

Predator-prey cycles

in the home garden

Photos: Mike Pignéguy

To help your plants survive insect pests, **Dee Pigneguy** shows the importance of getting to know the predators and prey in your garden, and understanding their life cycles

When watching the fantail in flight capturing insects, or white-eyes scouring the branches of fruit trees, or ladybirds devouring aphids, you are seeing nature's predator-prey cycle in action. In the insect world each species is either predator or prey.

Pollinators, predators and parasites

To see the cycle in action, get to know the three Ps: the pollinators, the predators and the parasites. Pollinators, like flies, bees, bumblebees, hoverflies, butterflies, ants and beetles all fertilise flowers to provide us with fruits and vegetables. Predators, like spiders, ladybirds, praying mantis and centipedes eat insects, while the parasites like wasps and ichneumon wasps use pests like caterpillars as nurseries for their young.

When prey populations are low there will be few predators, but when there are lots of prey species, predators will increase as well. If you interfere with nature's cycle by using poisonous sprays to kill pests, the insect-eating predators will vanish as well.

Providing habitat

Planting a beneficial insect garden (or insectary) to provide homes, shade, shelter and breeding areas for insects, spiders, and lizards is a fundamental part of controlling insect pests in the organic garden. As well as plants to supply nectar and pollen you will need some 'trap' plants like calendula, nasturtium and cleome, while ponds will supply water and a special place for dragonflies and frogs.

Top: Ladybirds and aphids

Bottom from left to right:

An adult green shield beetle with a freshly-laid egg case

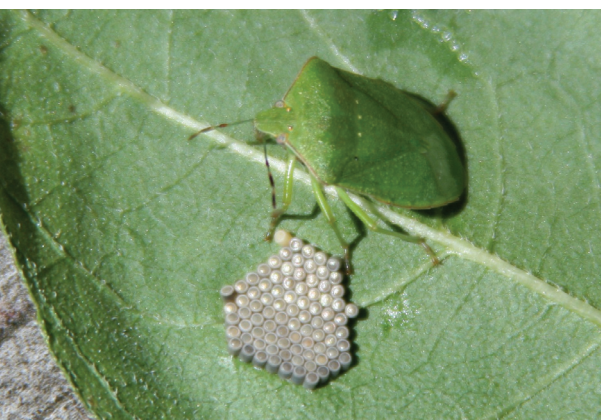
Adult passion vine hopper

A young green shield beetle seeking shelter in the developing seed head of a calendula plant

Cabbage white butterfly caterpillar

Once the eggs hatch, these 'fluffy bums' (passion vine hopper nymphs) use the mechanism in their rear ends to catapult themselves out of danger

Bees collecting nectar



Umbelliferous plants with flower clusters that look like miniature flat-topped parasols are perfect for a majority of insects. But also include phacelia, anise hyssop, borage, bergamot, a range of herbs – lavender, rosemary, thyme, sage – and let some of your carrots, parsnips, lettuces and Chinese greens go to seed.

Now get a good garden guide and make sure you can recognise the predators like lacewings, praying mantis, ladybirds, hoverflies, spiders, centipedes, rove beetles, wasps and ichneumon wasps, and dragonflies. Take note of the pests like green shield beetles, codlin moths, loopers, earwigs, passion vine hoppers, aphids, scale, and whitefly.

The following examples show the value of learning about insect life cycles, and will help you learn how to control the insect pests that are most destructive in your garden.

Passion vine hopper

The passion vine hopper laid her eggs long before the cold autumn nights killed her. Reproduction is the driving force, and after mating the female spent the summer using her short, powerful ovipositor to thrust her eggs into twigs and wooden fences. Every time she withdrew her ovipositor tiny tufts of wood fibres came out, making the tiny eggs easy to spot.

The overwintering eggs wait for the longer, warmer days of October to signal the right time for hatching into tiny, bottom-tufted, frog-like nymphs. Then, using their tubular mouthparts, they suck the sugar-laden phloem out of the new plant shoots, while using the tufts in their bottoms to catapult them out of danger. By late January

they have gone through their final moult and become sucking bugs – even though they look like small butterflies.

The window of opportunity to stop this plague is in autumn (usually March) after the eggs have been laid. So in April and May, after I have pruned all the berry fruit and kiwifruit, I check out my wooden trellises and scrape the eggs off with a small knife. When I see signs of the emerging ‘fluffy bums’ in October I use a spray made with chillies, soap and a small amount of oil. A three-week course of spray seems to keep them well in check.

Green shield beetle

The first sunny, warm days of advancing spring also reveal the first egg cases of the green shield beetles. No matter how well I trim or remove overwintering plants, unless winter provides a series of sharp frosts, one or two green shield beetles will survive to start off the next prolific generation. So it is hands-on for a search-and-destroy mission. Every morning on my way to feed the chickens I check out the new growing areas for signs of egg cases or newly hatching beetles.

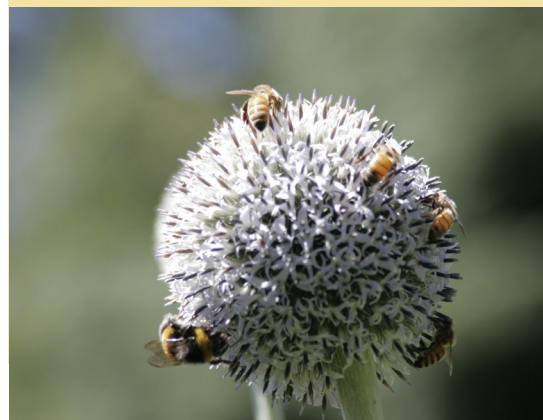
A profusion of spring-flowering calendula is the preferred trap plant. Any hatching beetles I miss will be sheltering in the centre of these colourful flowers or in the seed heads. Later in the season cleome also provides refuge for the hiding green shields.

