

Table 4. Scouting Guidelines and Biological Control Options for Vegetable Bedding Plants and Transplants

Pest	How to Monitor	Where to Look	Biological Control Options
Aphids	Monitor weekly. Rely on plant inspection, not sticky cards. Look for small, 1/16 inch long aphids with two cornicles or “tailpipes” at the rear of their body. Identification to species is needed to determine which host specific aphid parasite to release when using biological controls. If uncertain, mixes of different species are available.	Underside of leaves and along stems on tips of new growth on eggplant, pepper, tomatoes and many different leafy vegetables. Signs of aphid activity: shed white skins, shiny honeydew, presence of ants, curled new leaves, and distorted growth.	<i>Aphidoletes aphidimyza</i> (aphid midge, predator) <i>Aphelinus abdominalis</i> (aphid parasite) <i>Aphidius matricariae</i> (aphid parasite) <i>Aphidius colemani</i> (aphid parasite) <i>Aphidius ervi</i> (aphid parasite) <i>Chrysoperla spp.</i> (green lacewing, predator)
Bacterial Leaf Spot	At first, chocolate-brown spots are less than 1/4 inch in diameter, & water-soaked in appearance on pepper. Severely spotted leaves appear scorched and defoliation may occur. Some strains cause leaf spot on tomatoes.	Seed-borne disease. More prevalent during moderately high temperatures and long periods of high humidity and leaf wetness.	<i>Bacillus subtilis</i> (Cease) (biofungicide)
Botrytis blight	Look for leaf blight and tan stem cankers. Botrytis blight produces characteristic gray fuzzy appearing spores on the surface of infected tissues during humid conditions.	In areas where plants are spaced close together and where condensation may occur.	<i>Bacillus subtilis</i> (biofungicide) (suppression) <i>Streptomyces griseoviridis</i> (suppression) <i>Streptomyces lydicus</i> (suppression)
Broad Mites	Look for symptoms of damage – leaf edges curling downward, twisted and distorted growth. Under a microscope, look on underside of leaves for mites and their eggs.	Near ornamental crops affected with broad mites.	<i>Neoseiulus californicus</i> (predatory mites) <i>Neoseiulus cucumeris</i> (predatory mites)
Cyclamen Mites	Look for symptoms of damage – inward curling of leaves, puckering and crinkling. Under a microscope, look within buds for mites and their eggs.	Near ornamental crops affected with cyclamen mites.	<i>Neoseiulus cucumeris</i> (predatory mite) <i>Neoseiulus californicus</i> (predatory mite)

Damping Off (Pythium Root and Stem Rot)	Monitor seed flats of susceptible plants. Inspect weekly. Visually examine roots for cortex that sloughs off leaving central core.	Inspect plants weekly for signs of disease: Wilted, stunted off-color plants with discolored root systems. Focus on areas where plants stay wet. or where there may be high populations of shore flies that may carry disease spores. High soluble salts/fertility increases susceptibility.	<i>Bacillus subtilis</i> (biofungicide) <i>Trichoderma harzianum</i> (biofungicide) <i>Streptomyces griseoviridis</i> (biofungicide) <i>Streptomyces lydicus</i> (biofungicide)
Damping Off (Rhizoctonia Root and Crown rot)	Monitor seed flats of susceptible plants including cole crops, peppers, and tomatoes. Look for small, water-soaked spots on stems or leaves before seedlings collapse.	Seed flats near walkways or near dust and debris. Overcrowded seedling flats are more susceptible to damping off.	<i>Bacillus subtilis</i> (biofungicide) <i>Streptomyces griseoviridis</i> (biofungicide) <i>Streptomyces lydicus</i> (biofungicide) <i>Trichoderma harzianum</i> (biofungicide)
Fungus gnats	Use sticky cards to monitor for adults. Place cards horizontally above soil surface. Potato chunks can be used to monitor for larvae. Check every two days.	Favorable habitats include areas with standing pools of water, mud floors, spilled media and weeds.	<i>Bacillus thuringiensis</i> subsp. <i>israelensis</i> (pathogen) <i>Atheta coriaria</i> (predatory beetles) <i>Hypoaspis miles</i> (predatory mites) <i>Steinernema feltiae</i> (nematodes)
Powdery mildew	Scout weekly. Look for faint, white fungal threads and spores on leaves.	Scout near vents, or any location with a sharp change between day and night temperatures.	<i>Bacillus subtilis</i> (biofungicide) <i>Streptomyces griseoviridis</i> (biofungicide) <i>Streptomyces lydicus</i> (biofungicide)
Spider Mites (Two-spotted Spider mites)	Rely on plant inspection. Look for light flecking, speckling or discolored foliage, and webbing if high populations have developed.	Look in hot, dry locations in greenhouse (i.e. near furnace) or near entrance ways.	<i>Feltiella acarisuga</i> (predatory midge) <i>Neoseiulus californicus</i> (predatory mites) <i>Phytoseiulus persimilis</i> (predatory mites)
Thrips (Western flower thrips)	Rely on sticky cards (placed just above crop canopy) and foliage inspection of key plants for early detection and to evaluate treatments. Use petunia and fava bean plants to indicate early thrips feeding.	Inspect plants by tapping tender new growth over a white sheet of paper. Watch for curled, emerging leaves, distorted new growth on pepper. Look for white scarring and black fecal spots (size of pin point) on foliage of cucumber and eggplant.	<i>Amblyseius swirskii</i> (predatory mite) <i>Chrysoperla spp.</i> (green lacewing, predator) <i>Hypoaspis miles</i> (predatory mites) <i>Neoseiulus cucumeris</i> (predatory mites) <i>Orius insidiosus</i> (pirate bug, predator)

Tospovirus Impatiens Necrotic Spot Virus (INSV) & Tomato Spotted Wilt Virus (TSWV)	Symptoms will vary depending upon the host. On pepper, look for necrotic spots on the leaf. Ringspots may also develop. On tomato, young leaves may develop small, dark brown spots.	Thrips populations may be highest at front and rear of the greenhouse. Use fava bean or petunia indicator plants to determine if thrips are carrying the virus. Symptomless weeds may also be a source of virus.	None See thrips.
Whiteflies	Rely on plant inspection to detect immature stages. Use sticky cards to monitor adults.	Egg laying adults are found on the uppermost tender leaves of tomatoes, eggplant and assorted greens. Immature stages are stationary and are found on the undersides of leaves.	<i>Chrysoperla spp.</i> (green lacewing, predator) <i>Amblyseius swirski</i> (predatory mite) <i>Eretmocerus sp.</i> (sweet potato whitefly parasite) <i>Encarsia formosa</i> (greenhouse whitefly parasite)

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