, etiolated, or slow-growing, and those that have been stressed at any time for water or nutrients, seldom produce a vigorous plant.

Acceptable transplants have only one or two true leaves (don't count cotyledons), grow rapidly, and are succulent, dark green, short, and compact. Transplant 2–3 weeks after last average frost and only if the forecast predicts mild weather. Once a healthy transplant has been placed in the garden, it must be protected from intense sunlight, wind, and near-freezing or freezing temperatures.

Planting specifications:

- Seeds per hill: 3–5
- Distance between hills: 3–4 feet*
- Final stand per hill: 2–3 plants
- Ounces of seed per foot: 0.05
- Row width: 4–6 feet
- Seed depth: 1 inch
- Germination: 6–10 days

*Hill spacing for transplants is the same as for seed.

Fertilizer

Cucumbers respond well to adequate levels of soil nutrients. Split applications of N work best to keep cucumbers growing vigorously throughout the season. Apply the equivalent of 0.25 lb N (in combination with P and K) per 100 square feet during soil preparation. A 10-10-10 fertilizer formulation (or product with similar nutrient ratios) is usually appropriate. Side-dress an additional 0.3 lb N (21-0-0, 46-0-0, or similar product) at the time the plants begin to form running vines.

Weed Control

Cucumbers do not compete well with weeds at any stage of growth. Consequently, season-long weed control is required. Control weeds through mechanical tillage, hand weeding, or use of a labeled garden herbicide. At all stages of growth, tillage activities close to plants should be shallow in order to prevent damage to roots. Avoid damage to the vines during weed-control efforts.

Irrigation

If plants are stressed for water, cucumber fruits become malformed and often develop a bitter flavor. Thus, it is important to supply consistent irrigation. Once plants are established, application of 1.5–2 inches of water every 5 or 6 days is usually adequate.

Insects

Cutworms are a common pest of cucumbers in Idaho. They emerge from the soil at night and cut down newly emerged seedlings. Repeated problems with cutworms may require application of a labeled soil insecticide prior to soil preparation.

Diseases

Production of watermelons, cucumbers, cantaloupes, and squash in the same site over multiple years can result in the buildup of a soilborne disease called **fusarium wilt**. This fungus causes plants to remain small, become weak, turn yellow, develop burned leaf edges, and eventually die early. Partial prevention is possible by practicing crop rotation with at least four-year intervals between these crops. Cucumbers are also very susceptible to root rots if overirrigated or grown where there is poor soil drainage.

A few viral diseases occasionally occur on cucumbers. Symptoms include malformed leaves and fruit, mosaic color patterns on the leaves, and general yellowing

or stunting. Plants showing these symptoms should be removed to prevent them from competing with healthy plants.

Powdery mildew, identified by white, powdery fungal growth on the upper leaf surface, often appears in Idaho gardens. No control is necessary if it appears during the last month of the season because it will do little or no damage to the crop. If it appears earlier, it may be necessary to apply a labeled garden fungicide.

Harvest

Harvest cucumbers any time after they have reached the desired size, but be sure to harvest before they turn yellow and the seeds become hard. For slicing, fruits should be 6–10 inches long. For pickles, harvest when fruits are 2.5–6 inches long. Cucumbers are of the highest quality when they are dark green, firm, and crisp.

Storage

If refrigerated, cucumbers can be held for several days. Sometimes seeds continue to develop in storage, reducing quality.

Consumptive Yield

Compute household planting requirements as follows:

- 2.5–4 lb fresh cucumbers per person
- Each foot of row will yield 0.8 lb

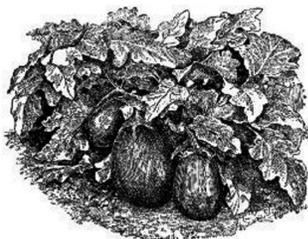
Plant 3–5 feet of row per person. Add additional row space for pickles as experience dictates.

Nutritive Value

Cucumbers have a mild diuretic effect, which helps reduce weight and blood pressure. Due to their very high water content (95%), cucumbers rank as a good source of only a few nutrients, including vitamin A and vitamin K. One hundred grams (3.5 oz) of cucumbers with skins contain 0.7 gram of protein, 0.1 gram of fat, 3.6 grams of carbohydrates, 15 calories, and 0.5 gram of dietary fiber.

Eggplant

Eggplants (*Solanum melongena*) are native to India. They were also cultivated in southern and eastern Asia long



before historical records were kept. The first known description of eggplant was found in an ancient Chinese agricultural record written in 544 AD. All of the original eggplant names are of Arabic and North African origins, indicating that Arab cultures were primarily responsible for introducing eggplants to the Mediterranean region.

Most of the historically important varieties produced fruits that resembled goose or chicken eggs, were relatively small, and were white or light yellow.

Eggplants are in the Solanaceae family and many people originally believed the plant was extremely poisonous. Over time, people learned that it was not only safe but a wonderful addition to many recipes.

Eggplant fruits vary greatly in size, shape, and color. They can be purple, green, white, or even orange. Some cultivars have mixed colors or color gradients. Size varies from two-pound fruits to small, egg-size fruits. Some cultivars produce large, oval fruits, while others, such as the Chinese cultivars, produce fruits that are shaped like cucumbers. In India, miniature cultivars are quite popular.

Growing Suggestions

Eggplants are best adapted to Idaho's warmest regions. However, they can be grown in some of the shorter-season areas if provided with proper conditions. They benefit from full sun, a warm southern exposure, cold weather protection, black plastic mulch, and possibly row covers.

Soil Type and Soil Preparation

Eggplants grow best in a rich soil with plenty of organic matter. Soils low in organic matter should be amended with compost or manure (added the previous fall, if possible). Work soil well to produce a deep, friable bed. Good soil tilth helps eggplants develop a healthy root system.

Planting

In Idaho, eggplants are almost always grown from transplants. Transplanting should occur 2–3 weeks after average last frost and after warm weather is the rule. At transplanting, the plants should be stocky and only 4–6 inches tall in order to minimize transplant shock.

It is feasible to produce your own transplants of eggplant. Doing so allows production of unusual va-

rieties. Sow seeds in containers 10 weeks before the intended transplant date. The young plants tend to be very sensitive to transplant shock; therefore, it is best to plant two or three seeds in individual pots and thin to one plant by clipping off the weakest plants.

Transplanting specifications:

- Final spacing: 18–24 inches
- Row width: 24–36 inches

Fertilizer

Eggplants have a fairly high demand for nutrients over a long growing season. They do best with a balanced fertilizer program and respond to adequate levels of P and K. Add fertilizer in two separate applications. Add the equivalent of 0.25 lb N (in combination with P and K) per 100 square feet during soil preparation. A 10-10-10 fertilizer formulation (or similar nutrient ratios) is usually appropriate for preplant applications. Side-dress an additional 0.25 lb N when the plants are 12 inches high. For side-dressing, select a high-N source such as 21-0-0, 46-0-0, or product with similar high N formulation.

Weed Control

Early season weed control is important for eggplant production. Weeds can be controlled through mechanical tillage, hand weeding, or use of a labeled garden herbicide. Once rapid growth begins, tillage close to plants should be shallow in order to prevent root damage. Once plants are tall, they often suppress weeds through competition and shading.

Irrigation

Once established, eggplants can get by on less water than many other vegetable crops. They develop an extensive fibrous root system. However, if they become severely stressed, fruit set will be curbed. Irrigate eggplants with 1.5–2 inches of water every 5–7 days.

Insects

Eggplants grown in Idaho can have problems with leaf-feeding insects. Colorado potato beetles and tomato hornworms can cause extensive defoliation. They can be controlled with an insecticide or by picking the larvae from the plants by hand. Aphids are an occasional problem and can be controlled by knocking them from the plants with a hard stream of water.

Diseases

Leaf spot diseases are common to eggplants in moister climates, but are seldom a problem in Idaho. Soilborne diseases such as verticillium wilt make plants yellow and weak. Control these diseases by rotating eggplants and other solanaceous crops to different places in the garden each year.

Harvest

Eggplants can be harvested anytime after the fruits reach egg size. The quality of young fruit is better than that of older fruit. Be sure to harvest before the fruit reaches full maturity and the seeds harden. Leave a short stem on the fruit when harvesting. The stems are woody, so harvest with pruning shears. Keeping the fruits picked will stimulate additional production. Three or four weeks before the average first killing frost, clip or pinch off any remaining blossoms to encourage the plant to finish maturing the existing fruits.

Storage

Eggplant fruits cannot be refrigerated without suffering cold injury. Storage life at room temperature is limited to a few days.

Consumptive Yield

Compute household planting requirements as follows:

- 3–5 lb fresh eggplant per person
- 2–3 lb canned or frozen eggplant per person
- Each foot of row will yield 1 lb

Plant 3–8 feet of row per person.

Nutritive Value

Eggplants contain a lower nutrient content than many other vegetables, but are still an important source of some vitamins and minerals. Research in Brazil has shown eggplants to be effective in treating high blood cholesterol. Fruits with purple skin also contain some anthocyanins with antioxidant activity. Eggplants are a good source of vitamin B5, vitamin B6, folate, and manganese. One hundred grams (3.5 oz) of raw eggplant contain 1 gram of protein, 0.2 gram of fat, 5.7 grams of carbohydrates, 24 calories, and 3.4 grams of dietary fiber. Fresh eggplant fruits contain 92% water.

Kohlrabi

The edible portion of kohlrabi (*Brassica oleracea*) is an aboveground enlarged stem that resembles a mild turnip in shape and flavor.

An excellent raw addition to relish dishes, it also may be boiled, stuffed, or baked. Historians don't agree on its origins.

Historical records indicate that in the first century AD, Pliny the Elder talked about what he called a "Corinthian turnip." Based on the description of this plant's growing habits, most historians agree that he must have been referring to kohlrabi. Apicius, a Roman citizen, wrote an early cookbook on Roman cooking and dining and includes this vegetable as an ingredient in some of his recipes.

By the 1600s, kohlrabi was being grown in northern India, where it became an important part of local diets. It is now common in China and Africa. In the United States, it continues to be a lesser-known vegetable, but seems to be gaining in popularity. Cultivars vary in color, including white, green, and purple.

Growing Suggestions

Growing kohlrabi is similar to growing many of the other cole crops such as broccoli, kale, and cauliflower. Kohlrabi develops best quality when grown in the cool weather of early spring or late fall.

