



New Start Community Garden
Garden Curriculum

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NEW START COMMUNITY GARDEN

GARDEN CURRICULUM

The purpose of this curriculum is to provide educational materials to support student and community visitors to the New Start Community Garden, aka the Shark Garden. It is designed for ages 10 and up and many lessons and activities can be used at home as well as in the garden. Our goal is to create inclusive curriculum that encourages sustainable organic gardening, environmental stewardship, and multicultural appreciation for food. For more information about the Shark Garden, contact info@sharkgarden.org

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The Importance of Seeds

Inside of each seed is a baby plant just ready to grow. Plants make oxygen for our air and food for all other living creatures. They help keep our soil in place and clean our water. We use them to make medicine, shelter, and lots of other products we need to survive. Quite simply, life would not exist on this planet without plants.

Seeds are the way most plants make new plants. In addition to plants being important in general, it is also very important that there are lots of different kinds of plants in our world. When there are lots of different kinds of living things in the ecosystem it is called biodiversity. Why is it important for our ecosystem to have many different types of members? What if we had only one type of tree in our forests and a big insect population came in and ate all of the leaves off that particular type of tree? Or what if a disease infected the roots of plants we relied on for food. That actually happened!

White potatoes were a very important food crop in Ireland. However, in the mid-1850s a fungus started attacking the roots of the potatoes and it killed a majority of the potato plants in the country for many years in a row. People were so dependent on this one type of food that millions of people died because they did not have enough to eat. Millions more had to move to other countries that had more food available. This horrible time in history showed people how important it was to grow a variety of food crops so that if one was destroyed, there were other things that could be grown and eaten.

To make sure this never happens again, scientists work hard to get people to grow lots of different types of plants. They also make sure to save seeds so that when natural disasters do hit (like fires, floods, and disease), we have back-ups to grow replacement plants. Scientists save these seeds in protected locations they call seed banks. In a seed bank, seeds are kept in a cool (generally frozen), dry condition so that they do not sprout or rot. Seed banks are designed very carefully to be safe from people and the environment. However, seeds can't be stored forever. Every so often, the seeds are taken out of storage and used to grow new plants, which will in turn produce fresh seeds for storing in the seed bank.



The Importance of Seeds



The impact of seeds on our lives is enormous. Seeds are the foundation of human and animal life on earth. The foods we eat, the fibers in the clothes we wear, and most of the products we use in our daily lives are created from seeds—from corn, cotton, and canola to wheat, barley, and soybean, to vegetables, flax, and flowers. As the delivery mechanism for new plant technologies and varieties, seed is also the crux of agriculture. Quality seed is essential for growing quality crops.



Products grown from seeds are critical in meeting modern consumers' needs for the “Four F’s” – food, feed, fiber, and fuel. And demand is continuing to grow. Between 2015 and 2030, it is expected that the world population will increase by over 1.86 billion people. Much of this growth will come in countries that currently don't have enough natural and other resources to adequately feed and clothe their citizens.



Thanks to continuous improvement in productivity and technology, the seed industry is meeting the expanding needs of the global market. It is feeding more people, producing healthier foods, using fewer resources and more renewable materials, while offering quality products with more diversity. And it is accomplishing all this with a smaller environmental footprint. The seed industry is also making a growing contribution to the economy. In 2007, the U.S. seed industry, which represents about 21% of the global seed market, generated \$11.2 billion in sales.

What Are Seeds?



A seed is a small, hard structure that contains the embryo of a plant. It is part of the plant that is responsible for reproduction and the continuation of the species. They are produced by flowers and other types of plants, and they are the means by which these plants disperse their offspring.

They come in a variety of shapes and sizes and are often covered in a protective coat or hull. Inside the seed is the embryo, which is the developing plant. The embryo is made up of the cotyledons, which are the first leaves of the plant, and the radicle, which is the root of the plant. It also contains nutrients that the plant needs to grow and develop.

Further, they are important because they allow plants to reproduce and spread to new areas. They are also an important source of food for animals and humans. They can be eaten whole or used to produce oil, flour, and other food products. They are also used in plant breeding to produce new varieties of plant.

They can be stored for long periods of time and can be transported easily, making them a valuable resource for farmers and gardeners. In addition, they play a vital role in plant evolution and adaptation, as they allow plants to spread and colonize new areas.

