



Grow Great Fruit

ESSENTIALS COURSE



[WEEK 8 – MID-AUTUMN]



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ORCHARD MAINTENANCE...

WHAT IS ORCHARD MAINTENANCE, AND WHY IS IT SO IMPORTANT?

Most problems that fruit trees suffer from are caused by either fungi, bacteria, or pests, all of which have very clever ways of ensuring their ongoing survival in your garden! Luckily, we're smarter than they are, and can come up with ways to disrupt their life cycle, usually by removing the source of the ongoing infection, and often while they are in their dormant phase.

Here's the 10 key orchard maintenance rules:

1. **REMOVE** all fruit from the trees and the ground under the trees. This should be done as part of the routine monitoring during the fruit season, and after the season before winter. This effectively removes fungal spores, bacteria and the eggs of various pests. Any waste fruit can still be returned to the soil so the nutrients aren't wasted, but needs to be 'cleaned' first, either by composting or feeding to worms or some other animal. The worm castings or manure can then be put back on the soil.
2. **REMOVE** dead and damaged wood when you're pruning. The wood needs to be treated in some way before it can be used again in the soil, either by chipping and composting, using as litter in the chook pen, or burying away from the fruit trees so it can rot safely without spreading disease.
3. **KEEP** nasty, invasive, and/or unpleasant weeds under control. Invasive weeds like paspalum and blackberry can reduce the biodiversity in your garden, and directly affect the health of your fruit trees by choking out the plants you want.
4. **REPLACE** non-useful weeds with helpful or companion plants in the environment around your fruit trees. This encourages biodiversity and provides habitat for predator insects that help to keep pests under control. It's great to include some plants with deep taproots that will "mine" nutrients from deep in the soil and bring them up to make them available to your trees. You can also make best use of your space and increase the yield from your garden by growing other food-producing plants under your fruit trees.
5. **PLAN** for gluts. If you can't manage to use all the fruit you grow, it might be time to replace your existing fruit trees with more useful varieties.
6. **RECOGNISE** there is no waste and find a way to return everything the fruit tree produces to the soil. Remember, if it is diseased, it needs to go through compost, worms, and/or other animals first.
7. **MAKE** sure air can circulate freely around the trees. Judicious pruning, weed removal, grass cutting, and removing suckers all help with this, allowing better penetration and cover of organic fungicides, helping the leaves and fruit to dry faster, and reducing the chance of a fungal outbreak after rain. If not removed,

suckers can rapidly grow as big as the fruit tree, dominate the tree, and create confusion in your mind about which trunk is the "real" tree.

8. **WATER** the ground, not the tree. Sprinklers that get the leaves wet are not a good idea as they can create the ideal conditions for a fungal outbreak.
9. **ENCOURAGE** biodiversity under the soil as well as on top of it. Worms, bacteria, and fungi (as well as lots of other microbes) can all be encouraged by using compost tea, worm juice, or seaweed preparations, as well as making sure there is a constant supply of organic matter for them to eat by regularly adding compost.
10. **REMOVE** feral or unwanted fruit trees. If a tree is not of use to you, it's much better to either remove it altogether, or graft it to a more suitable variety that will be valued and used.

AT A GLANCE...

Orchard maintenance is just a grand way of describing the practice of keeping the area in and around your fruit trees clean, and free of disease producing conditions.

It's NOT about creating a manicured garden, because at the same time it's a great idea to encourage lots of different types of plants to grow near and under your fruit trees - which doesn't always result in a neat-looking garden!



SPOTLIGHT ON...CODLING MOTH

ABOUT

Codling moths are a very boring brown colour and are quite small, with only a 15 mm wing span, so it's unlikely you'll notice them. Larvae are cream coloured, about 20mm long, with dark brown head parts, and it's easy to spot them if you cut open an infected apple. They usually only affect apples and pears, though you'll occasionally see them on quinces, and occasionally on a walnut, plum, or peach.

