



Grow Great Fruit

ESSENTIALS COURSE



[WEEK 10 – EARLY WINTER]



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‘NATURAL FERTILITY’: HOW DID PLANTS GROW BEFORE ARTIFICIAL FERTILISERS?

Back in 1881, when Charles Darwin was writing about earthworms (see the next story), agriculture was a very different beast to the type of chemical agriculture our food systems are based on today. Without wanting to turn back the clock, we have a lot to “remember” about the resilient and sustainable food systems from that era, that were based entirely on natural fertility.

SO WHAT IS ‘NATURAL FERTILITY’, AND HOW DO WE CREATE IT?

Really it just describes the way plants—including food plants— have grown for millions of years, well before the invention of artificial fertilisers, which deliver soluble nutrients directly to the roots of your plants.

In commercial orchards, each year the amount of nutrient leaving the orchard as fruit is calculated, and then replaced with fertiliser (the NPK fertilisers you’ve probably heard of). Sounds logical, doesn’t it, and it forms the basis of all our modern, chemical food production systems.

So, what’s the problem? Well unfortunately artificial fertilisers damage the soil, kill your soil microbes, don’t always provide your trees with exactly what they need when they need them, are expensive (and likely to get more so in the future), and they create pollution- did you know they’re one of the biggest

contributors to greenhouse gas emissions from agriculture? Other than that, they’re great! (can you tell, we’re really not fans of artificial fertilisers...)

Natural fertility on the other hand, is based on building healthy soil that has lots of organic matter, holds a lot of water, and has a huge biodiversity of microbes (bacteria, fungi etc) as well as other animals like worms, spiders and bugs that live in the soil.

Whenever soil organisms eat organic matter, or each other (which they do, all the time) they release nutrients in a form your plants can use them. But the best bit is that your fruit trees have a special relationship with a particular type of fungi, called mycorrhizal fungi, whose job is to bring the trees exactly the nutrients they need, when they need them. It’s a sophisticated, highly evolved system of fertility that science is only just beginning to understand.

Luckily, as gardeners and fruit growers our job is really easy. All we have to do is create the right conditions for healthy soil microbes and worms to live, and everything else takes care of itself.

Worms are one of the most visible workers in your soil providing natural fertility for your trees, and we’ve covered how to create the perfect conditions for worms in our soil in Soil Organism of the Week on page 5. In the coming weeks we’ll go into detail about worm farms—different types, pros and cons, and how to build and look after a worm farm at home.

AT A GLANCE...

The best type of fertility you can provide for your fruit trees is ‘natural fertility’ that comes from building healthy soil full of organic matter, worms and microbes.

In this article we explain how the natural fertility system works and has worked perfectly well for millennia!

IS IT TOO LATE FOR A GREEN MANURE CROP?

Even though winter is here, it may not be too late to plant a green manure crop, depending on your local conditions. If you’re not too frost prone and the ground still has some warmth, the advantages of planting a green manure crop before you plant your fruit trees are so great that it’s still worth doing, even though there won’t be time for it to completely mature before you plant your trees.

Here’s the main points:

Plant a seed mixture including a legume (e.g., faba beans, peas, lupin, which is fast growing, clover, birdsfoot trefoil, fenugreek, medics, serradella or vetch) and a grass or cereal (e.g canola, linseed, barley, oats, rye or wheat). You can also include herbs in the mix.

The crop needs to be either slashed, or turned in before the trees are planted. Ideally you’d wait until the crop was mature, but before it flowered, to do this, but any growth is useful for the soil.

When the crop is turned into the soil it will heat up, so if you’re planning to dig the crop in, do it at least a couple of weeks before planting your new fruit trees, to make sure you don’t burn the roots.



Building organic matter is key to healthy soil

SPOTLIGHT ON WORMS

Charles Darwin did earthworms a huge service when he published *The Formation of Vegetable Mould Though the Action of Worms with Observations on their Habits* in 1881. It was controversial at the time as some early scientists believed that worms ate live plant roots...they don't... but it was the beginning of the scientific study that proved the valuable role that worms play in the soil. Of course farmers have always known it, but it takes scientists a while to catch up sometimes...

INTERESTING WORM FACTS

Worms are invertebrate, cold-blooded animals that absorb oxygen very efficiently through their skin, which explains why they are easily drowned by waterlogging. They have no teeth, eyes or ears, but do have a very sensitive nervous system – they are even able to learn simple tasks! They can move both forwards and backwards with ease. Worms are very sensitive to ultraviolet light, which can easily kill them.

Worms get so few diseases you could almost say they are immune to disease! This is because they carry such a strong biodiversity of healthy microbes in their gut that pathogenic (disease-causing) microbes don't get a look in!

There are thousands of species of worm, ranging in length from 1 cm to 7 m. There are more than 500 species in Australia (both native and exotic), but only about 350 have been identified. Native worms tend to prefer poor soil, and it's often the imported varieties that are doing the best work in your garden and worm farm, but they are all important, and often work together in the same space.

Worms make a great garbage disposal unit, and will eat anything that was once alive (though not until it's dead!).

Different species have different life spans, but they can live for 1–8 years; 1 year is common in compost worms.

AT A GLANCE...

Worms are one of the most visible signs that your soil is in good condition, and productive.

If you have worms, you will also have lots of microbes, but they're invisible to the naked eye!

WHAT DO WORMS DO?

- Build topsoil and improve the health of soil, partly by creating an oxygen-rich environment by tunnelling in the soil. An oxygen-rich environment favours healthy microbes ('bad' microbes prefer low oxygen). Soil with lots of worms will also have heaps of bacteria, viruses, fungi, insects, spiders and other soil animals, plus it will be rich in humus (a form of carbon that stays in the soil for a long time).
- Break down dead roots, leaves and other organic matter in the soil. Worms can eat half or more of their own weight daily, and as they do, they turn, aerate and fertilise the soil very rapidly. As they work, the soil gets increasingly healthy and nutrient rich, and will hold more water.
- Build passages in the soil allowing entry of water and air, then coat the passages with mucus, which is rich in nitrates. Plant roots can easily grow in these tunnels. As the mucus dries it hardens, which helps to build soil structure.
- Build soil by forming soil aggregates.
- Neutralise acidic soil as a result of the calcium carbonate used in their digestive process, plus some of the bacteria in their gut have a neutralising effect on the soil.
- Produce castings (yes, worm poo!)

WORM CASTINGS

Castings act as a fertiliser. As the worms digest their food, they convert some of the insoluble minerals into a plant-soluble form, and also partly break down cellulose. The bacteria and enzymes responsible for this are excreted with the castings, and the break-down process keeps going in the soil.

Worms don't create nutrients, just liberate them from the food they eat.



So, if they eat healthy plants, they liberate exactly the right nutrients needed for healthy plant growth! Vermicast is brilliant because it provides these nutrients to plants in a form they can take up. Plus, there is no excess of nitrates or phosphates, a common problem with artificial fertilisers, which cause pollution when they run-off into waterways.

CAN YOU INTRODUCE WORMS TO YOUR SOIL?

Rather than adding mature worms to your soil (where they may die if the conditions are too different from the environment in which they were raised), it's better to create the environment that worms like, and wait for them to arrive! If you don't want to wait, you can give them a head start by adding, vermicast (which contains worm eggs) to your soil, because worms that hatch in the soil tend to do better than worms that are added. That's why it's a great idea to have a worm farm as well as encourage earthworms.

ARE COMPOST WORMS THE SAME AS EARTHWORMS?

All worms are earthworms, but some species are chosen for worm farms because they prefer to feed on the surface, thrive in the warmer temperatures created around decomposing food and tend to be rapid breeding species.

The species we typically find in the soil in temperate climates are usually those that prefer to burrow and feed underground, and prefer cooler conditions. They are often much slower breeders.

