Diseases & Pests in Greenhouse & Hydroponics Systems

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Because of the warmth and humidity of greenhouse growing, and because indoor crops are grown year-round (or nearly year-round), disease and pest issues can become particularly challenging for indoor growers. Prevention is key, as it can be difficult to eradicate some pests and diseases once they have entered your system. The following is an overview of common considerations and prevention strategies, as well as a description of some of the common diseases and pests found in indoor growing systems. For help identifying specific diseases and pests, we recommend that you consult your local cooperative extension office.

PREVENTING DISEASE

To reduce the likelihood of disease, implement the following preventative measures:

- **Ensure good air circulation.** Use fans to move fresh air through your greenhouse. Avoid crowding plants. To maintain air flow, regularly prune vining plants and remove diseased or dead plant matter. Eliminate weeds which may block air flow.
- **Ensure good drainage.** Take care not to overwater. If growing in containers, be sure to monitor drainage systems for failures that may cause oversaturated growing media and standing water.
- **Choose cultivars that are bred for indoor growing environments**. These plants are carefully bred for their disease resistance and their ability to thrive in indoor growing conditions. You can view a list of recommended varieties here: Johnny's greenhouse performers.
- **Limit plant stress** that may cause plants to be more susceptible to disease. Ensure proper nutrition and monitor environmental variables such as temperature and humidity. Close attention to environmental conditions is particularly important when growing hydroponically; see more in our tech sheet on Seed Starting in Hydroponic Systems and Primary Environmental Variables.
- **Sanitize your trays and tools on a regular basis.** If growing hydroponically, you may also need to sanitize your growing media; for more information, see our tech sheet on Hydroponic Media.
- **Scout for disease.** Walk through your crops 1–2 times per week to scout for emerging disease issues.
- **Establish a 1-month crop-free period per year**, if possible, to help break disease cycles.
- **Control pests.** Many pests introduce and spread disease; for example, cucumber beetles can spread bacterial wilt and whiteflies can spread tomato chlorosis virus and tomato yellow leaf curl virus.

COMMON DISEASES

For a definitive diagnosis of disease, contact your local cooperative extension office to have a tissue sample analyzed. We have also included some references, below, which may be helpful for disease identification. Common diseases can include:

- **Bacterial disease:** bacterial canker, bacterial speck, bacterial spot, bacterial wilt.
- **Fungal disease:** black root rot, botrytis, damping off, early blight, *Fusarium* and *Pythium* root rots, *Fusarium* wilt, powdery mildew, *Sclerotinia* rot (white mold).
- **Viral Disease:** beet pseudo-yellows virus, tomato leaf curl virus, tobacco mosaic virus (TMV), tomato spotted wilt virus (TSWV), tomato yellow leaf curl virus (TYLCV).

Diseases: Recommended References

Vegetable Pathology Photo Gallery (Cornell University)

Zero Disease Tolerance in High Tunnels (Cornell University)

PREVENTING PESTS

Pests can cause direct crop damage and also transmit disease. Once pests enter the greenhouse, it can be challenging to eradicate them; therefore, prevention is very important. The following are some preventative measures to consider:

- **Limit entry.** Use insect screens and limit unnecessary traffic in and out of the greenhouse. If possible, install air-lock entrances to greenhouses, as doorways provide an easy entrance for pests. An air-lock entrance is essentially a double door system that helps prevent fans from pulling air through unscreened doorways.

- **Use metallic mulch around the exterior of entrance ways.** Researchers at the University of Florida found that a 20-foot strip of metallic mulch around the exterior of the ventilation air intake side wall reduced whitefly entrance by 90% (see below reference).

- **Use yellow sticky traps to monitor pest pressure.** Use 1–3 traps per 1,000 sq. ft. (305 sq. meter) and place extra traps at doors and vents and in problem crops. Monitor the traps 1–2 times per week. By seeing what pests are trapped by the yellow sticky traps, you will get an idea of the pest pressure and be able to proactively manage any emerging pest issues. Replace traps regularly. Use your local cooperative extension services to help with pest identification, as necessary.

- **Scout for pests.** Yellow sticky traps will not catch all pests, so it is also important to walk through your crops 1–2 times per week to scout for emerging pest issues. As you scout, use a magnifying lens (some pests are too small to see with the naked eye). Check the tops *and* undersides of leaves, as well as blossoms and fruit, for evidence of pests.

- **Eliminate weeds**, both in the greenhouse and around the perimeter of the greenhouse. Weeds can serve as a host for pests.

- **Regularly remove** fruit culls, dropped fruit, and dead plant matter from the greenhouse, to help reduce hospitable environments for pests.

- **Quarantine new plants.** If you purchase transplants, isolate the plants before transplanting if possible, and inspect plants for pests. Most pests are large enough to be seen either with the naked eye or a magnifying lens.

COMMON PESTS

A wide range of pests may affect greenhouse growers and we recommend you consult your local cooperative extension office to help you understand those most common to your region and to assist you with pest identification. We have also included some references, below, which we think will be helpful for pest identification. Some of the most common pests for indoor growers include aphids, mites, and whiteflies. Some additional common greenhouse pests include armyworms, bloodworms, cutworms, fungus gnats, leafminers, loopers, mealybugs, shore flies, slugs, snails, and thrips.

Insects: Recommended References

Exclusion Methods for Managing Greenhouse Vegetable Pests (University of Florida)

Greenhouse Insect Management (University of Kentucky)

Vegetable Insect Identification and Management (Florida Greenhouse Vegetable Production Handbook)

ADDITIONAL RECOMMENDED RESOURCES

- **Cooperative Extension**
  - Extension.org (includes a knowledge base and a tool for finding your local cooperative extension)

- **General Resources for Greenhouse Growers**
  - Controlled Environment Agriculture (Cornell University)
  - Small Farms & Alternative Enterprises—Hydroponic/Greenhouse Crops (University of Florida)

- **Plant Nutrition**
  - Guide to Symptoms of Plant Nutrient Deficiencies (University of Arizona)

- **Crop-Specific Resources**
  Each of these resources covers diseases and pests for the stated crop:
  - Lettuce: Hydroponic Lettuce Handbook (Cornell University)
  - Spinach: Hydroponic Spinach Production Handbook (Cornell University)
  - Tomatoes: Diseases and Abiotic Problems in Greenhouse Tomatoes (Mississippi State University)

Tell us what you think!

We would love your feedback about this information! Please take 1 minute to answer 3 short questions to share your thoughts.

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