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Basil is a high-value crop cultivated globally for use as a culinary herb and for its essential oils. It is a tender, herbaceous plant, sensitive to cold and prone to numerous pests and pathogens. This tech sheet provides an overview of the most common pests and diseases of basil, along with basic preventative and treatment measures, but it is not a comprehensive review. If you notice a problem in your field or greenhouse, we urge you to contact your local cooperative extension service or other agricultural agency as soon as possible and arrange to have the affected plants tested. For many pests and pathogens, testing is the only means of definitive diagnosis and determining the best course of treatment.

CULTURAL PRACTICES

The best way to manage most pests and diseases is through cultural practices that favor overall plant and soil health, including good sanitation and crop rotation. Elements of this approach involve the following:

- Use quality seed tested for the presence of fusarium wilt fungus.
- Choose resistant varieties where applicable.
- Grow your crop in sanitized greenhouse conditions.
- Do not grow consecutive basil crops in the same soil.
- Inspect growing areas frequently and remove and destroy any diseased or infested plants immediately.
- Provide adequate water and good drainage. Drip irrigation and mulching minimize water loss and the spread of waterborne and soilborne disease.
- Avoid overhead irrigation, which can facilitate the spread of disease.
- Facilitate good air movement with adequate plant spacing and/or fans.
- Provide adequate nitrogen fertility for this leafy crop.
- Ensure there is ample organic matter in the soil to support overall crop health.

MAJOR DISEASES of BASIL

Basil Downy Mildew (*Peronospora belbahrii*). This relatively new disease to North America spreads very quickly, with the potential to cause serious losses. It is characterized by a slight yellowing on the upper side of leaves, often in bands, somewhat resembling a nutritional deficiency. Purplish-gray spores develop on the lower surface, producing black “fuzz” on the underside of leaf.

Prevention and Control. In the U.S., you can find out where downy mildew has been reported at <https://basil.agpestmonitor.org>. If it has been reported in or near your area, start with quality seed of varieties known to be less susceptible. The newer generation of resistant varieties show a much stronger level of resistance than the first-generation varieties. Growing these varieties during the window when likelihood of infection is highest is most strategic. Reports from our trial partners across the U.S. and the world indicate there may be different strains (or races) of mildew that correspond to different geographical locations. However, since no race-specific information is currently available, we recommend you trial these varieties to see which ones best suit your needs.

The conditions favoring disease development — high humidity and extended leaf wetness — should be minimized as a preventative measure. This can be achieved with good air flow, the use of drip irrigation or soaker hoses, good soil drainage, full sunlight or illumination, and adequate plant spacing. Limited efficacy has been shown with preventive applications of OMRI-approved fungicides for both indoor and outdoor use, including MilStop, Regalia, OxiDate, and Actinovate.

Fusarium Wilt and Crown Rot. A vascular wilt disease, fusarium wilt and crown rot of basil is caused by the fungus *Fusarium oxysporum* f. sp. *basilici*. Symptoms include curling, yellowing, and wilting of the leaves, starting at the crown; vertical brown streaks on stems; stunted plants; and sudden plant death. Fusarium can be spread through contaminated soil, equipment, or seed, as well as by airborne spores.

Prevention and Control. Perform a soil test. If fusarium is found, choose fusarium-resistant basil varieties to grow; there are many available and they are highly effective.

Johnny's tests 400 seeds per basil seed lot for pathogenic fusarium wilt fungus. Only basil seed lots which test negative for this disease in a lab test are cleared for sale.

Low levels of fusarium can sometimes be controlled with OMRI-approved products such as Actinovate, GreenCure, MilStop, OxiDate, RootShield, and Regalia.

Gray Mold (*Botrytis cinerea*). A devastating disease, the characteristic brown-to-gray fungal growth of gray mold appears on stems cut for harvest or on plant debris proximal to the growing area. Plant crowding and high humidity, together with moderately cool temperatures create an environment most favorable for the disease to spread. Spores are easily disseminated by air currents, rain, and splashing.

Prevention and Control. To prevent botrytis gray mold, it is important to keep the growing area clean and provide drip rather than overhead irrigation, as well as adequate air circulation, heating, and ventilation.

Actinovate is an OMRI-approved biofungicide that can offer some control with foliar application.

Basal Root Rot, Damping Off (*Rhizoctonia solani*; *Pythium* spp.). Though plants can be affected at any stage, this is a set of diseases that are particularly virulent on seedlings and young plants. Sudden wilting and plant collapse are symptoms. Both are intensified by high relative humidity and poor air circulation. Pythium damping off is favored by cool conditions.

Prevention and Control. In a greenhouse environment, using sterile planting media and pots can help minimize the risk of root rot and damping off. Root disease prevention products such as Actinovate, NuCop, OxiDate, RootShield, or Regalia offer additional means of control.