LIFE CYCLE

The larvae pupate inside their cocoons in early spring and emerge as adult moths from mid-September to early October. The moths are active only a few hours before and after sunset, and they mate when sunset temperatures are 16°C or higher, and the air is calm. After mating each female deposits 30–70 tiny, disc-shaped eggs singly on fruit or leaves.

After the eggs hatch, young larvae seek out and tunnel into fruit, aiming for the core where they eat and damage seeds. Damaged fruit might drop to the ground.

After completing development inside the apple, the larvae leave the fruit (you'll often see separate entrance and exit holes in an infected apple - if there's only one hole, the larva's still inside!). They drop from the trees to search out pupation sites and continue the life cycle in the soil or on debris under the tree; some crawl back up the tree to pupate in bark crevices. They usually go through 2–3 cycles per year and then overwinter on trees under bark or in soil at the base of the tree.

MONITORING

A warm, dry spring speeds the development of eggs and larvae and can lead to more generations occurring during the season (usually 2 or 3). Warm autumn conditions increase the risk of late infestation. You'll see a distinct round hole on the surface of the fruit, with brown frass (which looks like fine sawdust) emerging from the hole. You should check your trees every week or two (starting at 6–8 weeks after full bloom), and remove and destroy any infected fruit, including any fallen fruit. In removing the fruit, it's important to make sure the larva inside is actually destroyed—don't just throw it in the chook pen, squash it first! Larvae can also be destroyed by putting fruit in a black garbage bag in the sun for 2 weeks.

AT A GLANCE...

What's worse than finding a grub in your apple? Finding half a grub...boom boom.

The classic "grub" in apples, codling moth larvae, is one of the most common and destructive pests of apples around the world.

By understanding its life cycle, monitoring, and treating it with vigilance throughout the season, it's possible to get this pest largely under control and ensure most of your apples and pears are grub free!



PREVENTION AND TREATMENT

Control strategies include:

- Wrapping corrugated cardboard or hessian traps around the trunk throughout summer and autumn to provide cocoon sites (the traps should be replaced regularly, and old ones burned).
- Removing bark, twigs, and litter from the forks of your apple trees and underneath the trees, and rubbing rough bark off the trunks, to reduce hiding places for cocoons.
- Banding your tree trunk with horticultural glue in spring, to prevent the movement of larvae or female moths from the ground into the tree (though the moths fly, some flutter up the trunk to lay their eggs)
- Refraining from using insecticides in your garden, as they might kill natural predators like the Trichogramma wasp. Even natural insecticides should be used with extreme caution.
- Providing habitat such as legumes in your garden to encourage predator insects that will eat the codling moth larvae.
- Planting nasturtiums and wormwood under tree is said to help repel the moths (but this is unproven)
- Letting chooks or other poultry scratch in the soil under your fruit trees a couple of times a year, especially in winter, to help get rid of any larvae in the soil.

For large gardens or where a group of neighbours can get together, mating disruption using commercial pheromone dispensers to emit massive amounts of pheromones into the air above the trees is a very effective choice, but the pheromone dispensers needs to be put out on a minimum area of 1 hectare, which costs about \$500 per hectare. The pheromones confuse male moths which are then unable to find the females.

GETTING READY TO PLANT NEW TREES...

LOOKING AFTER YOUNG TREES STARTS WITH THE SOIL, AND AUTUMN IS THE TIME TO DECIDE WHERE YOU'LL PLANT YOUR FRUIT TREES, AND START PREPARING THE SOIL BEFORE WINTER



Try to imagine how big your trees will be when fully grown.



Identify wet areas



Swales follow the contours

CHOOSING A SITE

In the southern hemisphere, a north-facing slope will provide the best growing conditions because the trees will harvest the most sunlight. Most fruit trees prefer to grow in full sunlight, but they will grow and produce fruit in a broad range of situations.

Of course, it's not always possible to find a site in full sun in a small garden if there are already large trees present—just try to plant them at a distance away from the competing tree equal to its height, to reduce competition for sunlight and water.

