



Organic Pest and Disease Management

In non-organic systems, pest or disease control generally happens in response to an outbreak or issue. Chemical pesticides can knock out pests quickly. However, these chemicals damage human health and the environment—they are not allowed in organic production.

Prevention is the first line of defense for organic farmers. Many practices are effective in decreasing pest and disease pressure, contributing to a healthier farm overall. This fact sheet offers an overview of simple and effective practices you can implement on your farm to minimize pest and disease pressure.

There isn't a silver bullet when it comes to organic pest and disease management. Many practices used in combination create a healthy system, making it harder for pests and diseases to gain a foothold. The beauty of having many tools at your disposal is that they don't all have to be implemented at once. Adopt management practices as you can, and you will see increasing resistance to pests and diseases over time.

Healthy Crops: Growing a healthy crop is a farmer's best defense against pests. A robust plant is better able to fend off pests and disease than a weak plant. Disease and pest outbreaks can be symptoms of an underlying problem, such as a nutrient deficiency or nutritional imbalance. An unhealthy plant will produce odors and signals that attract pests. Healthy transplants and good field conditions will go a long way toward decreasing pests.

Healthy, Balanced Soil: Research shows that soil fertility and the nutrient composition of a plant relate to pest and disease occurrences. Nutrient imbalance (too much or too little of specific nutrients) can cause plants to produce excess simple sugars and free amino acids, which attract many crop pests. On the other hand, a plant receiving balanced nutrients produces compounds that deter pests.

A simple way to start balancing soil nutrients is to get a soil test and follow its recommendations. Applications of compost or manure provide nutrients and contribute to increased organic matter, which makes nutrients more available to plants and improves soil structure, both of which benefit crops.

Scouting: Every successful farmer knows how important it is to

walk the fields on a regular basis. In addition to keeping an eye on crop growth, water movement, fertility patterns, etc., look for early signs of a pest or disease outbreak. Remove and burn or hot compost weak plants that show signs of disease. Monitor insect pests to see if damage goes above a certain threshold, when it may be necessary to use an organically approved treatment.

Hand Removal: For those farming on a very small scale, removing insect pests or diseased plants may be the most economical way to deal with a problem. Insects can be dropped into a pail of soapy water; diseased plants should be burned or hot composted. This method requires once- or twice-daily scouting and removal to be effective.

Cover Crops: Cover crops are grown to improve soil structure and fertility. They provide many ecosystem services, including covering the ground to reduce wind and water erosion, mining nutrients from the soil, suppressing weeds, and providing habitat for beneficial insects and microorganisms. They contribute to the overall health of a farming system. Some common cover crops include rye, oats and peas, clover, and hairy vetch.

Plant Residue: Pests can live and even overwinter in plant residue, perpetuating a problem. Remove problematic plants at the end of the season and dispose of them properly to destroy disease pathogens and insect eggs and reduce pest and disease pressure the next year. After you clean up your fields, plant a cover crop to keep the ground covered and the soil microorganisms active.

Crop Rotation: Rotating the crops grown in a field from year to year also helps disrupt pest and disease cycles. In vegetable farming, planting in blocks of specific plant families makes it easy to keep track of what was grown where and rotate every year. Keeping good records will help you manage this.

Crop Diversity: In nature, communities of diverse organisms interact to create a balanced system. Severe pest outbreaks are rare in the natural world, because the diversity of organisms creates a system of checks and balances. Growing plants in a monoculture disrupts this balance, increasing the likelihood of pest issues. Increasing your crop diversity will create habitat for more diverse organisms, including beneficial insects and microorganisms that will help keep pests at bay.

Crop Varieties: Many crop varieties have been bred for genetic pest- and disease-resistance. If you've faced a problematic pest or disease, look for organic seeds labeled resistant to that issue.

Insect Buffer Strips: Most insects have natural predators. Include strips of natural vegetation in field borders or between rows to provide habitat for these beneficial insects and other organisms. This can be as simple as not mowing some areas, or as complex as growing plants with a specific beneficial insect in mind. The closer the buffer strips are to your crop rows, the more effective the control will be.

