

What is IPM?

Integrated Pest Management (IPM) aims to control the insects and diseases that attack crops and landscape plants while minimizing economic, health and environmental risks. It emphasizes natural and safe methods, using a combination of prevention, avoidance, monitoring and suppression strategies that use physical, horticultural, and biological treatments. It uses chemicals as a last resort and then only those with the least adverse environmental impact.

A successful IPM program strives to:

- Reduce costs through reduced pesticide use;
- Reduce evolutionary pressures from resistant insect populations;
- Provide benefits through the use of self-perpetuating biological control organisms;
- Conserve energy;
- Reduce public health and environmental hazards of organic chemicals.

How IPM Helps Protect Human Health

Pesticides are poisonous chemicals designed to kill a variety of plants or animals. Pesticides include insecticides, herbicides, rodenticides and fungicides. Both the active chemical compounds and the inert ingredients in pesticides may ultimately be toxic to humans and wildlife.

In general, pesticide use can impose many health and environmental risks. Continued dependence on pesticides has caused the evolution of strains of insects with a high resistance to pesticides. Outbreaks of secondary pests due to the destruction of their natural controls and, damaging impacts on wildlife have occurred because of concentrations of pesticides in various food chains.

The toxic chemicals in pesticides can be absorbed through the skin, swallowed, and/or inhaled. Many pesticides are suspected to cause birth defects, cancer, or gene mutation in humans and other animals. They can also cause headaches, dizziness, stomach and intestinal upsets, numbness of hands and feet, spasms, convulsions and heart attacks. Children, pregnant women and people with chemical sensitivities and/or asthma may be at a particularly high risk from pesticide exposure.

During routine residential applications, pesticides can drift and settle on ponds, laundry, toys, pools and furniture among other household items. They can also make their way into homes when family members and pets pick up toxic residues and track them inside. Even pesticides that the [US Environmental Protection Agency](#) has approved for residential use can and do pollute streams, rivers and the water we drink. Sometimes people do not follow the precautions on pesticide labels and apply them recklessly to their homes and gardens in large quantities even when insects or diseases have not inflicted significant damage. Generally, only a small percentage of pesticides actually reach the target. The remainder

often contaminates runoff and/or dissipates in the air. It is appropriate to ask, "Are pesticides really worth it?"

How IPM Helps the Environment

Integrated Pest Management minimizes environmental impacts by using environmentally friendly methods to control pests. IPM's preventative, monitoring, and controlling techniques serve as an alternative to routine, indiscriminate spraying of chemical pesticides. IPM techniques enhance sustainability of vital natural systems and help promote lawns, trees and shrubs that are more resistant to insects and disease. IPM protects beneficial insects since it uses little or no pesticides. IPM also reduces threats to wildlife and water quality by lessening the amount of chemicals that will reach our drinking and recreational water resources.

Elements of IPM

Prevention

Pest prevention is a fundamental IPM concept. Prevention involves removing the conditions that might attract a pest or disease or provide it with the food and environment it needs to thrive.

Pest Prevention Techniques

- Adjust planting dates to avoid certain insect life stages;
- Rotate crops to reduce pest populations;
- Practice good housekeeping indoors and out to reduce food and shelter for pests;
- Plant native species, disease and insect resistant varieties in appropriate places;
- Monitor regularly for signs of damage.

Some plants need full sun, some do better in shade. Some grow best in sandy soils, others in clay or wetlands. Some need a lot of fertilizer, others very little. Nothing does well surrounded by weeds that compete for light, fertility and water and often harbor insects and diseases. When selecting annuals, perennials, shrubs or trees make sure the soil and light conditions on your property support the particular plant's needs. Strong healthy vegetation is much less susceptible to attacks by insects or disease. Monitoring flowers, vegetables and landscape plantings for damage every two weeks during the growing season can also help reduce pesticide use. With frequent monitoring, you are more likely to spot the problem before it has a chance to get too far. If you do identify a particular insect or disease, the first consider the level of damage. Then determine the best approach. Is the loss of a couple of tomatoes worth the risk and expense of treating all your plants with toxics? Why not try physical, biological or horticultural controls?

Physical Controls

If preventative measures fail to prevent pest problems, a second strategy is to use mechanical trapping devices, natural predators including various insects and birds, insect growth regulators, pheromones or other mating disruption substances.

