

# Pest & Disease Control

Kitchen Garden Academy



GARDENARY

# Midwest Disease

| DISEASE                          | VEGETABLE HOST  | TIME PERIOD   | DAMAGE   | CONTROL  |
|----------------------------------|---|---|--|--|
| <b>Powdery Mildew</b>            | Wide variety of plants including beans, cucumbers, squash, melons, grapes, apples, pears and strawberries | Mid to late summer  | Looks like talcum powder dusted on the leaf's surface.   | Start preventive fungicide spray program early.  |
| <b>Cucumber Mosaic Virus</b>     | Peppers, beans, cucumbers, lettuce, melons, potatoes, squash and tomatoes                                 | Any time during growing season  | Mottled green and yellow color in the foliage. Crinkling and mottling gets worse as the plant grows.   | Removal of plants.   |
| <b>Tobacco Mosaic Virus</b>      | Peppers, tomatoes, cucumber, melon, squash  | Any time during growing season  | Blotchy light and dark areas on leaves. Cupping, curling, elongation, roughening, wrinkling and other growth distortions. Fruits may have a blotchy color or be malformed.         | Removal of plants.   |
| <b>Tomato Spotted Wilt Virus</b> | Tomatoes, potatoes, peppers and eggplant  | Any time during growing season  | Symptoms usually start at top of plants. Upper leaves develop large areas that are dark brown to black, with occasional ringspots. Stems and petioles often have dark brown areas. | Select resistant varieties. Destroy infected plants.   |
| <b>Blossom End Rot</b>           | Tomatoes  | Any time during growing season  | Begins as a water-soaked spot near the blossom end of the fruit. This lesion soon enlarges and turns dark.   | Keep soil moist. Use fertilizers early in the season that are high in phosphorus and low in nitrogen. Spray plants early in the season with a diluted calcium chloride solution. |
| <b>Early Blight</b>              | Tomatoes, potatoes and eggplant   | Summer  | Fungus causes sunken, dark areas in stems and irregularly shaped spots on leaves.  | Select resistant varieties. Use crop rotation methods. Do not use overhead watering. Use fungicide labeled for this disease.   |
| <b>Late Blight</b>               | Potatoes and tomatoes   | Fungus overwinters in plant debris. Thrives in rainy, foggy weather with temps between 70/80 degrees F during the day and 20 degrees cooler at night. | Dark lesions surrounded by white fuzz under humid/damp conditions or dry dark lesions under dry conditions.  | Plant resistant varieties. Properly dispose of infected tubers. Use approved fungicides.   |

| DISEASE                                   | VEGETABLE HOST  | TIME PERIOD  | DAMAGE  | CONTROL   |
|---|---|--|---|---|
| <b>Southern Blight</b>                    | Tomatoes, peppers, onions, beets, rhubarb, strawberry, lettuce, cucumber, melon, carrot, asparagus, parsley           | Summer   | Water-soaked appearance on lower leaves or water-soaked lesions on lower stems. Infected plants yellow and wilt. Fruit rot, crown rots and root rots also are symptoms.               | Removal of plants and soil.   |
| <b>Leaf Spot</b>                          | Wide variety of plants  | Any time during growing season   | Leaves are dotted with small spots, gray or tan to light brown. As spots enlarge, black dots will appear in the center. Leaves may drop.  | Plant resistant varieties. Rotate crops. Keep garden free of plant debris. Apply copper dust or liquid copper spray every 7 to 10 days.   |
| <b>Downey Mildew</b>                      | Lettuces, herbs, beans, cauliflower, chard, cucumbers, melons, onions, radishes, squash, pumpkins, turnips and melons | Fungal disease that thrives where nights are wet and cool and days are warm and humid. | Purplish-gray, fuzzy growth usually on the underside of the leaves. Tops of leaves may be yellow, initially dull but becoming brighter over time.                                     | Plant resistant varieties. Minimize leaf wetness. Use fungicide treatment early in disease development.   |
| <b>Anthracnose</b>                        | Eggplant, garlic, peppers, cucumbers and tomatoes   | Overwinters in garden in debris of diseased plants                                     | Circular leaf spots are initially water-soaked, then become yellow to tan. Round, black, sunken spots can develop on fruit.   | Select resistant varieties. Apply fungicides, destroy crop debris after harvest and rotate crops.   |
| <b>Pink Eye of Potato</b>                 | Potatoes  | Excessive soil moisture and warm temperatures  | Short-lived external pink color that is often found around the potato eyes of freshly harvested tubers.   | If symptoms are minor, tubers may still be usable. If symptoms are severe, tubers should be rejected and discarded.   |
| <b>Bacterial Spot</b>                     | Tomatoes  | Summer   | Appears on leaves as small, sometimes water-soaked circular areas. Spots may initially be yellow-green, but darken to brownish-red. Extensive leaf yellowing and leaf loss can occur. | Removal of plants.  |
| <b>Verticillium Wilt</b>                  | Tomatoes, potatoes, peppers, eggplant, cucumber, pumpkin, watermelon and other garden crops                           | Any time during growing season   | Sudden yellowing of foliage, typically appearing on one side of a plant. Eventually the whole plant becomes affected and dies.  | Plants will eventually die. You can extend the life of infected plants by fertilizing and watering them properly. Practice crop rotation. Plant varieties that are disease resistant. Watch for varieties with the letter "V" after the variety name. |
| <b>Ralstonia Wilt (aka Southern Wilt)</b> | Eggplant, peppers, potatoes, tomatoes   | Summer   | Lower leaves of infected plants yellow and wilt, then die. Yellowing and death of upper leaves follow.  | Removal of plants.  |

