



Integrated Pest Management Program

Department of Plant Science and Landscape Architecture
UConn Extension

Scouting guidelines and biological control options for herb bedding plants

Pest	How To Monitor	Signs and Symptoms	Biological Control Options
Aphids	Monitor weekly. Look on the underside of leaves and along stems on tips of new growth for small (1/16 in. long) aphids with 2 cornicles or “tailpipes” at the rear of their bodies. Identification to species is needed to determine which host specific aphid parasite to release. If uncertain, mixes of different species are available.	Distorted young growth (will vary depending upon type of aphid). Shed white skins of aphids that have molted. Honeydew and sooty mold.	<i>Adalia bipunctata</i> (predatory ladybeetle) <i>Aphelinus abdominalis</i> (aphid parasite) <i>Aphidoletes aphidimyza</i> (aphid midge, predator) <i>Aphidius colemani</i> (aphid parasite) <i>Aphidius ervi</i> (aphid parasite) <i>Aphidius matricariae</i> (aphid parasite) <i>Chrysoperla spp.</i> (green lacewing, predator) <i>Hippodamia convergens</i> (predatory ladybeetle) Aphid Banker Plants (starter)
Bacterial Blight	Test plants prior to use as stock plants. Grower friendly test kits for <i>Xanthomonas</i> are available from Agdia and other companies	Scented geraniums may be carriers of disease without showing typical symptoms: wilting, small leaf spots and v-shaped angular lesions.	None.
Bacterial Fasciation	Look for abnormal branching near the base of scented geraniums.	Plants are stunted with short, swollen, fleshy and misshapen leaves.	None.
Beetles	During routine inspection, look for chewed holes or pinholes in leaves especially on herbs grown outdoors.	Chewed holes or pinholes in leaves.	

Botrytis Blight	Concentrate scouting on tender herbs grown in closely spaced area with poor air circulation. Look for dieback, stem cankers (especially near a wound), and gray fuzzy-appearing spores on surface of infected tissues during humid conditions.	Leaf blights, stem cankers, damping off and occasionally root rots.	Biological fungicides: <i>Bacillus amyloliquefaciens</i> <i>Bacillus subtilis</i> <i>Gliocladium catenulatum</i> <i>Reynoutria sachalinensis</i> extract <i>Streptomyces griseoviridis</i> <i>Streptomyces lydicus</i>
Caterpillars	When adult moths are active, look for eggs and young caterpillars. Look for fecal droppings and their feeding damage.	If damage is observed, look under pots or in planting medium just around the base of the plants. Many caterpillars hide during the day and feed at night.	<i>Bacillus thuringiensis</i> subsp. <i>kurstaki</i> <i>Trichogramma spp.</i> (egg parasite)
Crown and Root Rots	Inspect plants weekly for signs of disease: wilted off-colored plants with discolored root systems. Pay attention to media that stays wet. Monitor fungus gnats and shore flies, especially in propagation houses. Monitor soluble salt levels.	Leaves turn yellow and wilt. Plants are stunted and off-color. Roots are discolored and may turn brown or black.	Biological fungicides: <i>Bacillus amyloliquefaciens</i> <i>Bacillus subtilis</i> <i>Gliocladium catenulatum</i> <i>Streptomyces K61</i> <i>Streptomyces lydicus</i> <i>Trichoderma harzianum</i> (soil applications only) <i>T. harzianum</i> & <i>T. virens</i> (soil applications only) <i>Trichoderma asperellum</i> & <i>T. gamsii</i>

Downy Mildew	Inspect underside of basil leaves, especially during humid conditions.	Look for yellowing between the veins. (Maybe confused with nutritional deficiency). Look on underside of leaves for dark purple-brown sporangia (fungal-like sporulation).	None. Use resistant varieties.
Damping Off	Monitor seed flats for seedlings that do not emerge or collapse at the soil line. Disease often spreads from a central point. Discard heavily infected flats to avoid future problems.	Seeds do not germinate or collapse with dark, necrotic stem canker at soil line. Infected plants may later develop crown and root rots. Overcrowded seedling flats are more susceptible to damping off.	Biological fungicides: <i>Bacillus amyloqueliciens</i> <i>Bacillus subtilis</i> <i>Gliocladium catenulatum</i> <i>Streptomyces K61</i> <i>Streptomyces lydicus</i> <i>Trichoderma harzianum</i> (soil applications only) <i>T. harzianum</i> & <i>T. virens</i> (soil applications only) <i>Trichoderma asperellum</i> & <i>T. gamsii</i>
Four-lined plant bugs	Monitor herbs especially if weeds are nearby. Look for signs of feeding activity - small, yellow spots on upper leaf surface. Four-lined plant bugs tend to be secretive and move to the underside of leaves or drop off the leaves.	Round, brown, dead leaf spots that may be confused with fungal leaf spot disease.	