The spacing between trees depends on where you're planting. If it's a multiple-use area—perhaps a play area for kids, a barbecue spot, a quiet place in the garden for some garden furniture, or as part of a planting 'guild' within a permaculture design, then a distance of 4–5 meters will leave plenty of distance between trees. Even a small fruit tree can have a spread of 2–3 meters, so be aware of leaving enough room to move along paths and paved areas, but if you're trying to make small area as productive as possible, plant closer.

If you've got a dedicated orchard area (which makes it much easier to keep out predators like rabbits and birds), then trees can be planted in rows (ideally running north–south to maximise sunlight harvest) with 3–4 metres between rows, and 2–2.5 metres between trees. The trees might be pretty close when fully grown, but you can control that to some extent with pruning, and it's the most efficient use of space and infrastructure like water pipes.

It's also easy to make the orchard a multipurpose space by planting the understorey with beneficial plants, and also sharing the space with useful animals like chooks (though not necessarily all year)... we'll come back to the theory of using permaculture principles to design your orchard and create microclimates throughout the year.

When deciding where your fruit trees will go, think about all the things they can give you other than

AT A GLANCE...

Young fruit trees start life with a very small root system, so it makes sense to plant them in a welcoming environment, with a friable soil structure, good drainage and readily available nutrient while their roots get established.

Choosing the right site and preparing your soil in advance can give young trees a head start and make them more resilient in later years.

just fruit! A mature tree will probably get to 3–4 meters or more in height, so can provide some summer shade, and of course, being deciduous, they allow sun through in the winter months. This makes them a great choice for providing summer shade on the eastern or northern side of your house.

Fruit trees are beautiful all year, so can also be used to disguise ugly walls, fences, or views, and you can adjust the size and shape of the tree to suit the spot.

If planted in a chook pen or if animals are allowed to graze under the trees, windfalls or excess fruit can be part of their diet. However a word of caution - high nitrogen levels (from chook poo) and constant scratching around the roots are not ideal for good fruit production or the long term health of your tree, so it's best if the chooks can be excluded from the tree at times.

DRAINAGE

For good drainage, a gentle slope is best. On very flat ground it makes sense to mound the soil up to allow drainage away from the tree roots, however consider whether you'll be mowing, and what equipment you'll be using so you don't create problems for your equipment with mounds. Try to identify any problem wet areas in your garden, which should be obvious by the lay of the land and the type of plants that grow there. If you're not sure, watch carefully next time it rains and see where the water flows, and how long it takes to drain away.

If you want to plant trees in a wet spot, think about putting some underground drainage pipes in before



Building a swale

you plant, because sooner or later you'll have a really wet season, and having good drainage installed can save a heap of trees! Also choose fruit types for those areas that are more tolerant of wet feet, such as pears and plums.

On sloping ground, building swales slows water down as it runs off a landscape, and lets it soak into the soil, even on a very gentle slope. Depending on your climate and typical rainfall, it's usually best to plant trees on the edge of a swale rather than in the bottom, to allow drainage in periods of excessive rain and waterlogging.

Swales are a very simple idea—basically they are gutters built along the contour of a slope, which capture water as it flows down the slope. This slows the movement of the water, allowing it to soak into the soil, and prevents erosion of the soil caused by rushing water.

They're built on the contour of the land, but should slope very gently in one direction so excess water can flow off rather than breaking over the edge of the swale which would soon cause erosion and wreck the swale.

Swales can be built to flow from one to the next down a slope, ending in a pond or dam at the bottom of the slope. If building swales, also consider whether there will be run-off water from roads, paved areas, or buildings, and how that water can be slowed down with swales, or directed into dams or tanks.

In a world with a rapidly changing environment, it makes sense to plan for both extreme drought and extremely wet conditions in our gardens. Fruit trees vary in their tolerance to soil moisture, but none like a heavy

waterlogged soil for very long. However they also need a fair bit of water; swales help to maximise the value of rain, while allowing for good drainage.

You'll also need to plan how you're going to water your new trees before you plant. They don't need watering in (unless you're planting in severe drought conditions), but the irrigation needs to be ready to go by early spring.