# Midwest Pest

| INSECT                                       | VEGETABLE HOST   | TIME PERIOD   | DAMAGE  | CONTROL  |
|--|--|---|---|--|
| <b>Aphids</b>                                | Asparagus, beans, cabbage, corn leaf, green peach, melon, peas and potatoes      | Early spring and continuing through growing season. | Sucking of plant juices. Leaves thicken, wrinkle and turn yellow or brown. Can carry plant viruses.   | Wash plants with forceful stream of water. Treat with a recommended insecticide.   |
| <b>Diamondback Moth</b>                      | Cabbage and leafy greens   | Early in the growing season                         | Larvae mine the plant tissue and consume the middle layer of the leaves. As larvae grow they exit the leaves and consume all tissues except the thin layer of transparent wax resembling windowpanes. | Use recommended integrated pest management. Practice crop rotation. Use pest-specific insecticides early to mid season.  |
| <b>Imported Cabbageworm</b>                  | Cabbage, collards, broccoli, turnips   | Any time during growing season                      | Large holes are eaten in leaves. Larvae may be present in heads.  | Clean up old plants after harvest to remove pupae. Apply a recommended insecticide.  |
| <b>Leafminer</b>                             | Cucumbers, melons, squash, pumpkins, tomatoes, eggplant, peppers, lettuce, beans | Summer  | Mines and tunnels may serve as points where disease and decay may start.  | Hand pick infested leaves or use a recommended pesticide.  |
| <b>Japanese Beetles</b>                      | Wide range of plants   | Summer  | Skeletonized leaves (where they look like lace).  | Netting and row covers. Hand picking or knocking beetles off plants. Use of insecticides or Neem oil.  |
| <b>Spotted &amp; Striped Cucumber Beetle</b> | Cucumbers, melons, squash, pumpkins  | Any time during growing season                      | Beetles eat holes in leaves and flowers, and carry bacterial wilt.  | Protect young plants by cone-shaped netting or screen protectors until runners develop. Clean up weeds. Apply a recommended insecticide.   |
| <b>Squash Vine Borer</b>                     | Cucumbers, melons, squash, pumpkins  | Any time during growing season                      | Larvae bores into stems. Vines become wilted and later girdled. Leaves and stems will rot.  | Plant as early as weather will allow. With a few infested plants, stems can be split and larvae removed. A spade-full of moist soil should be placed over damaged stems to encourage new root growth. Apply a recommended insecticide weekly during fruiting period. |

| INSECT                        | VEGETABLE HOST  | TIME PERIOD   | DAMAGE  | CONTROL  |
|-------------------------------|---|---|---|--|
| <b>Tomato Hornworm</b>        | Tomatoes, eggplant, peppers   | Any time during growing season                      | Hornworms feed on leaves consuming large amounts of foliage resulting in stunting and fruit scald.  | Handpicking and destruction. A recommended insecticide may be needed.  |
| <b>Squash Bug</b>             | Cucumbers, melons, squash, pumpkins                                     | Any time during growing season                      | Sucking of plant juices can severely weaken or kill young plants. Damaged runners on older plants have wilted leaves that become crisp and dark brown.  | Hand collection of eggs and bugs for small infestations. For large infestations use a recommended insecticide.       |
| <b>Leafhopper</b>             | Carrots, lettuce, celery, onions, potatoes                              | May through summer                                  | Sucking of plant juices gives leaves a whitened, mottled appearance. Leaves and stems turn yellow and become stunted and twisted.   | Plant resistant varieties. Floating row covers may be used. Removal of infected plants.                              |
| <b>Asparagus Beetle</b>       | Asparagus   | Early spring and continuing through growing season. | Adult beetles feed on tips of tender young shoots. After leaves come out, the beetles and their larvae gnaw on the surface of the stems and defoliate ferns.  | Monitor visually for adults early in the year. Populations tend to be clumped. Treat with a recommended insecticide. |
| <b>Bean Leaf Beetle</b>       | Beans, peas   | Any time during growing season                      | Adults chew rounded holes on underside of leaves and on stems of seedlings. Larvae bore into roots and nodules, and chew tissue around stems.   | A recommended insecticide should be applied as soon as beetles are first noticed.                                    |
| <b>Colorado Potato Beetle</b> | Potatoes  | May through summer                                  | Defoliation starts with new foliage at top of plant. Then extends to those leaves and entire plant.   | Hand pick larvae and adults. Practice crop rotation. Plant trap crops.   |
| <b>Corn Rootworm</b>          | Corn  | June to August                                      | Rootworms tunnel in corn roots. Damage can consist of brown, elongated scars on root surface, tunneling within the roots or varied degrees of root pruning.   | Practice crop rotation. Use recommended soil insecticide if necessary.   |
| <b>Wireworm</b>               | Corn, beans, cabbage, carrots, lettuce, onion, peas, potatoes, radishes | Spring throughout growing season                    | Only larval stage can cause damage. Wireworm feeds on seeds preventing germination, or on the underground roots and stems of the plants, causing them to wilt. Dead spots throughout a planting may indicate wireworms. | Practice crop rotation.  |

| INSECT                | VEGETABLE HOST   | TIME PERIOD                    | DAMAGE  | CONTROL   |
|-----------------------|--|--------------------------------|---|---|
| <b>Flea Beetles</b>   | Potatoes, spinach, potatoes, tomatoes, peppers, eggplant, cucumbers, sweet corn, cauliflower, beets, lettuce | Any time during growing season | Very small rounded or irregular holes eaten in leaves giving a shot-hole appearance.                                      | Remove weeds from garden. Treat immediately with a recommended insecticide.   |
| <b>Cabbage Looper</b> | Cabbage, collards, broccoli, turnips, spinach, tomatoes, lettuce, peas, cauliflower, cucumber                | Any time during growing season | Large holes are eaten in leaves. Larvae may be present in heads.  | Application of <i>Bacillus thuringiensis</i> (Dipel or Thuricide) are usually needed.   |
| <b>Corn Earworm</b>   | Corn, okra, eggplant, peppers  | Any time during growing season | Chewing holes in pods of beans, peas, okra, eggplant and pepper. Large ragged holes in leaves of corn & stunted growth.   | Plant as early as weather permits. As soon as larvae are found, use a recommended insecticide. Cut off damaged tips of corn.  |
| <b>Cutworm</b>        | Tomatoes, eggplant, peppers, spinach, lettuce, onions, peas, broccoli, cauliflower, cabbage, cucumber        | Any time during growing season | Plump, smooth skinned, greasy looking caterpillars can eat plants down to ground level.                                   | Physical barriers like tinfoil wrapped around a 4 inch length of stem between leaves and roots may help protect newly set transplants. Baits or spray of a recommended insecticide may be needed. |
| <b>Maggots</b>        | Cabbage, corn, cucumber, onions, radish, turnips   | July through September         | Maggots feed internally and on the surface of roots. Plants may become off color or wilt. Leaves may yellow and collapse. | Use preventative methods. Use recommended insecticides at planting. Practice crop rotation. Do not use animal or green manure.  |

