

DESIGN AND MANAGE A PEST-RESISTANT VEGETABLE GARDEN

Growing your own vegetables can be a most satisfying task for a gardener. But, before you decide to do so, consider the following: How much time do you have to invest in the garden and who will do the work? What do you and your family like to eat and how do you plan to use your produce, as fresh, canned, frozen, dried or stored? Is enough space available to grow what you want? These factors are important in deciding what varieties to grow.

SITE CHOICE

Choose a site that receives at least 6–8 hours of direct sun daily, is well-drained (even after heavy rains) and is close to a water supply. The site should be relatively level and away from trees and shrubs, which compete for nutrients and water and may shade your plants. Avoid low-lying frost pockets and areas with high winds.

Place the vegetable garden near your house where it can be monitored daily to spot problems so you can take corrective measures promptly. Harvesting vegetables at their peak of perfection is much more likely if the garden site is close to your home.

PLAN AHEAD

Consider growing vegetables in beds about 1 m (3–4 ft) wide with paths in between. Defined beds make record-keeping and crop rotation easier. Paths prevent compaction of the soil in the growing area. Raised beds will warm up earlier in the spring and provide improved drainage.

Plan on 3 or 4 separate beds for crop rotation. Grow closely related vegetables in a different bed each year over a 3–4 year cycle. If a vegetable is grown in the same spot each year, pests and diseases that thrive on the crop will steadily increase, and one crop may exhaust the soil of certain nutrients it requires. The recommended succession groups are (1) cole crops/brassicac, (2) root crops and (3) others (including legumes and members of the onion family).

Orient your beds in a N-S direction to provide maximum sun exposure to all plants. Place tall and trellised crops on the north side of the garden so they won't shade shorter vegetables. Plant spring crops together so you can plant later crops or winter vegetables in these areas after the early crops mature. Successive plantings of a crop will give longer harvest and increased yield. Place perennial crops such as rhubarb, asparagus and small fruits along one side of the garden so they will be out of the way.



Front cover:
The W.S.U. Master
Gardeners' demon-
stration vegetable
garden at Ferndale.

Space seeds and transplants equal distances from each other on all sides so their leaves will touch at maturity. This saves space and the close plantings reduce moisture loss and discourage weeds.

Start planning in the fall or winter. Consult seed catalogues for helpful information on growing techniques and appropriate varieties for your area. Start some plants indoors at the right time so they are not too mature or too fragile when it is time to plant.

Remember: start small. It is discouraging to plant more than you can take care of. Each year, plant more of what you didn't have enough of and less of what was in surplus.

SOIL PREPARATION

Prepare soil in the fall to allow for earlier spring planting. Working excessively wet soils can destroy soil structure and cause compaction. To test soil moisture, squeeze a handful of soil. If it crumbles freely without forming a mud ball, it is about right. The ideal vegetable garden soil is deep, easily worked, well-drained and contains at least 5% organic matter. Organic matter added to warm fall soils will decompose faster than in cool spring soils. And, incorporating lime into soil in the autumn gives it time to integrate with the soil and influence spring plant growth.

You can check soil pH with a meter or soil kit. Soil pH affects availability of many plant nutrients. Vegetable requirements vary, but most need a pH of 6.2 to 6.8 (slightly acidic). Dolomite lime can be added to very acidic soils in south-coastal B.C. to reduce acidity. Interior soils tend to be alkaline and may benefit from the addition of organic matter or sulphur.

Prepare new garden beds by modified double-digging to loosen the soil so that air, water and plant roots can move freely. Begin at one end and dig a trench across the bed to a depth of approx. 30 cm (12 in.), placing the excavated dirt aside. Work a garden fork into the floor of the trench to loosen the soil. Dig a second, similar-size trench directly next to the first and place the excavated soil into the first trench you dug. Continue this process until you have tilled the whole bed. Fill the last trench with the soil set aside from the first trench. Mix topsoil from neighbouring pathways, as well as compost and manure into the top 30 cm (12 in.) of soil. In succeeding years, soil preparation will only require working organic and inorganic fertilizers into the top layer.

