

Landscape & Residential Gardens Recommendation

By Applied Bio-nomics Ltd.

OVERVIEW:

The home garden and landscape is an excellent place for all of us to learn and observe the flexibility and power of the intertwined webs of plants, insects, mites and animals. A few hours of careful observance quickly shows us that there are no “good versus bad” situations. Plants need insects and mites for pollination of their flowers, for soil creation and clean-up of old plant material, for predation or parasitism of the plant feeders and biological control of fungal diseases. Insects need plants for food and shelter, at the most basic level. In the nutritional levels, plants provide essential compounds that insects are incapable of producing on their own. Specific plants provide complex structures essential for bacteria, such as root nodules for nitrogen fixing bacteria. And then, you pick the pea and eat it.

Many of the commercially produced beneficial insects are very comfortable in outdoor landscapes. Some are native, and are therefore capable of over-wintering. Some are tropical, so will remain active after the “locals” have hunkered down for the winter, providing control until they actually freeze to death.

BENEFICIALS IN ESTABLISHED GARDENS

The first issue is chemical residue. Insecticides, as the name implies, kill insects. When chemical insecticides were first developed about 70 years ago, they were very effective. Very small amounts of these early chemicals were capable of killing almost every insect. Most were developed from chemical nerve weapons used in the Second World War. Very quickly, new and more toxic chemicals were developed as food yields increased, and home gardeners were able to effectively destroy plant feeding insects quickly and cheaply.

In the 1970’s people were beginning to realize that there were additional prices to be paid for these cheap chemicals. DDT was shown to persist in the food chain, actually concentrating in the higher order predators, such as birds and mammals (including us). In the past 20 years, new types of insecticides have been developed partly to reduce the risk to humans, but mostly to thwart chemical resistance in the insect pests. For us, this means that many of our gardens have high levels of persistent chemical residues that don’t work very well against the plant feeders anymore, but will still have an

effect on beneficial insects that have not survived the repeated chemical attacks.

So, the first step is to stop. Go through your chemical arsenal and safely dispose of the real bad ones that are now more harmful to you than they are to the “pests”. Chemicals such as diazinon, which has been banned for years in commercial production, but allowed for home owners because they are not expected to use it enough to kill them, is absorbed through your skin, and concentrates in your liver. If you have to have a few chemical weapons for your peace of mind, think of them as deterrents, only to be used as a last resort. The good news is that most chemicals are broken down over time by exposure to sunlight and temperature extremes, and will dilute from rain and watering. Typically, one month is usually a long enough period to wait before using beneficial insects.

PLANT SELECTION

It’s your garden so we aren’t going to tell you what to plant, but you need to know some basic facts. When we first started to work with woody ornamental nurseries and commercial gardens it didn’t take long for us to



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realize that there was very little business to be had selling to the “native” nurseries. Native plants, unless they have been chemically isolated, generally don’t get native pests. They fit into the intertwined systems that I referred to at the beginning. There is a native complex. Pests co-exist with their predators and parasites, and they all co-exist with the native plants.

Pests cue on stress. A stressed plant produces aromatic compounds that attract pests and their natural beneficials also. A stressed native plant will send out signals that the native web of characters will all recognize and react to. A stressed “exotic” plant will send out signals that exotic pests may recognize, but unless you just happen to have a lot of the right exotic predators and parasites visiting your garden, you will have an unchecked infestation. Severe infestations will ultimately send out universal aromatic compounds, such as the sticky honey-dew that sucking insects secrete; attracting the familiar generalists such as ladybugs and yellow jackets.

If you have exotic plants in your garden, do your best to reduce the stress for them. The more you can re-create their usual situation, the less stress they will have.

GETTING STARTED

Once the chemicals have worn off, insects and mites will begin to repopulate your garden. The pests will always show first, as many of them were there already. A good water blast will help knock down an outbreak of aphids or check an infestation of spider mites.