Soil Type and Soil Preparation

Kohlrabi grows in most soils, from sand to clay. Begin seedbed preparation early, but only when the soil has dried sufficiently to form a ball that crumbles into medium-size fragments with finger pressure. Kohlrabi quality will be enhanced by working in large amounts of organic matter.

Planting

Kohlrabi can be seeded directly into the soil or transplanted. To grow transplants, sow kohlrabi seeds into containers 6 weeks before the desired transplant date.

Planting specifications:

- Seed spacing: 1–1.5 inches
- Final spacing: 12–18 inches*
- Ounces of seed per foot: 0.01
- Row width: 18–24 inches



- Seed depth: 0.5 inch
- Germination: 3–10 days

*Transplant spacing is the same as for final spacing of direct-seeded kohlrabi.

Fertilizer

Kohlrabi requires only moderate amounts of fertilizer due to its short production period. Fertilizer can be applied during soil preparation. A 10-10-10 or similar fertilizer formulation is appropriate. Add the equivalent of 0.25–0.35 lb N (in combination with P and K) per 100 square feet.

Weed Control

Season-long control of weeds in kohlrabi is essential for maximizing production and quality. Kohlrabi does not compete well with weeds. Hand pulling, cultivation, or use of a labeled garden herbicide will control or eliminate most annual weeds.

Irrigation

Once established, kohlrabi will do fine with any irrigation regime that maintains reasonable soil moisture. For most soils, apply 1–1.5 inches of water every 3–5 days. If the soil is allowed to dry out, kohlrabi will develop a strong flavor and woody texture.

Insects

Common pests of kohlrabi in Idaho include aphids and cutworms. Aphids can be washed from the plant using a hard stream of water. Serious infestations may require the use of a labeled insecticide. Cutworms often kill seedlings or new transplants by chewing them off at ground level. Placing small cardboard collars around the base of the plants often prevents this problem.

Diseases

Diseases of kohlrabi in Idaho gardens seldom require control measures.

Harvest

Kohlrabi should be ready to harvest 50–60 days after transplanting. It has the best flavor when it is 2–4 inches in size and the flesh is still tender. The leaves of the young plant may be used like spinach.

Storage

If kept refrigerated at near-freezing temperatures and high humidity, kohlrabi can be stored for several weeks.

Consumptive Yield

Compute household planting requirements as follows:

- 2–4 lb fresh kohlrabi per person
- 4–8 lb canned or frozen kohlrabi per person
- Each foot of row will yield 0.75 lb

Plant 3–16 feet of row per person.

Nutritive Value

A large serving of kohlrabi will supply your daily requirement for vitamin C. Kohlrabi is also a good source of vitamin B6, iron, P, K, and manganese. One hundred grams (3.5 oz) of kohlrabi contain 1.7 grams of protein, 0.1 gram of fat, 6.2 grams of carbohydrates, 27 calories, and 3.6 grams of dietary fiber. Fresh kohlrabi is 91% water.

Lettuce

Lettuce (*Lactuca sativa*) is by far the most popular salad plant. Various types of lettuce have been cultivated in many parts of the world since ancient times. Modern cultivars were very likely derived from wild lettuce. Wild lettuce now grows throughout the world, but it probably originated in Asia Minor, Iran, and Turkistan.

Herodotus described lettuce being served on the tables of Persian kings as far back as 600 BC. One to two hundred years later, Greek writers described the virtues of lettuce. Roman gardeners were growing and improving this popular vegetable by the beginning of the Christian era. Their writings show that they had developed at least a dozen cultivars.

Most of the original cultivars of lettuce were leafy types. Head-forming types were developed much later, but seem to have been well developed in Europe by the sixteenth century. Romaine lettuce was first described in the early 1600s. This type was fairly common in Italy and a few other areas of Europe. Columbus brought lettuce to the New World in 1494. After that, it was slowly introduced to many parts of North and South America.

Lettuce is sensitive to high temperatures. Summer heat will cause most types to **bolt** (go to seed) and develop bitter flavor. Hot Idaho summers make it



especially difficult to produce quality head lettuce. Selection of heat-resistant cultivars is critical to success. Leaf, butterhead, Romaine, and some Batavia lettuce cultivars are less affected by heat, although bolting still occurs more quickly in warm weather.

Growing Suggestions

Lettuce can grow well with some shade. When the weather is especially warm, lettuce quality is actually better if plants are shaded in the afternoon or grown under a shade cloth.

Soil Type and Soil Preparation

Lettuce will grow in almost any type of soil. For production of the best-quality leaves, the soil must be fertile and have adequate organic matter. Lettuce is usually planted very early in the spring. Consequently, it is important to make sure the soil is not too wet when tilling. The soil should be damp but not wet.

Planting

Lettuce seeds are typically planted directly in the garden, but they may be sown indoors or in cold frames for transplanting. Lettuce is quite cold-tolerant and can be planted early in the spring (3–4 weeks before the average last killing frost) or as soon as soils are dry enough to be worked.

Succession planting can create a constant supply of lettuce throughout the summer. Plant additional seeds when plants of the previous crop reach about 1 inch in height. Plant beginning in early spring and ending a few weeks before average first frost.

Planting specifications:

- Seed spacing: 1.5–3 inches
- Final spacing (leaf): 6–8 inches
- Final spacing (head): 6–12 inches
- Row width: 18–24 inches
- Seed depth: 0.25–0.5 inch
- Germination: 4–8 days

Fertilizer

Lettuce has a very high demand for N, but has a short production cycle. Consequently, a single application of fertilizer at planting time is usually adequate. A 10-10-10 fertilizer formulation (or product with similar ratios) is usually suitable. Apply the equivalent of 0.3 lb N (in combination with P and K) per 100 square

feet during soil preparation. If using succession planting, apply fertilizer at the time of each new planting. Alternatively, if the seedbed was fertilized with the rest of the garden in the spring, add an additional small amount of N with each planting.

If soil tests indicate adequate levels of P and K, consider using a high-N fertilizer such as 21-0-0 or 46-0-0. Adjust the application rate to account for the percentage of N in the product.

Weed Control

Season-long weed control is essential for lettuce. Hand pulling, cultivation, or application of a labeled garden herbicide are effective control options. Cultivation should be shallow because lettuce has a shallow and limited root system. Deep cultivation close to the plants will destroy much of the root system and can reduce yield and quality.

Irrigation

Because of the shallow root system, lettuce should be watered frequently in order to support rapid leaf development. Inadequate water supply will lead to poor growth and bitter flavor. On most soil types, apply 1.25–1.5 inches of water every 4 or 5 days. On sandy soils, apply smaller amounts, but more frequently.

If possible, avoid overhead sprinkler irrigation on lettuce. Wetting the leaves often causes leaf scorch and encourages leaf diseases. These problems reduce quality and shorten the productive life of the plants.

Insects

Insect problems on lettuce rarely require control measures. However, many insects feed on lettuce, including aphids, leaf miners, flea beetles, loopers, cucumber beetles, cutworms, armyworms, and slugs. If infestations are severe, several organic or traditional control measures are effective.

Diseases

The short productive life span of lettuce generally precludes serious disease problems. In Idaho, white mold and stem rots may be problematic. To prevent these diseases, avoid overwatering and, if possible, avoid using overhead sprinklers.

Harvest

Leaves of plants pulled during thinning can be used for early salads. Harvest of leaf lettuce can begin as soon

as leaves are large enough to eat. Leaf lettuce can be harvested multiple times, so it is important to avoid damage to the crown and new leaves when harvesting older leaves.

Head lettuce is ready to harvest when the heads are solid and of adequate size. Butterhead lettuce can be harvested as soon as the heads form. Head lettuce and butterhead lettuce are usually harvested only once.

Storage

Lettuce is not usually stored. However, if kept refrigerated in a plastic bag, it can be held for several days.

Consumptive Yield

Compute household planting requirements as follows:

- 4–5 lb fresh lettuce per person
- Each foot of row will yield 0.5 lb

Plant 8–10 feet of row per person.

Nutritive Value

Lettuce is not considered a nutrient-rich food; however, it does contain significant amounts of several vitamins and minerals. It is an excellent source of vitamin K and vitamin A. It is also a good source of vitamin C, thiamin, riboflavin, folate, vitamin B6, iron, and manganese. One hundred grams (3.5 oz) of fresh leaf lettuce contain 15 calories, 1.4 grams of protein, 0.2 gram of fat, and 2.9 grams of carbohydrates. Fresh lettuce is 95% water.

Onions

Onions (*Allium cepa*) were grown in Chinese gardens as early as 5000 BC. In Egypt, the use of onions can be traced back to about 3500 BC. Studies show that the Sumerians were growing onions as long ago as 2500 BC.



Ancient Egyptians worshipped the onion. They believed that its round shape and concentric rings represented eternal life. In Egyptian burials, onion slices were placed over the eye sockets. It was believed the strong scent of onions would bring the dead back to life.

Roman gladiators often received onion massages in the belief that the onion juice would firm up their muscles. During the Middle Ages, onions were often

used for barter or given as gifts. Doctors prescribed onions to improve bowel function and to provide relief for headaches, hair loss, and even snake bites.

In 1492, Christopher Columbus introduced onions to the New World. They have since become one of the most popular vegetables around the world.

The length of summer days provides a trigger for onions to grow bulbs. There are onions that bulb best where summer days are short (low latitudes), moderate (medium latitudes), or long (high latitudes). It is very important to choose moderate- to long-day cultivars for Idaho's medium to high latitude.

Growing Suggestions

Planting onion sets (small bulbs) is a very convenient and dependable way to grow onions in the garden. However, not all onion cultivars respond well to the process of set production, namely partial growth, harvest, and storage at the immature stage. Onions available for planting as sets are usually the pungent, flattish Spanish onions. The large, round, mild "Walla Walla" type onions are not available as sets and therefore must be planted using seeds or transplants.

Soil Type and Soil Preparation

Onions grow well in a wide range of soils and climates, but they develop best in a loose, crumbly soil with high fertility. They can be planted very early, as soon as the soil is dry enough to till. Begin seedbed preparation when the soil has sufficient moisture to form a ball that will crumble with finger pressure into medium-size fragments. Onions benefit from consistent addition of organic matter, regardless of soil type.

Planting

Onion seed may be sown indoors for transplanting later or direct seeded into the garden or onions may be planted from sets. In short-season areas of Idaho, it is best to utilize transplants or sets.

When growing onion transplants indoors, sow the seeds about 8 weeks before the average last killing-frost date. Seeds are small, so plant them only about 0.25 inch deep and about 0.5 inch apart in a tray. If the plants get tall enough that they begin to tip over, trim them with a pair of scissors to about 3 inches tall. Trimming can be done more than once. Onion seedlings are not as frost-tolerant as are sets. Place them in the garden about a week after the

average last frost date. They will transplant better if hardened off.