SOIL AND ORGANIC MATTER

Fruit trees prefer a sandy loam soil with good drainage. However they're pretty tough, and it's worth planting fruit trees in whatever soil type you have. The poorer your soil, the more benefit you'll get from doing some work to improve the soil before you plant.

ORGANIC MATTER can be added to the soil by adding anything that was once alive—animal or vegetable! It has loads of benefits: supporting the "soil food web" of microbes that live in the soil and bring nutrients directly to your tree's roots, it helps the soil to hold more water, and it helps your tree to be resistant to pests and diseases.

COMPOST is the best source, but any type of garden waste can be chipped or shredded and added to the soil, buried, or used as mulch such as straw, leaves, weeds you've pulled up, remnants from the vegie bed, or well-rotted or composted animal manures. Dead animals, if buried, will also break down and help make your soil rich and spongy—this can be a great use for pests such as rabbits, and kill two birds with one stone!

If you've got lots of clay in your soil you might also incorporate small amounts of gypsum or lime before you plant, as well as large quantities of organic matter.

"GREEN MANURES" are another way of improving soil before you plant your trees, as you'll see in this week's video. Green manures are crops grown to improve the soil condition and nutrition. They can help crowd out the weeds you don't want, and some even get rid of soil diseases. Instead of being harvested, the crop is dug into the soil while still lush and green, when it has a high nitrogen and moisture content, and provides an ideal food source for soil microbes, worms and other soil creatures.



Making your own compost—very satisfying, and a great way to recycle organic matter and keep it on the property

WHEN SHOULD I PICK MY PEARS?

PERFECTLY RIPE, JUICY PEARS SHOULD PROPERLY BE EATEN NAKED, IN THE BATH...BUT PEARS NEED TO BE PICKED UNRIPE AND COOLSTORED BEFORE RIPENING, SO HOW DO YOU TELL WHEN TO PICK THEM?

Pears need to be picked slightly immature and then cold stored in the fridge, preferably at about 0°C (the pears won't freeze because of the sugars in them), to achieve really successful ripening (an old working fridge in the garage or shed is perfect for this).

However, it's still important to pick them at the right time, because if they are too immature they won't ripen at all! It's important to remember the distinction between 'maturity' and 'ripeness' - fruit is mature when it has accumulated enough starch to let it ripen, and it can only reach maturity while still on the tree. Once the fruit has enough starch, the starch begins to turn into sugar, and that's the beginning of ripening. Ripening can then continue off the tree.

Pears that are picked when slightly immature will be of better quality when they ripen, than pears that are

overmature when picked. When you do decide to pick your pears, pick the largest fruit, and leave the smaller ones for another week.

There are four main ways to decide when to pick your pears:

1. Cut a sample pear open, and check the colour of the seeds – they should be dark brown or black. If they're still white or partly white, come back next week and try again.
2. Colour: In Bartlett, D'Anjou, Comice, Williams, Packhams, and other yellow pear varieties, a slight change in skin colour to a lighter shade of green occurs at maturity. The flesh becomes whiter, and juice will appear on a cut surface.
3. Pears will come off the tree easily if the stem is held horizontal (unfortunately this is not true for every variety, e.g., Beurre Bosc are always hard to pick).
4. Date: Our Fruit Tree Database includes more than 20 varieties of pear with their picking dates (plus a system for you to calculate picking dates for your area). We've included some representative varieties in the following table:

AT A GLANCE...

Unlike other deciduous fruit, most pear varieties (except some of the early season ones) won't ripen properly on the tree, but need cold storage for a period of 2–6 weeks, followed by a period of ripening out of the fridge.

Pears ripen from the inside, and ripening them on the tree leads to both poor texture—either grainy or mushy—as well as poor keeping qualities.

