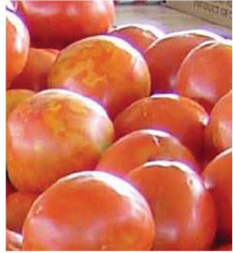


Starting a Home Vegetable Garden



With Tips on Pest Control and Plant Diseases



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and surrounding area weed-free and control aphids. Plant resistant varieties of beans and cucumbers.

Blossom End Rot of Tomatoes –

A blackened, water-soaked area develops on the blossom end of tomatoes. This is a non-parasitic disease caused by lack of water during warm weather. Drought or root injury can account for the insufficiency of water, so avoid damaging roots (do not hoe around the plants) and do not use excessive nitrogen fertilizers. Be sure the area to be planted with tomatoes has sufficient lime and superphosphate.



**“The earth here is so kind, that tickle her with a hoe, and she laughs with a harvest.”
-Anonymous**

Vegetable gardening is a satisfying hobby and a great way to put fresh food on your table. Here’s a primer on starting a garden of your own!

WHERE TO PUT IT Situating the garden with these things in mind:

- Locate the garden in full sun, away from trees or buildings. Most vegetable types need all the sun they can get.
- Choose an area with the best soil possible. Sandy loam type soils are ideal. Heavy clay soils are the poorest choice.
- Consider the garden’s proximity to your house and a water source. Closer is better for most folks.



THE FOUNDATION It all starts with the soil.

- Soil is the most important factor in vegetable production. Much of having a healthy garden is directly related to how well you build and manage your soil, so it’s important to continually improve the drainage, aeration, and nutrient content of your garden soil.
- Adding compost is perhaps the best way to improve soil structure. Compost is basically decomposed organic material such as grass clippings, fallen leaves, manure, etc. Make certain your material is *completely* broken down before adding it to your garden, especially when dealing with manure. Some other materials that will immediately improve your garden soil are peat, perlite, and vermiculite.
- Most soils in West Virginia are suitable for gardening except for those which are high in clay. Clay is very compact, poorly drained, and can be very acidic. Avoid clay soils if possible.

THE FUEL

Good soil fertility will improve vigor and yields.

- Plants need carbon, hydrogen, oxygen, nitrogen, potassium, phosphorus, calcium, sulfur, iron, magnesium, zinc, manganese, boron, and copper to grow.
- Plants, like humans are mainly carbon, hydrogen, and oxygen. The other 13 elements make up only 0.5% of plant tissue, *but* when growth is limited, the problem can usually be traced to a deficiency in one of them.
- Nitrogen, phosphorus, and potassium are considered primary nutrients because plants use them in larger amounts in relation to the other nutrients.
- Calcium, magnesium, and sulfur are secondary nutrients. Limed soil rarely has problems with calcium and magnesium levels. Sulfur is rarely deficient in soils where compost is added regularly.
- The other nutrients noted are called micro-nutrients because plants use them only in very small amounts.
- The only truly accurate way to determine how to fertilize your soil is with a soil test. The West Virginia University Soil Testing Lab will test your nutrient levels and pH for free. Contact your county extension agent or the WVDA for more information on the soil test.



UNLOCKING YOUR SOIL'S POTENTIAL

Soil pH governs a plant's ability to take up nutrients from the soil.

- Soil pH is a measurement of the acidity or alkalinity of soil. The pH scale runs from 0 (most acid) to 14 (most alkaline), with 7 as neutral.
- Technically, pH is the negative logarithm of the hydrogen ion concentration. In a nutshell, pH is a measurement of hydrogen ions (H⁺) in the soil. The more hydrogen ions there are, the more acid the soil.



to birds or other animals!

Bacterial Blight – Large, dry, brown spots, often surrounded by yellow borders, appear on the leaves of beans and peas. Water-soaked spots with reddish margins may appear in the pods and reddish cankers may be on the stems. The bacteria are carried on the seeds. This disease is rarely found west of the Rocky Mountains; therefore, whenever possible, western grown seed should be planted. Do not plant discolored seeds or those from spotted pods. Avoid working in the garden

when plants are wet, because the disease spreads more rapidly on wet foliage.

Bean Root Rot – Beans infected with bean root rot turn yellow, wilt, and usually die when young. Avoid planting beans when the soil is still wet and cold. Do not plant seeds deep – about 1 inch of soil cover is sufficient. Avoid planting beans in the same area in which you grew beans in the last two or three seasons.



Bacterial Wilt of Cucumbers – Large vines gradually wilt and die (no yellowing of leaves), and young plants rapidly die. Older plants may have only one shoot or runner affected at first. This disease is spread by cucumber beetles (striped cucumber beetle). Young plants affected early should be removed and destroyed.