Pests can often times be removed by hand, or by using a strong jet of water. Other physical practices, including pruning, raking, and regular mulching also help. Mulch, for example, discourages weeds from growing, conserves moisture during drought periods allows better use of water by controlling runoff, and increases the water-holding capacity of light sandy soils. Using physical controls means taking on a more active role in pest management, without spending time and money on pesticide treatments that may harm the environment.

Horticultural Controls

Various oils have been used for centuries to control insect and mite pests. Today, [horticultural oils](#) remain an important tool to manage certain pest problems. They help control aphid and mite populations that thrive on fruit trees, shade trees, and woody ornamental plants. They can also control some plant diseases, such as powdery mildew.

Although horticultural oils have different effects on various pest populations, the end result is usually the same — safe and effective pest management. The oils may block the air holes through which insects breathe, causing them to die from suffocation.

In some cases, oils act as poisons to insects, interacting with their fatty acids and interfering with normal metabolism. Oils can disrupt how an insect feeds. They have few residual effects, and so their impact on beneficial or benign insects is minimal.

Horticultural practices such as pruning, mulching, planting pest-resistant trees and shrubs, composting decayed plant material and using it to improve soil quality also help control pest populations safely and effectively while protecting the environment from chemical overuse.

Biological Controls

[Biological control](#) is yet another safe way to manage pests without the use of chemicals. Numerous organisms that feed upon or infect insect pests exist in nature. In many cases, these organisms can prevent insects from ever reaching the "pest" status. The most common natural enemies include predators, parasites, and pathogens. Predators, including various insects, birds, bats and moles, help consume and eliminate large numbers of pests. Ladybugs, for example, help control aphids. Predatory mites feed on the eggs and small stages of various insects. Parasitic wasps have helped control gypsy moths. Parasites, however, will generally only consume one host during its lifetime. Pathogens, including fungi, bacteria, viruses and protozoa can also help protect plants from disease.

Chemical Controls

Chemical pesticides are the last resort, used only when alternative controls have been exhausted. With IPM, landscapers and homeowners use the least toxic pesticides only when a pest is actively causing serious damage. They do not spray on a calendar basis. Insecticidal soaps have been accepted as a safe chemical for aphid, mite and whitefly control.

Many commercial greenhouses now use soap regularly because whiteflies and green peach aphids have become very resistant to standard greenhouse chemicals. Insecticidal soaps act by impairing the waxy layer of insect exoskeletons, which results in the eventual death of the insect. Sulfur can be used for spider-mite control and will control some other mites, which are resistant to other mite controlling chemicals. Sulfur competes with oxygen in the blood stream. Again, IPM aims to use very few chemical treatments, if any.

What Commissions Can Do

A number of environmental commissions have worked with their municipalities to adopt IPM for public lands and facilities. Towns and school districts have passed resolutions supporting IPM. Commissions have been able to persuade their school districts to switch from periodic toxic chemical treatments to the preventative, biological and horticultural controls of IPM – for both playing fields and buildings. USEPA offers guidance on the benefits and approaches for implementing [IPM in schools](#).

In Princeton Borough and Princeton Township, The Princeton Regional Health Commission and the Joint Princeton Environmental Commission investigated IPM, and maintained that IPM would benefit the health and welfare of citizens in their effort to adopt an IPM Policy. The Princeton Township ordinance requires that golf courses maintain vegetated buffers between chemically treated turf areas and any stream in order to protect the stream from chemical runoff. In addition, a section of the ordinance required the developer to submit an Integrated Turf Management Plan as well as an IPM Plan for the proposed golf course. In West Windsor Environmental Commission actively promotes [lawn care without chemicals](#), on the town's website.

ANJEC can provide [model ordinances](#) for your Environmental Commission to consider.

For Further Information

Government agencies

- [NJDEP Pesticide Control Program](#)
- [USEPA Office of Pesticide Programs](#)

Educational and non-profit organizations

- NWF - [Lawn care without chemicals](#)
- [The IPM Institute of North America, Inc.](#)
- Clean Ocean Action on [pesticide free zones](#)
- Rutgers Cooperative Extension [Pest Management Office](#)