WHAT DO WORMS LIKE?

- 🍏 Air
- 🍏 Moisture: you should be able to pick up a handful of material from your worm farm and squeeze a few drops out. Moisture is one of the main limiting factors of worm population growth, but, the more worms you get, the more moisture your soil will hold!
- 🍏 Food (i.e. organic matter): good diversity, not too much of any one food source. Compost worms are top feeders, and constantly eat their way upwards, leaving castings below them. In the garden or orchard, worm food is compost, mulch, fallen leaves, slashed weeds, grass or green manure crops that are mowed and left on the surface of the soil or dug in, prunings, dead

roots underground, and in fact any organic matter added to the soil from any source. It's better to harvest plants by cutting them off and letting the roots rot underground, rather than pulling them out. It's also easy to encourage and feed earthworms by burying food scraps, or building a simple worm tower in your garden (more on this next month).

- 🍏 Good drainage (worms will drown or move elsewhere if the soil is waterlogged)

WHAT DON'T WORMS LIKE?

- 🍏 Sunlight
- 🍏 Extremes of temperature. If the soil temp is too cold (10°C or below) your worms will basically become inactive, higher than about 30°C and they start finding somewhere cooler. Having good plant groundcover under your fruit trees will help to preserve the right conditions for your worms to keep working for longer. They will rapidly get overheated and disappear from bare ground.
- 🍏 Soil disturbance
- 🍏 Compaction, water-logging or anything that makes the environment anaerobic (i.e. low in oxygen)
- 🍏 Extremes of pH
- 🍏 Waterlogging

Worms are a wonderful addition to your organic garden, and will rapidly repay you in kind for providing them with the right conditions to thrive.



DO WORMS HAVE SEX?

Worms are hermaphrodites, i.e. have both male and female sex organs and produce both eggs and sperm, but most species still need to have sex with another individual to fertilise the eggs (though finding a mate must be so much easier when the whole question of gender is irrelevant!). There are so many different species of worms that they have come up with a number of unique ways of mating (some species even have up to 4 penises), and in a show of masterful self-sufficiency, some have even evolved ways of fertilising their own eggs, which gives "in-breeding" a whole new perspective!

Worms reproduce quickly, laying small cocoons, each holding up to 20 fertilised ova. If you start with 1,000 worms, 12 months later there'll be 60,000, if conditions are right.



FRUIT SELF-SUFFICIENCY MAY BE EASIER THAN YOU THINK...

Self-sufficiency sounds like it might be a lot of hard work, but when it comes to fruit, it might be much more within your reach than you realise. At the very least, it's not difficult to grow enough fruit in your home garden to eat some every week of the year, even if you have to top up with bought fruit in some seasons. How much fruit does your family eat, and how much does it cost?

This is pretty easy to work out—but can have some startling results! Firstly think about how much fruit you buy each week, including fresh fruit, dried fruit, tinned fruit and any other types of fruit you currently buy, for example fruit in yoghurt.

Use the following table as a guide to listing the types of fruit you commonly buy, and estimate the amount you spend over a whole year. We've given you 4 examples to show you how it works. A few tips:

- If you commonly end up with fruit going unused in the fruit bowl, don't include the quantity, but do include the price!
- To convert dried fruit weight to fresh weight, multiply by 5 (the actual difference in weight depends on the moisture content of the original fresh fruit, but this is good enough for our purposes)
- Record the amount you eat as the equivalent weight of fresh fruit
- It's fine to roughly estimate your habits

There may be fruit on your list that (a) is not possible to grow in your climate, or (b) you can't be bothered or don't know how to grow, so you need to exclude them from the total volume you need to grow. But if you are really aiming for fruit self-sufficiency, you can either:

- Create and explore micro-climates to find out how many types of fruit you CAN grow in your climate (include greenhouse and indoor growing, as well as microclimates you can create in the garden)
- Look for substitutes that you can grow yourself. For example, you may enjoy a banana on your cereal in the morning, but would you be just as happy with some bottled peaches (from your own garden) instead? Or, you may not want to start growing grapes to dry your own sultanas, but it's easy to substitute a different type of dried fruit for most uses.

HOW MUCH FRUIT DO YOU WANT TO GROW?

Now think about how much of your own fruit you'd like to grow, in the light of your new knowledge of how much fruit your family normally eats in a year, and how much money you spend. (Remember, the fruit from your garden will be organic, so if you are currently buying nonorganic fruit to keep the costs down, it's a great opportunity to improve the quality of your diet while reducing your costs!)

A mature, healthy fruit tree can easily yield around 20 kg of fruit each year. In fact, it can be much more than this, even up to 50 kg or more, but for the purposes of this exercise it makes sense to plan for the occasional disaster, and calculate the number of trees you need to achieve fruit self-sufficiency based on a more modest 10 kg/tree harvest.

Now make a list of the types of fruit you would like to include in your garden, including both the deciduous fruit we cover in the Grow Great Fruit Program (cherries, apricots, peaches, nectarines, plums, apples and pears) and also any

AT A GLANCE...

Are you still eating fresh fruit that grew in your garden this season? Did you bottle or preserve any fruit this year?

With the combination of growing the right quantities, good storage, and a range of preserving techniques, it's not that hard to make sure your family has access to home-grown, organic fruit all year.

TYPE OF FRUIT (ORGANIC)	YOUR FRUIT HABITS (TO HELP CALCULATE TOTAL)	AMOUNT CONSUMED EACH YEAR	ESTIMATED COST PER YEAR
Bananas	1 kg per week, average \$4 per kg, all eaten	52 kg	\$208
Sultanas	500 gm packet, once a month, (equivalent to 2.5 kg of fresh grapes) \$4.50	30 kg	\$54
Tinned peaches	300 gm tin, 2 per week when there are no fresh peaches available, so for about 6 months, \$3 per tin	16 kg	\$156
Raspberries	Special occasions, 200 gm punnet, maybe 6 times per year, \$8 per punnet	1 kg	\$48



other type of fruit you eat regularly, or that you fancy trying to grow. Your list might include:

- Citrus (oranges, lemons, cumquat, limes, mandarins, grapefruit, tangelo)
- Berries including raspberry, blackberry, blueberry, loganberry, mulberry, strawberry, cranberry, currants, gooseberry and ground cherry
- Other fruit types such as figs, loquat, feijoa, kiwi fruit, passionfruit, grapes, persimmon and pomegranate
- Exotic, tropical or unusual fruit like Chinese date (jujube), medlar, custard apples, Brazilian tree grape, jelly palm, sapote, babaco, capulin cherry, guava (pineapple, strawberry or Chilean), naranjilla, natal plum, pepino, tamarillo, bananas, dragonfruit, lychee, mango, pawpaw and pineapple.

Your choices are really only limited by your time, space, budget and willingness to try new things. Never assume something won't grow in your climate, but instead do the research about its preferred growing conditions, and think about how you can best create a micro-climate that mimics those conditions. (However trying to grow exotic fruit outside its usual climate is riskier, so be prepared to spend more time and money trying to grow things that may not prosper... but you'll have lots of fun!)

GOOD STORAGE

Even if you just stick to the 'safe' fruit that grow in pretty much any climate (as long as the winter gets cold enough), i.e. cherries, apricots, peaches, nectarines, plums, apples, pears and quinces, it's quite easy to create a harvest period in your garden of up to 6 months, by choosing the right varieties. With good storage, you can have fresh fruit available for 8 or 9 months in most seasons.

If fruit self-sufficiency is your aim, plan a good storage system at the beginning of the season. This might just be a dedicated fridge in the shed or laundry, where you store fruit throughout summer until it's to be preserved or eaten, and at the end of autumn where you put away the best of the late-season apples, pears and quinces to be used fresh for the next two or three months. Storing fruit in a cellar or other cool place can be almost as successful, as long as it's properly stored (i.e. choose only the best fruit for storage, exclude rodents, pack the fruit so the pieces are not touching each other, and check regularly to remove any fruit that has gone bad or ripened).