Powdery Mildew – This is common on many vegetable plants, especially cucumbers, melons and peas. This disease first appears as a powdery white coating on the leaf surface.



Mosaic Virus – This disease affects many garden plants such as cucumbers, beans and lettuce. Leaves of affected plants become mottled (green and yellow) and curled. Fruits may be warty, misshapen and spotted. This virus lives in perennial weeds – milkweed, ground cherry, catnip and others. It is spread by aphids. Keep the garden





in the garden to warrant concern. If controls are needed, contact your county extension agent or the WVDA Plant Industries Division.

Slugs and Snails – Slugs are brown or gray, shiny or slimy snails without shells. Slugs and snails eat leaves of small plants.

Control: In West Virginia, control is seldom needed for these pests.

However, when slugs and snails are present, the infested area can be dusted with hydrated lime. Commercial baits are also available.

CAUTION: Read the label to see whether or not these baits are permitted on or close to edible crops.

Whitefly – Although we call this little insect whitefly (due to its cream-colored wings), it is not a true fly and is more closely related to the scale insects. The adults are tiny (1/20 inch), four-winged creatures that readily fly off the foliage when disturbed. The larvae are flat and immobile and seldom noticed until the plants appear sickly.



It usually mid- or late July before this pest is noticed. At this time, control is difficult and little can be done to restore vigor to the plant. In the past few years, for many home gardeners, this insect has been a major pest on tomatoes.

This species does not survive our winter temperatures outdoors. Infestations come from the greenhouse that produces the young plants. Therefore, control is best achieved by examining the young plants carefully before setting them in the field.

Plant Diseases

There are many fungi, viruses and bacteria that cause plant diseases in the vegetable garden. Only a few can be mentioned here. Many disease problems can be avoided by purchasing only plants or seeds of disease-resistant varieties. Most disease control chemicals may be mixed with the insecticides you use. Check the label. Disease problems are often compounded by planting the same crop in the same location year after year. Rotating the crops from place to place is a great aid in disease-control activities.



Seed Decay and Damping Off – Certain chemicals used to treat seed will prevent these diseases. Before planting seeds, treat them according to package directions. Never feed treated seeds

- With a few notable exceptions most plants grow best in a pH of about 6.0-6.5. This slightly acidic pH is where the largest number of nutrient ions, such as nitrogen, potassium, phosphorous, and calcium are available for plant uptake.
- Soil pH is paramount to managing a good garden. Even if your soil has plenty of nutrients in it, if the pH is too far away from 6.5, most plants will not be able to absorb enough of them for optimum growth.
- Most West Virginia soils are acidic. You can bring an acid soil closer to 6.5 with lime.
- The only way to know for sure what your soil pH is and how much lime will be needed to bring it to 6.5 is with a soil test. Again, the West Virginia University Soil Testing Lab will test your soil pH and give a lime recommendation for free. Contact your county extension agent or the WVDA for more information on the soil test.



PLAN AND PRACTICE

Gardening, like most things, requires planning and effort to be successful.

- A garden plan is particularly important for beginners. It should include what vegetables you will plant and where you will place them in the garden.
- Prepare your plot during the fall or on a nice day in early winter. A tiller is the easiest way to form your plot. If you don't have access to a tiller, good old fashioned hand shoveling will have to do. The goal is to try to clear the area of existing vegetation and loosen the soil 12-18 inches deep, forming rows 24-36 inches apart.
- In early spring, make further improvements to your plot by clearing weeds and adding soil amendments, such as lime, gypsum, and compost.
- Add nutrients to your soil in accordance with the recommendations of a



soil test.

- Growing some sort of legume during the fall and winter seasons such as hairy vetch and then incorporating it into the soil in spring is a good way to add nitrogen and other nutrients naturally.

OLD FAVORITES

Once you've chosen your site, prepared your soil with amendments for pH and fertility, you're ready to set out some plants. Here are some commonly grown vegetables that have been filling gardens for years:

- **Bush and Snap Beans:** Plant them every 10 days from April to May. Sow seeds directly in the ground, 1 inch deep and 2 inches apart in a row. Thin the seedlings to one plant every 6 inches.
- **Corn:** Make three or four plantings every two weeks, starting in April at a depth of 1.5 inches. Allow 8 inches between seeds in a row. Corn should be planted in blocks of 3 or four rows, rather than a single row. Good pollination is essential for the development of full ears and a block planting will allow more uniform pollination than a single row.
- **Cucumbers:** Plant seeds 9 to 12 inches apart in rows or mounds which are about 4 feet apart. Water and harvest frequently.
- **Hot peppers:** Plant young plants 24 to 36 inches apart in a row after danger of frost has passed and the soil has warmed. Most will yield heavy, so just a few of these plants will be enough.
- **Potatoes:** Plant seed potatoes 4 inches deep and 12 inches apart in rows. Potatoes can be harvested after the vines die. The harvest time varies from late summer to fall depending on the variety used. Most varieties will keep for months in a cool cellar. Different varieties will keep for differing lengths of time.
- **Sweet Peppers:** Same as hot peppers, but you may want to



stem by ½ inch all around will usually prevent damage.