# Northeast Disease

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| <b>Powdery Mildew</b>            | Wide variety of plants including beans, cucumbers, squash, melons, grapes, apples, pears and strawberries | Mid to late summer  | Looks like talcum powder dusted on the leaf's surface.   | Start preventive fungicide spray program early.  |
| <b>Cucumber Mosaic Virus</b>     | Peppers, beans, cucumbers, lettuce, melons, potatoes, squash and tomatoes                                 | Any time during growing season  | Mottled green and yellow color in the foliage. Crinkling and mottling gets worse as the plant grows.   | Removal of plants.   |
| <b>Tomato Spotted Wilt Virus</b> | Tomatoes, potatoes, peppers and eggplant  | Any time during growing season  | Symptoms usually start at top of plants. Upper leaves develop large areas that are dark brown to black, with occasional ringspots. Stems and petioles often have dark brown areas. | Select resistant varieties. Destroy infected plants.   |
| <b>Blossom End Rot</b>           | Tomatoes  | Any time during growing season  | Begins as a water-soaked spot near the blossom end of the fruit. This lesion soon enlarges and turns dark.   | Keep soil moist. Use fertilizers early in the season that are high in phosphorus and low in nitrogen. Spray plants early in the season with a diluted calcium chloride solution. |
| <b>Early Blight</b>              | Tomatoes, potatoes and eggplant   | Summer  | Fungus causes sunken, dark areas in stems and irregularly shaped spots on leaves.  | Select resistant varieties. Use crop rotation methods. Do not use overhead watering. Use fungicide labeled for this disease.   |
| <b>Late Blight</b>               | Potatoes and tomatoes   | Fungus overwinters in plant debris. Thrives in rainy, foggy weather with temps between 70/80 degrees F during the day and 20 degrees cooler at night. | Dark lesions surrounded by white fuzz under humid/damp conditions or dry dark lesions under dry conditions.  | Plant resistant varieties. Properly dispose of infected tubers. Use approved fungicides.   |

| DISEASE              | VEGETABLE HOST  | TIME PERIOD  | DAMAGE  | CONTROL   |
|----------------------|---|--|---|---|
| <b>Leaf Spot</b>     | Wide variety of plants  | Any time during growing season   | Leaves are dotted with small spots, gray or tan to light brown. As spots enlarge, black dots will appear in the center. Leaves may drop.          | Plant resistant varieties. Rotate crops. Keep garden free of plant debris. Apply copper dust or liquid copper spray every 7 to 10 days. |
| <b>Downey Mildew</b> | Lettuces, herbs, beans, cauliflower, chard, cucumbers, melons, onions, radishes, squash, pumpkins, turnips and melons | Fungal disease that thrives where nights are wet and cool and days are warm and humid. | Purplish-gray, fuzzy growth usually on the underside of the leaves. Tops of leaves may be yellow, initially dull but becoming brighter over time. | Plant resistant varieties. Minimize leaf wetness. Use fungicide treatment early in disease development.                                 |
| <b>Anthracnose</b>   | Eggplant, garlic, peppers, cucumbers and tomatoes   | Overwinters in garden in debris of diseased plants.                                    | Circular leaf spots are initially water-soaked, then become yellow to tan. Round, black, sunken spots can develop on fruit.                       | Select resistant varieties. Apply fungicides, destroy crop debris after harvest and rotate crops.                                       |

# Northeast Pest

| INSECT                                       | VEGETABLE HOST  | TIME PERIOD   | DAMAGE  | CONTROL  |
|--|---|---|---|--|
| <b>Aphids</b>                                | Cole crops, cucurbits, beans, peas, potatoes, tomatoes, lettuce, turnips, spinach, other garden crops | Early spring and continuing through growing season. | Sucking of plant juices. Leaves thicken, wrinkle and turn yellow or brown. Can carry plant viruses.   | Wash plants with forceful stream of water. Treat with a recommended insecticide.   |
| <b>Spider Mites</b>                          | Beans (especially snap beans), corn, tomatoes, eggplant   | Hot, dry weather.                                   | Sucking of plant juices cause leaves to become blotched with white or pale yellow to brown spots. Then leaves become pale, sickly yellow and brown and drop from plants.                                    | Remove weeds from garden. Maintain adequate soil moisture. Treat with a recommended miticide.  |
| <b>Cabbage Moths</b>                         | Cabbage, brussels sprout, cauliflower, turnip, apple, beetroot, onion, potato, rhubarb and tomato     | May to October                                      | Skeletonized leaves. Holes and frass on leaves and heads. Eggs on underside of leaves.  | Remove weeds from garden. Release of Trichogramma parasitoids (i.e., small wasps). Insecticide treatments targeting defoliating larvae.  |
| <b>White Mealy Bugs</b>                      | Wide range of plants  | Spring  | Sucking of plant juices and excretion of a sticky honeydew over leaves and stems. Plants will experience irregular or no growth, yellowed leaves and significant leaf drop. Left untreated, plants can die. | Permit predatory insects such as lacewings, syrphid flies, ladybugs and small parasitic wasps. Remove mealy bugs manually with alcohol-dipped cotton swabs or forceful water spray. Control ants. Use insecticidal soap or superior horticulture oil sprays. |
| <b>Japanese Beetles</b>                      | Wide range of plants  | Summer  | Skeletonized leaves (where they look like lace).  | Netting and row covers. Hand picking or knocking beetles off plants. Use of insecticides or Neem oil.  |
| <b>Spotted Lantern Fly</b>                   | Wide range of plants  | Eggs are laid in the fall and hatch in the spring.  | Wilting leaves, leaf curling and dieback.   | Scrape egg masses. Use traps to catch nymphs. Remove host plants. Apply insecticides.  |
| <b>Spotted &amp; Striped Cucumber Beetle</b> | Cucumbers, melons, squash, pumpkins   | Any time during growing season                      | Beetles eat holes in leaves and flowers, and carry bacterial wilt.  | Protect young plants by cone-shaped netting or screen protectors until runners develop. Clean up weeds. Apply a recommended insecticide.   |