There are millions of different types of seeds and they are used for a wide variety of purposes. However, here are a few statistics that may be of interest:

- According to the Food and Agriculture Organization of the United Nations (FAO), there are approximately 1.5 million known plant species in the world, and most of these species produce seeds.
- The FAO estimates that there are more than 50,000 different types of edible seeds, including grains, legumes, nuts, and seeds from fruits and vegetables.
- They are an important source of food for many people around the world. For example, grains such as wheat, rice, and corn are the main staples in many diets, and legumes such as beans, lentils, and peanuts are also widely consumed.

What Are Seeds?

- They are also important for agriculture and horticulture, as they provide a reliable and efficient way to grow new plants. According to the FAO, there are more than 2,000 different types that are used for agricultural and horticultural purposes.
- They are also important for plant evolution and adaptation, as they allow plants to spread and colonize new areas. Many plants have seeds that are adapted for dispersal by animals, wind, or water, allowing them to move to new locations and establish themselves in new environments.

General Types of Seeds

There are many types of seeds, including seeds for plants, animals, and food. Some examples include:

- **Flower seeds:** These are used to grow a wide variety of flowers, including annuals, perennials, and biennials.
- **Vegetable seeds:** These are used to grow a wide variety of vegetables, including tomatoes, peppers, cucumbers, lettuce, and peas.
- **Tree seeds:** These are used to grow trees, including fruit trees, shade trees, and ornamental trees.
- **Grass seeds:** These are used to grow lawns or pasture for animals.
- **Herb seeds:** These are used to grow herbs, including culinary herbs like basil, mint, and oregano, as well as medicinal herbs like chamomile and echinacea.
- **Cover crop seeds:** These are used to grow crops that are not harvested for food, but rather to enrich the soil and control erosion.

Some examples of types of seeds for animals include:

- **Birdseed:** This is used to feed a variety of birds, including finches, sparrows, and chickadees.
- **Fish food:** This is used to feed a variety of fish, including goldfish, koi, and tropical fish.
- **Livestock feed:** This is used to feed animals like cows, pigs, and chickens.

Some examples of types of seeds for food include:

- **Grain seeds:** These are used to grow grains like wheat, oats, and corn.
- **Legume seeds:** These are used to grow legumes like beans, peas, and lentils.
- **Nut seeds:** These are used to grow nuts like almonds, peanuts, and pecans.
- **Oil seed:** These are used to produce oil like soybeans, sunflowers, and canola.



Types of Seeds according to Plant Breeding

In plant breeding, seeds can be classified into several categories based on the type of plant they produce and the method used to produce them. Here are some common types of seeds based on plant breeding:



Open-pollinated Seeds

Also known as OP seeds, these seeds are produced by plants that are pollinated naturally by insects, birds, or the wind. They will grow into plants that are genetically similar to the parent plant. OP varieties grow out true every year. They are genetically diverse, so there can be a lot of variation in the plants and fruits. Since agriculture began about 12,000 years ago, people have been choosing the qualities they like in a plant, such as fruit size, flavor, growth habit, heat and cold tolerance, and uniformity, saved the seed, and continually grew it out year after year. This is plant selection and can only be done with OP seed.



Hybrid Seeds

Also known as F₁ Hybrid Seeds, these seeds are produced by crossing two different varieties of the same species. These will grow into plants that have characteristics from both parent plants. They are often more uniform and higher-yielding than open-pollinated.

Heirloom Seeds

These are passed down through generations and are often open-pollinated. They are valued for their genetic diversity and for preserving the heritage of traditional plants.