Flies

Seedcorn Maggot – these are yellowish white, legless and approximately ¼ inch long maggots (or larvae) of a small (1/5 inch long) grayish brown fly. The maggots hatch from eggs laid by the female fly near sprouting seeds. They bore into the sprouting seed and prevent the development of plants.



Control: Purchase insecticide-treated seeds and plant when the soil has warmed up and is dry. Replant if seeds are destroyed by maggots.



Cabbage Maggot – The adult is a grayish fly a little smaller than a housefly. The female fly lays eggs on the ground near cabbage, broccoli, cauliflower and related plants. Beets, radishes, turnips and celery are among other plants that may be attacked. The maggot tunnels into the roots and stems of young plants, causing rot; plants wilt and die.

Control:

Apply a granular insecticide according to label directions prior to planting.

Onion Maggot – This is a fly larvae about 1/3 inch long which burrows into the bulb, causing the plants to yellow, wilt and die. Cool, wet weather favors the development of serious infestations.



Control: Apply a granular insecticide according to label directions to the open furrow in which onions are to be set.

Miscellaneous

Millipedes – These are brown or grayish worm-like creatures with many legs; they attain lengths of several inches. These pests usually feed on or are found in organic debris. However, they may feed on stems, roots, tubers, bulbs or on newly planted seeds.



Control: These are usually not numerous enough

Squash Vine Borer – This is a stout white borer up to 1 inch long with a brown head. It bores into vines and eats holes in the stem near the base of runners and squash, cucumbers, pumpkins and muskmelons. The vine wilts and may die.



Control: Dust or spray stems at regular intervals during egg-laying period (after mid-June). When a vine is infested, locate the point of injury, slit the stem and kill the borer. Put a mound of moist soil over the split to prevent drying and to stimulate root growth. This will often save a vine or portion of it.



Common Stalk Borer – This slender cream-colored larva has a darker brown front half and stripes running lengthwise on the lighter portion. These stripes disappear as older borers attain lengths up to 1½ inches.

The common stalk borer infests a wide variety of crops, including tomatoes. It also attacks a wide variety of weeds, where the young larvae develop in small

plants and then move to either larger weeds or nearby garden plants. The stems of plants are tunneled and will wither and die.

Control: Keep the area around your garden free of weeds. Mow as far around the garden as possible. An infested stem may often be saved by using the same technique as described for squash borer.

Cutworm – Many kinds of cutworms attack vegetable gardens. The adults are dull-colored moths which lay eggs that develop into destructive caterpillars or cutworms. When full grown, these cutworms are up to 1½ inches long. They curl up into a “c” shape when disturbed. Most cutworms are dull in color and have hairs on their bodies.



Cutworms cut off plants above, at, or below the soil line. In the daytime, they hide in the soil or in debris near the damaged plants.

Control: Apply a granular insecticide according to label directions prior to planting. The insecticide should be worked into the soil. A 3-inch collar of stiff cardboard placed around the stems (1 inch into the soil and 2 inches above) and clearing the

set out more plants because the yield is comparatively lower. May require staking for support.

- **Squash & Zucchini:** Sow 3 seeds 18 to 24 inches apart in rows or mounds which are about 3 feet apart. Harvest generally occurs when squash is about 8 inches long, but you can harvest them at smaller sizes for more tender vegetables. Water and harvest frequently to encourage higher yields.
- **Tomatoes:** Set young plants 24 to 36 inches apart in a row. Tomatoes need staking for support.

HOME VEGETABLE GARDEN PEST CONTROL

There are about 25 or more injurious vegetable garden pests common to West Virginia. Fortunately, not every one of these is a pest every year. However, we generally cannot predict from year to year or season to season just which will be problems. A few insects, such as bean beetles, are common nearly every year. Others, like Japanese beetles, are common some years and scarce during others.