For both existing and new gardens, the second step to take is to apply a soil predatory mite, such as *Stratiolaelaps scimitus*. Welcome to the world of beneficial insects. Don’t worry about pronunciation; we will know what you mean. *Stratiolaelaps* is a true generalist predator. In greenhouses it is sold primarily to manage fungus gnats and thrips. Outside it does the same, but it is effective in controlling many other garden pests such as root weevils, pathogenic nematodes, over-wintering mites and anything else that has a vulnerable larval stage in the soil. Generally, one application for the life of the garden is all that is needed. *Stratiolaelaps* persists in many soil types and almost any climate. The normal rate of application is 20 liters per acre, or about 10 mites per square foot. More should be added to existing problem areas such as plants infested with Black Vine Root Weevil or in fresh beds where there is a high level of organic material.

SPIDER MITES

Few pests cause so much damage to so many plant varieties as spider mites. Many spider mites are virtually microscopic, such as the eriophyid mites. These mites can kill fully grown trees, and unless you looked at them through a microscope, you would never see them. Other mites, such as the red mite or the more common two-spotted mite, are quite a bit larger and can be seen with the naked eye. Many mites produce webbing, which also helps in spotting them before they cause permanent damage.

For plants that are susceptible to spider mites, apply *Amblyseius fallacis* as soon as possible, at a rate of 2 mites per cubic foot. The cubic rate is used to compensate for tall trees and shrubs. Therefore, a 3 foot tall Red Cedar should receive 6 mites, assuming its’ footprint is about 1 square foot. If the plant has an existing spider mite infestation, increase the rate up to 10 times with fallacis, or if the pest is the two-spotted mite, supplement with *Phytoseiulus persimilis*, at a rate of 20 mites per cubic foot.

Fallacis is a true generalist predator, feeding on and controlling almost every known pest mite, including many eriophyid mites. It is native throughout most of the Northern Hemisphere and over-winters easily. We have been working with fallacis for over 15 years and can still easily find them on plants that were inoculated 15 years ago. It is used in Montana to control spider mites in Mint. It is the best mite for control of the Bamboo mite also.

Persimilis is a predatory mite for the two-spotted spider mite. It is less expensive than fallacis, but is tropical, so it will not over-winter in cold climates. It works faster than fallacis and can tolerate webbing. It is best used as a curative when the infestation has developed webbing.

The small black beetle, *Stethorus punctillum* has been used successfully in nursery trials on Boxwood, and in commercial Raspberries. Like fallacis, it is a true generalist, but is considerably more expensive and will eventually migrate out of your garden once the spider mites have been effectively eliminated.

APHIDS

Most gardeners are quite familiar with aphids, at least with the foliar feeding stage. Aphids are a very complex



pest. Most over-winter as a soil dwelling “root aphid”, getting your plants from underneath also. The soil stage can persist for years in some species, but almost all aphids can be induced if the conditions are just right, to switch from soil dwelling to foliar feeding, and vice versa. There are many different species, showing many different sizes and colors, but they all have one thing in common- they all suck. They all produce (to varying degrees) honeydew which is their waste. If the honeydew remains on the plant for any length of time, a black sooty mold will be formed and can completely cover your plants.

The good news about aphids is they seldom cause permanent damage, unlike the less obvious spider mite. Some aphids, such as the Foxglove Aphid, are capable of causing structural damage to plants, but it is rare in outdoor situations as they prefer and need the protection of a greenhouse. Some aphids are virus vectors, but home gardeners have enough to worry about without dwelling on virus issues which are usually crop specific.

The other good news about aphids is that everybody else in the garden loves them (except you, of course). Large predators such as ladybugs, green lacewings (*Chrysoperla rufilabris*), praying mantis, yellow jackets and true bugs all will go well out of their way to stop and consume these sweet treats. Parasitic wasps and predatory midges also exist as specialists against these prolific suckers. Even ants love them, but in a different way. Ants love the excrement of the aphid- the sweet honeydew. Ants actually “farm” the aphids by harvesting the waste, standing guard over their “herd”, shepherding them, or even carrying them to new and more promising plants. They are so effective in this husbandry that the first step for aphid control is actually ant control. You must find a way to eliminate the ants in your garden. Most species of ants are hive types, servicing one Queen. Ant baits are designed to kill the Queen by tricking the worker ants to deliver the toxin to the Queen. Once the Queen dies, the hive disperses and you can go about dealing with the aphids.