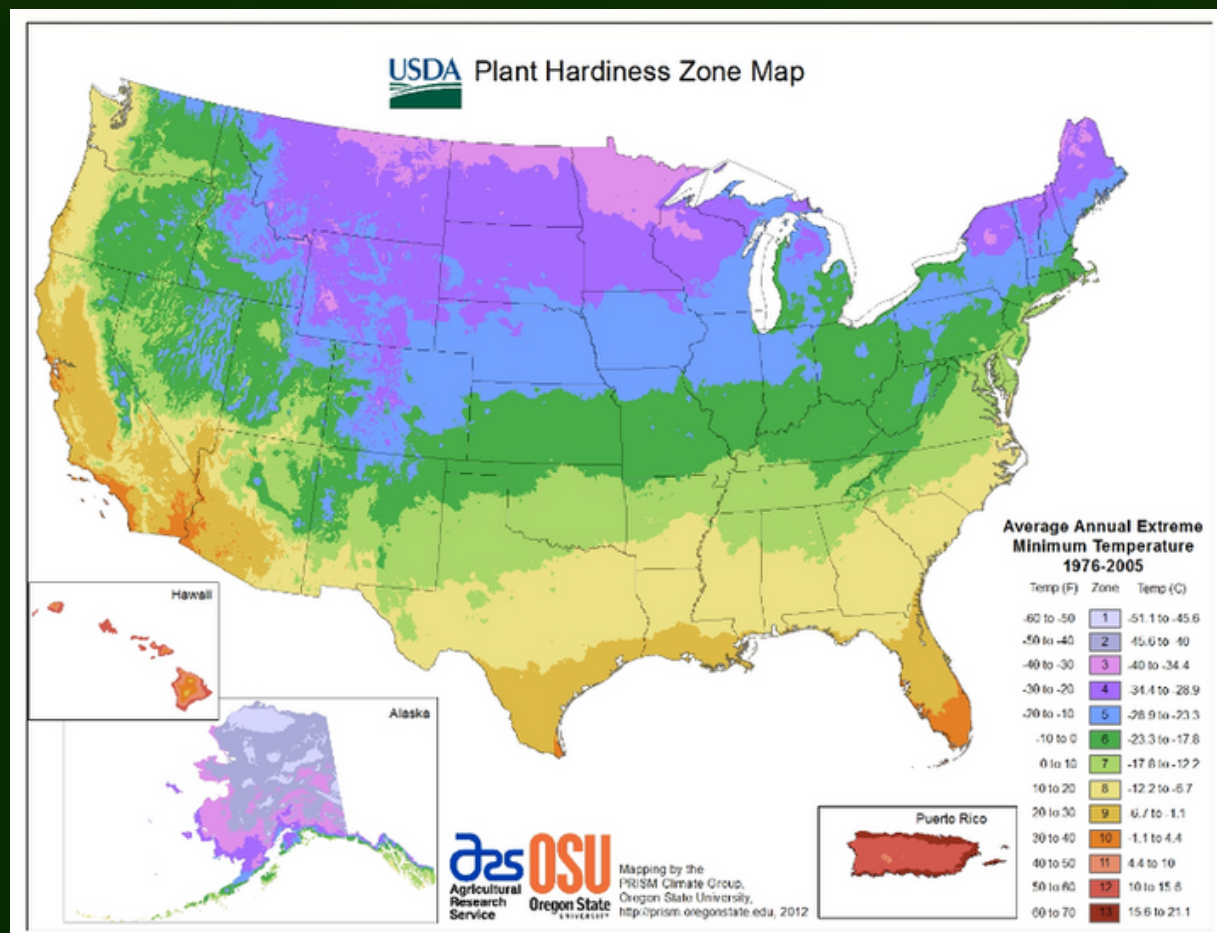


Genetically modified (GM) seeds

These have been genetically modified in a laboratory using techniques such as gene splicing or gene modification. They are often used to produce plants with desirable traits such as resistance to pests or drought.



What are USDA Plant Hardiness Zones?



Plant hardiness zones are regions that have been labeled by their average minimum growing temperatures; they help gardeners understand which plants will grow in their zonal growing environment. They are extremely helpful to gardeners in helping to compare the zone they live in, to the zone where a plant is supposed to grow well. This is of particular interest in states with more unusual climates, like Florida, where it rarely freezes and has high humidity. If these zones didn't exist, it would be extremely difficult and disappointing for growers using a trial-and-error method of finding out what they can and cannot grow. While there are factors that the map does not take into consideration, such as snow cover and length of freeze time, overall it is a very useful tool for gardeners throughout the United States.

The hardiness zones defined by the USDA begin with zone 1, which is the coldest (it includes parts of Alaska) and end with zone 13, which encompasses the warmest growing areas, such as Hawaii and the Florida Keys. "When we're talking with new gardeners, this is a concept that is often confusing," say the O'Neals. "Remember that the lower number is colder and the larger number is warmer—that's a good mental trick to remember how they work."

Why It's Important to Know Your Plant Hardiness Zone

You need to understand your specific hardiness zone so you know which plants will—and will not—thrive in your garden. This will ultimately help you save time and money.

What are USDA Plant Hardiness Zones?