Most people cannot identify one bug from another when they begin to garden, but it doesn't take long before you realize that the little white butterfly flitting around your cabbage will soon produce a batch of leaf-eating cabbage worms. Once you have lost your cucumbers to a disease transmitted by the striped cucumber beetle, you will be on the lookout for that fellow and control him before he strikes again. And on and on it goes.

If you need help in identifying the pest problems you have, contact your county extension agent or the West Virginia Department of Agriculture's (WVDA) Plant Industries Division. They will identify your problems and make recommendations for treatment or control. When pesticides are recommended, follow the directions carefully, and above all READ and HEED the label.

Some Common Pests of Vegetable Gardens

Aphids

There are several kinds of aphids (or plant lice) common in West Virginia gardens. They are soft-bodied insects which are green, black, red or white in color. Some have wings, but most individuals found clustered and feeding on the undersides of leaves or on the stems are wingless.



Infested leaves curl, thicken, or become distorted and the whole plant may become yellowed or stunted. Some aphids carry plant disease viruses. Nearly all vegetables may be attacked by aphids.

Control: Consider treating aphids with insecticidal soap when insects appear in damaging numbers.

Beetles



Bean Leaf Beetle – This is a small reddish or yellowish beetle, up to ¼ inch long, with black markings. It eats regularly shaped wholes in leaves.

Control: Dust or spray with an insecticide labeled for vegetables. Be sure to treat the undersides of leaves. Clean all plant debris from garden at the end of season.

Flea Beetles – There are many species of flea beetles that attack potatoes, tomatoes, eggplants, peppers, beets, spinach, turnip, radishes and cole crops. Young plants, especially transplants, may be severely damages. Their leaves look as if they have been shot full of holes. The beetles are very small, are black, brown, or striped, and tend to jump when disturbed.

Control: Dust or spray with an insecticide labeled for vegetables. Be sure to treat the undersides of leaves. Clean all plant debris from garden at the end of season. Newly set transplants should be treated soon after planting.



Mexican Bean Beetles – These ¼-inch-long beetles are copper-colored, oval and have 16 black spots on their backs. The larvae, or immature beetles, are yellow to orange, fuzzy or spiny, and about 1/3 inch long. Both adults and larvae feed on the pods and leaves, skeletonizing them.



Control: Dust or spray with an insecticide labeled for vegetables. Be sure to treat the undersides of leaves. Clean all plant debris from garden at the end of season.

Spotted Cucumber Beetle – The ¼-inch long beetles are yellowish green and have 12 black spots on their backs. They eat holes in the leaves and pods of beans and cucumbers.

Control: Dust or spray with an insecticide labeled for vegetables. Be sure to treat the undersides of leaves. Clean all plant debris from garden at the end of season. Treat at the first sign of the beetle. Continue at weekly intervals.



Striped Cucumber Beetle – Adult beetles are yellow to dark-colored and have three black



stripes down their backs. The larvae are 1/3 inch long, slender, white and brownish at the ends. The larvae bore into the roots and stems below the soil line, and the adults feed on the leaves, stem and fruit. They spread bacterial wilt of cucumbers and usually attack your plants. Damaged vines will wilt and often die.

Control: Dust or spray with an insecticide labeled for vegetables. Be sure to treat the undersides of leaves. Clean all plant debris from garden at the end of season. Treat at the first sign of the beetle. Continue at weekly

intervals.

Butterflies and Moths

Cabbage Looper – These are pale green measuring worms with light stripes down their backs. They may be up to 1 1/2 inches long. They feed on the undersides of leaves, producing ragged holes. Larger loopers burrow in the cabbage heads. These insects will attack cabbage, broccoli, brussel sprouts and cauliflower.



Control: Consider treating foliage with Bacillus thuringiensis (Bt). Repeat at weekly intervals.

Imported Cabbageworm – This caterpillar is the larvae of the white butterfly seen so commonly in fields and around the cabbage patch. It is velvety green and grows to about 1 inch long. It feeds on the leaf, producing ragged wholes and will bore into the head.



Control: Consider treating foliage with Bacillus thuringiensis (Bt). Repeat at weekly intervals. Remove plant debris after harvest.

Corn Earworm – The adult moth is seldom noted by the home gardener, but the up to 1¼-inch long green, brown, or pink worm with light stripes on its side is often seen burrowing through the silk of sweet corn and feeding on the kernels near the tip on the ear. When this insect appears on tomatoes eating holes in the fruit or buds, it is called the tomato fruitworm.

Control: On corn, dust or spray silks every other day beginning at 10% silking and continuing until 90% of silks have wilted and turned brown. On tomatoes, dust or spray when plants attain good growth and when fruit begins to set.

