Integrated Pest Management (IPM) for Home Gardeners

Circular 655

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INTRODUCTION

Integrated pest management (IPM) is an approach to managing pests that seeks to limit or suppress pest populations by using a variety of compatible tactics that minimize potential harmful effects on human health and the environment. Chemical controls (insecticides) are used only as a last resort.

The concept of IPM was first developed in the late 1950s to address various issues that had arisen from the overuse of chemical controls for insect pests, including widespread environmental problems and resistance to insecticides (with consequent control failures). While IPM was originally developed in relation to insect problems, the basic approach is equally applicable to pests in the broader sense, such as weeds, nematodes, plant pathogens (i.e., disease-causing organisms), and vertebrate pests.

APPROACH

The ultimate goal of a good IPM program is to keep populations of all potential pests below the level at which a pesticide is considered necessary. This is achieved through a combination of tactics that includes cultural, biological, and physical controls, with chemical controls being used only if other measures prove inadequate. The emphasis throughout is on *managing* pests (i.e., keeping them within tolerable limits), rather than on eliminating them.

IPM begins with planning and choosing the correct plants for your particular site. Try to ensure that the plants that you select are suitable for your conditions; take into account the eventual height and width of the plants (particularly trees and shrubs), their preferences for soil type and pH (a measure of soil acidity), winter hardiness, and their tolerance of sun, shade, and drought. Plants not suited to your growing conditions will always be under some degree of physiological stress, and stressed plants are much more susceptible to pest and disease problems.

Cultural Controls

Much can be done to prevent pest problems by paying close attention to plant health and regular maintenance. Correct irrigation and fertilization are particularly important; too much or too little of either water or fertilizer can trigger pest outbreaks.

The condition of your soil is also important. Regular addition of well-composted (not fresh) plant wastes or animal manures helps increase the level of organic matter, which in turn will stimulate beneficial soil microbes and other organisms. These microbes can improve plant health by increasing the availability of certain nutrients, by helping prevent or reduce root colonization by disease-causing plant pathogens, and by stimulating the plants' own natural defenses against insect pests and diseases.

If lawns are part of your landscape, make sure that mowing heights are appropriate (setting the blades too low, for example, can create bare patches that provide sites for weed establishment)[2]. Be particularly careful when mowing close to trees and shrubs because mechanical injury from the mower can provide points of entry for pest insects or disease organisms. Try to prevent an excessive build-up of dead "thatch" at soil level (e.g., by using mechanical aeration devices) since this can reduce irrigation efficiency and encourage problems such as chinch bugs. Correct irrigation and fertilization practices are as important for your lawn as for other elements of the home garden.

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[2]See NMSU Cooperative Extension Service Guide H-505: *Mowing Your Lawn*. http://aces.nmsu.edu/pubs/_h/h-505.pdf

Follow correct procedures for pruning (including fruit trees)[3] since incorrect techniques (or timing) can stress the plants and make them more susceptible to pest problems.

Finally, sanitation techniques such as the prompt removal and destruction of virus-infected plants or insect-infested fruit may also help reduce pest and disease build-up.

Biological Controls

All insects have a range of natural enemies that help provide some degree of control. These biological control agents include predatory invertebrates such as ladybird beetles ("ladybugs"), lacewings, ground beetles, rove beetles, big-eyed bugs, pirate bugs, hover flies, and many others. Equally important, but often less visible, are the parasitoids—various species of wasps and flies that lay their eggs on or in the body of a host insect; when the eggs hatch, the developing parasitoid larva feeds on the internal tissues of the host until the host dies. At that point, the parasitoid larva usually pupates inside the dead host, and eventually a new adult parasitoid emerges. Parasitoids tend to be more restricted than predators in the number of different insects that they can successfully attack, but nevertheless can be very effective biological control agents if given the chance.

Populations of beneficial insects can be encouraged by minimizing the use of pesticides and by diversifying your plantings to include a variety of flowering plants. The adult stages of many beneficial insects benefit from having access to nectar and/or pollen, which can extend their lifespan and reproductive output, or, in some cases, sustain them when prey is scarce. Since beneficial insects differ widely in size and in their preferences for different flowers, it helps to grow a mixture of flowering species to provide a variety of flower shapes, sizes and blooming periods. The ideal is to provide continuous bloom for as much of the growing season as possible.

Larger predators such as insectivorous birds are also important predators of insects, and if sufficient space is available you might want to consider installing nest boxes to encourage them. Both birds and beneficial insects will also benefit from a regular supply of fresh water, but remember to empty and clean out the container every few days to prevent the development of mosquito larvae.

In enclosed or partially enclosed situations such as greenhouses and hoop houses, you may want to consider buying and releasing beneficial insects from a commercial insectary company. If the correct natural enemies are selected and the releases are done early enough (i.e., as soon as developing pest problems are detected and before their populations become too high), this approach can be very effective. However, it is not normally worth releasing beneficial insects in an open garden situation, as the insects will often disperse some distance away from the release site.

