

A Garden Primer

This primer was written to give you basic gardening information but the knowledge and wisdom of experienced gardeners is invaluable. We strongly encourage you to seek the advice of many fine gardening experts in your communities and of those listed in the resources section.

Where to Plant: Site, Soil, Water, and Safety

Site

All plants need sun, some more than others. The amount of sunlight depends on the type of plant. Large flowering or fruiting plants need twelve-plus hours of sunlight per day. These plants are referred to as "warm weather plants" or "summer crops" and include tomatoes, peppers, squash, beans, cucumbers, corn, eggplant, melons, potatoes, and sunflowers. "Cool weather crops" are those which grow well spring and fall. They grow with less sun but still need at least eight hours per day to thrive and produce. Cool weather crops include spinach, lettuces, other greens, radishes, carrots, broccoli, cauliflower, onions, and garlic. If a garden with cool weather plants gets too much sun—especially true for south or west facing beds-- build shade barriers or plant sun-sensitive plants in the shade of larger sun-loving plants.

Trees and shrubs will block sun so don't put beds too near these. Young trees and shrubbery may not cause shade now but might in a few years. Also, larger plants will suck up water and nutrients from young starts and seeds.

Try to put the garden on flat or slightly sloping ground in well-drained soil so it is easier to level and won't sit in a puddle which will be messy and cause rot. Slight southern slopes are usually a great location for maximizing sun. If the sunniest site is on a hillside, be creative with terracing. Retaining walls can provide stable support and are a great spot for pockets of herbs, or for trailing flowers or vining vegetables to hang over.

Soil

The best garden soil is loose enough so roots can grow freely, drains well yet retains moisture, is slightly acidic (pH between 6.2 -7.0), and provides lots of nutrients for healthy plant growth. For in-ground gardens, amendments may be needed to improve the soil's balance of nutrients and texture. Adding organic matter, or compost, will create a balanced, crumbly soil that water and air can easily move through so roots can grow easily. Learn more about making your own compost in the "how to" section. Raised beds should be filled with a light, nutrient-rich mixture so young plants have what they need to thrive.

Water

Water is as important as sun and soil for healthy plants so site gardens near a water source. Larger, community gardens need to be close to several spigots and have agreements in place

with city or county authorities for billing. Teach community gardeners about any security or safety systems so they can get water when they need it. Put home gardens near a faucet if possible and keep hoses, watering cans, or buckets nearby. Be careful when dragging hoses around since they can easily damage plants. More about watering plants is covered in the "how to" section.

Safety

Gardens should be in well marked areas safely away from busy streets. They should also be a good distance away from industrial areas or factories that may contaminate nearby water, air, or soil. Planting a community garden adds significantly to the beauty, pride, and safety of neighborhoods.

What to Plant

Hardiness Zones/Heat Zones

Gardeners should plant what they want to eat but it doesn't always work out that way. Climate and elevation play a key role in determining which plants will grow where. To decrease frustration and waste by trial and error, plant hardiness zones, or climate zones, were set up by the United States Department of Agriculture (USDA) as a guide to help determine which plants grow best in what climates. Hardiness zones show the lowest average temperature it will get in each zone every year with Zone 1 being the coldest and Zone 11 being the warmest. Southwest Washington is mostly in Climate Zone 8. The criteria for these zones will vary even within a few miles due to natural conditions such as altitude, wind, humidity, and heat.

There is also a heat zone map based on the average number of days the temperature is 86 degrees or more. Eighty-six degrees is the temperature at which plants begin suffering damage to their branches and leaves. Southwest Washington is in Heat Zone 4, having 14-30 days hotter than 86 degrees. Heat Zone, like Hardiness Zone also is affected by other conditions but the biggest problem with heat is water supply. Warm weather crops can take more direct heat and usually aren't damaged until temperatures reach 95 degrees but ALL plants need lots of water in severe heat. Always keep a check on the water needs of your plants, especially those in raised beds and containers.

Knowing the hardiness and heat zones helps gardeners choose plants and seeds that do well in their areas. This information is often included on seed packs or with planting instructions. Experience over time will help gardeners learn what will thrive in their gardens.

Selecting Seeds

Buy quality, disease-resistant seeds from a reliable dealer and shop early for best selection and sales. Seed packets offer important planting information and often a drawing or photo of mature plants which is very helpful to new gardeners. Sharing seeds with others is a fun, educational, and free way to increase your gardening knowledge and bounty.

