



MOSES ORGANIC FACT SHEET

Organic and Sustainable Pest Control

The organic and sustainable approach to pest and disease control focuses on preventative measures and the reduction of purchased inputs by utilizing a combination of cultural and biological techniques that reduce the need for sprays or other inputs. Simply substituting a “natural” spray for a “synthetic” one is not sustainable and not allowed under the National Organic Standards. Natural and synthetic pesticides allowed under the National Organic Standards are actually “restricted use.” They can only be used AFTER your other control techniques have failed.

The conventional view of pest control often focuses on treating a pest problem once it has already occurred. Organic growers focus on preventative pest control techniques that prevent or minimize pest damage—only treating when necessary. Therefore, organic growers take a holistic approach to pest management. This approach is concerned with the entire system and the interactions between the components that make up that system. These methods can potentially reduce dependence on off farm inputs and improve the bottom line.

Factors Affecting Pests

To develop a holistic pest management system, we need to determine what factors on the farm affect pest pressure:

- Climate, weather and the crops grown are basic factors that determine what pest issues may arise. All crops have natural pests that can become problematic if conditions are optimal.
- Crop diversity: The diversity of crops grown within a year has important implications on how easily pests move and reproduce among fields. Crop rotation (diversity over time), also strongly influences pest distribution.
- Native biodiversity in non-cropped areas provides habitat for pest predators and parasites which help control crop pests.
- Soil fertility is a factor in enhancing crop resistance to pests.

Climate and weather influence pest pressure because they determine the crops that can be grown in a region, and therefore the associated pests that become issues. Farmers need to know the life cycles of the pests specific to their area. Weather influences immediate pest pressures. Many bacterial and fungal diseases need prolonged periods of wetness and high humidity. Insect pressure can increase or

decrease dramatically given the right weather conditions. Climate determines what pests may be problems in an area and weather determines when the conditions are right for a potential problem. Consider this when choosing plant varieties, designing crop rotations, monitoring for pests, and choosing appropriate control materials.

Choose crop varieties with genetic resistance to pests. Resistant varieties make pest management easier because it can effectively prevent pests from becoming a problem. Most seed catalogs will list a plant variety’s resistances.

Crop diversity: Natural ecosystems contain a community of organisms, and through their interactions, these organisms create a balance. This natural balance is the reason that severe pest outbreaks are rare in the natural world. The natural balance is interrupted in an agricultural monoculture. The response of the ecosystem is to send in insects and weeds to try to restore balance—it is unnatural for a plant to grow in monoculture.

If we encourage pest predation by including strips of natural vegetation between fields, we can let the ecosystem do some of the pest control work. By keeping field sizes smaller, by growing a variety of crops and by intercropping, you can increase diversity. Crop rotation and cover crops also diversify the cropping system. A more complex landscape increases habitat for pest predators and parasites and can confuse pests, which are unable to travel easily between and within fields. Smaller field sizes (even 50 acres versus 100) increase the mobility of pest predators within the crop, while disease pressure is often reduced as well.

Plant Health—A Powerful Tool

Healthy crops are the organic producer’s best defense against pests. Research shows that soil fertility and the nutrient composition of the plant are related to pest and disease occurrence. Insects and diseases are nature’s clean-up crew; stressed plants are more susceptible to pests and disease. Disease and pest outbreaks are often symptoms of an underlying problem. Rather than treating the symptoms, the cause of the outbreak must be addressed. Problems will continue if a farmer simply chases the pest or disease with new and different “-cides.”

Insects are attracted to plants mainly based on chemical “odors” from the plant. Unhealthy, stressed or diseased

plants produce different odors and signals than healthy ones. These “stress” odors result from the differing nutrient concentrations within the plant. Conventional fertilizers can, at times, lead to an imbalance in nutrition, because these fertilizers are easily absorbed by the plant in excess. This can lead to a metabolic bottleneck where excess simple sugars and free amino acids (simple non-protein nitrogen compounds) accumulate in the plant. These accumulated compounds (and their associated odors) are highly attractive to many crop pests because they are easily digestible. Excess nitrogen fertilization is correlated with increased aphid populations, and research shows that European Corn-Borer prefers to lay its eggs on plants fertilized with soluble synthetic nitrogen fertilizers, as opposed to those fertilized with organic materials.