| INSECT                   | VEGETABLE HOST                      | TIME PERIOD                    | DAMAGE   | CONTROL  |
|--------------------------|-------------------------------------|--------------------------------|--|--|
| <b>Squash Vine Borer</b> | Cucumbers, melons, squash, pumpkins | Any time during growing season | Larvae bores into stems. Vines become wilted and later girdled. Leaves and stems will rot.         | Plant as early as weather will allow. With a few infested plants, stems can be split and larvae removed. A spade-full of moist soil should be placed over damaged stems to encourage new root growth. Apply a recommended insecticide weekly during fruiting period. |
| <b>Tomato Hornworm</b>   | Tomatoes, eggplant, peppers         | Any time during growing season | Hornworms feed on leaves consuming large amounts of foliage resulting in stunting and fruit scald. | Handpicking and destruction. A recommended insecticide may be needed.  |
| <b>Scale</b>             | Wide range of plants                | Any time during growing season | Premature leaf drop or yellowed leaves. Whitish or yellowish patches on leaves, stems or branches. | Permit predatory insects such as lacewings, syrphid flies, ladybugs and small parasitic wasps. Remove manually with alcohol-dipped cotton swabs or forceful water spray. Control ants. Use insecticidal soap or superior horticulture oil sprays.                    |

# Southeast Disease

| DISEASE                  | VEGETABLE HOST  | TIME PERIOD                    | DAMAGE   | CONTROL  |
|--------------------------|---|--------------------------------|--|--|
| <b>Nematodes</b>         | All plants. Nematodes are small, eel-like worms which live in the soil and feed on plant roots. | Any time during growing season | Root-knot is the most common. Damage to root systems causes yellow and stunted top growth. Look for swollen galls on the root system.  | Soil samples for nematode assay is best way to determine numbers and kinds of nematodes present. Choose plants resistant to nematode attack. Practice crop rotation. Good gardening practices such as removing dead plant material is also beneficial. |
| <b>Root Rot/Stem Rot</b> | All plants where crop rotation is poor. Caused by root-rotting fungi.                           | Any time during growing season | Rhizoctonia causes sunken red lesions on the roots and stems. Fusarium causes serious root rot and reduces the growth rate. Pythium causes long, water-soaked lesions up the stem. | Crop rotation, seed and soil treatment. Garden seeds should be purchased new each year from a western-grown source. Seeds should be treated with a chemical to protect against soil-rotting fungi.   |
| <b>Snap Bean Rust</b>    | Beans   | Any time during growing season | Tiny, yellow pimples on the leaves which progress into ruptured pustules of tiny, brown, seed-like spores.   | Application of a fungicide will protect clean foliage and prevent future damage.   |
| <b>Stem Anthracnose</b>  | Lima Beans  | Any time during growing season | Brick-red lesions on the stem, leaves and fruit. You may find lots of under-developed pods on the soil surface.  | This fungus advances too quickly to stop by using fungicides. Purchase western-grown, disease-free seeds, plant them in a new section of the garden and spray with a recommended fungicide.  |
| <b>Early Blight</b>      | Tomatoes  | Any time during growing season | Target spot beginning on lower leaves and moving upward.   | Mulching plants which prevents the fungus from being introduced by splashing soil and chemical spray.  |
| <b>Southern Blight</b>   | Tomatoes, peppers and eggplant  | Any time during growing season | Affects plants at soil level causing a mass of white, thread-like mycelium.  | Deep-plowing removes the fungus from its oxygen supply. Aluminum foil may be wrapped loosely around the stem of the plant. The plant should be planted with 2 inches of foil below the soil level and 2 inches of foil above the soil level.           |

| DISEASE  | VEGETABLE HOST                        | TIME PERIOD   | DAMAGE   | CONTROL  |
|--|---------------------------------------|---|--|--|
| <b>Fusarium Wilt</b>                               | Tomatoes and okra                     | Any time during growing season  | The plant slowly turns yellow and dies.  | Use resistant varieties. Plant those varieties which have the letters VFN at the end of the name in the seed catalog. This means they are resistant to Verticillium, Fusarium and Nematodes. |
| <b>Bacterial Wilt</b>                              | Tomatoes                              | Any time during growing season - usually comes in through contaminated transplants. | Immediate wilting of green foliage. The plant looks like someone has poured hot water on it.   | Grow your own transplants or purchase certified disease-free transplants.  |
| <b>Tomato Mosaic Virus/Cucumber Mosaic Virus</b>   | Tomatoes                              | Any time during growing season  | Mottled green and yellow color in the foliage. Crinkling and mottling gets worse as the plant grows.   | Removal of plants.   |
| <b>Leaf Spotting Diseases (i.e., Downy Mildew)</b> | Turnips, collards, cabbage and squash | Any time during growing season  | Downy Mildew occurs on underside of leaf causing a gray mold to develop.   | Start preventive fungicide spray program early.  |
| <b>Black Rot</b>                                   | Cabbage                               | Any time during growing season  | Shows up as V-shaped lesions down the leaves. Then moves into the vascular system and causes heads to deteriorate.   | Buy certified transplants.   |
| <b>Squash Mosaic Virus</b>                         | Squash                                | Any time during growing season  | Mild mottle on older leaves becoming more mottled toward the terminal area of the plant. All fruit will be green and yellow in color and physically distorted. | Purchase western-grown, disease-free seeds and control insects like aphids. Once a plant is infected, there is no recovery.  |
| <b>Powdery Mildew</b>                              | Squash                                | Any time during growing season  | Looks like talcum powder dusted on the leaf's surface.   | Start preventive fungicide spray program early.  |
| <b>Pea Mosaic</b>                                  | Southernpeas                          | Any time during growing season  | May cause mild mottling and crinkling, or severe distortion.   | Purchase western-grown, disease-free seeds and control insects like aphids and leaf hoppers.   |

