

CONTROL OPTIONS

MONTH	DISEASE	BIOLOGY	SYMPTOMS	SCOUTING	CULTURAL	CHEMICAL
May – June	Rhizoctonia damping – off or root rot	Rhizoctonia is a common soil-borne fungus that is more aggressive on young plants	Stem is constricted near the soil line. Roots may appear decayed. Damage occurs first in patches. Fine web-like growth may be present near lesion.		Use rigorous sanitation in green house (clean soil-less medium, disinfected trays, benches and tools). Avoid planting too deeply.	Biocontrol such as SoilGard (incorporated into potting soil) has limited efficacy as does Thiram seed treatment. Field application of
May – June	Pythium damping-off and root rot	Soil-borne fungus with broad host range. In seedlings, high soil moisture, excess fertility and crowding (in greenhouse) can exacerbate the problem	Emergence of seedlings may be reduced. Roots and stems become tan to brown and water soaked.	Seedlings damaged in patchy or circular areas in flats. Look for symptoms on stems and roots.	Use rigorous sanitation in green house such as clean soil-less medium, disinfected trays, benches and tools.	Ridomil Gold or Ultra Flourish (Pythium only), Vapam or Terraclor (Rhizoctonia only), are effective but rarely economically justified for damping-off alone.

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May – September (until night temperatures are below 60 °F)	Bacterial leaf spot	Causal bacterium is <i>Xanthomonas compestris</i> pv. <i>vesicatoria</i> . Three races occur in the region. The bacteria is typically seed-borne. Disease is favored by high nighttime temperatures and moisture.	Initially water-soaked irregular spots (often delimited by veins) may have yellow border. Lesions turn brown to black. Infected leaves often turn yellow and prematurely drop off the plant. Fruit spots, initially green turn tan to brown.	Observe plants weekly, with special attention to susceptible cultivars.	Several cultivars resistant to local races are available. Buy transplants grown from treated seed. Keep fertility moderately high. Use rigorous sanitation in greenhouse, crop rotation and weed management. Minimize duration of leaf wetness.	Apply streptomycin-based spray in greenhouse. In field, apply copper (1 lb. active ingredient per acre) plus maneb at 1.5 lb. 80 WP per acre.
June through harvest	Sclerotinia blight	Hard black structures (sclerotia) survive many years. Sclerotia germinate and initiate disease when soil is moist for several (6 or more) days. Fungus becomes established on senescent tissue such as old flowers or leaves. Disease is favored by cool temperatures	Symptoms are fluffy white mycelia and presence of sclerotia (1/16 to 1/2 inch hard black structures) on diseased tissue. Tiny salmon colored mushroom like structures may be present on the soil surface.	When cool, damp weather occurs look for tiny mushroom-like structures on soil and black sclerotia.	Long rotation with corn and small grain reduces disease.	Terraclor in transplant water (3 lb. 75WP/100 gal. Of water applied at 0.5 pint/plant).

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July – as fruit develops	Anthrachnose	Typically a disease of mature fruit, however, a new strain in our area infects immature fruit.	Sunken lesions form on fruit. The center of lesions may have gray to black fungal growth. Following periods of high humidity or rain, salmon colored spore masses develop on lesions.	Scout for presence of lesions and initiate sprays at first sign of disease. Apply fungicide preventatively where there is a history of disease.	Rotate away from solanaceous plants for two years.	Alternate applications of 1.5 to 2 lb. 80 WP/A and Quadris 6.4 to 15.4 fl. oz/A
June to harvest	Phytophthora Blight	Devastating disease spread rapidly when conditions are favorable.	Crown rot phase: Plants wilt and dark lesion girdles the base of the stem or just below the soil surface. Symptoms appear first in low-lying areas of field. Aerial phase: Black girdling lesions, 2-3 inches long, form in the axils of pepper branches. Fruit phase: Large soft water soaked lesions form on fruit. White sporulation may occur in humid conditions. Fruit symptoms coincide with presence of aerial phase.	Use cultural practices even in absence of disease.	Use resistant cultivars when possible. Rotate away from peppers, eggplants, tomatoes and all cucurbits for at least 3 years. Plant only in well-drained fields. Produce peppers on raised beds that have a central crown. Following transplanting, mound soil at the plant base. Remove diseased plants.	Note: Application of chemicals alone cannot control this disease. Apply 1 pt Ridomil Gold 4 E or 1 qt. Ultra Flourish 2 E/A broadcast prior to planting or in a 12-16 inch band over the row before or after transplanting. Make two additional directed applications (6-10 inches) on either side of row at 30-day intervals. Applications may be through drip. Stem and fruit rot phase: Apply fixed copper at 2 lb. 77 WP/A, or equivalent, or Ridomil Gold Copper 2.5 lb. 65 WP/A at 10-14 day intervals. If Ridomil Gold Copper is used for stem and fruit rot phase, the third application of Ridomil Gold 4 E cannot be made.