New seeds may have better germination rates, but seeds that were saved and stored properly will be good for several years. Never save seed from hybrid plants because over time they will produce inferior plants. Examples of some hybrid plants are eggplant, bell peppers, broccoli, and most corn. Below is a table of typical storage lives assuming seeds are kept cool, dark, and dry.

Storage Life of Most Seeds

1 year	2 years	3 years	4 years	5 years
Onions	Chives	Beans	Cauliflower	Collards
Parsley	Corn	Broccoli	Heirloom tomatoes	Cucumber
Spinach	Hot peppers	Cabbage	Kale	Lettuce
		Carrots	Pumpkin	
		Celery	Radishes	
		Marigolds	Squash	
		Peas	Swiss Chard	
			Watermelon	

Selecting Plants

Vegetable plants, also known as starts, are often the only chance for long-season vegetables like tomatoes, peppers, and broccoli. Buy plant starts sales hosted by horticulture programs, nurseries, or garden centers of variety stores. Choose plants that are strong, straight, and deep green without yellowing or insect damage. Plants bought from outside stands will be ready to go in the ground but those from a green house or windowsill will need time to slowly adjust to the outside. Abrupt temperature changes can shock, stunt, or even kill tender plants. Helping plants adjust to the outside is called "hardening off" and is further explained in the planting section.

Think about the mature size of the plants you're choosing for your garden beds. In large, in-ground plots space isn't too much of a problem, but smaller raised beds can quickly become jungles. Two zucchinis will overtake a small bed. Seed packets and most plant starts will have information on mature size and whether or not plants will need to be supported with stakes, cages, or trellises.

When to Plant

Starting early increases production and variety of a garden. In our area, many cool season crops can be planted in early spring when the soil temperature is around 50 degrees. Warm season crops won't do well until the ground is above 60 degrees. Seed packets, plant labels and experienced gardeners can give guidance on planting times. Planting early, mid-season, and late crops is called succession planting. Well timed succession plantings provide a steady supply of produce from spring through fall and helps lessen bumper crop madness.

How to Plant

There are several ways to plant a garden; the method chosen depends on the layout. For large, in-ground plots, single-row furrows or wide row plantings are most typical. Seed packets or planting guides will tell you how far apart to plant. Some gardens may include hill plantings where vining plants like squash and cucumbers are planted in small hills to allow the roots to spread out and the vine to grow freely. The hills are planted with 4-6 seeds. Once growing, thin the starts to no more than three plants.

Our projects used raised beds which were filled with a special soil mix and overlaid with a grid that divided them into one foot squares. The squares were then planted with one, four, nine, or sixteen seeds or plants depending on how big the plant would be when mature. All the information needed for this type of planting is found in "The All New Square Foot Gardening" book by Mel Bartholomew. See the resources section for information on Mel's book.

The depth seeds are planted depends on their size. Small seeds should be lightly covered with $\frac{1}{4}$ " of soil. Larger seeds should be planted the depth that is about $\frac{1}{2}$ of the seed's width. Seed packets and planting tags will provide information on planting. All seeds should be kept moist during their germination period.

Seeds are ready to plant when soil reaches the right temperature: 50 degrees for cool season plants and 60 degrees or more for warm season plants. Dig a small hole, put in one or two seeds, cover lightly with soil and water well. While most instructions tell you to over plant, then thin, why not plant only what you need in the first place? This will save time, work, and seeds. No need to plant something only to pull it up two weeks later.

Starts bought from outdoor stands are ready to go in the ground. Those bought from greenhouses or started indoors need to be "hardened off" before planting by gradually exposing them to the outside. Begin to harden off your plants about a week before their transplant date which is found on the seed packet or with planting instructions. Set plants out in a protected, shady spot during the day and bring them in at night and if the weather turns cold, windy, or rainy. Leave them out a bit longer each day so that by the end of the week, they'll be tough enough to bask in the sunshine all day. Transplant seedlings into the garden on an overcast, even misty day if possible, to ease the shock of moving from the pot to ground.