VARIETY	TYPICAL PICKING DATE	COLD STORAGE BEFORE RIPE
CLAPPS FAVOURITE	Early February	None
BARTLETT	February 10–20	None
SECKEL	Late Feb, March	None
BEURRE BOSC	Early to mid-March	None
D'ANJOU	Early to mid-march	2 months
COMICE	Late March	1 month
PACKHAM'S TRIUMPH	Late March, April	1 month
FORELLE	Late March	1 month
WINTER NELIS	Early April	1 month



SPOTLIGHT ON... FUNGI

It's hard to believe, but 1 teaspoon of healthy soil can contain 2-5 km of fungal hyphae, which are long strands of fungi which push their way between soil particles, roots, and rocks. There can be 7,000 species of fungi per gram, and a single hyphae can be metres long.

Hyphae sometimes group into masses called mycelium or thick, cord-like "rhizomorphs" that look like roots, and then you can usually see them.

Mushrooms are the visible fungal fruiting structures that you can see above the ground, which in some species are edible, and poisonous in others! (Never eat wild-harvested fungi unless you have a positive ID of the species).

Most fungi, including beneficial soil fungi, are aerobic organisms, which means they need oxygen. Soil which becomes anaerobic (i.e., loses its oxygen after getting waterlogged or compacted) generally loses its fungal component, though some fungal species can survive for up to a month with no oxygen. Wet conditions tend to favour 'bad' or pathogenic fungi that cause disease.

Fungi also physically bind soil particles together, creating stable aggregates that help increase water infiltration and soil water holding capacity.



There are 3 groups of soil fungi:

DECOMPOSERS (saprophytic fungi). These fun-guys (sorry...) break down organic matter (like dead trees, fallen leaves or buried prunings) into a form that other critters can use. This means they're really important for keeping those nutrients in the soil (an important part of closed-loop nutrition, which we'll cover in detail in a couple of weeks).

MUTUALISTS (mycorrhizal fungi) live in the area immediately around plant roots (the rhizosphere), and form a symbiotic relationship with fungi and plant roots.

These are the really important ones when growing organic fruit trees because they are the messengers that bring the essential nutrients directly back to the fruit trees—both macro-nutrients such as calcium, nitrogen, potassium and phosphorus, as well as micro-nutrients like zinc, magnesium, and boron. Mycorrhizal fungi have an almost magical capacity to seek out new food sources in the soil, absorb the nutrients from them, and transport them back to the host plant.

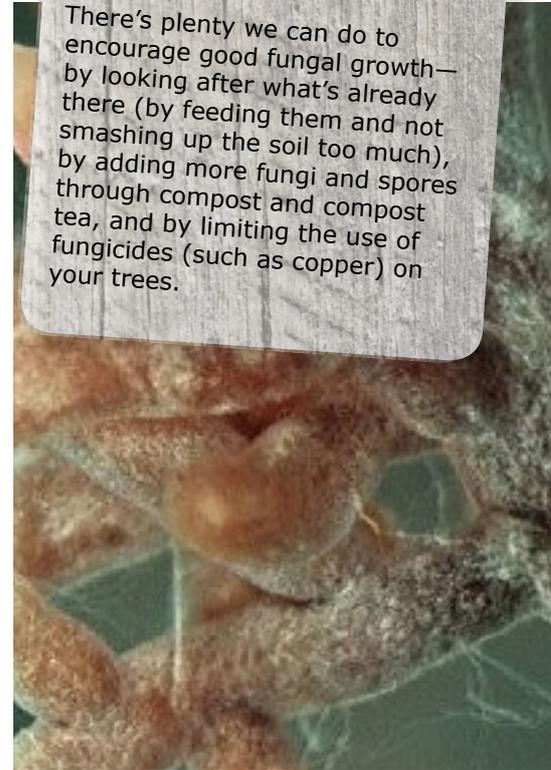
Nearly all trees and agricultural crops need mycorrhizae, except some Cruciferae (e.g., broccoli, mustard),

The largest known organism in the world by area is thought to be an individual honey fungus (Armillaria ostoyae) in the Malheur National Forest in the Blue Mountains of eastern Oregon. It spans 8.9 km² (2,200 acres) and is estimated to be 2,400 years old. It may weigh as much as 605 tons. It is not known, however, whether it is a single organism with all parts of the mycelium connected.

AT A GLANCE...