Onions that are direct seeded into the garden do not go through the shock of being uprooted and replanted. This method minimizes stress and disease potential and results in plants that are less likely to bolt. It also produces onions that will store better.

If using onion sets, sort them into two sizes: sets smaller than 0.75 inch and those that are larger. Use the larger sets for green onions because they frequently form seed stalks instead of a bulb. Plant these sets 1–2 inches apart.

Planting specifications:

- Seed spacing: 0.75–1.25 inches
- Final spacing: 3–4 inches
- Ounces of seed per foot: 0.2
- Row width: 12–14 inches
- Seed depth: 0.5 inch
- Sets depth: 2–3 inches
- Germination: 7–12 days

Fertilizer

Onions are considered to be high users of nutrients, due more to their shallow root system than to their actual nutrient needs. Onions use nutrients over a long period, so apply fertilizer two times. The first application can be made during soil preparation. The second is typically made no later than mid-July. If fertilizer is added later, the plant may revert to leaf growth at the expense of bulb growth.

Onions do best with a balanced fertilizer program and benefit from fairly high levels of P. Apply the equivalent of 0.25 lb N (in combination with P and K) per 100 square feet before planting. A 10-10-10 fertilizer formulation (or product with similar ratios) is usually suitable. Side-dress an additional 0.25 lb N by mid-July. For side-dressing, it is appropriate to use a high-N product such as 21-0-0 or 46-0-0.

Weed Control

Direct-seeded onions emerge more slowly than most weed competitors. It is important to avoid damaging or killing emerging seedlings during early weed-control activities. Carefully mark the planting location, in case weeding is needed before crop emergence. Hand weeding is best for removing early weeds.

Onions provide little or no competition for weeds and require season-long, intensive weed control. Weeds can be controlled by hand-pulling, cultivation, or use of a labeled garden herbicide. Onions have very weak, shallow roots, so cultivation should be shallow.

Irrigation

Their shallow root system and relatively high demand for water mean that onions should be watered fairly lightly and frequently. On most soil types, apply 1–1.5 inches of water every 3 or 4 days. On sandy soils, irrigation may be required even more frequently. Frequent watering becomes less critical toward the end of the season.

Insects

Many insects can cause severe damage to onions, including onion thrips, onion maggots, pea leafminers, and wireworms. A severe outbreak of onion thrips may require the use of a labeled insecticide. Onion maggots and wireworms can destroy the bulbs, and control can be difficult. Crop rotation may help, especially in preventing maggot damage. Application of a granular insecticide at planting can be helpful if the site has a history of problems with these pests.

Diseases

In Idaho, onions are potentially subject to a number of serious diseases. Plate rot, pink rot, and neck rot are soil-borne fungal diseases that infect onions while growing in the garden. If unlucky enough to have one of these diseases in the garden, there is very little a gardener can do, other than employ crop rotation. These diseases infect the bulbs during growth, but often do not create serious problems until onions are in storage. Inspect onions at harvest. If there is any sign of disease on the root surface or neck tissue of the bulbs, use these onions immediately rather than trying to store them. Foliar diseases, such as powdery mildew and downy mildew, although sometimes visible, usually do minimal damage to onions.

Harvest

Green onions can be harvested at any stage of growth, either before or after bulbing is initiated. Simply pull the onions from the ground by hand to avoid disturbing nearby plants.

Proper harvest of mature onions is more complex. Softening of the neck tissues allows the leaves to fall

over (known as top break), indicating maturity. Once half or more of the onions break, the crop is ready to pull and cure. Curing is essential if onions are to be stored. Cure onions by leaving them on the soil surface or other dry place until tops and outer scales are completely dry. Drying can take up to a week. Do not allow the onions to be rained on during curing. After the bulbs are cured, remove the dried tops.

Storage

The pungent Spanish-type onions generally store better than the large sweet onions. Onions store best refrigerated at near 32°F. However, they are damaged by temperatures below 30°F, so it is important to carefully control storage conditions. Onions do best with only moderate levels of humidity in storage. Cold, relatively dry conditions are often difficult to find in home storage facilities, but a dry cellar or attic may suffice. Under proper conditions, onions can be stored for 6 months or longer.

Consumptive Yield

Compute household planting requirements as follows:

- 3–5 lb fresh onions per person
- 15–20 lb dried or stored onions per person
- Each foot of row will yield 0.75 lb

Plant 4–33 feet of row per person.

Nutritive Value

Due to the presence of the compound allacin and the trace mineral chromium, onions help moderate the symptoms of diabetes. They are an excellent source of vitamin A and a good source of vitamin B6, vitamin C, and manganese. One hundred grams (3.5 oz) of fresh chopped onions contain about 40 calories, 0.1 gram of fat, 9.3 grams of carbohydrates, 1.1 grams of protein, and 1.7 grams of dietary fiber. Fresh onions are 89% water.

Peas

Field peas were among the first crops cultivated by humans. Archaeologists and historians think the garden pea (*Pisum sativum*) may have originated in China or Egypt. Peas found in what is called “Spirit Cave,” located between Myanmar (Burma) and Thailand, have been carbon dated to 9750 BC. These peas were



probably growing wild and were gathered rather than cultivated. Peas have also been found in archaeological digs in northwestern Iraq that date back as far as 7000 BC. In Switzerland, peas were found that date to about 3000 BC.

Peas were not widely eaten in early history. The Romans seemed to prefer the taste of chickpeas over that of garden peas. During the Middle Ages, peas were sometimes dried and kept for use in times of famine.

When explorers prepared to sail to the American continent, they took along dried peas. Peas were easy to store and kept for long periods of time. A list published in 1635 showing supplies needed for one colonist for one year listed “one bushell of pease.” Europeans didn’t start eating fresh peas until the late seventeenth century.

Peas are classified as smooth or wrinkled according to how the seed looks when dry. The wrinkled seed types are normally the sweetest.

Growing Suggestions

Obtaining a good stand of peas can be one of the most challenging problems associated with growing this crop. Peas are very susceptible to a number of rot organisms that kill the seedlings before or just after emergence. See subsection “Diseases” for managing this problem.

Early planting is essential because peas do not set pods in extreme summer heat. It is important that the crop be ready to harvest by the time it gets hot. Luckily, peas are cold-tolerant and can be planted up to 5 weeks before the average last spring frost.

Soil Type and Soil Preparation

Peas will grow in any well-drained garden soil. They do best in soils that do not crust. They require only routine soil preparation.

Planting

Plant peas as soon as the ground can be worked in the spring, usually 3–5 weeks before the average last spring frost. Maximum daytime soil temperature at the time of planting should approach 50°F.

Peas can be planted in a variety of row designs. Some gardeners plant peas in a block with seeds planted on a grid about 2 inches apart in each direction. Peas planted in this way will support one another without the use of a trellis. Others plant a double row of peas about 6 inches apart, with the seeds placed 2 inches

apart in the rows. When planting single or double rows, it may be desirable to install a trellis for the peas to climb.

Planting specifications (single row):

- Seed spacing: 1.5–1.75 inches
- Final spacing: 3–4 inches
- Ounces of seed per foot: 0.16
- Row width: 18–30 inches
- Seed depth: 1.5–2 inches
- Germination: 6–15 days

Fertilizer

Take care when fertilizing peas. Peas are a legume and are able to produce much of their own N. Excess N can cause the plants to produce large vines, but fewer peas. Although peas require minimal applications of N, levels of P, K, and other nutrients must be adequate to ensure productivity. Apply fertilizer during soil preparation. A 5-10-10 or similar fertilizer formulation that is low in N and high in other nutrients is best for peas. The equivalent of 0.1–0.2 lb N (in combination with P and K) per 100 square feet will provide adequate nutrients.

Weed Control

Season-long weed control is important for peas because they are only moderately competitive with weeds. Achieve control through mechanical tillage, hand weeding, or use of a labeled garden herbicide. Be careful when cultivating close to pea plants to avoid damaging the root systems.

Irrigation

Peas have a shallow root system and little tolerance of drought stress. Optimal irrigation entails frequent, small applications of water. On clay or loam soils, apply 1–1.5 inches of water every 3–5 days. On sandy soils, apply smaller amounts, but more frequently.

Insects

Many insects feed on peas, but few become problematic. Pea aphids may occasionally reach population levels that require control. Washing them off the plants with a hard stream of water usually provides adequate control. In some parts of Idaho, pea weevils are problematic. Larvae penetrate the pods and feed on the developing seeds. A timely insecticide application to control the adults before egg laying may be required.

Diseases

Seed and root rots impact emergence of peas. These problems are managed by planting in warm soil (above 50°F), planting after soil dries partially, and delaying irrigation until after emergence. White mold occasionally damages pods that touch the ground. Staking the vines and allowing the soil surface to dry between irrigations usually eliminates this problem. Peas are also susceptible to a number of viruses. These diseases are usually kept in check by buying certified seed from a reputable source.

Harvest

Pick peas during the cool part of the day so they remain crisp. Harvest garden peas when pods are nearly full, but before pods begin to wrinkle. If allowed to mature too long, peas become starchy and lose their sweetness. Peas also become starchy if left to sit at room temperature after harvest. As little as 4 hours is enough time to significantly reduce quality.

Harvest edible pod peas while the pods are still flat and the peas are hardly discernible. Pick these peas every other day to prevent overmaturity.

Storage

In order to maximize quality, do not store peas. They should be consumed, frozen, or canned immediately. If immediate use is not possible, peas can be stored in the pod for a few days at high humidity and a temperature near 32°F.

Consumptive Yield

Compute household planting requirements as follows:

- 4 lb fresh peas per person
- 10 lb canned or frozen peas per person
- Each foot of row will yield 0.3 lb

Plant 13–46 feet of row per person.

Nutritive Value

Peas contain significant quantities of many nutrients, including some that are difficult to obtain from other vegetables. They are an excellent source of niacin, vitamin C, and potassium. They are also a good source of vitamin K, riboflavin, thiamin, vitamin B6, folate, iron, P, magnesium, manganese, and zinc. One hundred grams (3.5 oz) of peas contain 81 calories, 0.4 gram of fat, 14.5 grams of carbohydrates, 5.4 grams of protein, and 5.1 grams of dietary fiber. Fresh peas are 79% water.