# Southeast Pest

| INSECT                          | VEGETABLE HOST  | TIME PERIOD   | DAMAGE  | CONTROL  |
|---------------------------------|---|---|---|--|
| <b>Corn Earworm</b>             | Beans, peas, corn, okra, eggplant, peppers  | Any time during growing season                      | Chewing holes in pods of beans, peas, okra, eggplant and pepper. Large ragged holes in leaves of corn & stunted growth.   | Plant as early as weather permits. As soon as larvae are found, use a recommended insecticide. Cut off damaged tips of corn. |
| <b>Aphids</b>                   | Cole crops, cucurbits, beans, peas, potatoes, tomatoes, lettuce, turnips, spinach, other garden crops | Early spring and continuing through growing season. | Sucking of plant juices. Leaves thicken, wrinkle and turn yellow or brown. Can carry plant viruses.   | Wash plants with forceful stream of water. Treat with a recommended insecticide.   |
| <b>Spider Mites</b>             | Beans (especially snap beans), corn, tomatoes, eggplant   | Hot, dry weather.                                   | Sucking of plant juices cause leaves to become blotched with white or pale yellow to brown spots. Then leaves become pale, sickly yellow and brown and drop from plants.  | Remove weeds from garden. Maintain adequate soil moisture. Treat with a recommended miticide.                                |
| <b>Southern Green Stink Bug</b> | Lima beans, okra, tomatoes, cucurbits   | Any time during growing season                      | Sucking plant juices and injection of toxic saliva causes yellow spots with halos on leaves. Lima beans are shriveled and spotted with slick brown stains. Okra pods are distorted with wart-like growths. Tomatoes show white spots. Corn leaves appeared twisted in a spiral. | Remove weeds from garden. Treat immediately with a recommended insecticide.  |
| <b>Flea Beetles</b>             | Potatoes, spinach, sweet potatoes, tomatoes, peppers, eggplant, cucumbers                             | Any time during growing season                      | Very small rounded or irregular holes eaten in leaves giving a shot-hole appearance.  | Remove weeds from garden. Treat immediately with a recommended insecticide.  |
| <b>Bean Leaf Beetle</b>         | Beans, peas   | Any time during growing season                      | Adults chew rounded holes on underside of leaves and on stems of seedlings. Larvae bore into roots and nodules, and chew tissue around stems.   | A recommended insecticide should be applied as soon as beetles are first noticed.  |
| <b>Thrips</b>                   | Beans, peas, onions   | Any time during growing season                      | Sucking of plant juices cause whitish blotches.   | Remove weeds from garden. Treat immediately with a recommended insecticide.  |

| INSECT                                       | VEGETABLE HOST   | TIME PERIOD                    | DAMAGE   | CONTROL  |
|--|--|--------------------------------|--|--|
| <b>Whiteflies</b>                            | Beans, peas, tomatoes, eggplant, peppers                         | Any time during growing season | Sucking causes leaf discoloration and leaf drop; stunting of plants. Sooty mold grows on the honeydew causing a black, unsightly appearance on the leaves. | Use a recommended insecticide.   |
| <b>Spotted &amp; Striped Cucumber Beetle</b> | Cucumbers, melons, squash, pumpkins                              | Any time during growing season | Beetles eat holes in leaves and flowers, and carry bacterial wilt.   | Protect young plants by cone-shaped netting or screen protectors until runners develop. Clean up weeds. Apply a recommended insecticide. |
| <b>Leafminers</b>                            | Cucumbers, melons, squash, pumpkins, tomatoes, eggplant, peppers | Summer                         | Mines and tunnels may serve as points where disease and decay may start.   | Hand pick infested leaves or use a recommended pesticide.  |
| <b>Pickleworm</b>                            | Cucumbers, cantaloupe, squash                                    | Any time during growing season | Pickleworm burrows into buds, blossoms, vines and fruits and pushes out small masses of green, sawdust-like excrement from holes causes rotting fruit.     | Plant as early as weather will allow. Apply a recommended insecticide during fruiting period.  |
| <b>Cowpea Curculio</b>                       | Beans, peas  | Any time during growing season | Asults cause black wart-like strings on surface of pods.   | Preventative insecticide must be used beginning when first blooms are found on Southernpeas. Repeat applications are required.           |
| <b>Mexican Bean Beetle</b>                   | Beans, peas  | Any time during growing season | Leaves appear lacy from adults and young chewing on undersides.  | Hand pick bugs and crush their eggs as they appear. Apply a recommended insecticide.   |
| <b>European Corn Borer</b>                   | Peppers  | Late season                    | Larvae bores into stems and fruit. May cause premature fruit drop.   | Plant as early as weather will allow. Apply a recommended insecticide as soon as larvae is found.  |
| <b>Squash Bug</b>                            | Cucumbers, melons, squash, pumpkins                              | Any time during growing season | Sucking of plant juices can severely weaken or kill young plants. Damaged runners on older plants have wilted leaves that become crisp and dark brown.     | Hand collection of eggs and bugs for small infestations. For large infestations use a recommended insecticide.                           |

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|---------------------------------------|--------------------------------------|--------------------------------|---|--|
| <b>Squash Vine Borer</b>              | Cucumbers, melons, squash, pumpkins  | Any time during growing season | Larvae bores into stems. Vines become wilted and later girdled. Leaves and stems will rot.                      | Plant as early as weather will allow. With a few infested plants, stems can be split and larvae removed. A spade-full of moist soil should be placed over damaged stems to encourage new root growth. Apply a recommended insecticide weekly during fruiting period. |
| <b>Cabbage Looper<br/>Cabbageworm</b> | Cabbage, collards, broccoli, turnips | Any time during growing season | Large holes are eaten in leaves. Larvae may be present in heads.  | Application of <i>Bacillus thuringiensis</i> (Dipel or Thuricide) is usually needed.   |
| <b>Imported<br/>Cabbageworm</b>       | Cabbage, collards, broccoli, turnips | Any time during growing season | Large holes are eaten in leaves. Larvae may be present in heads.  | Clean up old plants after harvest to remove pupae. Apply a recommended insecticide.  |
| <b>Harlequin Bug</b>                  | Cabbage, collards, broccoli, turnips | Any time during growing season | Sucking adults and nymphs cause yellow splotches. Leaves wilt, turn brown and die.                              | Hand pick bugs and crush their eggs as they appear. Apply a recommended insecticide.   |
| <b>Fall Armyworm</b>                  | Sweet corn                           | Any time during growing season | Attacks young emerging leaves in the whorl and the ear. They will chew through the husks to attack the kernels. | Plant early. Apply a recommended insecticide.  |
| <b>Cutworm</b>                        | Tomatoes, eggplant, peppers          | Any time during growing season | Plump, smooth skinned, greasy looking caterpillars can eat plants down to ground level.                         | Physical barriers like tinfoil wrapped around a 4 inch length of stem between leaves and roots may help protect newly set transplants. Baits or spray of a recommended insecticide may be needed.  |
| <b>Tomato Hornworm</b>                | Tomatoes, eggplant, peppers          | Any time during growing season | Hornworms feed on leaves consuming large amounts of foliage resulting in stunting and fruit scald.              | Handpicking and destruction. A recommended insecticide may be needed.  |