PRESERVING

There are so many preserving techniques that it's not hard to find at least one that will fit with your lifestyle! Freezing is probably the easiest, but the downside is that it uses the most electricity (and therefore money) for the life of the fruit. Other preserving techniques to consider include:

- Drying (solar dehydrator, a tray in the sun, electric, oven or suspended over a heater)
- Jams and jellies (i.e., preserving with sugar)
- Pickling, flavoured vinegars
- Chutneys and relishes
- Bottling
- Fruit pastes

Aiming for fruit self-sufficiency, or partial self-sufficiency, is incredibly satisfying, and you can also improve your diet, your health, your bank balance and your fun quotient!



UNDERSTOREY MANAGEMENT...

IT'S NOT "WEED CONTROL", IT'S "UNDERSTOREY MANAGEMENT"!



Healthy gardens thrive on biodiversity, which is just a fancy way of saying it's good to have a big variety of all living things in your garden, and believe it or not, that includes weeds!

Some plants get called 'weeds' just because they grow where we don't want them, but they are a useful part of a diverse garden, and often provide habitat for useful predator insects (the ones that eat the pest insects that eat your fruit!). They might also have other uses, like medicine or food, which gives us more reason to value them.

Sometimes, though, a weed will be doing more harm than good by taking more of its fair share of water and nutrient from the tree, without giving enough benefit in return. This can be true of some of the more invasive weeds like paspalum, blackberry or gorse.

If you do decide to remove a weed from under your fruit trees, think about how you want to do it.

PULLING THE WEED OUT, ROOTS AND ALL: this damages the soil by upsetting the soil fungi, but at the same time creates a great opportunity to plant something you want to grow under your tree.

- 🍏 If you're keen to increase the food you grow, use asparagus, herbs or vegies
- 🍏 You might choose to put in a nitrogen-fixing plant like clover, lucerne, peas or beans (some of which are also food plants)
- 🍏 Companion plants may include nasturtium, chamomile and elderberry
- 🍏 Plants to attract beneficial insects would include herbs like coriander, borage, dill, and tansy

SMOTHERING WEEDS: one of the advantages of removing weeds by cutting them off rather than pulling them out is that the roots will die off underground, providing wonderful organic matter for your worms and microbes. But, how do you stop the weeds regrowing?

One method is to use newspaper, cardboard or similar to smother the regrowth—similar to sheet mulching used in permaculture.

1. Use a brushcutter around the drip line and beyond to cut the weeds back to ground level
2. Place a thick sheet of wet newspaper where the root clump was (about 6 layers of newspaper works well, and seems to be more effective than cardboard)

3. Mulch over the top of that
4. Sprinkle grass seed around the outside edge around the drip line to outcompete next year's paspalum (we'd suggest choosing seed of beneficial plants)

This is a great method for persistent clumpy grasses such as paspalum because it is effective without disrupting or damaging the soil or the fruit tree roots.

KILLING WEEDS WITH CHEMICALS: There's just one thing to say about this – DON'T DO IT! Herbicides will destroy the habitat of your beneficial soil microbes very quickly, and persist in the soil for some time. Your worms will leave immediately! And do you know what happens next? Weeds will start growing again, because nature hates a vacuum, and an opportunistic weed will quickly fill the bare space in an attempt to heal the soil. You rapidly end up on a merry-go-round of trying to control nature in a way that progressively does more damage to your soil.

OTHER METHODS: steam, vinegar or boiling water can all be used to kill weeds as well, with varying degrees of effectiveness. Use them in moderation, to be sure you're not going to have a detrimental effect on your soil microbes.

A word of caution – don't use salt to kill weeds. It probably works, but kills microbes. There's no sense replacing a weed problem with a salinity problem!

LOOKING AFTER YOUR UNDERSTOREY PLANTS: It's a great idea to mow your understorey regularly, or let animals in to graze it occasionally. This puts a constant source of organic matter into the soil (both from the green parts of the weeds above the ground, if you leave it lying as mulch, as well as from the roots that are shed underground), and it also encourages the plants under your fruit trees to keep actively growing for as long as possible before they go to seed. As long as the plants—including weeds—under your fruit trees continue to grow (before they set seed), they are very effectively taking carbon out of the air and pumping it into the soil, where it is hugely beneficial not only for your fruit trees but also for worms, microbes and other plants.

Get to know your understorey plants, and before you decide to get rid of any, consider both the advantages and disadvantages of each one.



Clover is a great understorey plant

CHOOSING GOOD TREES FROM A NURSERY

Trees are usually bought from a nursery as a bare rooted tree in winter, when the tree is dormant i.e. the leaves have fallen. The nursery should have the trees "heeled-in", with the roots kept moist in sand, sawdust or straw. Before you buy a tree from a nursery, check the roots and make sure they look moist and not shrivelled. Avoid trees that have obviously been allowed to get dry.

It's not uncommon for the roots to be slightly damaged during the process of being lifted from the soil at the nursery where they were grown, and this is not usually a problem, as you'll probably prune the roots back a little when you plant the tree anyway, and that's a good opportunity to prune any damaged parts away. Obviously if there is too much root damage avoid the tree.

Trees that are being offered for sale with bare roots, for example at markets, can be a dodgy prospect, because you don't know how long the roots have been exposed, whether they've been in the sun, or how many times they've been lifted in and out of the heeling-in medium; there's just too much risk the roots will have dried out or been damaged.

Other things to look for at the nursery are:

HOW OLD IS THE TREE?

It's possible to gauge the age of the tree by counting back the 'joins' in the wood, starting at the tip of a branch. Counting back, the bark on each successive year's growth will be a bit rougher and thicker. Nursery trees will usually be 1 or 2 years old, and that's the ideal age to be planting a tree. Any older than that, and the tree is at greater risk of transplant shock, which can set it back severely or kill it.

HOW MUCH DID THE TREE GROW LAST YEAR?

Check the length of last season's growth on the tree. On a strong, healthy tree, the tree will have grown anything from 20 cm to 1 m. Any less than that is an indication that the tree might not be very healthy or vigorous.

DOES THE BARK LOOK HEALTHY?

There should be no obvious lesions, blobs of gum, or damage to the bark.

If there is, the tree may already have disease and should probably be avoided

ARE THE BUDS INTACT AND HEALTHY?

It's not uncommon for buds to be damaged during the lifting process at the nursery. If you are planning to prune the tree into a 'vase' shape (which we recommend), this involves pruning the tree to about knee height after you prune it, to encourage the tree to produce branches at the right height. Check the buds on the tree, particularly just below knee height on the trunk (or on each branch if the tree already has multiple branches), to make sure there will be at least 3 or 4 healthy buds below where you will make your first pruning cuts.

BE CAUTIOUS WITH TREES IN POTS

Trees that a nursery doesn't sell in winter are often put in pots to be sold the following year, and can end up being quite pot bound and stunted. As long as the tree has reasonable growth, and looks strong and vigorous, with fat healthy buds, it should do well when transplanted into your garden.

LOOKING AFTER THE TREE ONCE YOU'VE BOUGHT IT

Once you've bought the tree, it's up to you to keep it in good condition. It will usually be literally bare-rooted when you take it home, ie not in a pot, or covered with anything.

If it's not convenient to plant the tree within a couple of hours after purchase, then heel it in by covering the roots with some loose, moist soil, where it can stay until it's convenient to plant it.

If you'll be able to plant within a few hours, it's OK to keep the roots moist just by covering with wet newspaper, or a plastic bag (but a word of warning, make sure the tree is kept in the shade, a dark-coloured plastic bag can heat up very quickly in the sun). Once you've heeled it in properly, you've got a bit of time before you need to plant the tree.

