

Pinetrees Wellness Week: Introduction to Organic Gardening

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Pest and Disease Control

An organic garden is a small ecosystem with numerous life forms – bacteria, fungi, protozoa, insects, arachnids, annelids, nematodes, molluscs, chilopods, crustaceans, amphibians, reptiles, birds and mammals. A 10 square metre garden can have thousands of life forms, most of which you'll never see!

Life forms that eat your plants are generally known as pests or 'bad bugs'. Life forms that eat pests (or help with the soil building process) are generally known as 'good bugs'. As much as we'd like to be rid of all 'bad bugs', the basic principles of ecology remind us that 'good bugs' would soon die of starvation if there were no 'bad bugs' to eat. So, to summarise thousands of pages of scientific research, a balanced and stable garden ecosystem needs 'bad bugs' and 'good bugs' – in the correct proportions. The trick is to manage the populations in a way that best suits the production of vegetables. This is done through general organic gardening practices and specific pest control practices.

General Practices

Maintain diversity. An organic garden requires a diverse range of vegetable and flower species and a diverse range of age groups (i.e. seedlings through to mature plants that have gone to seed) and plant structure (i.e. small plants, tall plants, bushy plants and flowering plants). Such diversity mimics natural ecosystems and provides a range of environmental services, including a moderated micro-climate and habitat for 'good bugs', birds and lizards.

Select the best varieties for seasonal and soil conditions. It's important for plants to be healthy and growing in optimal soil and climate conditions, as sick or stressed plants attract more pests and diseases than healthy plants. They are also less productive. Over watered and over fertilised plants are just as prone to pest and disease problems as under watered and under fertilised plants.

Select pest and disease resistant varieties. Many heirloom and improved varieties have natural or bred resistance to pests and diseases. Most seed suppliers highlight such features on their websites and packaging.

Practice successional planting and crop rotation. Many vegetable species belong to the same plant families (e.g. Broccoli, Cabbage, Cauliflower, Brussels sprout, Kale and Turnip are all part of the Brassicaceae family, while Tomato, Capsicum, Eggplant and Potato are all part of the Solanaceae family).



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Many pests and diseases are attracted to plants in the same family, and growing related plants in the same position over and over can lead to problematic pest and disease outbreaks. This can be minimised by rotating plants from different families through each planting position over time. An example is Snap Pea (Fabaceae) in winter, followed by Tomato (Solanaceae) in spring, followed by Celery (Apiaceae) in autumn, followed by Broccoli (Brassicaceae) in winter.

Add organic matter. The frequent addition of organic matter to the garden helps to break pest and disease cycles in a way similar to crop rotation. Properly made compost (see previous instructions), composted cow manure (purchased in bags from garden centres) and green manure (legume crops grown as part of your crop rotation) are all good sources of organic matter.

Use seaweed sprays regularly. Seasol and Maxicrop are both seaweed-based plant conditioning sprays that are amazingly effective at maintaining healthy and vigorous plants. We spray our plants every fortnight.

Remove underperforming plants. Plants can underperform for a variety of reasons. They may be the incorrect variety or suffer from unseasonal conditions. They may be overfertilised with nitrogen and attract sap sucking 'bad bugs' or overwatered and susceptible to root rot disease. They may be infected with fungal disease through improper handling or just be near the end of their life cycle. There are many possibilities. In any case, a sick plant is a magnet to pests and disease and can encourage large populations that upset the balance of the garden ecosystem. It's good practice to remove all underperforming plants from the garden and put them through your next 'hot compost' (see instructions in Section 5). Don't be sentimental about your plants. If they're not producing, they have no place in your garden!

Avoid unnecessary handling. Many pests and diseases spread from plant to plant via you! Sap sucking insects and fungal diseases are good examples. One way to prevent the spread of pests and disease is to avoid all unnecessary handling of your plants. This includes brushing plants with your hands or legs when you walk past. Make sure that your garden layout includes enough space to walk between your garden beds.

Spend time in your garden. This is essential – the more time you spend in the garden, the more you'll observe and the more you'll learn. On a warm spring or summer morning, you'll count dozens of life forms in your garden. Learn to identify them and watch what they do. Use an identification guide (*The Garden Guardians* by Jane Davenport is excellent) to help you distinguish between 'bad bugs' and 'good bugs'. It's also important to monitor 'bad bugs' and determine if they're a problem or not. Sometimes they can be present in large numbers but not doing any serious damage. White fly is a good example - swarms can appear from under your zucchini or basil and make you run for the Pyrethrum bottle, but more often than not the damage is minimal.



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Use broad spectrum organic insecticides only as a last resort. Pyrethrum is a great organic insecticide, but it kills 'bad bugs' and 'good bugs' indiscriminately. If you have an unacceptably large population of aphids or caterpillars that need to be removed, make sure you spray them at dawn or dusk when many of the 'good bugs' are not flying.

Manage risks. Good organic gardeners understand, accept and plan for unexpected events, seasonal variability and pest and disease damage through simple risk management. This involves the use of multiple varieties of vegetables and flowers planted at regular intervals. Good organic gardeners are also prepared to accept a percentage of crop loss (i.e. the better the gardener the lower percentage) and plant excess quantities to cover any unexpected losses.

Common Pest and Disease Control Practices

Ants have a symbiotic relationship with Aphids and encourage the growth of Aphid populations. Ants are best controlled by pouring boiling water down their nest holes.

Aphids are easily controlled with Pyrethrum spray or Eco-oil.