These USDA zones are helpful in determining which plants will be perennial crops based on how hardy they are in the various temperatures. High temperatures, rainfall, and soil type will also determine if a plant will grow well in your garden. Most vegetables are annuals, which means they only live for one year or less, so they only need to grow for one season as soon as the weather is warm enough for them.

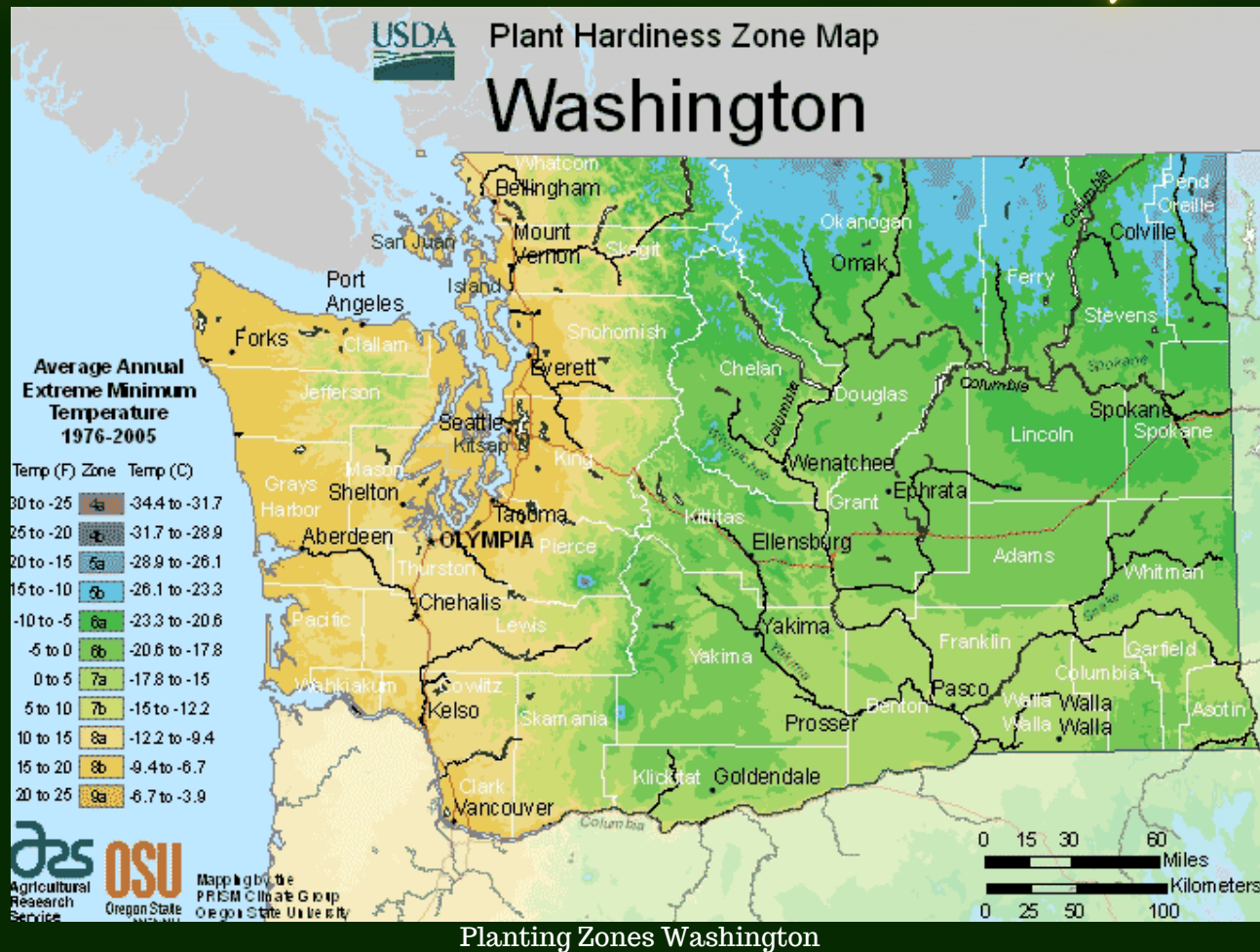
The length of your growing season will help you determine which vegetables you can grow. The season length is determined by your latitude on the globe which determines the length of days throughout the season. Temperatures also affect your ability to grow crops, of course, but vegetables also need a certain amount of daylight. Your “Growing Season” is the number of warm and light days you have at your latitude that are favorable for growing crops. The farther you get from the equator, the shorter the growing season is.