The tree should be planted while still dormant and before the buds

AT A GLANCE...

When you buy trees from a nursery, days or weeks before you buy them they will have been lifted from the soil in which they grew, and then 'heeled in', which means they've been stored in sawdust, loose soil or some other medium to stop their roots drying out.

This is common practice, and it's not bad for the trees, as long as the roots haven't been allowed to dry out at any stage, which can kill the tree. It's worth checking the trees thoroughly before you buy.

start to swell at the beginning of spring, because the tiny root hairs start to grow at the same time. It's not good to disturb the roots after they start to grow, as this can set the tree back in its first season. As the roots start to grow before the above-ground part of the tree, it can be a bit hard to predict, so it's best to plant the tree as soon as you can—we'll have full instructions in the coming weeks.



When buying bare-rooted trees from a nursery it's vital to ensure the roots haven't dried out at any stage, and don't get dry when transporting.



SPOTLIGHT ON...APHIDS

ABOUT: Aphids are 'sucker' type pests, with piercing mouthparts. They have wings that are membranous and transparent at the tips, but thick and leathery at the base. Aphids are small (about 2mm), pear-shaped and soft bodied, and live in colonies.

Most species in Australia were introduced, but there are also about 50 native species. Most pest aphids in Australia are introduced, but there are about 50 native species. They feed by sucking nutrients out of the tree sap, but they can also transmit plant diseases.

Aphids secrete honeydew (the waste from the sap they ingest, after they've extracted nitrogen and other nutrients from it), through short tubes on their abdomen, and this can cause sooty mould to grow on the plant. Ants feed on the honeydew, and in return protect the aphids from their natural enemies—in effect they 'farm' the aphids, and will actually move aphids to new locations to provide new habitat for them.

Aphids are attracted to plants that are fed artificial fertilisers, especially high nitrogen fertiliser—yet another good reason to avoid them altogether! In balanced, organic gardens, aphids are usually not a bad problem, in fact they are usually only a troublesome pest if their many natural predators are being killed by indiscriminate use of pesticides.

GREEN PEACH APHID: *Myzus persicae*. Leaf damage can be seen as soon as the leaves unfold, the leaves start curling in on themselves, and on inspection, a colony of aphids will be found inside the curled up leaf. Affected leaves may turn yellow, shrivel and fall, and laterals can die.

BLACK CHERRY APHID: *Myzus cerasi*. Adults are shiny black when mature, but brown when young. Eggs are also shiny black. Found in masses on curled leaves at the tip of young terminal shoots in spring.

WOOLLY APHID: Mainly attacks apples, and usually found in cracks in bark, pruning scars, on new growth, or on suckers coming up at the base of the tree. Infestations can spread to fruit, covering the fruit with a sticky black mess. They prefer the shade, and are usually found on the inside of trees and undersides of lateral growth.

LIFE CYCLE: In most species females lay eggs, but they may also give birth to live young, and sometimes can do this without mating (called parthenogenesis).

The key fact about their life cycle is they overwinter as eggs around the base of buds, which gives us one of our best opportunities to control them by smothering the eggs. Woolly aphid moves down to root systems to overwinter.

MONITORING: If you visit your fruit trees weekly, you'll quickly notice any aphid infestations. It's quite easy to see aphids in most cases, but you may also notice young tip growth becoming deformed. Green peach aphids colonise the undersides of leaves on peach and nectarine trees, causing them to curl in. Black aphids will be seen as a messy black mass on the ends of branches, and woolly aphids are clearly visible because of the white waxy coating they exude.

Because aphids are leaf suckers, they can drain energy from your tree, so the first thing you might notice is a tree that looks sad and is not growing.

Start monitoring for predators, because they'll usually turn up relatively quickly and start helping to control the aphids for you.

AT A GLANCE...

There are several different types of aphid that are pests on fruit trees, but the three you're most likely to come across are black cherry aphid, green peach aphid, and woolly aphid on apples.

What they have in common is their life cycle, allowing us to interrupt it at the same place, by smothering their eggs in winter with a winter dormant spray of mineral oil.

The good news is that all aphids have plenty of predators, and even if you have a really bad outbreak, it's not too hard to get them under control.



Green peach aphids



Black aphids



Woolly aphids

PREVENTION AND TREATMENT:

The important thing with any aphid outbreak is don't panic, because an outbreak is usually followed by an explosion of predators that will eat them! Having said that, there's lots of things you can do to help control aphids and prevent them damaging your trees.

WINTER: Aphids lay eggs on leaves and branches at the end of summer, and these can be successfully smothered with a winter spray of mineral oil (also called 'winter oil' or 'white oil'), when the trees are dormant. This is not necessary unless you have had a bad aphid problem, but can be a useful tool to help get aphids under control if the outbreak in summer was really severe. It's common for aphid problems to slowly disappear over the years as you improve your soil health, tree health and biodiversity.

SUMMER: Luckily, aphids have many predators, including birds, ladybirds (and their larvae), hoverflies, lacewings, young mantids, predatory mites, spiders, earwigs and many species of wasp.

Encourage predators by NOT using any insecticides or poisons in your garden, and have a wide variety of plants to attract them.

If you detect the early stages of a black cherry aphid infestation, it's easy to prune or snap off the bunch of affected leaves and destroy them, to prevent the aphids spreading.

Other tactics include

- Encouraging predators with tree health, soil health and biodiversity
- Including yellow and white flowering plants in understorey
- Banding trees with double-sided sticky tape or horticultural glue to prevent ants guarding and 'farming' aphids
- Washing off with strong jet of water or soapy water
- Rubbing off with gloved hands, or rag dipped in rubbing alcohol
- Using home-made melia spray (see below)
- Using other home-made organic sprays that are reputed to work include garlic, clay, eucalyptus, rhubarb, tomato leaf, quassia, onion, seaweed or wormwood.
- As a last resort for really severe infestations, spot spraying with an organic pesticide like Eco-Oil or pyrethrum, but be sure to read the label carefully, and only spray the aphid colonies rather than the whole tree, to make sure you don't spray the predators, as this will just make the problem worse!

HOME-MADE MELIA SPRAY FOR APHIDS

You can make your own very effective aphid spray from the crushed seeds of the Melia tree (*Melia azedarach*, aka Queensland white cedar and Persian lilac). The kernels contain azederachtin, the same active ingredient of the Indian neem tree.

Melia are commonly used as street trees. Gather the seeds when they are ripe (light brown colour, not green) in winter (and be warned, they smell like wet dogs!). Store them somewhere the rats can't get to them, and allow them to dry over winter until they are dry and shrivelled.

The seeds have a soft outer skin and pulp. To make the spray, put the seeds in a sack and smash them with a hammer. The seed pods are really hard, so you'll need a decent sized rock or some hard surface to rest them on while you're bashing them. They need to be well crushed because the active ingredient is the oil in the kernel, not the outer pulp and flesh.

Steep the crushed seeds in water for a few hours, then strain and spray. You can add a bit of soft soap to help it stick. Once made, the spray should be used within a couple of days.

For bad infestations, spray the entire tree, but small outbreaks can be controlled with spot sprays by hand.



Melia seed pods, shrivelled in late autumn, ready to pick to make a home-made aphid spray



Melia tree in flower

MAINTENANCE PRUNING OF MATURE FRUIT TREES...

Fruit trees can be trained into lots of different shapes, and the shape you choose will often depend on what you want from your tree, primarily fruit, but also shade, beauty, shelter or food for animals. You also need to think about things like the amount of space available for the tree in your garden.

Common training systems include vase, central leader, trellis, espalier, high vase, natural or wild shape, and bush.

