

Organic farming systems

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A green lacewing (*Chrysopa* sp.), a predator of aphids, sizes up its next meal.



Colorful prairie plants not only add aesthetic value to a roadside/field edge, but also provide a nectar source and habitat for many beneficial predatory and parasitic insects. Kalamazoo County, MI.

Organic pest management

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In agriculture, a pest is any plant (weeds), animal (insects, nematodes) or microbe (pathogens) that interferes with the production of crops. In conventional agriculture, pests are most often managed with pesticides, most of which are synthetically produced and thus prohibited for use in certified organic or transitional production. Because of this, the best approaches toward managing pests organically are to:

- ◆ Know and understand the potential pests, their life cycles and weaknesses.
- ◆ Have a diverse cropping system and good crop rotation.
- ◆ Use cover crops to build soil health and soil microbial communities.
- ◆ Use non-GMO varieties. Use varieties that are resistant to diseases whenever possible.
- ◆ Promote biological control by incorporating non-weedy flowering plants to feed and foster beneficial insects.

Developing a diverse and biologically active farm is an organic farmer's best weapon against pests. The organic field crop farmer's approach to managing diseases and insect, weed and nematode pests requires a holistic strategy that considers the potential consequences of all farm management actions. For example, harvesting alfalfa is an effective way to manage alfalfa weevil if the alfalfa is harvested before the weevil larvae can cause the greatest damage. Research has demonstrated that planting orchard grass into alfalfa can reduce potato leafhopper infestation by 30 percent when compared to pure alfalfa stands. One of the oldest pest management strategies has been to plant wheat after the Hessian fly-free date. Having a good crop rotation will promote active soil microbial communities that can decrease disease pathogens in the soil.

Some practices reduce one pest but may cause another pest to be a problem. Farmers need to keep the whole system in mind when making their decisions. For example, most plant pathologists recommend moldboard tillage to bury disease pathogens for disease management. However, research has shown moldboard tillage may increase cutworm populations. Furthermore, while early planting can reduce potential devastation from soybean rust or soybean aphid, it often results in slower crop germination and growth and can increase weed competition.

Crop rotations are extremely important to breaking up pest cycles. Research has shown that longer crop rotations (five years or more) can reduce weed populations. Having a corn-soybean-wheat/spelt rotation eliminates corn rootworm as a pest problem in corn. Diversifying the crop rotation each year also will decrease disease organisms in the soil.

Organic farmers can use beneficial and predatory insects to control insect pests. They can plant flowering and native plants in strips or along edges of fields to increase and provide energy for beneficial insects.



Long crop rotations help break weed, pest and disease cycles.

The benefits of this practice were verified at the W. K. Kellogg Biological Station (KBS) in Michigan, where field borders of grassy, weedy woodlots surrounding a soybean field yielded seven species of parasitic wasps and 11 species of predatory flies attacking soybean aphids. Much more research needs to be collected to help stimulate these biological control systems.

As a last resort, organic farmers can use organic pesticides to control insects and diseases. These products are very different than the synthetic pesticides used by conventional farmers. Specifically, they tend to be more expensive, do not last long (short residual) and target very specific pests. Organic pesticides must be listed by the Organic Materials Review Institute (OMRI) and allowed by the grower's certifier in order to be used in organic fields (www.omri.org). Growers also need to consider the impact of organic pesticides on beneficial organisms (predators, pollinators, beneficial microbes) as they are typically killed along with the pest. The repopulation and recovery time is usually quicker for the pest than it is for the beneficials, so once the decision to spray has been made, the grower is on his or her own. Below are some recommended resources available to farmers to help them further their education about weeds and pests.

Recommended resources

"Michigan Field Crop Pest Ecology and Management." Cavigelli, M. A., S. R. Deming, L. K. Probyn and D. R. Mutch (eds.). 2000. MSU Extension Bulletin E-2704. 108 pp.

ATTRA. www.attra.ncat.org/pest.html.

Dr. Doug Landis, Integrated Plant Systems Center, Michigan State University. www.nativeplants.msu.edu/.

North Carolina State University. www.organicgrains.ncsu.edu/pestmanagement/pestmanagement.htm.

"Building a Sustainable Future: Ecologically based farming systems." Chapter 2—Agricultural landscapes and ecologically based farming systems. Landis, D., J. Soule, L. Gut, S. Gage and J. Smeenk. Pp. 13-31. Chapter 3—IPM benefits of managing field borders, cover crops and other noncrop vegetation. Brewer, M. et al. Pp. 32-39. 2007. MSU Extension bulletin E-2983.

Organic Materials Review Institute. www.omri.org.

Iowa State University. www.extension.agron.iastate.edu/organicag/rr.html.

"Manage insects on your farm." M. A. Altieri, C. I. Nicholls and M. A. Fritz. Sustainable Ag Network, Beltsville, MD 20705. www.sare.org/publications/index.htm.

"Crop Rotation on Organic Farms: A Planning Manual." www.nraes.org/nra_crof.html.

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