In Seattle, our typical growing season is around 110 days on average, when it’s warm enough and light enough to grow annual vegetable crops. In Alaska, their season is much shorter, but they do have longer days in summer. In many areas, the growing season starts after the last frost in spring and ends with the first frost in the fall, so you can also look up the average frost dates for your area.

Most seed packets will have a section that says the “days to maturity” or “days to harvest” for that variety and you’ll need to select varieties that have that number less than your growing season days or the vegetable will not be able to mature enough. Some winter squash, melons, gourds, and peppers take over 110 days to mature, so we should look for “early maturing” varieties when possible. The seed packet may also give us clues as to the ideal temperature for that crop and how much sun or water it needs as well as how large it gets and how to plant the seeds. Keep in mind that the temperature drops at night, so some warm weather crops may not do well in areas with colder nighttime temperatures.

Basil, for example, does not like to go below 50 degrees Fahrenheit, so it will only grow well in the middle of our Seattle summers when it’s warm at night. Seed packets and seed catalogs have a wealth of information about which varieties might grow in your region. Selecting seeds from a local company also helps you connect with varieties that are appropriate for your climate and region. Selecting varieties of vegetables from your same latitude around the world can also be a fun way to find things that grow well in your garden. Let’s look at what information we can get from vegetable seed packets to help decide if it is a good variety for your garden.

USDA Plant Hardiness Zones: Washington State



Washington State is known for its high yearly rainfall and lush green forests. The state is covered by a wide range of geographical regions, like coastal towns, mountain ranges, volcanic peaks, lowlands and plateaus. Because of this, Washington has a wide range of growing hardiness zones all the way from 4a to 9a.

The west of the state tends to remain between 50 and 80 degrees year round and receives 200 inches of precipitation per year, while the east has warmer summers and cooler winters and only 6 inches of precipitation annually.

A hot summer day in the east can reach highs of 90, while the winter gets as low as 30 with snowfall. Summers tend to be drier, while the fall and winter months have the highest number of days with rain.

- If you live along the coast you are likely in the hardiness zone 9a. This area of the state remains between 50 to 80 degrees year round.
- The area further east off the coast moves to a zone 8.
- Small areas of the state along the Cascade Mountain range are in zones 4a, 4b, 5a, and 5b. It is important to find these on the map because the areas immediately surrounding them can be from 6a to 8a.
- The north of the state as well as the areas around Lincoln and Spokane (which are both zone 6b) are in hardiness zone 6a, with much of the rest of the state being zone 6b or 7a.

Seattle's Plant Hardiness Zone



Above you can find the Washington hardiness zones map, sometimes called the growing zones map based on the 2012 USDA Map Data. This map provides gardeners and farmers with the information they need to decipher what plants will grow best in their region and what their optimal growing time is.

To use the map, begin by finding your area on the map. You can also search by zip code. See the color of your area and compare that to the legend. The legend will tell you what your hardiness zone is.

Washington is primarily in zones 6a through 9a however, the hardiness map is very important because there are a few small pockets of the state that get as low as zone 4a. This will help you to decide what plants you can grow outdoors.

This information from the USDA is just a guide. It is also important to discuss with greenhouses and nurseries what plants will thrive in your area. Use planting and care instructions as a guideline and remember that you can always move plants indoors to help them survive winter.

You can create something called a micro-climate in your yard. This happens when your yard has artificial replicas of naturally occurring geographical climates, such as a pond, large rocks, or treelines. This can change the hardiness zone of your yard, one zone up or down.

To create a more friendly yard for growing, plant trees or large shrubs around the edges of your yard.

Most of Washington tends to have a long growing season. Planting can begin in many areas in March and the first frost of the fall usually doesn't hit until late in November. According to Watson's Greenhouse, long season and warm weather allow for you to grow a great selection of fruits and vegetables.

Choose options like root vegetables, greens, fruit trees or berries. Keep in mind the west coast has primarily overcast days and not a lot of direct sunlight.

Seattle's Plant Hardiness Zone

Seattle's USDA hardiness zone is 8b. That means winter temperatures can drop as low as 15 degrees Fahrenheit. Freezing temperatures tend to begin in November and extend all the way until March the following year.

According to your hardiness zone, 8b, the final frost date in spring is likely to be around March 21st. Keep in mind that this is an estimation based on the observation of 30 years of data. It is not a guarantee. It is possible for frost to occur after this date so be prepared to cover your plants in the off chance you get an unexpected frost after this date.