WHY WE LOVE VASE TREES

In most gardens, we recommend growing your tree in the vase shape, with between 6 and 10 limbs branching from the trunk quite close to ground, usually about knee height. This shape works well for home gardeners because it:

- is easy to establish and maintain
- spreads the vigour and helps to prevent the tree getting too big
- keeps most of the fruit growing where you can reach it from the ground
- allows easy access to do maintenance jobs like pruning,

thinning, picking and spraying

- creates an open tree with good air circulation that is less prone to pests and diseases
- allows more light into the tree
- is easy to keep the balance between growing fruit and wood
- allows use of small animals under the tree without losing fruit
- works well with the natural form of the tree wanting to grow its branches towards the sun

AT A GLANCE...

There are three main types of pruning:

Establishment pruning, where you establish the shape and set up the main branches the tree will have for the rest of its life.

Maintenance pruning of mature trees to control the height and shape of the tree, and encourage it to produce fruit and wood in all the right places!

Renovation pruning to bring old or neglected fruit trees back into order and production.

This month we cover the maintenance pruning of all the types of fruit trees you normally prune in winter, ie peaches, nectarines, plums, apples and pears.

MAINTENANCE PRUNING METHOD

The main upright limbs form the permanent shape of the tree, and are not usually replaced.

Most of the fruit grows on the horizontal branches ("laterals" or "side shoots") growing from the main limbs. One of the main aims of pruning is to renew these side shoots to make sure the tree stays fruitful.

Before you start, here's a reminder about some of the principles that should guide your decisions:

- Prune as little as possible to achieve your aims
- Aim to have a mix of 1, 2 and 3 year old side shoots on each limb (actual ratio depends on the type of tree, see next page)
- Practice counting back from the end of a shoot to identify the 1, 2 and 3 year old wood—there is usually a visible joint between each year's growth, and the bark is often a different colour as well.



OUR FOOLPROOF 7-STEP METHOD FOR MAINTENANCE PRUNING

1. Look at the tree, imagine what shape you want it to be (vase, bush etc)
2. Remove any dead or diseased wood. This is always the first job when pruning, and is important for two reasons:
 - Until the dead wood is gone from the tree, you can't really see what shape the tree is or wants to be
 - Removing the diseased wood is an important part of maintaining tree hygiene. Removing dead wood is easy—just get rid of all of it. But removing diseased wood is not quite that simple, and often involves finding the right balance between removing as much diseased wood as possible, but not removing too much live healthy wood in the process. Trees will often isolate disease that's got into the wood, and then continuing to grow beyond it. So a branch may have a diseased spot close to the trunk, but lots of healthy wood and fruit buds at the end of the branch. In this case, revert to the principle of "prune as little as possible to achieve your aims". Healthy looking trees can stand having a bit of diseased wood in them, and are not necessarily going to die or get sicker if you leave it there, so in each case, there's no right or wrong, you just have to make a judgement call based on the general state of health of your fruit tree.
3. Identify the permanent limbs. Do any major limbs or branches need removing?
4. Choose the easiest looking limb to start with. Start at the top of the limb, and select a shoot that defines the end of that limb – it's now called the 'leader'. If you don't need to reduce the height of the limb, just choose one of the shoots at the end of the limb that is pointing in the right direction (usually straight up, and not towards the middle of the tree), and removing any other shoots that are competing with it. However, if your tree is too tall and you want to reduce the height, choose a shoot that is about at the right height, and remove the part of the branch that is above that shoot.
5. Work your way down the limb, making a decision on every lateral or side shoot you come to. (Remember, you're aiming to have a mix of 1, 2 and 3 year old wood on the limb.) When deciding whether to cut each side shoot, ask yourself does it need to be (a) removed (b) cut back to a new shoot (c) thinned out (spur pruning) or (d) left alone? Consider:
 - Where are the fruit buds? Are they getting too far away from the limb?
 - Is it going into the centre of the vase?
 - Is it too bushy and creating shading further down the limb, maybe it needs thinning out.
 - Is it growing too vertical (ie with an acute angle to the limb), as it will compete too strongly with the limb and become another branch. Horizontal side shoots are better because they don't compete strongly with the main limb, and are more likely to bear fruit buds.
 - For at least one-third of the laterals, try to cut back to a side shoot that is close to the limb
 - Remember the 3:1 rule—remove any lateral that is more than 1/3 the diameter of the limb. If large laterals are not removed they become limbs, creating branching too high in the tree and shading out the bottom
 - **IMPORTANT:** Try not to remove a lateral or side shoot completely unless there is another to take its place
6. Now methodically work your way around the tree, pruning one limb at a time.
7. To finish, remove all the suckers (shoots that grow from below the graft union, or from the roots), as they are often stronger than the variety above the graft, and can easily take over the tree. Cut back either flat to the trunk, or close to the dirt. They can be big and may need a pruning saw.



Defining the 'leader'

before

after



GRAFTING YOUR OWN FRUIT TREES IS EASY, AND FUN!

All fruit trees that you buy from a nursery (and therefore probably most of the fruit trees in your garden) have been grafted. Why? Because it's the only way to make absolutely sure we're growing and preserving known varieties. The Jonathon apples we eat today are the same as they were a couple of hundred years ago, because they have been faithfully grafted throughout the generations. New varieties are discovered (and bred), all the time, but once a variety has been 'defined', it can only be reproduced faithfully through grafting.

Fruit trees grown from seed will still bear fruit, but they will be genetically very different to their parent because the seeds have been pollinated by fruit of a different variety. So, preserving heritage varieties, and making sure we are actually growing the variety we want are two excellent reasons for grafting.

It can also be a terrific way of improving trees in your garden that might not be performing well, for example a chance seedling that has come up, or an old, sick fruit tree that has produced a strong new

sucker from its roots, giving you a great chance to replace the sick tree without losing the strong root system.

Other reasons for grafting are:

- Changing unwanted varieties (if you planted a Red Delicious tree and no-one in the family likes them, why not change it to a Pink Lady?)
- Producing a tree in the right place, rather than having to move it
- Creating multigrafts (more than one variety of the same fruit type, eg Angelina plums and Greengage plums) or fruit salad trees (more than one type of fruit on a tree, eg plums and apricots) to increase the number of varieties in your garden.

So, having decided which trees you'll try grafting this year, you need to know your options in terms of what types of tree you can graft onto your existing tree or rootstock, so check the compatibility chart on page 11.

Grafting relies on having the scion wood (this refers to the wood of the variety you want to add to your

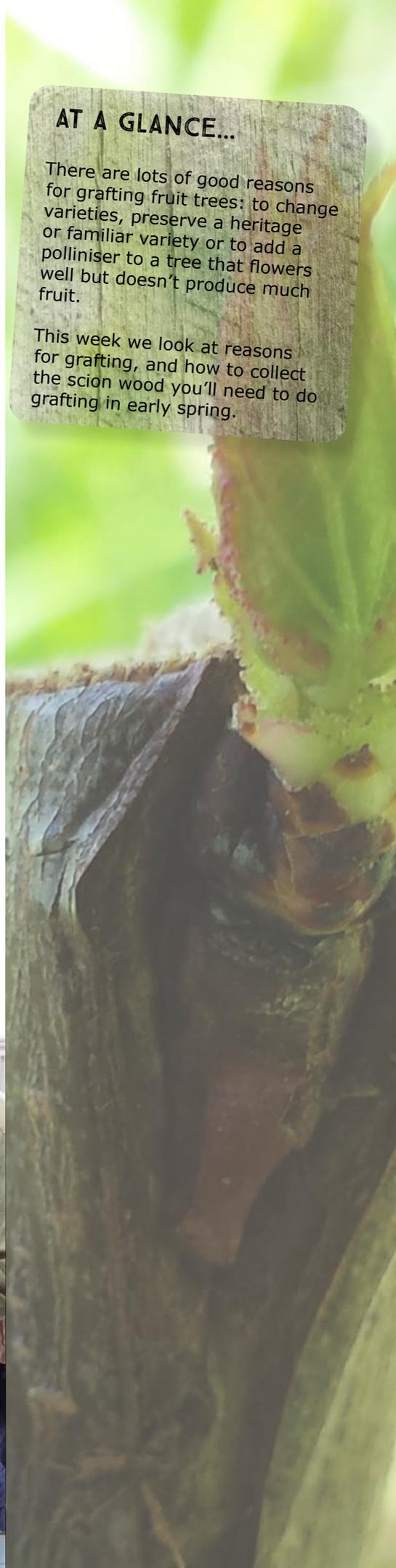
AT A GLANCE...

