*Backyard Gardener*
*#240*

# Insecticides

Insects become pests for a variety of reasons. First, insects can be accidentally (or intentionally) introduced to areas outside of their native range where they escape the controlling influence of their natural enemies. Second, they can be harmless until a plant or animal disease is introduced into their range that they are able to transmit (i.e. malaria). Third, we can introduce non-native plants, such as crops, and the native insects change their food preferences. Fourth, we crop the land so intensively that benign species or minor pests become major pests. In all of these cases, some form of pest management can become a necessity.

Often we reach for a synthetic insecticide to solve our pest problems. Synthetic insecticides are valuable tools in the production agricultural setting. Commercial operators are highly trained and monitor action thresholds before pesticide applications are made. In the backyard setting, we also need to monitor pest activities and damage levels before we take action. This means tolerance of some pest damage and positive identification of the pest when damage levels warrant action.

Synthetic insecticides were developed and came into widespread use during and after World War II. DDT was the first of these chemical compounds and was introduced as an insecticide in 1939. By the late 1940's, insects had started to develop resistance to it. DDT is also highly toxic to fish and accumulates in the fatty tissue of animals. For these reasons, DDT was banned from use in the United States in 1973 (it is still in use in some countries). During the years of widespread use, DDT is estimated to have saved 25,000,000 human lives by killing mosquitoes that spread malaria and lice carrying typhus. Since DDT, synthetic insecticides have become less toxic to non-target organisms. The remainder of this publication will be on specific synthetic insecticides, their advantages and disadvantages.

Malathion is probably the safest of the widely used synthetic insecticides. It remains effective for one to three days. It controls aphids, scale insects, mealybugs, leafhoppers, whiteflies, cucumber beetles, and many other insects that feed on exposed plant surfaces. It is especially useful on vegetables, and because of its short life, is less toxic to non-target insects.

Zeta-cypermethrin (Sevin) is not highly toxic to humans and quite effective against many insects. It is more toxic than malathion to bees and beneficial insects, so its use should be avoided whenever possible. It should not be applied to flowers and other plants visited by bees. Sevin comes in bait forms that are less likely to cause damage to non-target insect population. It is especially toxic to natural enemies of spider mites and outbreaks of spider mites can often be traced to the use of Sevin. Sevin remains on plant surfaces much longer than most other insecticides available to homeowners. For this reason, it is useful for controlling difficult pests such as codling moth.

Although the focus of this publication is synthetic pesticides, don't forget that there are many other insect control options that can be less toxic to non-target organisms. Among these are: horticultural oils that work mainly through suffocation; dormant oils that control over-wintering pests; soap sprays; sorptive dusts such as boric acid, silica gel, diatomaceous earth and sulfur dust that can offer some control against mites as well as many fungi; microbial insecticides such as Bacillus thuringiensis; and botanical insecticides such as pyrethrums and neem tree oil. When applying any of these products, always read the entire product label, wear the proper personal protective equipment, and apply at the proper time and under the proper environmental conditions.

Many residents' first reaction to plant-feeding insects like aphids and thrips is to apply a broad spectrum insecticide. In doing so, there are often unintended, negative consequences to non-target insects. These non-target insects include bees (and other pollinators) as well as predatory, parasitic, and benign insects.

Applications of broad spectrum insecticides such as malathion and pyrethroids often have a greater negative effect on pollinators and predators than the pest species being targeted. If you see aphids, in a week or two, you should also see ladybird beetles (i.e. ladybugs). These ladybird beetles are mating and laying eggs which hatch to produce predatory larvae that feed on aphids. Similarly, thrips have natural enemies which include predatory thrips, green lacewings, minute pirate bugs, predatory mites, and parasitic wasps. Your patience will allow those natural enemies to build up their numbers and naturally reduce pest populations.

Pollinator protection is an important consideration when considering insecticide use. Nationwide, honeybees have been declining in numbers due to a combination of factors. The phenomenon is called Colony Collapse Disorder (CCD). Known factors include varroa mites, viruses, gut pathogens, and stress induced by transportation to multiple locations across the country. In addition, environmental stressors are also being investigated for their role in CCD. These stressors include scarcity and lack of diversity of pollen and nectar, pollen and nectar with low nutritional value, limited access to clean water supplies, and accidental or incidental exposure to pesticides at lethal or sub-lethal levels.

While exact causes of CCD continue to be investigated, recent research has pointed to a class of pesticides called neonicitinoids, and specifically the active ingredient imidacloprid, as being a contributing factor in CCD. Imidacloprid is readily available in garden centers and nurseries. It is a systemic insecticide which is available in liquid and granular formulations. Imidacloprid labels include directions for use on non-bearing fruit and nut trees. Some researchers believe that imidicloprid labels have not given adequate consideration to the protection of honeybees and other pollinators. All of this to say, you might think twice before applying imidacloprid in situations where honeybees and other beneficial insects could be exposed to it.

So, how should we approach management of aphids and thrips? We should learn to tolerate some plant damage – aphids and thrips do cause some cosmetic damage, but they do not normally kill plants or totally destroy crops. If you are seeing lacewings, ladybird beetles, and other predatory insects, do not apply broad spectrum insecticides. High pressure water sprays can be used to mechanically dislodge these aphids and thrips if non-target insects are also present. Horticultural oils and soaps can be used when damage is more significant. These are best applied to non-flowering plants in the evening to further minimize risk to non-target insects, particularly pollinators.

Thrips are particularly fond of peaches and plums. You can monitor for thrips by “whipping” a branch tip onto a sheet of white paper and observing for small (1/20 inch) linear shaped insects. They are small, but their movement is visible upon careful observation. Spinosad (a fermentation product of a naturally occurring bacterium) is thought to be more effective against thrips than other pesticides. Even so, spinosad can be toxic to certain natural enemies and bees when sprayed and for about 1 day afterward; do not apply spinosad to plants that are flowering and consider late evening applications to protect beneficial and benign insects.

We can also plant pollinator friendly flowers and food plants for insect predators and parasites. Be aware that native ground and wood nesting solitary bees are also pollinators and these insects have a positive impact on the ecosystems and food plants we value. Finally, avoid using broad spectrum insecticides unless absolutely necessary. If an insecticide is warranted, use least toxic, target-specific insecticides and give consideration to pollinators and other beneficial and benign insects.

*October 12, 2024*

Adapted from original Backyard Gardener publications by Jeff Schalau, Agent, Agriculture & Natural Resources, University of Arizona Cooperative Extension, Yavapai County