# Southwest Disease

| DISEASE                  | VEGETABLE HOST  | TIME PERIOD                    | DAMAGE   | CONTROL  |
|--------------------------|---|--------------------------------|--|--|
| <b>Nematodes</b>         | All plants. Nematodes are small, eel-like worms which live in the soil and feed on plant roots. | Any time during growing season | Root-knot is the most common. Damage to root systems causes yellow and stunted top growth. Look for swollen galls on the root system.  | Soil samples for nematode assay is best way to determine numbers and kinds of nematodes present. Choose plants resistant to nematode attack. Practice crop rotation. Good gardening practices such as removing dead plant material is also beneficial. |
| <b>Root Rot/Stem Rot</b> | All plants where crop rotation is poor. Caused by root-rotting fungi.                           | Any time during growing season | Rhizoctonia causes sunken red lesions on the roots and stems. Fusarium causes serious root rot and reduces the growth rate. Pythium causes long, water-soaked lesions up the stem.                                 | Crop rotation, seed and soil treatment. Garden seeds should be purchased new each year from a western-grown source. Seeds should be treated with a chemical to protect against soil-rotting fungi.   |
| <b>Snap Bean Rust</b>    | Beans   | Any time during growing season | Tiny, yellow pimples on the leaves which progress into ruptured pustules of tiny, brown, seed-like spores.   | Application of a fungicide will protect clean foliage and prevent future damage.   |
| <b>Anthracnose</b>       | Beans (snap, lima & butter), squash, cucumber and tomatoes                                      | Any time during growing season | Brick-red lesions on the stem, leaves and fruit. Also yellowish spots on foliage that turn brown and then black. You may find lots of under-developed pods on the soil surface.                                    | This fungus advances too quickly to stop by using fungicides. Purchase western-grown, disease-free seeds, plant them in a new section of the garden and spray with a recommended fungicide.  |
| <b>Early Blight</b>      | Tomatoes  | Any time during growing season | Target spot beginning on lower leaves and moving upward.   | Mulching plants which prevents the fungus from being introduced by splashing soil and chemical spray.  |
| <b>Late Blight</b>       | Tomatoes  | Any time during growing season | Lesions produced on leaves are at first irregular, rather large, greenish-black and water-soaked. These enlarge rapidly, become brown and may develop moldy growth on the lower surface of the leaves or on stems. | Practice crop rotation. Avoid planting tomatoes near potatoes. Spray regularly with a fungicide.   |

| DISEASE  | VEGETABLE HOST   | TIME PERIOD                    | DAMAGE  | CONTROL  |
|--|--|--------------------------------|---|--|
| <b>Southern Blight</b>                             | Tomatoes, peppers and eggplant   | Any time during growing season | Affects plants at soil level causing a mass of white, thread-like mycelium.   | Deep-plowing removes the fungus from its oxygen supply. Aluminum foil may be wrapped loosely around the stem of the plant. The plant should be planted with 2 inches of foil below the soil level and 2 inches of foil above the soil level. |
| <b>Fusarium Wilt</b>                               | Tomatoes, cucumber, squash, eggplant and okra  | Any time during growing season | The plant slowly turns yellow and dies.   | Use resistant varieties. Plant those varieties which have the letters VFN at the end of the name in the seed catalog. This means they are resistant to Verticillium, Fusarium and Nematodes.   |
| <b>Tomato Mosaic Virus/Cucumber Mosaic Virus</b>   | Tomatoes   | Any time during growing season | Mottled green and yellow color in the foliage. Crinkling and mottling gets worse as the plant grows.                                      | Removal of plants.   |
| <b>Leaf Spotting Diseases (i.e., Downy Mildew)</b> | Turnips, collards, cabbage and squash  | Any time during growing season | Downy Mildew occurs on underside of leaf causing a gray mold to develop.  | Start preventive fungicide spray program early.  |
| <b>Black Rot</b>                                   | Cabbage  | Any time during growing season | Shows up as V-shaped lesions down the leaves. Then moves into the vascular system and causes heads to deteriorate.                        | Buy certified transplants.   |
| <b>Mosaic Virus</b>                                | Squash, Beans (Snap, Lima & Butter), Beets, Cabbage, Lettuce, Peppers                    | Any time during growing season | Leaves become puckered and mottled with light and dark green areas. All fruit will be green and yellow in color and physically distorted. | Purchase western-grown, disease-free seeds and control insects like aphids. Once a plant is infected, there is no recovery.  |
| <b>Powdery Mildew</b>                              | Squash, beans (snap, lima & butter), beets, cabbage, broccoli, brussel sprouts, cucumber | Any time during growing season | Looks like talcum powder dusted on the leaf's surface.  | Start preventive fungicide spray program early.  |
| <b>Pea Mosaic</b>                                  | Southernpeas   | Any time during growing season | May cause mild mottling and crinkling, or severe distortion.  | Purchase western-grown, disease-free seeds and control insects like aphids and leaf hoppers.   |