There are lots of good reasons for grafting fruit trees: to change varieties, preserve a heritage or familiar variety or to add a polliniser to a tree that flowers well but doesn't produce much fruit.

This week we look at reasons for grafting, and how to collect the scion wood you'll need to do grafting in early spring.



Grafting workshop held at our farm in Ha-court





A simple whip and tongue graft

garden, that you'll use for grafting) dormant, but the tree it's being grafted on to should be just coming out of dormancy in early spring. So, it's important to collect the scion wood while it is dormant, and then store it properly to prevent it breaking dormancy and starting to grow in spring.

COLLECTING GRAFTING WOOD

- Choose the variety you want to put on the tree, and find a tree of that variety. Ask around your friends and neighbours and see who has a fruit tree of the right variety in their garden—most gardeners are very generous when it comes to sharing plant material.
- The wood must be one-year-old wood, ie wood that grew the summer just gone. Clearly, this will be the wood at the end of each shoot! It will usually be a different colour than the older bark, often with a greeny tinge. Look for the clear 'join' that shows where this season's growth joins the growth from the year before.
- Scion wood must be as big and healthy as possible. Look for

new growth that is at least the diameter of a pencil. Try to get pieces that are at least as long as a pencil also. If the tree is not very vigorous and did not grow much last year, the scion wood may be thinner and shorter than this—if that's all that is available, it's still worth collecting.

- Look for well formed buds, and make sure the wood you are collecting is not diseased, and that the bark looks nice and healthy.

STORING GRAFTING WOOD

The wood needs to be kept at a nice cool temperature (but not frozen) until you do your grafting in early spring, to fool the wood into thinking it's still winter, and holding it in the dormant state. A coolroom is the perfect place to do this, if you have access to one, but a fridge will do (though it's best not to store the wood in the same place as ripe fruit, as the ethylene gas produced by the fruit can encourage the wood to break dormancy). At a pinch a cellar will do—in fact anywhere that artificially keeps the temperature of the wood lower than if it were still attached to the tree. It's also important to

keep it out of the light (trees break dormancy in response to both light and temperature).

- Wrap the wood up really well so it won't dry out, but it doesn't need to be completely airtight. Wrap it in plastic, or use supermarket or garbage bags. A few layers of plastic wrap or an old fertiliser bag will do!
- Wrap each variety separately
- LABEL THEM! Either write on the plastic bag, or bundle your scions together with tape and write on the tape, or attach a label to the bundle. Either way, make sure the label will still be visible (and readable) in a month or so when you come to do your grafting.



SPOTLIGHT ON...GUMMOSIS

ABOUT:

Gummosis is actually a defence mechanism by your fruit tree to protect itself against some sort of damage, either disease or physical. The gum exudate is a very effective way for the tree to either seal a wound, or isolate a disease pathogen and prevent it spreading further into the tree.

It's common to see dieback from a Blossom Blight infection for example, that ends at a blob of gum, and the tree will have put out fresh new growth just beyond the gum.

CAUSES:

BACTERIAL GUMMOSIS (bacterial canker) is caused by *Pseudomonas syringae*, a naturally occurring bacteria. It affects cherries, peaches, nectarines, plums and apricots and has a sour smell. Infections move from the top of the tree downwards. Infection in spring causes flowers to turn brown and die (easy to confuse with Blossom Blight). The disease is favoured by wet, windy conditions in autumn and early winter, therefore don't prune in those conditions.

FUNGAL GUMMOSIS *Botryosphaeria dothidea* has lesions centred on the lenticels or 'pores' on the bark. It is controlled by hygiene and an autumn/winter copper spray.

SUMMER CANKER *Phytophthora* is a fungal disease, also called root rot, with lesions that appear in summer and smell sickly sweet (infections caused by *Phytophthora cinammoni* have a distinct smell of cinnamon in the infected wood). The infection moves from the base of the tree upwards and is not controlled by copper sprays. The pathogenic soil fungus likes anaerobic (lack of oxygen), low organic matter and compacted soil, but it is easily out-competed by 'good' soil fungi which are favoured by aerobic (high oxygen) conditions, high levels of organic matter and loose, friable soil. Therefore the best treatment is to improve the soil with organic matter and microbes.

SOUR SAP is caused when a cold snap follows warm spring conditions.

BLOSSOM BLIGHT, caused by *Monilinia* fungal infection of the flowers, usually leads to twig blight and die-back, common in apricots, peaches and nectarines. The tree will limit the infection by producing gum at the infection site.

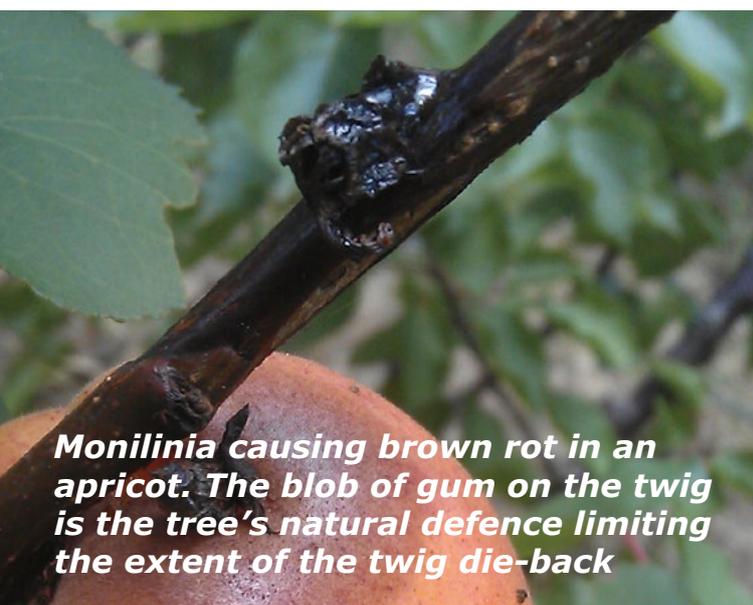
PHYSICAL DAMAGE will usually be obvious, and may be caused by branches that have broken due to a heavy load, pruning wounds or animal damage. The tree will attempt to seal the wound with gum (often very effectively), but the damage will have created an opportunity for disease to get into the tree.

MONITORING:

You'll notice gum exuding from the bark on the limb and trunks, especially on apricot trees. There might also be dieback of leaves, shoots or limbs, and a sour, or sickly-sweet smell coming from the wood.

AT A GLANCE...

Gummosis is more of a symptom than a disease, but can give some useful clues as to what's going on in your fruit trees. It may indicate your tree has a fungal disease, a bacterial disease, a root fungus or has suffered physical or environmental damage. Diagnosis of the cause, if possible, can help know which treatment to apply.



Monilinia causing brown rot in an apricot. The blob of gum on the twig is the tree's natural defence limiting the extent of the twig die-back



Gummosis caused by Phytophthora, often accompanied by a sickly sweet cinnamon smell

PREVENTION AND TREATMENT:

Copper sprays used in spring at early budswell, and in autumn when the leaves are falling freely will assist in the control of bacterial blight, fungal gummosis, leaf curl, blossom blight, shot hole and rust. In bad cases, an extra copper spray in winter may also help (depending on the cause!). Use the list above to try to diagnose the cause of the gummosis in your tree, as this will help you decide how to treat it!