FERTILIZING

Apply well-aged manures and composts to the soil in the fall; add fertilizers to garden beds in early spring. The kind and amount of fertilizer to use should be based on soil test and the needs of the specific vegetables being grown. The three numbers on packaged fertilizers represent the proportions of nitrogen (N), phosphorus (P) and potassium (K) and they promote, respectively, leaves, roots and fruits. Thus, too much nitrogen can produce lots of foliage, but no fruit.

Plants that need extra nutrients are called “heavy feeders” and include asparagus, brassicas, beets, corn, cucumbers, lettuce, parsley, radish, spinach, squash and tomatoes. Light feeders include carrots, onions, parsnips, peppers, potatoes and swiss chard.

TIME TO PLANT

Vegetables are either a cool-season or a warm-season crop. Plant cool-season crops (lettuce, peas, most cabbages and onions) as soon as soil can be worked in the spring. Most can take a light frost. When the weather gets too warm, many cool-season crops will “bolt” (their leaves turn bitter and they send up flower stems).

Plant warm-season crops (tomatoes, peppers, eggplants, beans, corn, squash, cucumbers, melons, pumpkins) after all danger of frost has passed and the soil has warmed. Tomatoes, peppers and eggplant can be started indoors to give them a head start or purchased from a local garden center. As transplanting time approaches, be sure to harden them off gradually.

IRRIGATION

During the growing season, plants need about 2.5 cm (1 in.) of water per week. One deep watering is better than several light ones. If a sprinkler is used, water early in the day so that the plants dry quickly. This reduces the spread of disease. Soaker hoses, drip or trickle irrigation deliver water directly to the soil without wetting the foliage. Organic matter increases the soil's ability to hold water, and mulch helps retain moisture.

SOME COMMON PEST PROBLEMS AND SOLUTIONS

Crop	Problem	Prevention / Control
Many vegetables	Slugs and snails	Use beer traps and check refuges regularly.
Asparagus	Asparagus beetle	Hand-pick eggs, adults and larvae. The larvae overwinter in the top growth, so remove the fronds in the fall after they have died.
Beans	Various fungal diseases: white mold, grey mold, fusarium root rot	Avoid overhead watering, and water early in the day to allow plants to dry before night. Avoid overfertilization which produces large amounts of tender susceptible growth. Remove and destroy infected plants. Do not compost. Rotate crops. Space plantings to provide good air circulation.
Beets, spinach and swiss chard	Leafminer	Screen plants with a floating row cover prior to emergence of flies in spring (April-May). Do not put row covers over soil previously infested with the pest. Rotate crops.
Brassicac/Cole crops	Imported cabbage worm	Screen plants with floating row covers to prevent egg-laying by the adult. Hand-pick any eggs and caterpillars found on the leaves. Birds and wasps eat many of the worms. BTK is effective and does not harm beneficial insects or birds. Be sure to spray the underside of leaves and the interior of the heads.
	Loopers	The webby cocoons of these are sometimes seen on the leaves. Management is the same as for the cabbage worm.
	Cabbage maggot	Early plantings are especially vulnerable to these maggots. Prevent egg-laying by placing pieces of tar paper, Kraft paper, milk cartons, or several layers of newspaper flat on the ground surrounding each plant. Row covers are also effective, but not in an area previously infested with the maggots. Rotate crops.
Carrots and parsnips	Carrot rust fly	Seeding late (after mid-May) and harvesting early (before mid-July) can avoid some damage. The best prevention is floating row covers but be sure the soil was not previously infested. Rotate crops.
Onions	Onion maggot	Very similar in life cycle and appearance to cabbage maggot. Protect with floating row covers.
Peas	Pea leaf weevil	Weevils chew the leaf margins of young plants and feed at night. Pea plants readily outgrow early damage, so treatment is often not required. Practise crop rotation.
	Pea enation virus	Spread by aphids and infected seed. Causes mottling, stunting and small bumps or blisters (enations) on leaves. Plant certified, virus-free seed. Plant enation-resistant varieties such as 'Oregon Trail'.
Potatoes	Early blight	A problem mainly in alkaline soils of the BC Interior. Increase soil fertility, avoid frequent and overhead watering, clean up crop debris after harvest.
	Late blight	Plant certified seed free of rot, in a different part of the garden each year and not close to tomatoes or in shaded areas. Avoid overhead watering. Monitor regularly and quickly remove any suspicious leaves or shoots. Discard infected tubers and leaves. Do not compost. Remove tops 2 weeks before digging the tubers. Harvest in dry weather. Harvest all tubers so there are no volunteers the next year.
	Common scab	Occurs in high-pH (alkaline) soils. Avoid using lime or fresh manure in soil where potatoes will be grown. Do not plant infected tubers. Bacteria carries over in the soil. Use varieties with resistance ('Russet Burbank', 'Norgold').
Tomatoes	Early blight	A problem mainly in the BC Interior. Pick off and discard older leaves with spots. Increase soil fertility, avoid frequent and overhead watering, clean up crop debris after harvest.
	Late blight	Plant early-ripening varieties against a south wall under eaves or a temporary lean-to to protect from rain. Water the ground only, and do not over-fertilize.
	Blossom end rot	Caused by a calcium deficiency, and worsened by overfertilization and inconsistent watering. Water regularly and add calcium to the soil.