# Southwest Pest

| INSECT                          | VEGETABLE HOST   | TIME PERIOD   | DAMAGE  | CONTROL  |
|---------------------------------|--|---|---|--|
| <b>Corn Earworm</b>             | Corn, okra, eggplant, peppers  | Any time during growing season                      | Chewing holes in pods of beans, peas, okra, eggplant and pepper. Large ragged holes in leaves of corn & stunted growth.   | Plant as early as weather permits. As soon as larvae are found, use a recommended insecticide. Cut off damaged tips of corn. |
| <b>Aphids</b>                   | Cole crops, cucurbits, beans, peas, potatoes, tomatoes, lettuce, turnips, spinach, peppers, other garden crops | Early spring and continuing through growing season. | Sucking of plant juices. Leaves thicken, wrinkle and turn yellow or brown. Can carry plant viruses.   | Wash plants with forceful stream of water. Treat with a recommended insecticide.   |
| <b>Spider Mites</b>             | Beans (especially snap beans), corn, tomatoes, eggplant, squash, peppers, cucumber                             | Hot, dry weather.                                   | Sucking of plant juices cause leaves to become blotched with white or pale yellow to brown spots. Then leaves become pale, sickly yellow and brown and drop from plants.  | Remove weeds from garden. Maintain adequate soil moisture. Treat with a recommended miticide.                                |
| <b>Southern Green Stink Bug</b> | Beans, okra, tomatoes, cucurbits   | Any time during growing season                      | Sucking plant juices and injection of toxic saliva causes yellow spots with halos on leaves. Lima beans are shriveled and spotted with slick brown stains. Okra pods are distorted with wart-like growths. Tomatoes show white spots. Corn leaves appeared twisted in a spiral. | Remove weeds from garden. Treat immediately with a recommended insecticide.  |
| <b>Flea Beetles</b>             | Potatoes, spinach, sweet potatoes, tomatoes, peppers, eggplant, cucumbers, sweet corn, cauliflower             | Any time during growing season                      | Very small rounded or irregular holes eaten in leaves giving a shot-hole appearance.  | Remove weeds from garden. Treat immediately with a recommended insecticide.  |
| <b>Thrips</b>                   | Beans, peas, onions, tomatoes, lettuce, peppers, broccoli, cauliflower   | Any time during growing season                      | Sucking of plant juices cause whitish blotches.   | Remove weeds from garden. Treat immediately with a recommended insecticide.  |
| <b>Whiteflies</b>               | Tomatoes, eggplant, broccoli, cabbage, cucumber  | Any time during growing season                      | Sucking causes leaf discoloration and leaf drop; stunting of plants. Sooty mold grows on the honeydew causing a black, unsightly appearance on the leaves.  | Use a recommended insecticide.   |

| INSECT                                | VEGETABLE HOST  | TIME PERIOD                    | DAMAGE   | CONTROL  |
|---------------------------------------|---|--------------------------------|--|--|
| <b>Leafminers</b>                     | Cucumbers, melons, squash, pumpkins, tomatoes, eggplant, peppers, lettuce, beans                      | Summer                         | Mines and tunnels may serve as points where disease and decay may start.   | Hand pick infested leaves or use a recommended pesticide.  |
| <b>Squash Bug</b>                     | Cucumbers, melons, squash, pumpkins   | Any time during growing season | Sucking of plant juices can severely weaken or kill young plants. Damaged runners on older plants have wilted leaves that become crisp and dark brown. | Hand collection of eggs and bugs for small infestations. For large infestations use a recommended insecticide.   |
| <b>Squash Vine Borer</b>              | Cucumbers, melons, squash, pumpkins   | Any time during growing season | Larvae bores into stems. Vines become wilted and later girdled. Leaves and stems will rot.   | Plant as early as weather will allow. With a few infested plants, stems can be split and larvae removed. A spade-full of moist soil should be placed over damaged stems to encourage new root growth. Apply a recommended insecticide weekly during fruiting period. |
| <b>Cabbage Looper<br/>Cabbageworm</b> | Cabbage, collards, broccoli, turnips, spinach, tomatoes, lettuce, peas, cauliflower, cucumber         | Any time during growing season | Large holes are eaten in leaves. Larvae may be present in heads.   | Application of <i>Bacillus thuringiensis</i> (Dipel or Thuricide) is usually needed.   |
| <b>Armyworm</b>                       | Sweet corn, spinach, tomatoes, lettuce, onions, peas, peppers, beets, broccoli, cauliflower, cabbage  | Any time during growing season | Attacks young emerging leaves in the whorl and the ear. They will chew through the husks to attack the kernels.  | Plant early. Apply a recommended insecticide.  |
| <b>Cutworm</b>                        | Tomatoes, eggplant, peppers, spinach, lettuce, onions, peas, broccoli, cauliflower, cabbage, cucumber | Any time during growing season | Plump, smooth skinned, greasy looking caterpillars can eat plants down to ground level.  | Physical barriers like tinfoil wrapped around a 4 inch length of stem between leaves and roots may help protect newly set transplants. Baits or spray of a recommended insecticide may be needed.  |

# West Coast Disease

| DISEASE               | VEGETABLE HOST  | TIME PERIOD   | DAMAGE  | CONTROL  |
|-----------------------|---|---|---|--|
| <b>Powdery Mildew</b> | Wide variety of plants including beans, cucumbers, squash, melons, grapes, apples, pears and strawberries | Mid to late summer  | Looks like talcum powder dusted on the leaf's surface.  | Start preventive fungicide spray program early.  |
| <b>Allium Rust</b>    | All alliums (i.e., garlic, leeks, onions, chives)   | Early summer to late autumn   | Red-orange tic marks on greens of mature alliums.   | Avoid dense plantings. Avoid over application of nitrogen. Avoid overhead watering and wetting the leaves. Rotate allium beds each season. |
| <b>Early Blight</b>   | Tomatoes, potatoes and eggplant   | Summer  | Fungus causes sunken, dark areas in stems and irregularly shaped spots on leaves.                           | Select resistant varieties. Use crop rotation methods. Do not use overhead watering. Use fungicide labeled for this disease.               |
| <b>Late Blight</b>    | Potatoes and tomatoes   | Fungus overwinters in plant debris. Thrives in rainy, foggy weather with temps between 70/80 degrees F during the day and 20 degrees cooler at night. | Dark lesions surrounded by white fuzz under humid/damp conditions or dry dark lesions under dry conditions. | Plant resistant varieties. Properly dispose of infected tubers. Use approved fungicides.   |