Consider companion planting which is based on the idea that certain plants do better in the company of certain other plants. One plant may benefit another by enriching the soil with nutrients or by improving conditions above ground like the shade produced by a tall, sun-loving plant for a low-growing cooler plant. A companion planting chart is found below:

Table 1. COMPANION PLANTING CHART FOR HOME & MARKET GARDENING (compiled from traditional literature on companion planting)

CROP	COMPANIONS	INCOMPATIBLE
Asparagus	Tomato, Parsley, Basil	
Beans	Most Vegetables & Herbs	
Beans, Bush	Irish Potato, Cucumber, Corn, Strawberry, Celery, Summer Savory	Onion
Beans, Pole	Corn, Summer Savory, Radish	Onion, Beets, Kohlrabi, Sunflower
Cabbage Family	Aromatic Herbs, Celery, Beets, Onion Family, Chamomile, Spinach, Chard	Dill, Strawberries, Pole Beans, Tomato
Carrots	English Pea, Lettuce, Rosemary, Onion Family, Sage, Tomato	Dill
Celery	Onion & Cabbage Families, Tomato, Bush Beans, Nasturtium	
Corn	Irish Potato, Beans, English Pea, Pumpkin, Cucumber, Squash	Tomato
Cucumber	Beans, Corn, English Pea, Sunflowers, Radish	Irish Potato, Aromatic Herbs
Eggplant	Beans, Marigold	
Lettuce	Carrot, Radish, Strawberry, Cucumber	
Onion Family	Beets, Carrot, Lettuce, Cabbage Family, Summer Savory	Beans, English Peas
Parsley	Tomato, Asparagus	
Pea, English	Carrots, Radish, Turnip, Cucumber, Corn, Beans	Onion Family, Gladiolus, Irish Potato
Potato, Irish	Beans, Corn, Cabbage Family, Marigolds, Horseradish	Pumpkin, Squash, Tomato, Cucumber, Sunflower
Pumpkins	Corn, Marigold	Irish Potato
Radish	English Pea, Nasturtium, Lettuce, Cucumber	Hyssop
Spinach	Strawberry, Favba Bean	
Squash	Nasturtium, Corn, Marigold	Irish Potato
Tomato	Onion Family, Nasturtium, Marigold, Asparagus, Carrot, Parsley, Cucumber	Irish Potato, Fennel, Cabbage Family
Turnip	English Pea	Irish Potato

<http://attra.ncat.org/attra-pub/complant.html#chart> (companion planting chart)

Watering

There is an art to watering well: not enough and plants will stunt, shrivel, and die. Too much and they'll rot or die from lack of oxygen. Plants like sun-warmed so keep a bucket full nearby and refill it after each watering to be ready next time. Warm water gets a little deeper into the soil so more quickly increases the soil temperature and helps plants absorb nutrients faster in spring and late fall. Water the roots only by lifting the leaves and slowly pouring water directly into the ground. This way water goes where it is most needed and reduces the risks of fungal infections in plants.

Overhead watering drenches some plants with too much water while others don't get enough. Also, the gardener is too far away to closely check out the plants for any problems. Besides, hoses will hurt plants if they are dragged over them. If you must use a hose, have a shut off valve for the end and an extension hand wand with a spray nozzle. This helps direct the water under the leaves to the roots, thus keeping most of the plant dry. Keep the hose coiled in the sun but be careful that the water is not too hot for use. Drip systems can be very efficient when they deliver water when and where it is needed but they may also be expensive.

Seeds and seedlings need consistent moisture until well-established. Spring rains will take care of some days but gardeners need to keep watch for signs of under- or over-watering. Over-watering is the more common problem. Too much water causes stems to wilt, leaves to turn yellow, and mold to grow. Over-watered plants may appear to need water because their stems wilt and their leaves may turn yellow and fall off. Check the soil! If it's wet, don't water again until it has dried out a bit.

Once growing well, water needs will vary depending on size, season, weather, and growth demands of individual plants. New gardeners will gain confidence about watering—and everything else—with experience.

Protecting the garden

Your garden is a living labor of love that will need protection at times. The most common harmful elements will be weather and critters. In all the excitement of spring planting, we sometimes forget frosts are still likely. The average last day of frost for Vancouver is April 12. The "Safe Date", the day on which nine of the ten previous years the last frost had already occurred, is May 14. There is only a 10% chance of a frost after this date.