WEED CONTROL

Because weeds take water, nutrients, sunlight and space from vegetables, they should be removed. Hand-pull or dig them out when the soil is damp but not wet. Avoid disturbing the soil too much as this brings buried weed seeds to the surface where they germinate. Mulching reduces weed growth, as does close spacing of plants. Suppress weeds in pathways by mulching with newspaper, old carpeting, landscape cloth or wood chips.

MINIMIZING DISEASES AND PESTS

Healthy plants are the best defense against diseases and pests. Minimize the conditions that favor disease and its spread by having good air circulation, rotating the crops and cleaning up debris.

Choose resistant or tolerant varieties. Buy treated seed to help prevent the seed from rotting in the soil before germination and to protect seedlings from “damping off”. Make sure seeds, transplants and propagating material are disease-free.

Time your plantings. Sometimes an earlier or later planting will be less susceptible to a specific insect pest. For example, there are several hatches of carrot fly during the year and to some extent sowings can be timed to avoid the worst attacks. Learn to recognize and conserve “beneficial” organisms. Provide food plants such as sweet alyssum, calendula, dill, parsley and thyme for these beneficial insects and plant them among the vegetables and around the edges of the beds.

Be vigilant: identify and monitor problems early, and take action when required. Keep records for future use.

PREPARING THE GARDEN FOR WINTER

Clean up all vegetable debris and remove weeds from the garden in the fall to prevent pests and diseases overwintering there. Then, you can either:

- (1) Cover the planting beds with an organic mulch. This will protect the beneficial soil organisms, decrease soil erosion and add organic matter when dug into the soil in the spring.
- (2) Sow a cover crop such as a mixture of legumes and fall rye. A cover crop decreases soil erosion, prevents compaction, reduces leaching of nutrients and adds organic matter when dug into the soil in spring. Wait a few weeks before planting to allow time for the cover crop residue to break down and new weed seeds to germinate.

HAPPY EATING!!!



Master Gardeners

Association of British Columbia

The Master Gardeners Association of British Columbia is a volunteer organization providing information about gardening and horticulture to the community and educating people about environmentally responsible gardening practices.

- Through its chapters in Vancouver, Victoria, Summerland, Vancouver Island and Prince George, the MGABC
- runs a series of clinics at garden centers and major garden events
 - presents gardening programmes in schools, hospitals and seniors' homes
 - works with community groups on various “greening” projects.

Most of the 700 Master Gardeners in BC are enthusiastic amateurs; some are experienced professionals — all of us have a passion for gardening. We share this passion with the public and promote the enjoyment of gardening through a variety of volunteer projects and activities.

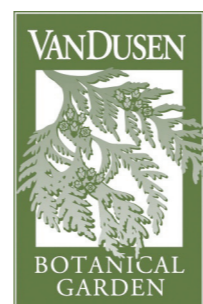
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