Your first frost in the fall is likely going to take place around November 14th. Just as with your final spring frost, your first fall frost can come a little bit earlier or a little bit later. This date is not an exact guarantee.

Your last frost date is around March 21st. When planting from seed, read the instructions carefully and count backward from your outdoor transplanting date. Some seeds will require being sown directly outdoors after the final frost has passed - these seeds likely don't handle being transplanted very well.

Understanding Seed Packet Information



How to Grow Kale Start to Finish

A seed packet is more than just a pretty envelope. It's a miniature biography that reveals all a gardener needs to know to successfully cultivate the seeds it contains. And while companies vary in quality and marketing, they share the obligation to present the consumer with an accurate picture of plant characteristics. So, whether a package of tomato seeds bears a realistic glossy photo or a simple drawing really doesn't matter. It's the printed info that we need to understand, to make a purchase decision.

The following categories represent the plant facts found on seed packages. Once you're familiar with them, you can shop like a pro

Plant Photo or Illustration

Most, but not all packages sport an enticing picture of the plant at maturity.

This is great for learning things like what various herbs look like, how big squash and melons should be before harvesting, and the shapes and colors of flowers.

Plant Name

The complete name of the plant appears prominently on the package, and includes the common name, cultivar, and Latin name - as in "Zinnia, Giant Cactus (Zinnia elegans)." The Latin name is particularly useful in comparing plants, as common names often vary, and there are usually many cultivars of a given species.

Plant Description

Plants are generally described in terms of attributes like color, dimensions, pollinators attracted, types of blossoms, harvest produced, bedding uses, and a myriad of additional features that make them appealing selections for the garden.

Understanding Seed Packet Information

Horticultural Company

The company (or companies) that cultivated, harvested, packed, and distributed the product is identified. Where the seed was grown may or may not appear. Older companies will often tout their heritage by including the year of origin, hoping to gain your favor by indicating their longevity. Here's my best advice in terms of sourcing: If you have had success with a product in the past, seek out the company that produces it again the next time planting season rolls around.

Price and Weight

Seeds are an affordable way to plant, as opposed to purchasing sets, seedlings, or full-grown varieties. Package prices and weights are based on qualities like the cost to produce, and the volume. For example, you may pay the same price for 25 marigolds as you would for 10 lima beans.

Accreditations: You may see the following designations:

Certified Organic

This is a USDA designation for seeds produced by plants that were grown without chemicals, using organic methods.

Fair Trade

This label indicates that the seeds were produced in a socially responsible manner that meets with certification standards, with fair prices paid to producer in developing countries.

Non-GMO

Products with this label have not been genetically modified to improve performance. Certified organic products are non-GMO, as are those produced by companies that have signed a Safe Seed Pledge.

Heirloom or Open-Pollinated

A "straight species" that has been grown for generations and is not cross-bred. Seeds may be collected from year to year to produce the same variety.

Hybrid

A cultivar of two plants that has been bred through cross-pollination to retain the best features of each.

Packed for/Sell by Date

Like food products, seeds are packed fresh, and you want the current year's crop for the best germination rates.

Understanding Seed Packet Information

Look for a stamp with the current year, to ensure that they are viable. You may also see a specific month of expiration. According to the Oregon State University Extension Service, seed packets may last up to four years, depending upon plant type and storage conditions. Keep them cool and dry for maximum longevity. If you stumble across old seeds for sale, or in your shed, you can give them a try. But for a full-price investment, buy fresh.

Lot Number

This information identifies a specific batch, and is useful for tracking it in the event of a recall.

Type

The type designation tells you how many growing seasons your plant will live through. Annuals grow for one season and die off. Biennials grow for two seasons, blooming and usually dying in the second, although I've had some live longer. Perennials come up year after year. You may also find the words "hardy" and "tender." Hardy annuals and perennials can withstand frost, but tender plants cannot. There are varying degrees of each, such as "half-hardy," which may withstand an occasional frost, and "very tender," which are too delicate to withstand any cold weather.

Hardiness Zone

Some packages may list the zones for which the plant is suitable. If you don't know your growing zone in the US, you may research it using the USDA Plant Hardiness Zone Map. Garden centers generally stock plants and seeds appropriate for their geographic zones. If you are ordering online or from a catalog, be sure to buy products that are suited to your area.