USING SWALES TO KEEP RAINFALL WHERE IT BELONGS— IN YOUR SOIL!

WHAT ARE THESE SWALE THINGS, AND DO I NEED THEM?

Swales are ditches or mounds built along the contours of your land. Building them on the contour means they are level, so as rainfall runs downhill it is trapped in these swales without running off. This slows the runoff and gives the water a chance to soak slowly into the soil.

In a climate with a low rainfall, or where droughts occur (like Australia), swales are a great tool to make the most of every drop of rain that falls on your property. They are a common feature in permaculture systems, and most permaculture books include a section on swales.

Swales have multiple functions, including:

- 🍏 Catching and slowing down runoff after rainfall, allowing it to soak into the soil
- 🍏 Preventing erosion and catching topsoil that would otherwise be washed away
- 🍏 Controlling drainage on your

property to direct water where it will be useful, and not destructive

Ideally, every slope should have enough swales built on it to collect all the water in a normal rainfall event, and prevent it draining away from your land. However, they should also be designed so that excess rainfall can safely drain away without causing any damage.

To build a swale, you must first mark the contour of your land. Quite affordable laser readers are available to help you do this, but there are also a couple of simpler (and much cheaper) ways to plot contours on a small scale.

A-FRAME

Make a simple triangular A-frame from wood, making sure the legs are of equal length. Then attach some way of telling when the frame is level, either with a spirit level taped to the cross-piece as in the photo below, or by hanging a string with a weight on it from the apex, and marking the centre of the cross piece. When the string is hanging over the centre mark, the legs are at the same height. Move one leg of the A-frame along the contour line at a time, marking it as you go, and then follow the line you've marked, when you're digging the swale.

AT A GLANCE...

Every year we all get free water as rainfall, and it makes sense to plan to keep as much of this incredibly valuable resource as possible on the land where it falls.

There are two main ways of doing this, by increasing the capacity of the soil to hold moisture, and by physically changing the landscape to stop rainfall simply running off.

We talk about how to do the first one regularly...this month, we address physically changing the landscape by having a look at **swales...**



Laser levels are handy if you have a lot to do, but there are cheaper home-made alternatives



HOSE

To measure longer distances, or if you have very rough land, it can be easier to use a hose level. You'll need a piece of transparent hose, about 10-15 m long, and two sticks, say 4x2 cm wide, and about 2 m long.

Mark the sticks in cm from the bottom (or attach measuring tapes to them). Lay the two sticks side by side, and attach the hose to the sticks, so the very ends of the hose are lined up with the tops of the sticks. Attach the hose firmly to the sticks with string or tape. The middle part of the hose will be loose between the two poles.

Now, standing the poles side-by-side, slowly fill the hose with water, being careful to get rid of air bubbles, until the level is 1m high in each of the upright sections of the hose (stand pipes) when they are held together. Now, plug both ends of the hose with a cork or other stopper.

You need two people to do the measuring, one to hold each pole. One person starts somewhere on the contour line where you are planning to build a swale, the other walks ahead until the hose is pulled (but not too tight) between them, then moves their stick up or down the slope until the water is at the same height in both standpipes. The spot where the standpipe is standing on the ground is then marked, then the first person walks ahead to the next point.

HOW TO BUILD A SWALE

Building a swale is essentially a cut and fill exercise. Dig a ditch along the contour line you have marked, putting the soil you remove from the ditch on the downhill side of the ditch (this is called the berm). You can either hire a digger, or do it by hand (working on it slowly and regularly, it's possible to gradually build your swales without breaking your back!).

Winter is the ideal time to do this, because the soil will be much easier to dig, and you will get opportunities when it rains to observe the flow of water over your land.

The depth and width of your swale, and the size of your berm will depend on your slope, rainfall, soil type and intended plantings. The higher your rainfall, the more swales you will need, and the bigger they need to be if you wish to trap all the water. They are usually between 0.3 and 0.5 m deep, and between 0.5 and 1.0 m wide.

In periods of excess rainfall, swales need to have some way of safely releasing water, either a pipe outlet at one end, or built with a very slight slope to allow any overflow of water to run out the end and downhill to the next swale, or into a drain or dam. This is to prevent water washing over the top of the swale, and washing away the berm.

Swales will probably spend a good deal of time dry, and may be used as part of the transport system around your garden or farm. Some people line the bottom of them with stones or wood chips to enhance this function.

WHERE DO YOU PLANT THE FRUIT TREES?

In an arid landscape (or a drought), it's great to give your fruit trees access to all available soil moisture, which can really reduce the amount

of irrigation water you need to supply. At the same time, it's also very important to make sure your trees have good drainage, because in a high rainfall year, a huge amount of damage can be done if the roots become waterlogged for any period of time.

In our increasingly variable climate we need to be prepared for both drought and flood, so we'll be looking at how to help your soils recover from floods and water-logging in coming months.

Probably the best place to plant fruit trees is on top of the berm, or mound, where they can access the soil moisture, but will also have free drainage in times of really high rainfall, though in a higher rainfall area you may choose to plant your fruit trees uphill of the swale.

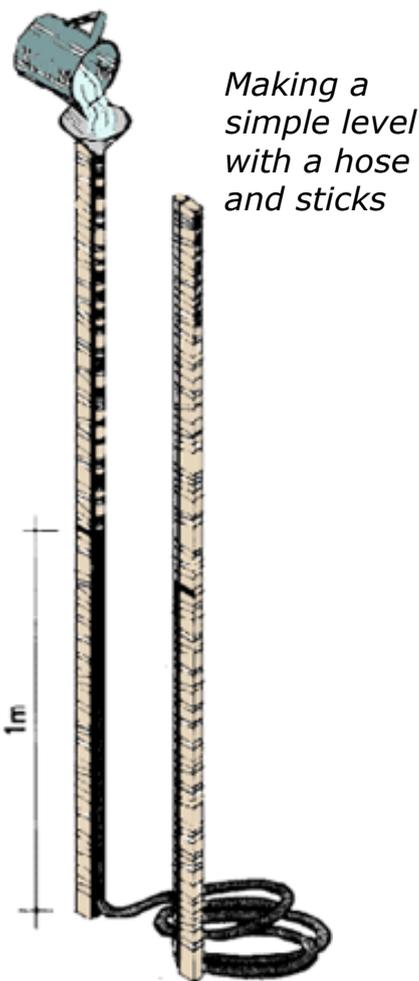
The function of the swale will eventually lead to increased soil moisture both above and below the swale, if rainfall is high enough.

You'll also still need an irrigation system to compensate for the times of low rainfall, but with swales, at least you'll be making the most out of every drop that falls!

POST-CONSTRUCTION OF A SIMPLE SWALE AROUND AN EXISTING FRUIT TREE

A simple way to add swales to your garden when you have existing fruit trees is to construct a crescent-shaped mound on the downhill side of the tree, either by the cut and fill method described above, or by building one with new soil.

The swale can be further supported with branches or logs to help the new soil stay in place while it settles down, and it's ideal to plant the top of your new berm with lots of plants that will help your fruit tree thrive, like nitrogen fixers and flowering herbs that will attract predator insects.



UNDERSTANDING THE LIFE CYCLES OF PESTS AND DISEASES

Most insects go through metamorphosis between life stages, which means they can experience big changes in body shape, diet, and habits.

Grasshoppers, mantids, dragonflies and damselflies go through simple metamorphosis with 3 stages of growth: egg, nymph and adult. Nymphs usually look similar to adults only smaller and often wingless, but they usually eat the same food source.

More complex insects (including most of the major pests of fruit trees), go through complete metamorphosis which has 4 stages: egg, larvae, pupae and adult. This is important because the larval and pupal stages are when the insects are most vulnerable to control by us! They will usually also have a different food source.