If you have been paying attention, you will already have a soil predatory mite, like *Stratiolaelaps*, in your garden. This mite is very effective in controlling the soil stages of most aphids, reducing the potential of the aphids establishing in your garden. This is the only prevention that you can use.

The next step is to wait for the aphids to show up. Insect development tends to follow the accumulated heat units, so a cold spring will often delay the onslaught. Once aphids are seen in your garden, you should apply the predatory midge *Aphidoletes aphidimyza*. This native aphid predator will provide your garden with years of aphid control, cycling on the aphids during the spring, summer and fall, and then hibernating in the soil until the following spring. The normal introduction rate is 10,000 per acre, or about 0.25 per square foot, applied half in the first week and then again one week later. This is to ensure that we create an uninterrupted presence. They are sold as pupae in plastic trays with moist vermiculite. Hold the trays in a warm area, but out of direct sunlight until all of the adults have emerged. This is usually about 2 to 5 days after you receive them. Once they start to emerge, wait for 24 hours to ensure complete emergence and forced mating in the container. Release them in the garden at the end of the day, as they are mostly nocturnal and the wind has typically diminished. They are great searchers and long distance fliers, but being a midge are not strong fliers. If it is windy, release them into the plant canopy. Care should be taken to release them away from the obvious aphid infestations, forcing them to disperse and not allowing too many to go to your main target. If too many are released directly at the infestation, they will kill all of the aphids before the larvae have fed enough to pupate. My favorite technique is to crack the lid of the tray, while walking through the garden, slowing down when I get near the target plants, but ensuring an even release.

For treatments of severe infestations, always hose off the plant first with water. This technique does a few things: first, it knocks off many of the aphids, frequently breaking off their feeding tubes; second, it washes off the honeydew which would begin to cause sooty mold; and third, by washing off the excess honeydew, it gives the *Aphidoletes* adults a much clearer target, directing them to the active infestation sites only.

Usually within about 2 weeks, complete control is seen. If you don't flag the problem plants, you will have a hard time figuring out which plant caused you all of that anxiety 2 weeks earlier. In many cases, the *Aphidoletes* did the job on its own, but in most cases it had a lot of help. If you look closely, you may find an unusual looking aphid; a bit larger and a golden color. This is a parasitized aphid, the result of *Aphidius* species. These tiny wasps have an egg injection tube in place of the



stinger that we know about on other wasps. The Aphidius are native, as are other types of parasitic wasps. They too, will cycle in your garden, provided you don't kill them or chase them away with a chemical.

The main point in managing aphids is not to panic. As previously stated, aphids usually don't cause permanent damage to your plants. Simply by not using a chemical, they will ultimately come under control as they continue to secrete honeydew, attracting a vast host of natural predators and parasites. If you can't wait for the natural control or you're tired of sitting on sticky garden furniture, release a few Aphidoletes for continuous yearly control.

THRIPS

These tropical pests have proven to be adaptive. In the 30 years that they have been in the Northern Latitudes, they have discovered ways of over-wintering and many new plants to enjoy. No garden is complete without them. For most of us, these are the fast moving, skinny, "mini-earwigs" that we can easily see when we spread rose petals or stare into a chrysanthemum.

For a landscape there is very little that you can do for them or even to them. Because of their constant presence in commercial flower production, they are virtually resistant to all chemical insecticides. Because of their size and flexibility, there isn't a screen, or even structure that can stop them. If you have plants that have thrips and want to do something about that, there are a few things that you should know about thrips. They are very poor fliers, tending to hover and being directed by the wind. More than most pests, they are truly windblown. In the summer, when the field of hay is cut 2 miles upwind, you will have a few guests arriving. They will also leave your garden in the same way. They are omnivores. As much as you don't like them, and as much as they damage your plants by scraping the leaf surface, they also can eat spider mites, actually helping you to some extent. They lay their eggs into the plant material, giving them protection. Many thrips pupate in the soil, strategically breaking the plant cycle and hiding from foliar predators. In sub-tropical areas such as Florida, native thrips do exist. This means that the natural "web" is potentially there. The native thrips can out-compete the Western Flower Thrips, causing less damage.