Codlin moth

Spring brings the first signs of another serious pest in my home orchard, one that targets my apple, nashi and pear trees. The larvae of the codlin moth have been

10 ways to prevent pest attacks

- 1 Diversify plantings to provide food and homes for beneficial insects and other predators like lizards.
- 2 Be aware of the risks of pest and disease importation with soil, nursery plants and gifts.
- 3 Plan for early seed sowing and transplanting of seedlings before pest insects hatch. Use cloches to get early growth.
- 4 Use lightweight row covers to provide a microclimate and protect plants from insect and wind damage.
- 5 Hygiene: manage weeds, don't crowd plants, provide air space around them, and rotate crops. Clean up garden debris and dead plants that pests overwinter on.
- 6 Encourage birds into the garden.
- 7 Build up the soil by mulching, using animal manure and making compost. Make foliar feeders using comfrey, nettles and seaweed to increase soil fertility.
- 8 Grow trap plants. Identify insects and the host plants they need.
- 9 Check often for pests, hand pick, make organic sprays, use row covers and protection frames and deal with any problems as soon as you see them.
- 10 Make yourself familiar with insect life cycles so you can recognise the early stages, especially the newly-laid eggs. Check under leaves and watch for early signs of infestation.





Left: All over the world honey bee numbers are falling due to colony collapse disorder. Councils, park managers and urban gardeners are increasingly planting garden borders to encourage pollinating insects into garden areas

Right: At Verran Primary School (Birkenhead, Auckland) the children pick off green shield beetles and snails, and look for the beneficial insects like ladybirds, hoverflies, wasps, praying mantis and a variety of spiders

overwintering either in the flaky bark of the tree or the soil. Now the larvae will be on the move to find a place to pupate.

To trap the larvae I wrap bands of corrugated cardboard around the tree trunk and also the main branches. I replace these weekly, and burn the bands. The flightless female codlin moth emerging from the soil will crawl up the trunk to begin breeding. To stop her in her tracks I wrap strips of hessian covered in petroleum jelly around the tree trunk, securing it in place with old shoelaces or pantyhose. I check these traps weekly, destroy them and apply new ones.

During the summer months any codlin moth-damaged fruit that falls is collected and either fed to the chickens or put into containers with lids to decompose before being added to the compost heap. In the autumn I let the chickens out into my small orchard to scratch around and clean up, before sowing more seeds.

Mealy bug

Mealy bugs are sap suckers and, along with aphids, whiteflies and scale insects, belong to the Coccoidea superfamily. Their soft body is covered with a powdery white 'mealy' wax that repels water-based controls.

They insert their piercing mouthparts into plant tissue to feed on the sugary-rich sap. While removing nutrients, they excrete toxic salivary fluids into the plant tissues, spreading pathogens and viruses,

weakening the plant and causing leaves to wither and turn yellow.

Like all insects their life cycle is dependent on temperature and they prefer warm, humid, sheltered places, reaching peak infestations in spring and autumn. Eggs, which hatch into crawlers, are laid in protective eggs sacs comprised of waxy secretions. These juveniles have five moult stages before reaching adulthood.

Parasitic wasps are persistent hunters, laying their eggs in the crawlers. Upon hatching, the wasp larvae feed on the internal fluids, killing the mealy bugs when they pupate. Ladybirds and lacewing larvae also act as biological controls.

An infestation of the *Balanococcus diminutus* or flax mealy bug is easily identified by the white, furry, cotton-wool-like clusters embedded in waxy filaments around the leaf midrib. Cut back and remove all infected leaves. Watch for early signs of mealy bugs and destroy them using a cotton swab that has been dipped in alcohol. The alcohol will dissolve the protective coating. Or try using a hose and a strong burst of water directed onto the underside of the leaves to dislodge the mealy bugs.

Rhizocetus spp., which attack the roots of vegetables just below the level of the soil, are frequently not detected, and it can take three to six months for numbers to reach plague proportions. If you examine infested

roots either in the soil or in your pot plants, you will discover the crawlers, which can move from pot to pot via drainage holes. If you purchase sale plants always inspect the roots for mealy bugs and destroy infected plants.

Cicada

Cicadas are not a huge problem but many people don't recognise cicada egg-laying damage. After their noisy mating ritual in the treetops, the female cicadas insert their eggs in a variety of backyard fruit trees. Using their sharp ovipositors they slice through the bark, weakening the new branches. Within a few days tiny cicada nymphs emerge from the eggs, fall to the ground and began a long journey to their new homes amongst tree roots. Here they insert their sharp beaks into the roots to feed on sugary sap, waiting for the day when once again they will emerge from the soil, climb up the tree and begin a new cycle.

So you see, the answer is to make sure you are smarter than the insects visiting your garden! 🍷

Dee Pigneguy is the author of *Gardening For Planet Earth*; *Nature's Techno Tricks*; *The Science of Biomimetics*; and *Feed Me Right: Nutrition Know How and Body Science*. She is also a Soil & Health National Councillor.