Bacterial diseases are best controlled with Bordeaux spray and prevented by the General Practices above. There are many recipes for Bordeaux spray – we use two teaspoons of Brickies Lime (from your local hardware shop) and one teaspoon of Copper sulphate (from your local garden centre or hardware shop) dissolved in one litre of water. A good trick is to enclose the Copper sulphate and Brickies lime in the foot of a stocking and add the stocking 'ball' to a two litre spray bottle with one litre of water. Shake the mixture until it's dissolved and then remove the stocking 'ball'. There's always some Copper sulphate that doesn't dissolve and will clog your spray nozzle unless you remove it in the stocking 'ball'.

Birds are mostly beneficial in the garden as they devour all sorts of 'bad bugs'. Sometimes, however, they can become pests. Parrots love green tomatoes in late summer and early autumn and young Magpies have great fun pulling seedlings out. It's best to cover your garden with bird netting when birds become a problem.

Caterpillars and budworms are best removed by hand - look for their tiny droppings on the top of leaves and search upward for the culprit. Large infestations are easily controlled with Pyrethrum and Dipel.

Fruit flies are best controlled by placing permeable and breathable bags over immature fruit. Otherwise, Eco-naturale combines bait and organic insecticide with some success.

Fungal diseases are best controlled with Bordeaux spray and prevented by the General Practices above. See **Bacterial diseases** above for a Bordeaux spray recipe.



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Mealy bugs are difficult to control, although Eco-oil has some success. We often just remove the affected parts of the plant (if possible) or, if the infestation is serious, remove the entire plant.

Mites are best controlled with Wettable Sulphur or Eco-oil.

Mildews are best controlled with Bordeaux spray. See **Bacterial diseases** above for a Bordeaux spray recipe. Increasing airflow and reducing overhead watering can also be effective.

Possums are a nuisance to most Australian gardeners and a major problem to some. They love most seedlings and have a particular taste for parsley, broccoli and lettuce. A hungry possum will eat most vegetables. A range of organic sprays made from garlic and chilli have mixed results in deterring possums. The safest method is to exclude them with bird netting over a structure such as a DIY 'garden guard'.

Root nematodes are best controlled by crop rotation and the addition of organic matter.

Root rot is best controlled by improving drainage and limiting water. Incorporation of organic matter is the easiest method.

Scale are best controlled with Pyrethrum spray or Eco-oil.

Snails and slugs are best removed by hand at night (particularly after rain or watering). If populations are large, we use Multiguard snail pellets to protect seedlings. These aren't organic, but are low impact - they only target snails and slugs and don't affect other life forms.

Thrips are best controlled with Pyrethrum spray.

Vegetable bugs are best removed by hand.

White flies are best controlled with Pyrethrum spray. Overhead watering can also discourage them.

Potential Pest and Disease Problems for Preferred Plants

Basil can attract caterpillars and White fly. Both can be controlled with Pyrethrum spray.

Beans are relatively pest and disease free. Some varieties are susceptible to disease. Bean fly can be controlled with Pyrethrum spray.

Beetroot is relatively pest and disease free.



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Broccoli is a favourite food source for White Cabbage Moth, which limits its productivity over summer months. Broccoli grown in autumn and winter has few pest and disease problems (other than hungry possums).

Celery is relatively pest and disease free.

Chilli is a common target for Fruit fly. Use permeable and breathable bags over immature fruit or spray with Eco-naturale.

Coriander is relatively pest and disease free.

Cucumber is susceptible to mite infestation in late summer and early autumn. Use Wettable Sulphur or Eco-oil as per directions. High humidity can lead to disease problems. Use Bordeaux spray on the underside of leaves – wait until the weather forecast is for three dry days with temperatures less than 30 degrees (Bordeaux spray in hot weather can burn plants).

Eggplant is a common target for Fruit Fly. Use permeable and breathable bags over immature fruit or spray with Eco-naturale. Use Bordeaux spray on the topside and underside of leaves to control fungal diseases - wait until the weather forecast is for three dry days with temperatures less than 30 degrees (Bordeaux spray in hot weather can burn plants).

Lettuce is relatively pest and disease free. Aphids can sometimes create problems.

Mizuna is relatively pest and disease free.

Parsley is relatively pest and disease free.

Pea is relatively pest and disease free.

Potato is prone to a range of diseases. Make sure you purchase certified disease free seed potatoes to limit potential disease problems.

Rocket is relatively pest and disease free.

Silver beet is relatively pest and disease free.

Spinach is relatively pest and disease free.

Tomato is probably the most difficult plant to grow. Budworm in the fruit is best controlled by Dipel (although complete control is difficult) and Fruit fly is best controlled by permeable and breathable bags over immature fruit or Eco-naturale spray. Use Bordeaux spray on the topside and underside of leaves to control bacterial and fungal diseases - wait until the weather forecast is for three dry days with temperatures less than 30 degrees (Bordeaux spray in hot weather can burn plants).



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With tomato, all of the General Practices above are critically important. Many gardeners still prune their tomato plants to a few strong leaders and remove the lower foliage. Our experience is that any kind of pruning encourages the spread of disease, which results poor yields. The alternative to pruning is wider spacing between plants (at least 70cm) so that the foliage of mature plants doesn't overlap. This allows better air flow and reduced humidity – both of which are important to reduce the spread of disease. Also, it's critically important not to water the tomato foliage as this encourages the spread of disease - just water the soil beneath the plant. The exception is seaweed sprays such as Seasol and Maxicrop every fortnight, which help to maintain healthy and vigorous plants.

Zucchini is prone to a range of fungal diseases in humid conditions. These can be controlled by limiting overhead watering – just water the soil beneath the plant. Half strength Bordeaux spray can also be used if necessary.



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