Trap Cropping: This is the practice of planting a secondary crop near a cash crop to attract pests away from the main crop. The trap crop should be more attractive to the pest you are trying to control than the main crop.

Spacing, Airflow, Mulch: Many bacterial and fungal diseases need prolonged periods of wetness and high humidity to take hold. Planting crops at the proper spacing allows them to dry quickly after rain, with adequate airflow to keep diseases at bay. Mulching can also disperse water droplets and prevent splashing up on your crop's leaves. This can help prevent fungal and viral issues.

Insect Exclusion: Floating row cover physically excludes insects from a crop. This light, breathable, water-permeable fabric can sit directly on a crop or drape over metal hoops and be secured with landscaping staples, weights or shovelfuls of soil. This method is commonly used to keep flea beetles off brassica crops, but needs to be placed early enough to prevent infestation.

High and Low Tunnels: Air- and soil-borne diseases particularly challenge vegetable growers. Midwest farms have been hit heavily by blight, a soil- and air-borne fungal disease that affects tomatoes. Many farmers have found success growing susceptible crops under cover in a high tunnel or low tunnel. Plants grown under cover are sheltered from wind carrying fungal spores, and rain splashing soil onto leaves. High tunnels are relatively costly to put up initially, but make high-value crops quite profitable in the long run. Low tunnels are easy to erect, and much less expensive.

Pheromone Traps: Pheromone traps attract and trap or confuse specific insect pests. Sex pheromones and aggregating pheromones are the most common. The traps come in several forms, including adhesive and bags. A word of caution about pheromone traps: they can sometimes attract more insects to the area, increasing rather than decreasing the problem. Always monitor the traps, and replace them when they are full.

Companion Planting or Intercropping: Growing plants that repel certain pests near plants that are susceptible can reduce pest pressure. There is a lot of literature available on this subject. Companion planting is growing more than one crop together in the same space. This practice is most suited to gardens and very small-scale farming operations. Intercropping

by growing rows of plants near each other can yield many of the same results. Experiment to see what works in your system.

Biological Controls: You can buy beneficial insects or microorganisms to control pests and diseases. Beneficial insects, such as aphid midges, lady beetles, lacewings, and trichogramma wasps, prey on or parasitize crop pests. Maintain buffer strips for their habitat to encourage these purchased insects to stick around. Beneficial microorganisms include nematodes, viruses, and bacteria that predate or parasitize specific crop pests.

Natural and Synthetic Treatments: Even with the best management, some pest and disease issues are unavoidable. The National Organic Standards (NOS) allows a limited list of natural and synthetic treatments for dealing with pest and disease outbreaks. These should be used sparingly, as they will kill some beneficial insects and microorganisms as well as the pests. You should ALWAYS check with your certifier before applying a particular treatment, as they are sometimes mixed with prohibited substances. These are most commonly used:

Pyrethrum – a naturally occurring compound found in some species of Chrysanthemum. It is a broad-spectrum insecticide sold as a powder. Pyrethrum is different from permethrin, which is a synthetic pesticide and prohibited by the NOS.

Neem Oil – a broad-spectrum insecticide and fungicide, extracted from seeds of the neem tree, common in Africa and India. It is very safe and quite effective for many pests and diseases.

Spinosad – a natural substance produced by a type of soil bacteria that is toxic to a number of insects, particularly beetles.

Diatomaceous Earth – a powdered rock product that is inexpensive and kills insect larva and caterpillars on physical contact.

Bacillus thuringiensis (Bt) – a bacteria that kills caterpillars and some insect larvae. It is available in liquid form.

Sulfur and Copper work as fungicides, and are allowed by the NOS. Sulfur is often mixed with lime to increase its effectiveness. Use copper sparingly, as it is persistent in the soil and has negative effects on human health.

It's important to remember that treatments such as these should be used as a last resort. Pest and disease pressure on your farm is usually a sign that your system is somehow out of balance. Bring your farm into a healthy balance that mimics nature as much as possible, and you will avoid most pest and disease outbreaks. Use treatments sparingly when they are really needed. You will end up with a healthier, more robust environment, and save money and time by not applying pesticides.

MOSES Organic Specialists can answer your questions about certification or organic growing practices. See the contact information on the front of this sheet.