Simple plant sugars are important building blocks of many plant compounds and high sugar content is only a problem when the plant is unable to convert the sugars because of a nutrient imbalance. A diversity of organic inputs will provide the entire spectrum of nutrients necessary for healthy crops in the correct amounts. Properly fertilized crops can maximize photosynthesis and sugar production, while making all the secondary compounds that are necessary to minimize pest problems.

Some Treatments are Allowed

Even with the best management, some pest and disease problems are inevitable. Organic farmers are limited to natural products, and a few synthetics allowed under the National Organic Standards (NOS). Organic growers should consult the NOS to view this list. The Organic Materials Review Institute also lists approved, restricted and prohibited products. This list can be found online at www.omri.org. It should be noted that companies manufacturing the products on the OMRI list submit their products voluntarily, so just because a product is not on the list does not mean it is not approved. Organic growers should always consult their certifier BEFORE applying a new product. A certifier can also complete a review of a new product if needed.

Some approved products are relatively expensive and therefore are most often used in high value crops. Examples of organic insecticides include:

- Pyrethrum (pyrethrin), naturally occurring in some species of *Chrysanthemum*. Pyrethrum is effective as a broad-spectrum insecticide and is sold as a powder and mixed with oil—sold commercially as Pyganic®. Do not confuse pyrethrum or pyrethrin (natural and allowed) with permethrin (synthetic and prohibited). Pyrethrum is frequently mixed with piperonyl butoxide, which is prohibited. Always check the label.
- Neem oil (extracted from a tree common in Africa and India).
- Spinosad is derived from bacteria and kills insects when eaten- effective against beetles.
- Diatomaceous earth is inexpensive and can work on crawling pests such as insect larva and caterpillars. Kills insects by physical contact.
- *Bacillus thuringiensis*, or Bt, a bacterium that kills cat-

terpillars and some insect larvae such as Colorado potato beetles.

- Sulfur and copper are allowed for use as fungicides, and sulfur is often mixed with lime to increase effectiveness.

NOP regulations state that these are restricted use products—only to be used when preventative measures have failed and a documented pest problem is occurring. Producers should always call their certifier for approval before using these products. This is only a small sampling of the many products available to organic producers. Consult the NOS, OMRI and your certifier for more options.

Biological Controls

Biological controls can reduce or eliminate pest problems. An example is the release of beneficial insects which prey upon or parasitize crop pests. Beneficial predatory/parasitic insects include aphid midges, lady beetles, lacewings and *Trichogramma* wasps, which are parasites of several insect pests. Other insects are available. Beneficial insects must be replenished at certain intervals, but offer good control in many situations. Farmers can buy predators and parasites, but to keep them must provide habitat and a source of food for them and/or their larvae. Natural areas and pollinator strips help encourage these insects to stay. ArbiCo-Organics and Planet Natural are two of several companies that sell beneficial insects. There are also nematodes, viruses and bacteria that can be used as biological controls. Be aware that most organically approved pesticides will kill beneficial insects along with pests. Use them with discretion and maintain unsprayed natural areas where the beneficial insects can remain protected.

Conclusion

Farmers will never be completely free from pest problems. Even when crops are healthy and diverse, pests and diseases will occur when conditions are optimal. If farmers use some simple techniques; providing natural vegetation for beneficial insect habitat, expanding crop rotations, growing a diversity of crops, and providing balanced fertility through organic sources, pest problems can be prevented or minimized. After the initial transition period, and after incorporating these pest management techniques, many organic growers report reduced pest control costs while maintaining comparable yields. Organic agriculture is about balance and a whole-farm approach to food production.

MIDWEST ORGANIC
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The Midwest Organic and Sustainable Education Service (MOSES) provides a variety of resources for farmers interested in organic and sustainable farming. To learn more, please see:

www.mosesorganic.org