Peppers

Peppers (*Capsicum annuum*) belong to the Solanaceae family, as do tomatoes and potatoes. Christopher Columbus found these plants growing in the New World and brought them back to Europe. He named them peppers because he mistakenly believed they were related to the plants that yielded the highly prized peppercorn.



Peppers are native to Mexico, Central America, and northern South America. Historians believe that chili peppers were probably the first plants to be domesticated in Central America. Evidence suggests they were consumed as early as 7500 BC. It is believed that other groups of people in North and South America developed domesticated varieties for cultivation. After Columbus brought peppers back to Spain, they slowly spread to other European and Asian countries. The impact of bringing the pepper plant to other parts of the world has been phenomenal. It has become one of the most important and widespread vegetable crops worldwide.

Extremely hot and pungent cultivars are often grown in South Asia. These types were introduced into these areas by Portuguese and Spanish explorers, probably in the sixteenth century.

Most peppers are categorized as either sweet or hot, depending on how much pungent capsaicin they contain. They range from very mild and sweet to so hot they are almost inedible. A rating system called the Scoville scale has been developed for quantifying the “heat” in various peppers. For example, bell peppers are rated at 0 Scoville units because they have no detectable “hotness.” Jalapeño peppers rate between 2,500 and 6,000 Scoville units. Cayenne peppers rate between 30,000 and 50,000 Scoville units and habañero peppers rate between 100,000 and 500,000 Scoville units. The hottest pepper on record, derived from the ghost peppers of India, was measured at 2.3 million Scoville units.

Growing Suggestions

Peppers grow best in very warm climates. In short-season areas of Idaho, production is enhanced by planting on the south side of a structure, planting on black plastic, or using row covers.

Soil Type and Soil Preparation

Peppers can be grown in most types of soil, as long as the soil is well drained. Pepper fruits will mature more quickly when grown on lighter soils. Peppers grow best when supplied with sufficient organic matter. Soils low in organic matter should be amended with compost or manure (added the previous fall, if possible). Work soil well to produce a deep, friable bed. Good soil tilth helps pepper plants develop a healthy root system.

Planting

In Idaho, peppers are almost always grown from transplants, partially because of the need to speed maturity and secondarily to overcome germination problems. Purchase healthy transplants or grow your own by sowing pepper seeds indoors or in the greenhouse 6–8 weeks before the intended transplant date. Transplants should be stocky and from 4–6 inches tall. Newly transplanted pepper plants require protection from frost, wind, and intense sun.

Transplanting specifications:

- Final spacing: 15–18 inches
- Row width: 24–36 inches

Fertilizer

Peppers do best with a balanced fertilizer program and respond to adequate levels of P and K. They have a fairly high demand for nutrients over a long growing season. Add fertilizer in two separate applications. Apply 0.25 lb N (in combination with P and K) per 100 square feet during soil preparation. A 10-10-10 fertilizer formulation (or product with similar ratios) is usually appropriate. Side-dress an additional 0.3 lb N when the plants begin flowering and setting fruit. The product selected for side-dressing should be high in N, e.g., 21-0-0 or 46-0-0.

Weed Control

Season-long weed control is important for pepper production. Control weeds through mechanical tillage, hand weeding, or use of a labeled garden herbicide. Once rapid growth begins, tillage activities close to plants should be shallow in order to prevent root damage.

Irrigation

Peppers require moderate amounts of water on a consistent schedule. If allowed to wilt, production will

decline and fruit will lose quality. Irrigate peppers with 1.5–2 inches of water every 5–7 days.

Insects

Other than spider mites, there are no major insect pests of peppers in Idaho gardens. Mites can be controlled by using overhead irrigation or occasionally wetting the leaves.

Diseases

Virus diseases are common in peppers. Plants that become unthrifty and have malformed and mosaic color patterns in the leaves are likely infected. Remove these plants to prevent them from competing with healthy plants. Verticillium wilt, a soil disease that causes plants to wilt, become yellow, and lose leaves, is also common in many places in Idaho. This disease is partially controlled through crop rotation.

Harvest

Peppers can be harvested at any time after they are large enough to use. Bell types usually are harvested when they are 3–4 inches long. Hot peppers grown for salsas and sauces can be picked when they reach the desired size and color. When picking peppers, cut them from the plant rather than pulling them. If the end cap is pulled off, the fruit will quickly rot.

It is important to harvest peppers on a consistent schedule. Allowing fruit to hang on the plant until completely mature will delay the setting of additional fruit. Hot peppers grown for drying are the exception. Leave them on the plant until they are wrinkled and partially dry. After harvest, place them in a sunny, hot place to complete the drying process.

Storage

Peppers can develop cold injury symptoms in a refrigerator. They are best stored in an unheated basement or storage room at 45°F–50°F. If conditions are good, they may keep for up to 2 weeks, although they will probably lose moisture and become wrinkled. An alternative is to slice and/or dice peppers and then dry them in an oven or dehydrator. They can then be stored in a glass jar. When dried properly, these peppers should remain flavorful for about 1 year.

Consumptive Yield

The amount of peppers required to supply household needs varies widely, due to differences in types of pepper, intended use, and processing methods. Experience will dictate how many to plant.

Nutritive Value

Peppers are used mostly as a seasoning rather than a staple food. However, sweet peppers are often eaten in quantity and become important nutritionally. They are a good source of B-complex vitamins. Peppers are one of the best sources of vitamin C among vegetable crops. They are also a good source of vitamin K and manganese. One hundred grams (3.5 oz) of raw sweet, green peppers contain 20 calories, 0.2 gram of fat, 0.9 gram of protein, 4.6 grams of carbohydrates, and 1.7 grams of dietary fiber. Peppers contain 94% water.

Potatoes

Potatoes (*Solanum tuberosum*) were critical to the development of the Andean cultures in South America. For thousands of years, they have provided a consistent, nutritious food source for these mountain-dwelling peoples. Potatoes were of such importance that they became deeply ingrained into every facet of society, including religion.



Andean potato varieties, still critical to food supplies in much of South America, are quite different from those grown in the United States and Europe. Tubers are typically small and come in a variety of colors and shapes. Occasionally, these native varieties are available for planting in gardens. It can be enjoyable to grow, prepare, and eat these interesting potatoes.

There are many cultivars of potatoes available. The type of potato often dictates product quality. Red potatoes are often harvested early and are good for boiling and making hash browns. White potatoes are good boiled and sometimes make great potato chips. Russet potatoes are usually great for baking or making french fries. In Idaho, many people prefer Russet Burbank potatoes. This cultivar is often difficult to grow in the garden. It must be consistently supplied with large amounts of water and fertilizer to perform well. If these conditions cannot be provided, choose another cultivar.

Growing Suggestions

The single most important tip for growing potatoes is to always buy new, certified seed potatoes. Potatoes are propagated by planting the current crop using

tubers from last year's crop. This practice means that any diseases present in the last crop will be transferred to the new crop. Using certified seed potatoes ensures that such diseases are minimized. Never plant potatoes sold in the grocery store for food. These potatoes are often treated with antisprouting compounds that prevent normal growth.

Soil Type and Soil Preparation

The largest, smoothest potatoes are produced in loamy or sandy soils. Clay soils often result in malformed tubers. Heavy soils can be improved with the application of large amounts of compost or manure.

Potatoes need soil that is loose and deeply tilled. Tubers will not develop properly in packed or hard soil. Till soil to a depth of at least 10 inches. Avoid tilling soil that is too wet.

Planting

Be sure to purchase and plant certified seed potatoes. Cut seed potatoes into pieces that weigh 2–3 ounces (about 2 inches long and 1–1.5 inches wide).

Potatoes can be planted about 2 weeks prior to average last spring frost or even slightly earlier if you don't mind a little frost damage to the newly emerged sprouts. Early planting is important if you want an early harvest of new, summer potatoes. Soil temperature is important for healthy sprout development and should be approaching 50°F at the time of planting. As the plants start to emerge, mound a few inches of loose soil around them to ensure that the developing tubers remain covered with soil.

Planting specifications:

- Seed-piece spacing: 1 foot
- Final spacing: 1 foot
- Ounces of seed tubers per foot: 2–3
- Row width: 30–36 inches
- Seed depth: 5 inches
- Emergence: 18–25 days

Fertilizer

Potatoes are considered to be heavy users of nutrients. In reality, they can grow with limited fertility, but they produce the largest tubers and highest yield with adequate nutrition. Potatoes respond positively to adequate levels of N, P, and K.

Potatoes do best with split applications of fertilizer. Add the equivalent of 0.25 lb N (in combination with P and K) per 100 square feet during soil preparation. A 10-10-10 fertilizer formulation is usually adequate. Side-dress an additional 0.25 lb N when the plants are about 12 inches tall. It is appropriate to use a product containing P and K for side-dressing.

Weed Control

Early season weed control is important for potatoes. Control weeds through mechanical tillage, hand weeding, or use of a labeled garden herbicide. Hilling soil around the plants is helpful. Once mature, plants compete well with weeds.

Irrigation

Consistent irrigation is important for producing smooth, high-quality potato tubers. To keep the seed pieces healthy, delay irrigation until after the sprouts emerge, if possible. Once emerged, plants require relatively frequent, small applications of water. On clay or loam soils, apply 1–1.5 inches of water every 3–5 days. On sandy soils, apply smaller amounts, but more frequently. As plants mature, irrigation can be less frequent.

Insects

Colorado potato beetles are the most damaging insect pest of potatoes. The bright orange larvae of this insect can completely defoliate plants within a few days. In a small garden, the larvae can be removed by hand and destroyed. With large numbers of plants, control may require the use of an approved standard or organic insecticide.

Diseases

Potatoes are prone to a number of very serious diseases. A variety of viral diseases can appear at any time during the growing season. Removal of infected plants is the only defense against further spread. Plants showing leaf mottling or serious malformation should be removed and destroyed.

A soil fungal disease called verticillium wilt causes plants to become weak, turn yellow, and develop burned leaf edges. This disease is very common in southern Idaho. Other than planting resistant cultivars, the only ways to manage this disease are to avoid planting in infected soil and to pull and destroy infected plants. Crop rotation will help minimize symptoms.

Both early and late blight cause leaf spotting and leaf drop on potatoes. Under the right conditions (cool, cloudy, rainy), these diseases can rapidly kill plants and may rot the tubers. These diseases can be controlled with multiple applications of a labeled garden fungicide, beginning immediately after symptoms are detected.