Covering your tender young plants can save them from frost damage. Cloth and paper work well for covers; use plastic as a last resort. Try cloth shower curtains, old blankets, pillow cases for tall plants, newspapers, or tarps. Drape covers over supports and secure tightly in case of high winds. Water plants well before covering since water carries heat from the ground upwards into the plant. Remember to remove covers the next day—especially plastic covers which can create a hothouse effect and overheat plants.

Wind and hail can also cause a lot of damage to your garden. When possible, put your garden beds in the most protected site that still receives plenty of sun. Solid walls are the best protection against strong winds. Temporary barriers made of hay bales can provide some wind protection and simple but sturdy tent structures can be effective against winds and hail.

Animals can be another cause of damage to your garden. Deer, rabbits and squirrels are notorious for devouring young starts from above while moles and voles can feast and destroy from below. Dogs can accidentally trample the garden while cats may find it an exceptional litter box. Fencing from above and below can be very effective against all these creatures while still allowing for sun, water, and attention to reach your plants. Check with other experienced gardeners and in the resources section for more ideas and information on protecting your garden.

Diseases and Pests

The healthier your garden is, the fewer problems it will have with pests and disease. Growing your plants in a sunny location in healthy soil and giving them the right amount of water will go far in promoting a thriving, verdant garden. Close attention to your garden each day will let you catch and address problems early. Early signs of disease include spotting, discoloration, and changes in plant structure like curling leaves or wilting stems. For accurate identification and what to do, seek the advice of an expert gardener such as a master gardener from WSU.

There are both good and bad garden insects. The goal is to attract and retain the good bugs while keeping the bad bugs away. Beneficial insects help gardens by eating harmful pests, pollinating plants, composting and improving soil, and by being food for birds and other animals that also eat pests. Attract common beneficial bugs like bees, dragonflies, and ladybugs by planting flowers, having a water source nearby, and by leaving some of your yard "wild" to create a safe home for insects. See resources for "Bugs and Pests: The Good, The Bad, and the Downright Ugly", a handy identification and information brochure produced by Clark County Solid Waste and WSU Extension.

Harvesting

Now comes the happiest part of gardening: harvesting your beautiful, delicious, nutritious produce. The key to harvesting is timing. If picked too soon, vegetables can be tough or soft, and lacking in taste and nutrients. If picked too late, again they may be tough and fibrous or too soft and mushy with an off or bland taste. Weather is the determining factor affecting plant maturity. Many sunny days can ripen some plants early while cooler, rainy weather may delay or prevent ripening at all (think green tomatoes) Information about typical days to maturity is generally listed on seed packets. Harvest tables, like the one on the next page, are also a helpful guideline. Taste, texture, and experience will guide you in harvesting the perfect prize.

Vegetable	Part Eaten	Too Early	Optimum	Too Late
Artichoke, Globe	Immature bloom	Flower buds small	When buds are 2" to 4" in diameter	Buds large with scales or bracts loose
Asparagus	Stem	Insufficient length , 1*	6" to 8" long; no fiber	Excess woody fiber in stem
Beans, Lima	Seed	Insufficient bean size	Bright green pod; seed good size	Pods turned yellow; ok for dried beans
Beans, Pole Green	Pod and seed	Insufficient size, 1*	Bean cavity full; seed ¼ grown	Seed large; pods fibrous; ok for dried beans
Beans, Snap Bush	Pod and seed	Insufficient size , 1*	Pods turgid; seeds just visible	Pods fibrous; seed large
Beets	Root and leaves	Insufficient size , 1*	Roots 2" to 3" in diameter	Roots pithy; strong taste
Broccoli	Immature bloom	Insufficient size , 1*	Bright green color; bloom still tightly closed	Head loose; some blooms beginning to show
Brussels Sprouts	Head	Insufficient size; hard to harvest , 1*	Bright green; tight head	Head loose; color change to green yellow
Cabbage	Head	Insufficient leaf cover , 1*	Heads firm; leaf tight	Leaf loose; heads cracked open
Cantaloupes	Fruit	Stem does not want to separate from fruit	Stem easily breaks away clean when pulled	Background color of melon is yellow; rind soft
Carrots	Root	Insufficient size , 1*	½" to ¾" at shoulder	Strong taste; oversweet
Cauliflower	Immature bloom	Head not developed , 1*	Head compact; fairly smooth	Curds open; separate
Celery	Stems	Stem too small , 1*	Plant 12" to 15" tall; stem medium thick	Seed stalk formed; bitterness
Collards & greens	Leaf	Insufficient leaf size, 1*	Bright green color; small midrib	Midrib large; fibrous
Corn, Sweet	Grain	Grain watery; small ; BABY CORN, 1*	Grain plump; liquid in milk stage	Grain starting to dent; liquid in dough stage
Cucumber	Fruit	Insufficient size , 1*	Skin dark green; seeds soft	Skin beginning to yellow; seeds hard
Eggplant	Fruit	Insufficient size , 1*	High glossy skin; side springs back when mashed	Seeds brown; side will not spring back when mashed
Lettuce, Head	Leaves	Head not fully formed , 1*	Fairly firm; good size	Heads very hard
Okra	Pod	Insufficient size, 1*	2" to 3" long; still tender	Fiber development; pods tough