Most pest insects fall into 2 broad categories, which can help us to come up with a plan of attack!

Chewers, such as caterpillars



And suckers, such as aphids



AT A GLANCE...

The more we know about the pests and diseases that annoy us, and understand their life cycle, the more we can be clever about finding easy ways to interrupt the life cycle while they are vulnerable.

Most insects have different life stages, and are more vulnerable at some times than others.

The best form of pest and disease control will always be having healthy plants and soil, and a garden full of diversity of plants, animals, birds, insects and soil biology.

But often a little intervention from us at the right time can reduce a pest population so natural predators can deal with them more effectively.



8 KEY PRINCIPLES TO KEEP YOUR FRUIT TREES HEALTHY

Healthy trees in healthy soil are more resistant to attack from pests and diseases

1. Soil = the plant's immune system, so build healthy soil
2. Prevention is easier than cure
3. Most pests have predators (beneficial insects)
4. Encourage variety in your garden to provide habitat for beneficial insects
5. Hygiene is important – clean up fruit, diseased wood etc
6. Maintain your trees well with nutrition, pruning, water
7. Monitor your trees regularly
8. Plan your fruit tree garden so you don't waste fruit

CHEWERS

Chewers have strong, toothed jaws called mandibles, used for chewing.

This group includes stem borers, leaf eaters, leaf skeletonisers and root eaters, eg beetles, larvae, caterpillars, grasshoppers, crickets, ants and millipedes.

Chewers are susceptible to stomach poisons, repellents and to predators. They can also be picked off by hand, shaken off or vacuumed up!

For both chewers and suckers, organic pesticides are available that will kill them, but should only be used as an absolute last resort, because it's too easy to kill beneficial insects that would kill the pests you're trying to control, and you'll end up doing more harm than good!

SUCKERS

These insects have tube-like mouthparts called a proboscis which is designed to penetrate tissue. They usually feed on plant fluids which they tap directly from the plant's circulatory system (xylem and phloem), or they might suck out the contents of plant cells.

This group includes scale, aphids, mealybugs, leafhoppers, cicadas, stink bugs, harlequin bugs and thrips.

Some sucking bugs feed on other insects (these are beneficial insects), and these include lacewing larvae and some flies, some mites, spiders and centipedes.

Plant suckers affect plants by reducing their vigour, and may also spread viral and bacterial diseases. Suckers can be smothered, rubbed off, physically removed with water jets, trapped, and are vulnerable to predators.

Grasshopper damage on peaches



[Click here to listen to the audio version of this article.](#)

THE TABLE LISTS THE COMMON PESTS AND DISEASES OF FRUIT TREES, WITH TIPS ABOUT HOW YOU CAN SWOOP WHILE THEY'RE VULNERABLE!

PEST	VULNERABLE PART OF LIFE CYCLE	CONTROL METHOD
Codling moth	Larvae looking for somewhere to pupate	Trap pupae with cardboard band on trunk
	Pupae in soil	Chooks
	Newly emerged female moth	Banding around tree trunk with sticky tape or horticultural glue
	Male moth looking for mate	Mating disruption with pheromones
Pear & cherry slug	Larvae on leaves	Dust with drying agent
	Pupae in soil	Chooks
Aphids	Eggs overwintering on leaves	Smother with winter oil spray
	Adult stage	Encourage predators with a range of white and yellow flowering plants
Earwigs & garden weevils	Adults crawling up trunk into tree	Banding around tree trunk with sticky tape or horticultural glue
	Adults overwinter in soil and emerge early spring	Chooks
Carpophilus beetles	Adults looking for mature fruit to breed in	Clean up all ripe fruit from tree and ground
Fruit tree borer	Pupae live in holes in trunk for up to two years	Stick a bit of wire in the hole and wiggle!
Fruit fly	Newly hatched adults need to find protein source before they can mate	Trap and kill with protein-based trap
	Mated females need ripe fruit to lay eggs	Clean up all ripe fruit from tree and ground
Grasshoppers	Overwinter as eggs	Smother eggs with winter oil

DISEASE	VULNERABLE PART OF LIFE CYCLE	CONTROL METHOD
Leaf curl	Fungal spores become active on peach and nectarine trees at budswell, in wet weather	Apply preventive organic fungicide spray to peach and nectarine trees at budswell
Blossom blight	Fungal spores overwinter on apricot, peach, nectarine and plum trees on 'mummies' and diseased wood	Remove all 'mummies' and diseased wood from trees when pruning in winter
	Fungal spores become active in early spring in wet weather	Apply preventive organic fungicide spray in early spring, and before predicted wet weather throughout spring
Brown rot	Infections can start in apricots, peaches and nectarines during wet weather (also cherries and plums in very wet weather)	Apply preventive organic fungicide spray to trees before predicted wet weather throughout summer
	Infection can spread quickly from infected fruit to non-infected fruit	Monitor regularly and immediately remove infected fruit from the tree
Black spot	Fungal spores will germinate on apple and pear trees during wet weather in spring when the temperature is over 17°C	Apply preventive organic fungicide spray to trees before predicted wet weather in spring
	New infection in spring starts from infected leaves under trees	Clean up infected leaves and fruit under trees during winter

ABOUT US

We—Katie and Hugh Finlay—run Grow Great Fruit from our farm in central Victoria, Australia. Teaching organic fruit growing was a natural progression from growing fruit commercially for years, and being asked thousands of fruit tree questions as we were selling fruit at markets.

We've always used organic, biological and regenerative farming methods, relying on building healthy soil to grow healthy trees and fruit—so that's what we teach. The trees get their nutrients from a diversity of microbes in the soil and plant tissues and from their relationships with other plants, rather than from artificial fertilisers.

We've been orchardists since 1998, both coming to it from non-farming careers, though Katie grew up on the orchard and Hugh worked on farms in Western Australia and the Middle East before roaming the globe for many years as a travel writer for Lonely Planet.

Training in organic farming, permaculture, soil biology, compost and holistic farming (as well as years of practical, hands-on experience) has all been important in developing our growing practices, the sustainable development of the farm, the establishment of the Harcourt Organic Farming Co-op, and the ethics of what we bring to you in Grow Great Fruit.

Diverse plantings rather than monoculture, spreading risk with biodiversity, and learning how to grow your own food successfully all contribute to food security—and we're on a mission to help build a secure food future for all!



DISCLAIMER: We make every effort to ensure the information given in this program is accurate. However, as conditions and methods vary, we cannot guarantee the results, and take no responsibility for any damage or injury that may occur, no matter how caused. But relax—you'll probably grow twice as much fruit as we predict...without incident!

Staying in touch

Part of what we love about the Grow Great Fruit Program is that we're building a community of like-minded fruit growers—something we wish we'd had when we were learning how to grow fruit.

There's lots of ways to join in, ask questions, share information, swap stories, make connections, and get to know us, and other GGF members.

On the socials...

See daily photos and updates from the farm, post comments, and share your own news on our social platforms:

Visit our [Facebook](#) page.



Instagram: [GrowGreatFruit](#)



For our exclusive community...

Grow Great Fruit Forum: Post your photos and questions online to get answers and feedback about fruit growing issues. Also a great place to brag about your success! Click [here](#).

Monthly Q&A Sessions: Join the community for a face-to-face friendly group chat once a month. Bring your questions and send photos in beforehand for us to share with the group. Register from the Members Home Page [here](#).

Blog. Our blog is another way we share what's happening on the farm, and go into more detail about various aspects of organic fruit-growing. Click [here](#) to view the blog.

All the material in the Grow Great Fruit program is the property of Hugh and Katie Finlay. It is provided to you as a member of the Grow Great Fruit program, and is not to be shared or distributed in any form without written permission.

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