Fungus Gnats	Use sticky cards to monitor for adults. Place cards at base of plants at soil line. Place potato chunks on soil surface to monitor for larvae. (Check every two days.) Scout favorable habitats including areas with standing pools of water, dirt floors or spilled media and weeds.	On cuttings, fungus gnat larvae may feed on callus, slowing down rooting. Larvae feed upon roots and may tunnel into stems causing plants to wilt and die.	<i>Dalotia coriaria</i> (rove beetles, predatory beetles) <i>Stratiolaelaps scimitus</i> (predatory mites) <i>Steinernema feltiae</i> (beneficial nematodes)
Fungal Leaf Spots	Scan the crop for leaf spots. With a hand lens, look for small, fungal fruiting bodies. To confirm, send samples to diagnostic laboratory.	Alternaria leaf spots are generally dark brown to black with a yellow border. Septoria leaf spots are small, grayish brown with a dark brown edge.	Biological fungicides: <i>Bacillus amyloolquefaciens</i> <i>Bacillus subtilis</i> <i>Streptomyces lydicus</i>
Fusarium Wilt on Basil	Look for downward bending or cupping of the leaves. May be confused with water stress, root rot diseases or <i>Botrytis</i> stem canker. To confirm, send samples to diagnostic laboratory.	Leaves may cup downward or the top of the stem will bend like a Sheppard's crook. On large-leaved cultivars, defoliation may occur. In later stages, brown streaks can be seen on the stem.	None. Use resistant varieties
Mealybugs	Inspect herbs propagated by cuttings. Look for small, oval, soft-bodied insects covered with a white, wax-like layer. May be found along stems, and on underside of leaves.	White, cottony residue may be seen.	<i>Anagyrus pseudococci</i> (parasitic wasp) <i>Cryptolaemus montrouzieri</i> (predatory beetle) is used against citrus mealybug but is ineffective against long-tailed mealybugs that give birth to living young.

Powdery Mildew	Scout weekly especially areas near vents, hanging baskets or any location with a sharp change between day and night temperatures. Use a hand lens to see white fungal threads and spores.	White powdery fungal growth can occur on upper or lower leaf surfaces. If severe, white coating can be seen on the foliage.	Biological fungicides: <i>Bacillus amyloolquefaciens</i> <i>Reynoutria sachalinensis</i> extract <i>Streptomyces lydicus</i>
Pseudomonas Leaf Spot	Inspect basil and other small plugs during routine scouting.	Look for water-soaked, dark brown to black leaf spots especially on young plugs. Confirm diagnosis through a plant diagnostic laboratory.	
Rhizoctonia Web Blight	Scout susceptible crops, especially when they are closely spaced. Look for cobweb-like growth that mats leaves together (web blight) especially during humid conditions.	Stems and leaves collapse rapidly and turn mushy with fine, web-like fungal strands present.	
Rusts	Look for yellow spots on the upper leaf surface and rusty brown spots on the lower leaf surface during routine foliage inspections.	Rusty brown spots or stripes especially on the lower leaf surface.	<i>Bacillus amyloolquefaciens</i>
Scale - Brown Soft Scale	Look for yellowish-brown, to dark brown scale insects along veins and stems.	Honeydew and sooty mold are additional signs of infestation.	<i>Chrysoperla carnea</i> (green lacewing) <i>Cryptolaemus montrouzieri</i> (prefers mealybugs)
Slugs	Look for chewed holes in leaves and shiny patches of slime. Slugs hide under dense foliage, beneath pots and benches and in other protected locations.	Chewed, irregular holes with smooth edges in leaves and slime that dries into silvery trails on foliage.	

Tarnished Plant Bugs	Look for signs of feeding injury on youngest growth and buds	Look for death of tender young growth, dead spots and badly distorted buds.	
Two-Spotted Spider mites	Look on leaf undersides, especially along the veins, for all stages of mites, empty eggshells and webbing. Look near hot, dry areas of greenhouse near furnace. Scout mite-infested areas last.	Light flecking, and discolored foliage. Leaf drop and webbing may occur during outbreaks.	<i>Amblyseius andersoni</i> (predatory mites) <i>Feltiella acarisuga</i> (predatory midge) <i>Galendromus occidentalis</i> (predatory mites) <i>Neoseiulus californicus</i> (predatory mites) <i>Neoseiulus fallacis</i> (predatory mites) <i>Phytoseiulus persmilis</i> (predatory mites)
Thrips	Rely on sticky cards (placed just above crop canopy) and foliage inspection to track population trends.	Distortion of flowers, buds and tender young growth. White scarring on expanded leaves and flowers. Transmission of tospoviruses.	<i>Amblyseius limonicus</i> (predatory mites) <i>Amblyseius swirskii</i> (predatory mites) <i>Dalotia coriara</i> (predatory beetles) <i>Neoseiulus californicus</i> (predatory mites) <i>Neoseiulus cucumeris</i> (predatory mites) <i>Orius spp.</i> (minute pirate bug, predator) <i>Steinernema feltiae</i> (beneficial nematodes) <i>Stratiolaelaps scimitus</i> (predatory mites) Ornamental Pepper Banker Plants Purple Flash and Lobularia for <i>Orius</i>

Viruses	Scan crops weekly. Inspect incoming plants. Look for mosaic patterns, leaf distortion, chlorotic streaking, ringspots, line patterns and stunted plants.	For confirmation, send sample to diagnostic laboratory.	None.
Whiteflies	Use sticky cards to monitor for adults. Inspect plants for scale-like immature stages found on underside of leaves.	When high populations develop, honeydew and sooty mold may be seen.	<i>Amblyseius swirskii</i> (predatory mites) <i>Chrysoperla spp.</i> (green lacewing) <i>Dicyphus hesperus</i> (predatory bug) <i>Delphastus pusillus</i> (predatory beetles) <i>Encarsia formosa</i> (parasitic wasp) <i>Eretmocerus eremicus</i> (parasitic wasp)

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