When growing fruit trees it's vital to have good populations of fungi in the soil. Without adequate fungi trees will struggle to gain the nutrients required for good health.

There's plenty we can do to encourage good fungal growth—by looking after what's already there (by feeding them and not smashing up the soil too much), by adding more fungi and spores through compost and compost tea, and by limiting the use of fungicides (such as copper) on your trees.



and the Chenopodiaceae family (e.g., spinach and beets).

Mycorrhizal fungi are damaged by:

- 🍏 leaving soil fallow,
- 🍏 planting crops that do not form mycorrhizae,
- 🍏 frequent tillage,
- 🍏 some fungicides, and
- 🍏 artificial fertilizers.

Once damaged, mycorrhizal fungi spores are probably still in the soil and will come back when the conditions are right. However, if you're not sure if you have enough mycorrhizal fungi, you can re-innoculate the soil by adding fungi obtained from natural sources, such as the litter under gum trees.

PATHOGENS OR PARASITES cause reduced production or death when they colonize roots and other organisms, eg, *verticillium* and *phytophthora*. If you're looking in a microscope, the thick, coloured fungi are the good guys, and the thin white or clear fungi are disease causers. Luckily, it's easy to help the good ones beat the bad ones by providing the right conditions —oxygen, enough water (but not too much), lots of organic matter, and plenty of healthy plant roots.

GROW AN AUTUMN/FALL GREEN MANURE CROP TO IMPROVE YOUR SOIL...

First let's clear up the confusion that often exists between green manures and cover crops...

"GREEN MANURE" refers to fast growing crops of annual plants (ie, plants that only live for one season, or die down between seasons), and are grown to build up the organic matter and nitrogen levels in your soil.

They usually contain a legume (such as alfalfa, clover, peas, beans, lentils, and soybeans), combined with a cereal, which is a good combination because the legume provides nitrogen, and the cereal provides bulk (and therefore lots of organic matter). Other broad-leaf herbs are sometimes included in the mix.

Green manure crops are usually dug into the soil, though your soil will still get the benefits just from slashing the crop and leaving it lying on top of the soil rather than digging it in; it just takes longer to be incorporated.

A **"COVER CROP"** usually consists of perennial plants (ie, plants that persist for several years) that are planted to cover bare soil. Bare soil is a really bad idea because the

soil dries out and quickly becomes sterile...which is why we love our weeds here at GGF— they protect the soil and provide great habitat for soil microbes on their roots.

Planting a cover crop involves putting a bit of thought into replacing opportunistic weeds with plants you choose to grow under your fruit trees. Rather than being turned into the soil, they are usually managed by harvesting, slashing, or mulching.

In fact, many of the same plants that are used as green manures also make great cover crop plants—the difference is that if you're using them for a green manure they are mowed or slashed just as the plants begin to flower (don't let them flower as this reduces the nitrogen content) and if they're a cover crop they're encouraged to persist season after season (but it is still best to mow in spring and summer).

Traditionally, after slashing, a green manure crop would then be dug into the top 30 cm of soil (this is the tree's main root zone). Digging the crop in is not strictly necessary, and in fact it's fine to leave the plants on the ground after slashing to rot in, where it acts like a slow-release nutrient

AT A GLANCE...

Green manures are crops grown to improve the soil condition and nutrition. They can help crowd out the weeds you don't want, and some even get rid of soil diseases.

Instead of being harvested, the crop is dug into the soil while still lush and green, when it has a high nitrogen and moisture content, and provides an ideal food source for soil microbes, worms and other soil creatures.

The microbes decompose the green manure quite quickly, which releases organic matter and nutrients into the soil where the trees can use them.

mulch. Digging the plants into the soil can result in a composting effect under the soil as the microbes get to work breaking it down, so if you've decided to go the digging route, and there's some hot activity when you go to plant your fruit tree, just make sure the fruit tree roots don't come into contact with it.

Field peas (left) and alfalfa (right) are both great green manure crops (but it's best not to let them flower or set seed before turning the plants into the soil).



WHERE CAN I BUY SEEDS?