Harvest

Tuber harvest can begin as soon as potatoes are large enough to eat. Immature tubers tend to lose their skin during handling and should be consumed shortly after harvest. If potatoes are intended for storage, let them grow into the cool weather of fall. Then kill or remove the vines and leave the tubers in the ground to mature for about 3 weeks. Finally, harvest tubers carefully to avoid damage.

Storage

Potatoes can be stored for 6 months or longer if provided with the right conditions. They need temperatures of 40°F–45°F and humidity over 95%. Supplying these conditions may require a root cellar or a refrigerator dedicated to produce storage. Potatoes must be kept in the dark to prevent greening and bitterness.

There is a direct relationship between storage temperature and frying quality of potatoes. If potatoes are to be used for making chips or fries, they must be stored at a warmer temperature than if they are to be baked or boiled. When fried, potatoes stored at temperatures below 45°F turn brown and taste burned.

Consumptive Yield

Compute household planting requirements as follows:

- 60 lb fresh and stored potatoes per person
- Each foot of row will yield 2 lb

Plant 30 feet of row per person. (If no storage is planned, 5 feet of row per person is adequate.)

Nutritive Value

Potatoes are one of the few vegetables to be considered a complete food. They provide most of the essential nutrients needed by humans, including a high-quality protein. Potato tubers are also a good source of vitamin B6 and contain valuable amounts of vitamin C, thiamin, niacin, K, P, iron, magnesium,

and manganese. Potatoes with yellow flesh also provide vitamin A. One hundred grams (3.5 oz) of fresh potatoes contain 2.1 grams of protein, 0.1 gram of fat, 18 grams of carbohydrates, 79 calories, and 1.3 grams of dietary fiber. Fresh potatoes consist of 79% water.

Pumpkins and Winter Squash

Pumpkin and winter squash (*Cucurbita* spp.) are botanically identical and are grown in a similar manner. Pumpkins are used



primarily for decorations, although pumpkin pie is the final fate of many pumpkins. Winter squash are used primarily for food, including pie.

Pumpkins and winter squash are believed to have originated in the region between northern South America and the southwestern United States. Seeds from closely related plants dating back to 7000–5500 BC. have been found in Mexico. Native Americans used pumpkins and squash as a dietary staple several centuries before the Pilgrims landed.

Very early explorers took pumpkins back to Europe. The Greeks named the fruits “pepon,” which meant “large melon.” The French changed the pronunciation to “pompon.” The English later changed “pompon” to “pumpion” and Shakespeare mentioned the “pumpion” in his *Merry Wives of Windsor*. American colonists changed the name from “pumpion” to “pumpkin.”

Winter squash and pumpkin cultivars are derived from three separate cucurbit species. The three species do not freely intercross. However, all three produce fruits that are consumed in their mature phase or used for fall decorations. Winter squash cultivars come in an amazing array of sizes, shapes, and colors. Pumpkins and most winter squash fruits have yellow or orange flesh, although a few have white flesh. Most winter squash and pumpkin cultivars are vining or semivining and grow to be very large, sprawling plants.

Growing Suggestions

Pumpkins and winter squash grow best in a warm site with full sun. Warm soil is essential to good seed germination and emergence. Using transplants can speed production.

Soil Type and Soil Preparation

Pumpkins and winter squash will grow in almost any well-drained soil, but prefer sandy or loamy soils. They are most productive on fertile soils with adequate levels of organic matter. Prior to planting, amend soils to enhance fertility, organic matter content, and drainage. Till soil as deeply as feasible to create a deep, mellow seedbed. Mounding or hilling the soil can improve drainage and increase soil temperatures.

Installing black plastic mulch prior to planting can warm the microclimate around plants, speeding harvest and improving productivity. Plastic mulches also help control weeds, thereby reducing the need for herbicides and cultivation.

Planting

Pumpkin and squash seedlings are extremely susceptible to frost. They should not be direct seeded in the garden until about 1–2 weeks after average last frost. Daytime soil temperatures at planting time should consistently be above 65°F.

Transplant pumpkin and squash plants to the garden 2–3 weeks after average last frost. Transplants should be small (one or two true leaves), dark green, and growing vigorously. Protect them during the first week from wind, direct sun, and cold.

Planting specifications:

- Seeds per hill: 3–5
- Distance between hills: 5–6 feet*
- Final stand per hill: 2–3
- Ounces of seed per foot: 0.05
- Row width: 6–10 feet
- Seed depth: 1 inch
- Germination: 5–14 days

*Hill spacing for transplants is the same as for seed.

Fertilizer

Pumpkins and winter squash need fairly high levels of N, P, and K and do best with a balanced fertilizer program. They are fairly high users of nutrients over a long period of the season, so apply fertilizer twice. Apply the equivalent of 0.25 lb N (in combination with P and K) per 100 square feet during soil preparation. A 10-10-10 fertilizer formulation (or product with similar ratios) is usually adequate.

Side-dress an additional 0.25 lb N before flowering. N is the most important nutrient for the side-dress fertilizer application, so a product made up primarily of N (e.g., 21-0-0 or 46-0-0) will work fine.

Weed Control

Early season weed control is important for pumpkin and squash production. Control weeds through mechanical tillage, hand weeding, or use of a labeled garden herbicide. Tillage activities close to plants should be shallow in order to prevent damage to feeder roots. Weed control becomes less essential later in the season.

Irrigation

Due to their requirement for warm temperatures at planting time, pumpkin and squash seeds may need one or two light irrigations to ensure good seedling emergence. Once established, these crops do best with infrequent, deep irrigation. On clay or loam soils, apply 1.5–2 inches of water every 5 or 6 days. On sandy soils, apply smaller amounts, but more frequently. If plants are allowed to wilt, fruit shape and eating quality will be negatively affected.

Insects

Several species of aphids and squash bugs can become problematic on pumpkins and winter squash. Control aphids by using an insecticidal soap, spraying the affected parts of the plants with a hard stream of water or applying a registered insecticide. Pick squash bugs from the plants and destroy them or use an insecticide. Wireworms can damage roots, stems, or the fruit where it touches the ground. They are very difficult to control during the growing season. If problems with wireworms persist over several seasons, a preventive spring application of a soil insecticide may be necessary.

Diseases

Pumpkins and squash can be infected by a number of root rot diseases, viruses, and fungal leaf diseases. In Idaho, disease problems are generally minimal due to low humidity and short seasons. However, viruses and root rots occasionally reach levels that require control.

Virus symptoms include malformed or splotchy leaves or fruit. These diseases cannot be cured. They are usually controlled through removal and destruction of infected plants.

Root rots are nearly impossible to treat once symptoms appear. The best prevention is to avoid overwatering (or overly frequent watering). Also, avoid planting squash plants in low spots where water may accumulate.

Powdery mildew is a disease that often appears on winter squash and pumpkins, but is seldom an issue of concern. Symptoms include a white, powdery fungal growth on the upper leaf surface. No control is necessary if symptoms appear during the last month of the season. If symptoms appear earlier, it may be necessary to apply a labeled garden fungicide.

Harvest

Pick pumpkins and winter squash any time after full fruit color is expressed and the rinds are hard. Full maturation does not always occur until after frost kills the foliage. Mild frosts help speed maturation. Moderate to heavy frosts damage the fruit and shorten storage life, even if the fruit heals and returns to a normal appearance. Harvest fruits before they are exposed to temperatures below about 28°F.

Storage

If not completely ripe, store pumpkins and winter squash in a warm (room temperature or above) place for the first few weeks. Once full skin color has developed, they can be moved to long-term storage with temperatures around 50°F and moderate humidity. A cool basement is ideal. Under the right conditions, some types of winter squash will store for several months.

Consumptive Yield

Compute household planting requirements for squash as follows:

- 6–9 lb fresh and stored squash per person
- 6–9 lb processed squash per person
- Each foot of row will yield 1 lb

Plant 6–18 feet of row per person.

Most pumpkin cultivars produce 3–6 fruits per hill. If pumpkins are grown for decorative purposes, calculate the number of plants needed based on the number of fruits needed.

Nutritive Value

Pumpkins and winter squash vary widely in nutrition. Those with orange flesh are some of the best sources

of vitamin A among vegetable crops. Pumpkins and squash also are good sources of vitamin C, vitamin E, vitamin B6, folate, riboflavin, K, manganese, and iron. On average, 100 grams (3.5 oz) of fresh pumpkin or winter squash contain 1 gram of protein, 0.1 gram of fat, 8.6 grams of carbohydrates, 34 calories, and 1.5 grams of dietary fiber. Fresh pumpkins and winter squash are 90%–92% water.

Radishes

Radishes (*Raphanus sativus*) are grown for their colorful, sharp-tasting root and are usually the first spring-planted vegetable to be ready for harvest. They originated in western Asia and are a staple food in China and Japan. Radishes grown commonly in the United States produce roots that are small, spherical, and dark red. However, many types of radishes are available for planting in the home garden. They vary in shape from round to long and in color from red to white (or bicolored). The white Japanese daikon radish is becoming popular in many places.



Growing Suggestions

Radishes are best grown in spring or fall when temperatures are moderate. Summer heat results in inferior quality due to increased pungency (heat) and fibrousness (woodiness). Even when grown in optimal temperatures, radish roots remain at their best quality for only a few days. Luckily, it is possible to plant very early in the spring or late in the fall. It is possible to maintain a continuous supply of radishes during spring and early summer (or early to late fall) by succession planting. Plant a new crop of radishes when seedlings from the previous crop are fully emerged. Radishes can also be grown in a container.

Radishes make a great relay crop, meaning they can be harvested early to make way for a warm-season crop in the same location. Some of the crops that can be planted after radishes in Idaho include green beans, cucumbers, melons, pumpkins, and winter squash.

Soil Type and Soil Preparation

Radishes grow well in almost any well-drained soil. They emerge and mature faster in a sandy soil, but often develop the best root color and quality in heavier loam or clay soils. Work the soil to form a smooth, firm seedbed. Work the soil as early as feasible, but avoid working wet soils.

Planting

Radish seedlings are very frost-resistant, so seeds can be planted 3–5 weeks before average last frost. Sow seeds directly in the garden. Radishes are small seeded, so they should be planted shallow.

To make the most effective use of space, you can plant radishes in a bed row (a wide row, several plants across) or grouping. Give each radish 1–2 square inches of space. To ensure full productive potential, you can overplant radishes and thin to a final stand after emergence.

Radishes emerge very quickly — within 3–6 days depending on daytime temperature. They can produce edible roots in 20–30 days, making them one of the earliest vegetables to come from the spring garden.