Physical Controls

These include both the physical removal of pests and using mechanisms designed to prevent them from reaching your plants in the first place. Hand-removal of pests, though laborious, can be effective on a small scale (e.g., with bagworms or squash bug egg masses).

Preventative approaches include the use of floating row covers to cover newly emerged seedlings or transplants before they can be colonized by pest insects. This technique is most commonly used to protect vegetable crops from either direct pests or the vectors of plant pathogens (e.g., to protect brassicas from flea beetles, or to protect tomatoes and other species from the beet leafhopper that can transmit curly top virus) (Figure 1). To be effective, care must be taken to ensure that no pests are present before the covers are installed, that there are no holes in the covers, and that a good seal is maintained between the soil and the edges of the covers. For crops that require insect pollination, the covers must be removed once flowers are produced.

Physical controls suitable for use in protected cropping situations include very fine mesh to cover ventilation openings and large-scale rolls of yellow plastic coated with insect-trapping glue; the latter will attract and capture a variety of greenhouse pests (e.g., thrips, whiteflies, and fungus gnats), but must be replaced when the trapping surface becomes saturated with either insects or wind-blown soil particles. Unfortunately, the yellow surface is

[3]See NMSU Cooperative Extension Service Guide H-156: *Tree Pruning Techniques*. http://aces.nmsu.edu/pubs/_h/h-156.pdf

Figure 1. Floating row covers used to protect newly transplanted tomato plants from beet leafhopper (vector of curly top virus).

also attractive to various beneficial insects, so avoid this technique if releasing biological control agents into the greenhouse.

Monitoring

In commercial situations, IPM usually includes a regularly scheduled program of pest monitoring together with formal treatment thresholds (also known as "action thresholds"). Application of insecticides is limited to situations when the pest population reaches the recommended treatment threshold. In a home garden, however, treatment thresholds for specific plants and pests may not be available, and pest monitoring (while still very important) tends to be more informal and less intensive.

In home gardens, monitoring for pests and beneficials may simply involve regular visual inspection of plants while carrying out other garden chores. With insect pests, feeding damage is often more noticeable than the insect itself. Many chewing insects feed in very characteristic ways that can help with diagnosis (e.g., flea beetles create small, circular "shot holes" while adult vine weevils cut semi-circular notches in the margins of attacked leaves). The presence of sap-sucking pests (e.g., aphids, scale insects, whiteflies, and mealybugs) is often first noticed by the presence of a sticky coating of "honeydew" on the surface of the leaves. This sugary waste product is excreted as the insects feed, and typically falls on the leaves underneath the colony; examining the undersurface of leaves above the honeydew will often reveal the insects responsible. If the honeydew is not washed off by rain, it may become covered by black "sooty mold"; although this fungus is unsightly, it only damages the plant indirectly by reducing the amount of light reaching the leaves. Both the honeydew and the sooty mold can be washed off with water.

Apart from careful visual checking, more formal methods of monitoring include the use of traps of various kinds (e.g., yellow sticky cards, pheromone traps, light traps, etc.). These are used for particular pests or situations, but a detailed explanation of their use lies outside the scope of this publication. Consult your local county Extension office for guidance on their use in relation to specific pests.

Insecticides

Insecticides must be chosen and applied with care. Ideally, it is best to try to use a selective product, that is, one that will kill the pest while preserving beneficial insects. Unfortunately, few such products are available for use by home gardeners; most of the commonly available products (including many so-called "organic" products) are broad spectrum in nature and will kill both pest insects and their natural

enemies. In some cases, this can result in secondary pest outbreaks, whereby spraying for one pest can create "new" pest problems through the destruction of predators and/or parasitoids that were keeping other potential pest species under control.

Before proceeding with an insecticide application, double-check that you have correctly identified the pest (otherwise your control tactics are likely to fail), that the insect is in the correct stage for treatment (some stages are easier to kill than others), and that the product you plan to use is registered for the intended purpose in New Mexico. If in doubt, contact the New Mexico Department of Agriculture. Remember that it is illegal to apply any pesticide in a manner not in accordance with the directions and instructions given on the product label.

REFERENCES

Cranshaw, W. 2004. *Garden insects of North America: The ultimate guide to backyard bugs*. Princeton, NJ: Princeton University Press.

Cranshaw, W. 1998. *Pests of the West: Prevention and control for today's garden and small farm*. Golden, CO: Fulcrum Publishing.

Ellis, B.W., and Bradley, F.M. (Eds.). 1996. *The organic gardener's handbook of natural insect and disease control: A complete problem-solving guide to keeping your garden and yard healthy without chemicals*. Emmaus, PA: Rodale Books.

Evans, A.V. 2007. *National Wildlife Federation field guide to insects and spiders & related species of North America*. New York: Sterling

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