Several online nurseries offer green manure seed mixes, which have the advantage of containing several different species, and the legumes are often pre-inoculated (but check). The disadvantage is that you don't get any choice about what seeds are in the mix, and they are usually more expensive than buying seeds of each variety and making your own mix.

We recommend the following nurseries because they offer organic, heritage, and non-GMO seed. If you're buying seed elsewhere, be sure to ask what it's treated with, and whether it's genetically modified.

Eden seeds: www.edenseeds.com.au

Greenharvest: www.greenharvest.com.au

Diggers Club: www.diggers.com.au

Turning in a green manure crop



WHAT ARE THE BENEFITS OF PLANTING A GREEN MANURE CROP?

- 🍏 Increases organic matter in your soil
- 🍏 Provides the right conditions for 'good' soil microbes to thrive
- 🍏 Increases nitrogen in the soil (as long as the green manure is incorporated into soil while still green and lush—if you wait until the plants are dry and woody, you can actually deplete your soil of nitrogen temporarily)
- 🍏 Increases the amount of water your soil can hold
- 🍏 Stabilises the soil and prevents erosion
- 🍏 Some plants 'mine' minerals from deep in the soil and bring them up where your tree's roots can use them
- 🍏 Improves soil structure
- 🍏 Provides habitat for beneficial insects
- 🍏 Crowds out less useful weeds

WHAT TO PLANT?

It's best to have diversity in your green crop—the more different plants you include the better. Choose plants that prefer to be planted in autumn, or the seed will just be wasted.

We already mentioned that your green manure should include at least one legume and a cereal. Legumes are plants which take nitrogen from the air into the soil, by forming a

symbiotic relationship with rhizobium bacteria which live in nodules on the plant's roots. The bacteria convert nitrogen from the air into ammonium—which is the form of nitrogen that plants get from the soil. Rhizobium is a naturally occurring soil bacteria, but different legumes need specific species of rhizobium, so check that the seed you buy has been inoculated with the correct rhizobium.

Some common legumes you can plant in autumn include faba beans, field pea, lupin (which is fast growing), lots of clovers (subclover, arrowleaf, sweet, rose, white), birdsfoot trefoil, fenugreek, medics, serradella, and woolly pod vetch.

Cereals are grasses, and there is a huge selection of grasses that are commonly used in green manures. Some that are suitable to plant at this time of year include canola, linseed, barley, oats, rye and wheat.

Herbs that are great to include in a green manure (or cover crop) mix include yarrow, chicory, borage, hyssop and comfrey, but most prefer spring sowing....so we'll cover them in more detail in spring.

WHEN TO PLANT?

Green manure crops are usually planted either in spring or autumn. Traditionally the autumn crop would be planted after the beginning of the cool season rains (or "autumn break"), as they rely on rainfall to grow. Unfortunately our rainfall seems to be increasingly unreliable due to

climate change! Most of the plants we've recommended for autumn planting are happy to be planted right through until the start of winter, but if you're waiting for rain, it might be a good idea to water the crop, at least to get the seeds to germinate.

If you're planning to plant some fruit trees this year and want to plant a green manure crop to improve the soil before you plant, get your crop in very soon—the plants will need about 8 weeks to grow before you turn them into the soil, and it's good (but not essential) if they get some time to break down in the soil before you plant your trees. That still gives you time to get a crop growing and turned in if you plant trees in July. If you want to plant trees earlier it's still worth getting a green manure crop established as quickly as possible, and slash or turn it in a couple of weeks before you plant your trees (it doesn't matter at all if the green crop doesn't grow for the full 8 weeks—your soil will still get some benefit).

It's easy to sow the green manure where you're planning to plant trees—dig the hole now, get rid of any 'bad' weeds, plant the green manure seeds and cover lightly with soil, irrigate and watch it grow (you may need to irrigate again if you don't get any rain soon). Mow or slash the crop a couple of weeks before you plant your fruit tree (or earlier if the green crop plants start flowering), and either leave on the surface as mulch or dig into the soil. Your new trees will love you for it!

DO MY TREES STILL NEED WATER?