Planting specifications (single row):

- Seed spacing: 0.5–0.75 inch
- Final spacing: 0.75–1 inch
- Ounces of seed per foot: 0.02
- Row width: 15–18 inches
- Seed depth: 0.5 inch
- Germination: 3–10 days

Fertilizer

Due to their very short production period, radishes require low to moderate levels of N fertilizer. For good root production, they do best with moderate to high levels of P and K. A 5-10-10 or similar fertilizer formulation is usually adequate. A single preplant application of 0.2 lb N (in combination with P and K) per 100 square feet will provide adequate nutrients.

Weed Control

Control of early weeds is essential for maximizing production and quality. Hand pulling and cultivation are usually adequate. Late-emerging weeds are not a concern with radishes due to their short production cycle.

Irrigation

Due to their requirement for shallow planting, radishes may need one or two light irrigations after seeding to ensure good seedling emergence. Once emerged, they do best with frequent, light irrigations that maintain soil moisture at a fairly high level. If soil is allowed to dry out, roots become pungent and woody.

Insects

Spring-planted radishes have very few insect pests, in part due to natural resistance, but also because their early season growth allows them to avoid many problematic pests. Flea beetles sometimes feed on the leaves, creating small, round holes. This damage generally does not affect growth or productivity.

Diseases

Disease control is rarely required for radishes in Idaho gardens.

Harvest

Radishes can be harvested as soon as the roots reach edible size, typically 1 inch in diameter. Larger roots (2 inches or more) often display inferior quality. Once the plants bolt (the blossom stem begins to form), the roots quickly become inedible. Optimal harvest period for quality often lasts for only a few days, depending on temperature.

Storage

Under moist, refrigerated conditions, radish roots can be stored for up to a week. Storage in a perforated plastic bag will help retain quality. Remove the leaves before storage to prevent the roots from losing moisture and becoming rubbery.

Consumptive Yield

Compute household planting requirements as follows:

- 2–3 lb fresh radishes per person
- Each foot of row will yield 0.67 lb

Plant 3–5 feet of row per person.

Nutritive Value

Radishes contain flavonoid antioxidants, which help lower the risk of cancers. They are a good source of vitamin C, folate, vitamin B6, and K. One hundred grams (3.5 oz) of radishes contain 0.7 gram of protein, 0.1 gram of fat, 3.4 grams of carbohydrates, 16 calories, and 1.6 grams of dietary fiber. Fresh radishes are 95% water.

Summer Squash

All species of squash (*Cucurbita pepo*) and closely related pumpkins and gourds have their origins in the New World, specifically northeastern South America, Mexico, and the southwestern United States. Summer squash are grown for their immature



fruits, which come in a variety of sizes, shapes, and colors. Most fruits have white flesh, although a few cultivars are yellow. Plants of most modern cultivars of summer squash have a compact, bush growth habit. However, some types are vining or semivining.

Growing Suggestions

Summer squash grow best in a warm site with full sun. Warm soil is essential to good seed germination and emergence. Squash can be transplanted to speed production.

Soil Type and Soil Preparation

Summer squash will grow in almost any well-drained soil, but prefer sandy or loamy soils. They produce best on fertile soils with adequate levels of organic matter. Before planting, amend the soil to enhance fertility, organic matter content, and drainage. Till soil as deeply as feasible to create a deep, mellow seedbed. You can improve drainage and increase soil temperatures by mounding or hilling the soil.

Installing black plastic mulch prior to planting can warm the microclimate around squash plants, thereby speeding harvest and improving productivity. Plastic mulches also enhance weed control, reducing the need for herbicides and cultivation.

Planting

It is critical that squash transplants be small (one or two true leaves), dark green, and growing vigorously. Squash seedlings are extremely susceptible to frost. If seeding directly into the garden, delay planting until about 1 or 2 weeks after average last spring frost. Day-time soil temperatures should consistently be above 65°F. If using transplants, protect them during the first week from wind, direct sun, and cold. If protection is not available, do not transplant squash to the garden until at least 2 weeks after average last spring frost.

Planting specifications (bush type):

- Seeds per hill: 3–5
- Distance between hills: 3–4 feet*
- Final stand per hill: 2–3
- Ounces of seed per foot: 0.5
- Row width: 5–6 feet
- Seed depth: 1 inch
- Germination: 5–12 days

*Hill spacing for transplants is the same as for seed. For vining types, space hills 5–6 feet apart in rows 8–10 feet apart.

Fertilizer

Summer squash are fairly high users of nutrients and do best with a balanced fertilizer program. They need fairly high levels of N, P, and K. They use nutrients over a long period, so apply fertilizer twice. Apply 0.25 lb N (in combination with P and K) per 100 square feet during soil preparation. A 10-10-10 fertilizer formulation (or product with similar ratios) is usually adequate. Side-dress an additional 0.25 lb N before flowering. N is the most important nutrient for the side-dress fertilizer application, so a product containing primarily N is adequate (e.g., 21-0-0 or 46-0-0).

Weed Control

Early season weed control is important for squash production. Control weeds through mechanical tillage, hand weeding, or use of a labeled garden herbicide. Tillage activities close to plants should be shallow in order to prevent damage to feeder roots. Late-season weed control is less essential.

Irrigation

Due to their requirement for warm temperatures at planting time, summer squash seeds may need one or two light irrigations to ensure good seedling emergence. Once established, squash do best with infrequent, deep irrigations. On clay or loam soils, apply 1.5–2 inches of water every 5 or 6 days. On sandy soils, apply smaller amounts, but more frequently. If plants are allowed to wilt, fruit shape and eating quality will be negatively affected.

Insects

Squash bugs and several species of aphids can become problematic on summer squash. Control aphids by using an insecticidal soap, spraying the affected parts of the plants with a hard stream of water, or applying a registered insecticide. Pick squash bugs from the plants and destroy them or use an insecticide. Wireworms can damage roots, stems, or the fruit where it touches the ground. They are very difficult to control during the growing season. If problems with wireworms persist over several seasons, a preventive spring application of a soil insecticide may be required.

Diseases

Squash can be infected by a number of root rot diseases, viruses, and fungal leaf diseases. In Idaho, disease problems are generally minimal due to low humidity and short seasons. Root rots are nearly

impossible to treat once symptoms appear, so prevention is the best strategy. Avoid overwatering (or overly frequent watering) and avoid planting squash in low spots where water may accumulate.

Harvest

Summer squash can be picked at nearly any stage of growth. For best quality, rinds and seed coats should be soft and pliable. In order to maintain plant productivity and maximize fruit quality, harvest squash every day. The presence of large fruit with mature seeds causes the plant to cease setting new fruit.

Storage

Summer squash quality declines very rapidly in storage. Squash generally are not stored or held in refrigeration for more than a day or two.

Consumptive Yield

Compute household planting requirements as follows:

- 6–9 lb fresh summer squash per person
- Each foot of row will yield 1.5 lb

Plant 4–6 feet of row per person. (Additional production may be needed if squash is frozen.)

Nutritive Value

Nutrition of summer squash is slightly different than that of winter squash due to differences in cultivars and harvest maturity. Summer squash tend to be a little higher in protein and lower in carbohydrates. They are a good source of vitamin C, riboflavin, vitamin B6, folate, K, manganese, and P. One hundred grams (3.5 oz) of summer squash contain 1.2 grams of protein, 0.2 gram of fat, 3.4 grams of carbohydrates, 16 calories, and 1.1 grams of dietary fiber. Fresh summer squash is 95% water.

Sweet Corn

Grain corn has been a staple crop among the native peoples of the New World for more than 5,000 years, especially in and around Mexico. Sweet corn (*Zea mays*), with its use of the crop before the kernels dry, is relatively new. Documented use of sweet corn as an important crop is limited to the past 200 years.



It is important to understand a little about the genetic nature of this crop. Sweet corn kernels express the genetic traits of both the female and male parent. Thus, the source of pollen affects kernel quality. There are three types of sweet corn: standard (su), sugary enhanced (se), and supersweet (sh2). When one type of sweet corn pollinates another, it negates the sweetening gene, resulting in starchy, poor-quality corn. There are two ways to deal with this issue. One is to plant only one cultivar of corn and make sure it is isolated by a few hundred feet from any other corn cultivars. The other is to determine the type of sweet corn being planted and make sure all other cultivars planted close by are of the same type. The class or type is usually indicated on the seed package. If not, it can usually be found by doing an internet search on the cultivar name.

In regions with short-season climates, it is important to plant cultivars that mature quickly. Generally, cultivars that are listed as maturing in 75 days or fewer are suitable.

Growing Suggestions

Sweet corn will grow well in almost any type of soil. It requires warm soil and air conditions during much of the growing season to produce a quality crop. Sweet corn must have full sun for the ears to develop normally.

Corn smut— a gray fungal growth that infects tassels and silks and looks like a puffball mushroom— is often seen in Idaho gardens. It is a systemic disease and will appear on other parts of the plant as well. It can be a serious problem if it infects a large number of ears. Do not leave infected plants as residue or the problem likely will return. Remove infected plants from the garden as soon as smut is visible. The fungus is edible and is often cooked and consumed as a delicacy in Mexico.

Harvest

Corn is usually ready to harvest when the silks are entirely brown and the husks are tight. Pull back the husk to reveal the top end of the cob and check whether the kernels are the mature color. Once ripe, it is important to pick sweet corn within a day or two to preserve quality.

Storage

Sweet corn quality declines very rapidly in storage. Ears are generally not stored or held in refrigeration

for more than 2 or 3 days. For frozen or canned corn, process sweet corn immediately after harvest.

Consumptive Yield

Compute household planting requirements as follows:

- 3–5 lb fresh sweet corn per person
- 9–15 lb canned or frozen sweet corn per person
- Each foot of row will yield 0.3 lb

Plant 10–67 feet of row per person.

Nutritive Value

Due to its starchy kernels, sweet corn is higher in calories (86 per 100 grams) and carbohydrates (18.7 grams per 100 grams) than most other vegetables. It provides many of the essential amino acids important to human health. Sweet corn is a good source of vitamin C, vitamin B6, folate, thiamin, niacin, K, P, magnesium, iron, and manganese. One hundred grams (3.5 oz) of fresh sweet corn kernels consist of 3.3 grams of protein, 1.4 grams of fat, and 2 grams of dietary fiber. Fresh kernels are 76% water.

Swiss Chard

Swiss chard (*Beta vulgaris*) is derived from the same species as table beets, but does not grow an enlarged root. Instead, the leaves are used for potherbs and salads. The crop has been selected to produce large, fleshy leaves, sometimes with colored stems, veins, and midribs. Swiss chard originated in western Europe and the Mediterranean region. It is a very popular crop in much of northern Europe.