Here is what you can do to mitigate them. There are some native predators that have decided that they like thrips. The most common one is the Minute Pirate bug (*Orius insidiosus*). It is a generalist, feeding on all sorts of plant feeders, from caterpillars to aphids to thrips. In the wild, you will most likely find Orius on nectar producing plants such as Queen Anne's Lace, Yarrow or Sunflowers. If you landscape using these types of plants, you will attract Orius into your garden where they will readily find the plant feeders. Orius is actually capable of catching and eating the adult thrips. Larval thrips are slower moving and much easier prey, so most general predators such as ladybugs and lacewings will make a meal of them. If you want something more direct, you can apply the predatory mite *Amblyseius cucumeris*. This mite, like its cousin fallacis, is a great generalist; feeding on all sorts of pests and their eggs, but it has a special fondness for thrips. It detects the emerging thrips and waits over the exit point. When the thrips sticks its' head out, the cucumeris will bite into their head and kill them. Cucumeris is also an effective spider mite predator, will eat whitefly eggs, and most importantly can survive just eating pollen. Typically one application of about 5 mites per square foot will last all season. Cucumeris is of tropical origin, so it will not survive the true winters. The presence of our old friend Stratiolaelaps in the soil will have a significant effect on thrips populations as it is about 80% effective in consuming the thrips while they are pupating in the soil.

WHITEFLY

While not as common a pest in the landscape, when they do occur they can be dreadful. Like its close relative the aphid, whitefly also sucks. They also produce honeydew which will cause sooty mold. But also like aphids, they seldom kill a plant and their damage is usually temporary.

Just like aphids, the first step is to hose them off before applying any beneficial insects. This removes the unsightly sooty mold and provides a better target for the predators.

Apply 1 *Delphastus catalinae* beetle for every cubic foot of affected plant, just once. Delphastus is a small black beetle native to Florida. It goes after all known species of whitefly and their relatives. It generally prefers to eat the eggs, but once it runs out of eggs, it will tackle all of the stages. It will not wander from your release point until it has eliminated all of the whitefly.



OTHER PESTS

We receive a lot of requests for the control of insects such as earwigs and sow bugs. While it is true that these arthropods will eat or damage your plants, in the overall scheme of things (the natural web), they are critical players. Earwigs will chomp on your flowers and climb into your artichokes, but they are also one of the main predators of caterpillar eggs. Most of the plant tissue they consume is dead material, making them a major contributor to soil creation. Sow bugs also love to chew on young seedlings, but once again, they mostly chew up all of the dead plant material which creates more soil. They are essential and just like some of your relatives; you have to put up with them (or at least you should). Seedlings can be protected by growing them away from the active garden. If you need to produce seedlings in the garden, moats or protective barriers can be applied.

BIRDS

Any fruit grower will tell you about what kind of pest birds can be, but in the natural web birds are far more important as a beneficial. Sure they will peck ripe fruit for a few weeks. I'm sure they consider it a reward for the tireless work they were doing for you for the rest of the year. Birds are the main predators of caterpillars, moths, borers, etc. Some are very well adapted and some are generalists. Swallows eat flying adult insects. Sparrows and tits eat scale and crawling insects. Woodpeckers eat boring and burrowing insect. Asparagus beetles only fear birds, as do potato beetles, flea beetles, and Japanese beetles.

Grow plants that assist birds. California quail absolutely love the Asparagus beetle. Grow plants and grasses in your garden or behind it, that support nesting and offer shelter from your cat. If you love trees, you should know that the most important tree in your garden is the dead one. This is the home for the Woodpeckers, your only friend when it comes to borers and burrowers. Dead or dying trees can be unsightly, but humans need to re-adjust their sense of aesthetics anyway. For safety reasons, dead trees in a populated landscape need to be managed, but leave the stump as high as possible, or at least 15 feet. This is too tall for your cat and offers enough protection to encourage a woodpecker into your landscape.



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