Leaf Spot (*Pseudomonas* spp.; *Colletotrichum* spp.). Black spots or lesions on leaves or stems are signs that suggest leaf spot (also known as black spot), but definitive diagnosis of this set of organisms is best accomplished by lab testing of a plant sample. High relative humidity, dense plantings, and overhead watering are factors that favor the spread of these diseases.

Prevention and Control. There is no known control for bacterial leaf spot once established, but practices that avert splashing up onto the leaves from infected soil will help prevent infection. Drip irrigation and adequate circulation are key to prevention of leaf spot. Mulching can also be helpful.

MAJOR PESTS of BASIL

Aphids. This group is a common warm weather pest. They are small, generally wingless, soft-bodied insects with long antennae. Aphids primarily feed on tender new growth, causing leaf malformation and puckering; act as vectors of viruses; and create conditions favorable to other secondary pathogens. They are visible to the naked eye and can also be identified by the shiny, clear excretion that they leave behind, known as honeydew.

Prevention and Control. Aphids can be discouraged with nearby plantings of insectary flowers in the composite and carrot family, which attract and sustain predators of aphids. Beneficial predatory insects include parasitic wasps, ladybugs, lacewings, praying mantids, syrphid flies, and aphid parasites.

A strong jet of water can also help eliminate aphids from the plants when numbers are not excessive.

If the colony has multiplied there are a variety of sprays that can be applied. Johnny's OMRI-approved controls include AzaGuard, Mycotrol, PyGanic, Safer Insect Soap, and SuffOil-X.

Japanese Beetles. A major problem for East Coast field growers, these ½"-long, metallic-green beetles can cause major crop damage in little time. Originally infesting states east of the Mississippi, Japanese beetles are quickly spreading westward. Damage is characterized by large, uneven holes and chew marks on the plant's foliage. Japanese beetles spend 10 months of the year as grubs in the soil before emerging to breed in the summer.

Prevention and Control. Japanese beetle exposure can be limited by succession-planting, covering each planting with row cover, then harvesting the basil plants whole. Traps are also available to help control the population but need to be placed strategically — only for a day or two every couple of weeks, upwind and at a distance from the planting — to have any lasting efficacy.

A dual application to the soil of beneficial nematodes and milky spore disease can eliminate the grub stage and help prevent recurrence over time.

Johnny's OMRI-approved control methods include row cover, AzaGuard, Mycotrol, and PyGanic.

Leafhoppers. A problem for the field and greenhouse grower, there are many species of leafhoppers. These insects are $\frac{1}{8}$ – $\frac{1}{4}$ "-long, wedge-shaped, and light in color. Their presence can be detected by a distinctly stippled or spotted appearance to the top surface of affected foliage. In addition to causing cosmetic damage, leafhoppers spread viral diseases.

Prevention and Control. Pyrethrum, neem, and horticultural oil sprays are effective against leafhoppers. Johnny's OMRI-approved control methods include row cover, AzaGuard, Mycotrol, PyGanic, Safer Insect Soap, and SuffOil-X.

Root-knot Nematodes. Nematodes are microscopic roundworms that are mostly benign or beneficial, but some can damage plant roots and interfere with the plant's ability to uptake nutrients and water from the soil. Plant symptoms include wilting, low yield, discoloration, and other symptoms related to nutrient deficiency.

Prevention and Control. Adding organic matter to the soil encourages competitive organisms, including beneficial nematodes. Soil solarization is another means of control for this pest.

Slugs. Most active during wet weather, slugs are nocturnal feeders. Damage is characterized by holes and marks on the leaves, along with a slime trail left behind by the slug.

Prevention and Control. Limiting overhead irrigation helps to reduce populations. Keeping the greenhouse clean and free of debris removes potential daytime havens for slugs. Sluggo is an OMRI-approved application that can be used to control these pests.

Whiteflies. One of the most common pests for the greenhouse grower, there are many species of whitefly. Generally identified by their $\frac{1}{16}$ "-long white bodies and wings, whiteflies tend to congregate on the undersides of leaves to feed and breed. They damage the leaves as well as transmitting secondary diseases.

Prevention and Control. Yellow sticky cards can be used to attract whiteflies and to gauge the extent of an infestation in the greenhouse.

The predatory wasp *Encarsia formosa* can be released to effectively control greenhouse whiteflies.

Certain sprays can also be effective, such as pyrethrum, insecticidal soaps, and horticultural oils. Johnny's OMRI-approved controls include AzaGuard, Mycotrol, PyGanic, Safer Insect Soap, and SuffOil-X.

Always follow label directions for pesticides and fungicides.