Growing Suggestions

Swiss chard will produce for a good portion of the summer if the leaves are frequently cut back or harvested. After old leaves are removed, the plant will produce tender, flavorful new leaves.

Soil Type and Soil Preparation

Swiss chard will grow in almost any type of soil. For production of the best-quality leaves, the soil must be fertile and have adequate organic matter. Swiss chard can be planted very early in the spring. Consequently, it is important to make sure the soil is not too wet when tilling. The soil should be damp but not wet. A ball of soil formed by squeezing in the hand should crumble easily under finger pressure.

Planting

Swiss chard can withstand moderate frost (down to 26°F) when the seedlings are small. Seed can be planted up to 2 weeks before last average frost. For best emergence, the daytime soil temperature should approach 50°F.

Planting specifications:

- Seed spacing: 1.25–2 inches
- Final spacing: 6–12 inches
- Ounces of seed per foot: 0.01
- Row width: 18–24 inches
- Seed depth: 1 inch
- Germination: 7–10 days

Fertilizer

Swiss chard has a fairly high demand for N in order to keep new growth vigorous and succulent. If you plan to harvest over a long period of the summer, apply fertilizer twice. Apply the equivalent of 0.25 lb N (in combination with P and K) per 100 square feet during soil preparation. A 10-10-10 fertilizer formulation (or product with similar ratios) is usually appropriate. Side-dress an additional 0.25 lb N at first harvest. N is the most important nutrient for the side-dress fertilizer application, so a product made up primarily of N (21-0-0 or 46-0-0) is appropriate.

Weed Control

Season-long weed control is important for Swiss chard, as it does not compete well with weeds. Control weeds through mechanical tillage, hand weeding, or use of a labeled garden herbicide. At all stages of growth, tillage activities close to plants should be shallow in order to prevent damage to roots.

Irrigation

Swiss chard has a shallow root system and little tolerance of drought stress. Even short, sporadic water deficits will cause the leaves to become fibrous and tough. Optimal irrigation entails frequent, small applications of water. On clay or loam soils, apply 1–1.5 inches of water every 3–5 days. On sandy soils, apply smaller amounts, but more frequently.

Insects

Insects rarely become a serious problem on Swiss chard. Occasionally, aphids or other leaf-chewing insects (such as blister beetles, loopers, armyworms, spotted blister beetles, or leaf miners) cause sufficient damage to require control. Insecticidal

soap or a range of organic or traditional insecticides will control most insects. The most difficult insects to control are leaf miners. They reside inside the leaves, where they are difficult to treat. The best strategy often is to remove and destroy damaged leaves and allow new leaves to grow in their place.

Diseases

There are few or no serious diseases of Swiss chard in Idaho. Occasionally, plants become infected with curly top, a virus. Remove and destroy malformed or mottled plants.

Harvest

Remove large, succulent leaves by cutting near the base with a sharp knife. Take care not to damage the new inner leaves.

Storage

Swiss chard is usually cooked or eaten immediately after harvest. It will retain adequate quality for 2 or 3 days under humid refrigerated conditions.

Consumptive Yield

Compute household planting requirements as follows:

- 1.5–3 lb fresh Swiss chard per person
- Each foot of row will yield 0.8 lb

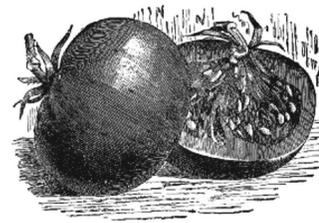
Plant 2–4 feet of row per person.

Nutritive Value

For a succulent, leafy vegetable, Swiss chard is surprisingly high in nutrients. It is extremely high in vitamin K, which is purported to protect brain activity and has a role in treating Alzheimer's patients. Swiss chard is an excellent source of vitamins A and C and a good source of vitamin E, vitamin B6, riboflavin, K, magnesium, manganese, iron, P, and calcium. One hundred grams (3.5 oz) of freshly harvested Swiss chard contain 1.8 grams of protein, 0.2 gram of fat, 3.7 grams of carbohydrates, 19 calories, and 1.6 grams of dietary fiber. Fresh chard consists of 93% water.

Tomatoes

Tomatoes (*Lycopersicon lycopersicum*) are one of the most commonly grown crops in home gardens around the world. Almost any small space can be utilized to grow significant quantities



of this popular vegetable. Tomatoes originated in the tropical deserts of coastal Ecuador, Peru, and Chile. Archeological evidence suggests that they first found consistent use by humans in Mexico.

In short-season climates of northern and southeastern Idaho, the single most important production decision is choice of cultivar. Only the earliest cultivars should be used. (Remember, the word “early” in the name does not necessarily equal early in the garden.) The earliest cultivars usually produce fairly small fruit. Multiple varieties can be planted to provide both early fruit and larger, higher-quality fruit later in the season. In the warmer climate of southwestern Idaho, cultivar choice is less important, although early cultivars can still be used to bring tomatoes to the table sooner.

Tomatoes vary widely in growth habit. **Determinate** cultivars are very short, set fruit early, and tend to ripen the fruit over a short period of time.

Indeterminate cultivars are viny and tall. They tend to set fruit continuously over the summer, mature a few fruit at a time, and reach maximum production very late in the summer. **Semideterminate** cultivars are intermediate between the two growth habit classes. Determinate cultivars tend to be more useful in short-season climates because of their earlier maturity. However, there are exceptions; some indeterminate cultivars, especially cherry tomatoes, set and mature their first fruit fairly early.

Tomato cultivars have been developed for specific uses. Tomatoes developed for fresh use have a good balance of sugars and acids to create a good flavor. The fruits have large cavities that are filled with gel and seeds to produce juiciness.

Processing or sauce tomatoes are starchy and have very thick walls, making them high in solids and low in water. They are much easier to cook down to a thickened processed product. Match the class of tomato to the intended use when choosing cultivars.

Heirloom tomato varieties are becoming very popular. These old varieties offer gardeners a wide array of unique production options. Heirloom plants are available in all maturity classes and growth habits. Fruits come in many sizes, colors, shapes, and flavors. Most heirloom varieties lack resistance to pests and disease, in comparison with modern hybrids, but offer other advantages.

Growing Suggestions

Both heat and sunlight markedly improve earliness in tomatoes. Planting tomatoes in full sunlight is critical to encouraging early fruit ripening. You can provide warmer growing conditions by planting next to a south-facing structure, planting on black plastic, or using row covers.

Tomatoes are very sensitive to fertilizer applications, especially N fertilizers. High levels of fertility dramatically delay fruit set and ripening. If your goal is early maturing fruit, maintain low levels of soil fertility. If a long season of production is desired (not possible in the short-season areas of Idaho), maintain higher levels of soil fertility.

Pruning tomato plants can enhance earliness and increase fruit size. Allow plants to grow unhindered until the first flush of fruits is set and increasing in size. At that time, begin removing all newly formed shoots from the plants.

Soil Type and Soil Preparation

Tomatoes can be grown in most types of soil, but do best in lighter, sandy loams and loamy sands. Not only will plants be healthier on lighter soils, but fruits will mature more quickly. Clay soils must be managed to avoid frequent saturation in order to prevent root, stem, and fruit rots.

Tomatoes do best in soil with sufficient organic matter. If soil is low in organic matter, amend it with compost or manure (the previous fall, if possible). Work soil well to produce a deep, friable bed. Good soil tilth helps tomato plants develop a healthy root system.

Planting

Tomatoes are almost always transplanted rather than planted as seed. Transplanting enhances earliness, reduces problems with seedling diseases, and helps with weed control. Fortunately, tomatoes are very easy to transplant.

Unlike many other crops, tomatoes can be transplanted as very large plants. The larger the transplant, the quicker the plant will produce and mature fruit. Regardless of size, tomato transplants should be healthy, dark green, and growing vigorously. If transplants are tall or spindly, plant them deeply enough to leave only the leafy part of the stem exposed. Roots will form along the buried segment of stem.

Tomato transplants are damaged or killed by very light frost. Consequently, if planted early, they must be protected. A variety of season-extending products (hot caps, water sleeves, milk jugs, row covers, etc.) is available. If protection is provided, tomatoes can be transplanted shortly after the average last frost date. Otherwise, delay transplanting by about 2 weeks.

To grow unusual or heirloom varieties, you may need to produce your own transplants. Plant seed indoors 5–7 weeks before the projected transplant date. The most difficult aspect of producing transplants without a greenhouse is providing adequate light to keep the seedlings healthy and compact. It is best to provide both a window with southern exposure and artificial lighting.

Transplanting specifications:

- Final spacing (determinate): 18 inches
- Final spacing (indeterminate): 30 inches
- Row width (determinate): 36 inches
- Row width (indeterminate): 36–48 inches

Fertilizer

Tomatoes have a reputation as heavy users of nutrients. In climates with long, warm seasons, this is true. In short-season climates, the tendency for delayed maturity under conditions of high fertility makes it necessary to limit the amount of added fertilizer (specifically N).

Tomatoes respond positively to adequate levels of P and K. A 5-10-10 fertilizer formulation (or similar product with low N ratio) is usually best. Apply the equivalent of 0.25 lb N (in combination with P and K) per 100 square feet during soil preparation. In short-season climates, this application will be sufficient to bring the crop to harvest; additional fertilizer will serve only to delay maturity. In longer-season climates, enhance late-season production by side-dressing an additional 0.2 lb N at first harvest. A third application of 0.1 lb N in early August may be beneficial in places where production continues into September or later. N is the most important nutrient for the side-dress fertilizer applications, so a product made up primarily of N (21-0-0 or 46-0-0) is appropriate.

Weed Control

Early season weed control is important for tomatoes. Once established, plants compete well with weeds.

Control weeds through mechanical tillage, hand weeding, or use of a labeled garden herbicide. At all stages of growth, tillage activities close to plants should be shallow in order to prevent damage to roots.

Irrigation

Young tomato plants have a relatively shallow root system and little tolerance of drought stress. Improper irrigation not only reduces productivity, it encourages the development of a fruit-destroying condition known as **blossom-end rot** (a black, leathery patch on the bottom of the fruit). Early in the season, optimal irrigation entails relatively frequent, small applications of water. On clay or loam soils, apply 1–1.5 inches of water every 3–5 days. On sandy soils, apply smaller amounts, but more frequently. As plants mature, irrigation can become less frequent, although the soil should remain evenly damp.