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Post-harvest	Bacterial soft rot	Pathogen population is high in fields previously cropped to potato or cabbage. Excessive nitrogen levels and high moisture predisposes fruit to damage.	Initial lesions are usually small and on the stem end of fruit. Large lesions are soft and slimy, enlarge quickly and the entire fruit collapses.	Management measures are preventative.	Avoid wounding fruit during harvest and washing. Do not pick during rain. Do not place in cold water, if washed.	Use chlorinated water to wash fruit, if necessary.

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June - September	Virus Diseases AMV, TEV, TMV, CMV, PVY And TSWV	Seed borne inoculum is rare. TSWV, and to a lesser extent TMV, may start initially in greenhouses. AMV, CMV, PVY and TEV are aphid transmitted. TSWV is thrip transmitted and TMV is spread mechanically.	Symptoms of each virus vary from a blotchy white or yellow mosaic (AMV, TEV, TMV), slight necrosis with ringspot or soakleaf pattern (CMV) vein banding (PVY) mild to intense mottling (PVY, TEV, TMV), wilting (TEV), systemic necrosis, brown spots, necrotic streaks or rings of line patterns (TSWV). Fruit develops mosaic, ringspots, necrotic spots and may be deformed.	Look for stunted plants with leaf symptoms.	Avoid planting near alfalfa, birdsfoot trefoil or potatoes. Do not grow ornamentals in same greenhouse as peppers. Control weeds that serve as alternate hosts, (milkweed, pokeweed, chickweed, wild geranium, campion, field bindweed, yellow rocket, ground cherry, broadleaf plantain, horsetail, common burdock, and curly dock. Use reflective mulch and tolerant cultivars (TMV).	Because aphid transmitted virus's can be vectored within 60 seconds, insecticides are generally not helpful. Insecticides to reduce thrips populations maybe helpful in reducing TSWV spread. Manage insects using IPM principles.
July – September	Nematodes	Southern root knot, lesion, and stubby root nematodes cause damage on peppers.	Above-ground symptoms are stunted and wilted plants that occur in patchy or circular areas. Wilted plants may recover in morning. Below ground symptoms are root galls, 1/16 inch to ¼ inch or swollen roots (root knot nematode), small lesions on root surface (lesion nematode), or reduced, coarse, extensively branched, stubby roots (stubby root nematode).	In fields that exhibit aboveground symptoms that are not attributed to other factors, perform soil and root assay. Routine assays should be conducted in the fall in fields cropped frequently to vegetables. Threshold nematode levels are: root knot or lesion (100 nematodes/6.1 in ³ soil) and stubby root (50 to 100 nematodes/6.1 in ³ soil).	Avoid planting peppers after potatoes or strawberries. Rotate with corn, wheat, barley, or rye. Green manure of Sudangrass and rapeseed may reduce nematode damage.	Pre-plant fumigation is effective, if economical. See the commercial Vegetable Production Recommendations for Maryland or Delaware.