Onions, Dry	Bulb	Tops all green	Tops yellow; ¾ fallen over	All tops down; bulb rot started
Peas, English	Seed	Peas immature and too small to shell ; EDIBLE PODS, 1*	Peas small to medium; sweet bright green	Pods yellow; peas large
Peas, Southern (green)	Seed and pod	Peas immature and too small to shell ; EDIBLE IMMATURE POD, 1*	Seeds fully developed but still soft; pods soft	Seeds hard; pods dry
Pepper, Green Bell	Pod	Pod thin and small, 1*	Tick walled and green to some red	Pod shrivels
Pepper, Colored Bell	Pod	Pods still light green and thin walled , 1*	Bright red/yellow etc. and firm	Pod shrivels
Potato, Irish	Tuber	Insufficient size, 1*	When tops begin to die back	Damaged by freezing weather
Potato, Sweet	Root	Size small; immature; 1*	Most roots 2" to 3" in diameter	Early plantings get too large & crack; damaged by soil temperatures below 50°F
Radish/turnip roots	Root	Size too small, 1*	Appropriate size for variety.	Pithy, strong flavor, hot taste, fibrous.
Soybeans, edible	Seeds	Seeds not developed	Pods thick; bright green	Pods yellowing/ dry; seed shatters out
Squash, Summer	Fruit	Insufficient size, 1*	Rind can be penetrated by thumbnail	Penetration by thumbnail difficult; seed large
Squash, Winter	Fruit	Rind soft but can be used as summer squash, 1*	Rind difficult to penetrate by thumbnail	Damaged by frost
Tomatoes	Fruit	<p>May be harvested in three stages:</p> <p>Mature green – tomato firm, mature, color change from green to light green, no pink color showing on blossom end. Pink – pink color on blossom end half. These tomatoes, at room temperature, will ripen in 3-4 days. Expose to indirect light / don't keep in the dark. Ripe – tomato full red but still firm. Should be used immediately or these tomatoes will store one to two weeks if kept 60 F. (Warm to room temp before using.)</p>		
Watermelon	Fruit	Flesh green; stem green and difficult to separate	Melon surface next to ground turns from light straw color to a richer yellow	Top surface has dull look

Some first time gardeners are so excited their plants are growing that they don't want to pick them. But that's the whole point! Harvesting produce for healthy meals and to share with friends is a true joy.

Preserving your Produce

Well-planned and cared for gardens produce a bounty of fruits and vegetables that sometimes overwhelm even the heartiest appetite. Preserving this abundance provides delicious summer-fresh taste in the dark of winter and can greatly reduce grocery bills. Preserved produce is also among the proudest of gifts to give and the most welcomed of gifts to receive.

The most common methods of food preservation are drying, canning, and freezing. Successfully preserved foods retain their flavor, texture, and nutrients and remain safe to eat for a long time without contaminants or fermentation. For information and education about a variety of food preservation methods, check out local experts in the resources tab.

Putting your Garden to Bed

Putting your vegetable garden to bed for the winter properly will prepare it for an early and productive spring just a few short months away. The crops that are finished or have been killed by frost need to be removed and tossed into the compost pile. Be sure to gather up any decaying vegetables which may have hidden fungus and insect pests. Once all spent plants are cleaned up, layer on a few inches of compost and/or mulch of shredded leaves and work it into the soil. This organic matter will add nutrients and air to the soil in preparation for next year's garden.