Insects

Only a few insects routinely affect tomatoes. The most damaging is the tomato hornworm. This large caterpillar can defoliate an entire plant within a day or two. Luckily, hornworms do not appear in large numbers and can usually be removed by hand and destroyed. Colorado potato beetles may damage leaves; they can also be controlled by hand removal or application of an approved insecticide. Spider mites occasionally become a problem in hot weather. They are best controlled by irrigating with overhead sprinklers or frequently spraying the plants with water.

Diseases

Tomatoes are prone to a number of very serious diseases. Curly top is a virus that appears frequently in Idaho gardens. This virus causes the youngest leaves on the plant to curl and become malformed. It does not spread from one plant to another, so it can be ignored if not serious. If it affects productivity, remove diseased plants so they do not compete with healthy plants.

A soil fungal disease called verticillium wilt often causes plants to become weak, turn yellow, and develop burned leaf edges. This disease is very common in southern Idaho. Other than planting resistant cultivars (usually designated with a “V” following the name), the only treatment is to practice crop rotation.

A number of leaf-spotting and leaf-drop diseases affect tomatoes, including early blight, late blight, and septoria. Early blight and septoria leaf spots start on the oldest leaves and may move very slowly up the canopy. If symptoms become severe before midseason, it may be necessary to apply a labeled fungicide. Late blight, although somewhat rare, can rapidly kill plants under the right conditions (cool, cloudy, rainy). If present, multiple applications of a good fungicide are required. Because of the threat to potato crops, public media in Idaho deliver warnings when late blight is a local issue. This information will help guide control decisions. It may be necessary to get professional help to distinguish among the tomato leaf-spotting diseases.

Fruit rots often damage the crop as it nears harvest. These fungal and bacterial diseases are best controlled by avoiding overwatering and staking the plants to keep the fruit off the ground.

Harvest

Fruits can be harvested at any time after they begin to turn pink (assuming the cultivar's mature fruit is red). The best-quality fruits with the fullest flavor are those that ripen fully on the vine.

Storage

Store unripe fruit at 50°F–60°F in a relatively dry room. These conditions allow slow and steady maturation and color development. Fully ripe tomatoes can be stored for several days at 50°F with high humidity. They can be stored in the refrigerator for up to 2 weeks, but must be used immediately upon removal due to injury and degradation that occur at cold temperatures.

Consumptive Yield

The required quantity of planted tomatoes varies widely, depending on how they are used. If intended strictly for fresh use, one healthy tomato plant can supply the needs of several people. If used to produce sauces, salsas, and other products, several feet of row may be required for each person. Experience will help define needs.

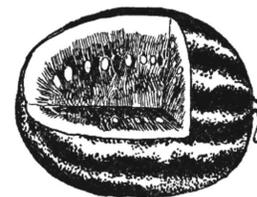
Nutritive Value

Red tomatoes contain lycopene, which has been shown to protect skin from damage due to ultraviolet radiation. Tomato fruits are also a good source of vitamin A, vitamin C, vitamin B6, vitamin K, manganese, and K. One hundred grams (3.5 oz) of

fresh tomatoes contain 0.9 gram of protein, 0.2 gram of fat, 3.9 grams of carbohydrates, 82 calories, and 1.2 grams of dietary fiber. Fresh tomatoes consist of 95% water.

Watermelons

Watermelons (*Citrullus lanatus*) are native to the savannah regions of Africa, where they were used as much for their



water content as for their nutrition. They can be a challenge to grow in all but the warmest climates of southwestern Idaho. In short-season climates, they are the epitome of a green-thumb challenge. Regardless of where you live, they are a fitting treat in the heat of late summer.

Most watermelon cultivars are suitable for production in the south-central and southwestern regions of the state. In all other areas, it is important to select early maturing cultivars. Even then, many cultivars developed for earliness in other parts of the country (e.g., Sugar Baby and New Hampshire Midget) do not produce quality melons in Idaho because they are not adapted to cool summer nights. Some of the best melons for short-season areas of Idaho are the yellow-flesh icebox types (e.g., Early Moonbeam, Yellow Doll, and Yellow Baby).

Growing Suggestions

Watermelons are suitable only for fairly large gardens. They do not require as much room as pumpkins or winter squash, but each plant still needs at least 30–40 square feet to produce well. Fruit will not size well if plants must compete with tall or dense plants of other crops.

Watermelons require full sun all day long to produce their sweetest fruit. Shade not only results in inferior flavor, but delays maturity, making production in marginal climates even more difficult.

Watermelons are truly a warm-season crop. Not only are they extremely sensitive to frost, they are injured by temperatures as high as 35°F. It is critical to be patient in waiting for warm, late-spring weather before planting watermelons in the garden. Also, it helps to provide warm growing conditions by planting next to a south-facing structure, planting on black plastic, and/or using row covers.

Soil Type and Soil Preparation

Watermelons are best adapted to lighter soils — sandy loams and loamy sands. They grow faster, mature earlier, and produce the best-quality melons on these soils. However, they can be grown on any soil, as long as irrigation is managed to avoid frequent saturation. Watermelons do not require large amounts of organic matter in the soil.

Planting

Transplanting is an option in order to enhance earliness. However, due to physiological problems created by transplanting, watermelons often produce better if planted directly from seed, even in cold climates. Plant seed 2–3 weeks after the average last frost and then only if daytime soil temperatures are at least 70°F.

Transplanting can be successful if all conditions are correct. Most importantly, use transplants that are healthy and at the right stage of growth. Transplants must be small, rapidly growing, and dark green. A root-hardening response common to this family of plants slows or prevents new growth of less-than-ideal transplants. Transplants that are too old, etiolated, or slow-growing, or those that have been stressed at any time for water or nutrients, seldom produce a vigorous plant.

Place transplants in the garden 2–3 weeks after the last average frost and when the forecast is for mild weather. Once a healthy transplant has been placed in the garden, it must be protected from wind, sun, and cold, even if growing conditions are ideal.

Planting specifications:

- Seeds per hill: 3–5
- Distance between hills: 4–5 feet*
- Final stand per hill: 2–3
- Ounces of seed per foot: 0.05
- Row width: 6–8 feet
- Seed depth: 1 inch
- Germination: 5–14 days

*Hill spacing for transplants is the same as for seed.

Fertilizer

Watermelons are heavy feeders and respond positively to adequate levels of N, P, and K. Split applications work best to keep watermelons

growing vigorously throughout the season. Apply the equivalent of 0.25 lb N (in combination with P and K) per 100 square feet during soil preparation. A 10-10-10 fertilizer formulation (or product with similar nutrient ratios) is usually adequate. Side-dress an additional 0.3 lb N when the plants begin to form running vines. For side-dressing, select a high-N source such as 21-0-0 or 46-0-0.

Weed Control

Watermelons do not compete well with weeds at any stage of growth. Consequently, season-long weed control is required. Control weeds through mechanical tillage, hand weeding, or use of a labeled garden herbicide. At all stages of growth, tillage activities close to plants should be shallow in order to prevent damage to roots. Avoid damage to the vines during weed-control efforts.

Irrigation

As they grow, watermelons develop relatively deep, vigorous root systems. Plants will produce the best quality melons if not overirrigated. Irrigation should be deep and infrequent in comparison with most garden crops. Once plants are established and growing well, weekly applications of 2–2.5 inches of water are usually adequate. On very sandy soils, apply smaller amounts, but more frequently.

Insects

Cutworms are the most common pest of watermelons in Idaho gardens. They emerge from the soil at night and cut down newly emerged seedlings. Consistent problems with cutworms may require application of a labeled soil insecticide prior to soil preparation. Spider mites occasionally become problematic and are best controlled by using overhead sprinkler irrigation. Occasionally, application of a miticide may be necessary.

Diseases

Many diseases affect watermelons in humid climates, but the dry air in Idaho limits these problems. In gardens where watermelons, cucumbers, cantaloupes, and squash are frequently grown, a soilborne disease called fusarium wilt can build up. This fungus causes plants to remain small, become weak, turn yellow, develop burned leaf edges, and eventually die early. Partial prevention is possible by practicing crop rotation with at least four-year intervals. Watermelons are also very susceptible to

root rots if they are overirrigated or planted in poorly drained soil.

A few viral diseases, such as curly top, occasionally appear on watermelons. Symptoms include malformed leaves and fruit, mosaic color patterns on the leaves, and general yellowing or stunting. Remove and destroy plants showing these symptoms to prevent competition with healthy plants.

A physiological fruit rot (not caused by fungi or bacteria) called blossom-end rot occasionally appears on watermelons. It is typified by a black, leathery patch on the end of the fruit opposite the stem. It is caused by repeated drought stress. Proper irrigation usually alleviates this problem.

Harvest

It is important to pick watermelons when fully ripe because they will not finish ripening off the vine. Knowing when to pick a watermelon is an art unto itself and no one is successful all of the time. However, there are three fruit-related signs that will make the decision easier. First, as a melon ripens, the ground spot (the spot on the melon that is in contact with the soil) will turn from white to yellow. Second, a ripe melon will display a dried-up vine tendril. Follow the stem of the fruit to the vine. At the point of attachment, you will see a leaf and a tendril. The tendril is a “curly-cue” that the plant uses to grab and climb. This tendril will dry up when the fruit is ripe. Third, small wasps will sting a ripe watermelon, causing the development of small (usually less than 1 inch in diameter) rings or target spots on the top of the fruit. Additionally, if you are a good watermelon “thumper,” the sound of a melon does deepen as the fruit ripens, providing a final test for ripeness.

Storage

Watermelons are usually not stored for any significant length of time. However, they can be held in a cool, unrefrigerated place for a week or more without losing quality. Once cut, the melon should be refrigerated and consumed within a few days.

Consumptive Yield

Compute household planting requirements as follows:

- 3–6 lb fresh watermelon per person
- Each foot of row will yield 0.5 lb

Plant 6–12 feet of row per person.

Nutritive Value

Fresh watermelon consists of 92% water. Due to this high water content, watermelons are relatively low in nutrients, but they are a good source of vitamin C and have trace amounts of many other vitamins and minerals. One hundred grams (3.5 oz) of fresh watermelon contain 0.6 gram of protein, 0.2 gram of fat, 7.6 grams of carbohydrates, 30 calories, and 0.4 gram of dietary fiber.

Further Reading and Resources

Source of nutritional information: USDA/ARS FoodData Central, <https://fdc.nal.usda.gov/>

Additional source of health benefits information: *Nutrition and You, Vegetable Nutrition Facts*. <http://www.nutrition-and-you.com/vegetable-nutrition.html>

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