Planting Depth

A general rule of thumb is to plant no deeper than a seed's diameter. The shallowest planting is on top of moist ground with no soil covering it, and the deepest is generally no more than an inch. This information may be presented in the form of a fraction, like "1/4 inch." Use your judgment, as it's better to plant too shallowly than too deeply. Seeds need air as well as moisture to germinate.

Thin To

Once plants have sprouted "seed leaves," the first set of leaf-like protrusions, and "true leaves," the first pair of real leaves, it's time to reduce overcrowding and remove any weak sprouts. This is called thinning. Your package indicates how far apart the remaining plants should be, with a direction such as, "thin to 6 inches."

Sun/Shade

The amount of daylight your plants will require is also important to note.

Full-sun plants do best with six hours of morning sun.

If the package says they can tolerate shade, this means they will do best in the sun, but will grow in shade as well.

Understanding Seed Packet Information

Height

Knowing the height of plants is essential to planning a layered garden in which taller types anchor the back of a planting bed, behind an array of progressively shorter varieties. Note descriptions like “giant” and “dwarf” when making selections.

Days to Germination

If your package says, “from 5 to 10 days,” this means you may see sprouts as early as five days after planting. However, within the above range, this also means it may take closer to 10, or even a bit longer. This is an estimate, and soil, light, moisture, and temperature conditions all play a role in the length of the germination period.

Maturity

When a plant grows to its full stature, with multiple leaves and stems, it is mature. At this point it may bloom, produce a crop, and fulfill its life cycle. Knowing the time from germination to maturity is useful for planning events like when flowers may be ready for bouquets, and crops ready to harvest.

Direct Sow

Direct sowing is planting in the ground outside.

It is generally recommended to wait until all danger of frost has passed. Here in the northeast, that’s usually late April.

Start Indoors

Instead of sowing directly outdoors, you may start seeds indoors. Packages describe when to do this, to coincide with outdoor planting after all danger of frost has passed.

Bloom

This section tells the time during which you may expect your plants to bloom, like early spring, or June through August. By selecting plants with differing bloom times, you may be able to create a continuously blooming garden to enjoy from spring through fall.

Pre-Planting Prep

Some seeds have especially hard coatings and require a little help to germinate.

If you see “scarification required,” gently sand them before planting. Some may want “stratification,” a process of layering in moist soil. Others may require soaking. All are methods to open them enough for germination to begin. Without the described prep, they may never sprout.

Understanding Seed Packet Information

Harvest

Edible plants like herbs, vegetables, melons, and berries may include information on how and when to harvest. Picking produce at its peak is essential to good health, as well as the best flavor and texture. Notes on harvesting technique can be helpful to prevent potentially damaging a plant that is still producing.

Level of Difficulty

You may see the words “easy to grow” on packages. This is to be taken with a grain of salt, because as we said, there is no guarantee that your soil, light, moisture, and weather conditions will exactly mimic the ideal growing conditions for a given plant. If you find varieties that are moderately difficult, take this to heart, and be prepared to plant extra, just in case.

Soil/Moisture

There are three main types of soil: sand, silt, and clay. Often this list is extended to include chalk, loam, and peat. For now, suffice it to say that different plants require different types of soil, with many requiring only “average well-drained soil,” as noted on packages. Knowing your soil type will help you to choose the proper plants. This can be done by sending a sample to your local extension service, or purchasing a home testing kit. As for moisture, the package will tell you if your plant requires frequent watering because it likes “wet feet,” or if it likes to dry out completely between waterings. If your packet, like the one pictured in this article, does not discuss water needs, it may be able to thrive on whatever moisture is provided naturally. This is the case for many native plants, as well as “drought tolerant” varieties. Drought tolerant plants can withstand severe water deprivation, but feel free to give them a drink if they look wilted.

Seed Packet Activity



Directions:

Please follow this link to find directions and activity description details:

<https://gardening.cals.cornell.edu/lessons/project-s-o-w-seeds-of-wonder-food-gardening-with-justice-in-mind/unit-2-gardening-with-gratitude/2-5-reading-a-seed-packet/>

Review Questions to Ask Students:

What is the vegetable's variety name?

Can you tell if it is a hybrid or open pollinated variety? (marked "F1" for hybrids vs OP for open pollinated)

What size does it get?

How many days does it take to mature?

How deep should you plant the seeds?

How far apart should you plant the seeds?

Will the variety mature in Seattle's growing season?

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