# West Coast Pest

| INSECT                                       | VEGETABLE HOST  | TIME PERIOD   | DAMAGE  | CONTROL  |
|--|---|---|---|--|
| <b>Aphids</b>                                | Cole crops, cucurbits, beans, peas, potatoes, tomatoes, lettuce, turnips, spinach, other garden crops | Early spring and continuing through growing season. | Sucking of plant juices. Leaves thicken, wrinkle and turn yellow or brown. Can carry plant viruses.   | Wash plants with forceful stream of water. Treat with a recommended insecticide.   |
| <b>Slugs and Snails</b>                      | Wide variety of plants  | Warm weather  | Irregular shaped holes on leafy greens. Small black or brown droppings collect in center of greens. Slime trails among beds. Baby slugs tuck near the core of greens. | Check interior of plants regularly. Physically remove slugs. Trim beds with copper foil. Cover beds with floating row covers early. Use targeted insecticides.                                     |
| <b>Spotted &amp; Striped Cucumber Beetle</b> | Cucumbers, melons, squash, pumpkins   | Any time during growing season                      | Beetles eat holes in leaves and flowers, and carry bacterial wilt.  | Protect young plants by cone-shaped netting or screen protectors until runners develop. Clean up weeds. Apply a recommended insecticide.   |
| <b>Leafminers</b>                            | Cucumbers, melons, squash, pumpkins, tomatoes, eggplant, peppers                                      | Summer  | Mines and tunnels may serve as points where disease and decay may start.  | Hand pick infested leaves or use a recommended pesticide.  |
| <b>Cabbageworm</b>                           | Cabbage, collards, broccoli, turnips  | Any time during growing season                      | Large holes are eaten in leaves. Larvae may be present in heads.  | Squish worms, spray off droppings and remove damaged leaves. Apply targeted recommended insecticide. Cover beds with floating row covers early. Clean up old plants after harvest to remove pupae. |

# West Disease

| DISEASE                     | VEGETABLE HOST  | TIME PERIOD   | DAMAGE  | CONTROL  |
|-----------------------------|---|---|---|--|
| <b>Powdery Mildew</b>       | Wide variety of plants including beans, cucumbers, squash, melons, grapes, apples, pears and strawberries | Mid to late summer  | Looks like talcum powder dusted on the leaf's surface.  | Start preventive fungicide spray program early.  |
| <b>Scab</b>                 | Potatoes, carrots and red beets   | Any time during growing season  | Corky lesions appear on the tuber's surface. Lesions may be small and superficial or consist of deep pits.  | Use certified seed potatoes. Use tolerant varieties where possible.  |
| <b>Early Blight</b>         | Tomatoes, potatoes and eggplant   | Summer  | Fungus causes sunken, dark areas in stems and irregularly shaped spots on leaves.                           | Select resistant varieties. Use crop rotation methods. Do not use overhead watering. Use fungicide labeled for this disease.   |
| <b>Late Blight</b>          | Potatoes and tomatoes   | Fungus overwinters in plant debris. Thrives in rainy, foggy weather with temps between 70/80 degrees F during the day and 20 degrees cooler at night. | Dark lesions surrounded by white fuzz under humid/damp conditions or dry dark lesions under dry conditions. | Plant resistant varieties. Properly dispose of infected tubers. Use approved fungicides.   |
| <b>Leaf Curl</b>            | Tomatoes  | Any time during growing season  | Curling leaves resulting from stress.   | Select varieties less prone to leaf curl. Maintain adequate moisture. Avoid excessive fertilizer, especially nitrogen. Prune indeterminate varieties conservatively. Avoid high temperatures by shading plants when logistically possible. |
| <b>Purple Leaf Disorder</b> | Tomatoes  | Initial symptoms appear between 6-8 weeks after transplanting   | Leaves turn various shades of purple.   | Unknown  |

# West Pest

| INSECT   | VEGETABLE HOST  | TIME PERIOD   | DAMAGE  | CONTROL  |
|--|---|---|---|--|
| <b>Asparagus Beetle</b>  | Asparagus   | Early spring and continuing through growing season. | Adult beetles feed on tips of tender young shoots. After leaves come out, the beetles and their larvae gnaw on the surface of the stems and defoliate ferns.                                  | Monitor visually for adults early in the year. Populations tend to be clumped. Treat with a recommended insecticide.   |
| <b>Spider Mites</b>  | Beans (especially snap beans), corn, tomatoes, eggplant   | Hot, dry weather.                                   | Sucking of plant juices cause leaves to become blotched with white or pale yellow to brown spots. Then leaves become pale, sickly yellow and brown and drop from plants.                      | Remove weeds from garden. Maintain adequate soil moisture. Treat with a recommended miticide.  |
| <b>Cabbage Moths</b>   | Cabbage, brussels sprout, cauliflower, turnip, apple, beetroot, onion, potato, rhubarb and tomato | May to October                                      | Skeletonized leaves. Holes and frass on leaves and heads. Eggs on underside of leaves.  | Remove weeds from garden. Release of Trichogramma parasitoids (i.e., small wasps). Insecticide treatments targeting defoliating larvae.  |
| <b>Aphids (includes cabbage aphid, green peach aphid &amp; turnip aphid)</b> | Broccoli, brussels sprout, cabbage and cauliflower  | Any time during growing season                      | Aphids damage plants by sucking plant sap which causes leaves to curl and stunt. They excrete honeydew which causes sticky, shiny leaves to turn black because of a sooty-mold fungus growth. | Destroy affected plants immediately. Destroy weed host late in the year. Populations tend to be higher in crops that are fertilized liberally with nitrogen. Plant traps or Neem oil may be successful.                              |
| <b>Flea Beetle</b>   | Broccoli, brussels sprout, cabbage and cauliflower  | When seedlings emerge                               | Small holes show on transplants or on plants from seeded fields.  | Floating row covers may be used during seeding. Repeated vacuuming of foliage. Trap crops like radish, noxious weed, white top/hoary cress may help lure beetles away from main plants. Plant seedlings that can outgrow the damage. |
| <b>Spinach Leafminer</b>   | Spinach, chard and beets  | Late spring through summer                          | Leafminers tunnel through leaves and lay eggs on the leaf underside. When mature, the larvae fall to the ground to complete their life cycle.   | Check young seedlings regularly. Remove affected leaves, then bag and eliminate. Apply chemical treatment if necessary.  |
| <b>Grubs</b>   | Wide variety of plants  | May to September                                    | Grubs eat the roots of plants.  | Dig and remove.  |