SHOULD I STILL BE WATERING MY TREES IN AUTUMN, AND HOW MUCH?

Now that harvest is (mostly) finished and trees are getting ready for winter, their watering requirements change.

During the growing season and summer it is important to keep water up to the trees at all times, especially during spring, and pre-harvest. In autumn the trees' water requirements are much less, but they still do need water.

Dams and tanks are often low at this time of year and the temptation is to stop watering as early as possible, but there are risks to this.

Autumn is an important time for the tree, as buds for next year's crop are developing, and the tree stores available nutrients for the start of next season. These processes require that the tree is functioning well, and having water available is an important part of this. A lack of water at this time may have an impact on next year's buds, flowering, and fruit set.

Depending on the season, you may go from watering two or three times a week in summer to once a week or less in autumn.

As always, monitoring is important, and so keep an eye

on how moist the soil is—it should never be allowed to dry out. It's easy to think that because the weather is cooler that the tree doesn't need watering.

If weather conditions are mild and there's been some rain, you may indeed not have to water at all, but in most conditions a weekly watering is still a good idea.

It is also easy to be tricked into thinking that your trees are starting to change colour as part of the normal cycle of moving into autumn when in fact they are simply suffering lack of water. At this time of year lack of water does not tend to result in wilting but shows up more as early leaf fall. If you find that leaves are changing colour and are falling earlier than you would expect, this may be a sign that the tree is actually not getting enough water rather than the normal autumn colour change—see how other trees in your area are looking and use this as a guide.

Autumn is often dry in central Victoria (where our farm is), and we continue watering as long as the trees have leaves, or until we get the autumn break.



POLLINATION IN YOUR HOME ORCHARD

WHEN THINKING ABOUT WHAT FRUIT TREES TO PLANT THIS YEAR, IT'S IMPORTANT TO CONSIDER POLLINATION BEFORE YOU CHOOSE VARIETIES.

HOW POLLINATION WORKS

Not all fruit trees need pollination. For example, all peaches and nectarines are self-fertile, as are some cherries and apricots. However most plums, apples, pears, apricots, and cherries either need pollination, or benefit from having a polliniser nearby.

For those fruits that need pollination, you've got to have a tree of the same type, but a different variety, that flowers at the same time.

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The *polliniser* is the variety that provides the pollen to fertilise a flower, while the *pollinator* is the insect that moves pollen from one flower to another.

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For example, Japanese type plums need other Japanese type plums for pollination, and apricots need a different apricot.

This may sound complicated, but in fact, **in most urban situations, pollination takes care of itself**—there are usually enough fruit trees around to give a good chance of there being a suitable tree nearby. It's quite reasonable to not worry too much about pollination unless (a) you live quite remotely, (b) you have a mature tree which consistently flowers but doesn't produce fruit, (c) you are planning which trees to plant and want to make sure you are not going to have a problem with pollination. The transfer of pollen from one tree to another is mostly carried out by insects (mainly bees, but also lots of other insects), as they gather pollen or nectar from the flowers and, in the normal course of feeding, an insect will cover quite a large territory.

Our [Fruit Tree Database](#) (accessible through the Members page) lists pollination and flowering information for more than 200 different varieties (where it's known), which can help you plan your garden.

If pollination of a variety is unknown, ask us and we'll try to

track down the information for you. If we can't find it, just be guided by harvest dates—fruit that ripens at the same time is more likely (though by no means guaranteed) to flower at the same time and therefore cross-pollinate, so as a rule of thumb, it is a good idea to have two different early season cherries, two mid-season and two late-season, for example.

The more accurate guide is **flowering times**, so keeping track of flowering dates for different trees in your Fruit Tree Diary can help to pin down whether all of your fruit trees have a polliniser flowering at the right time, and can be a really useful tool in diagnosing

a problem tree that isn't bearing fruit for you.

The practice of **multi-grafting** (grafting more than one variety onto a tree) can solve the pollination problem with only one tree, as long as the two (or more) varieties grafted onto the tree are cross-pollinators.

AT A GLANCE...

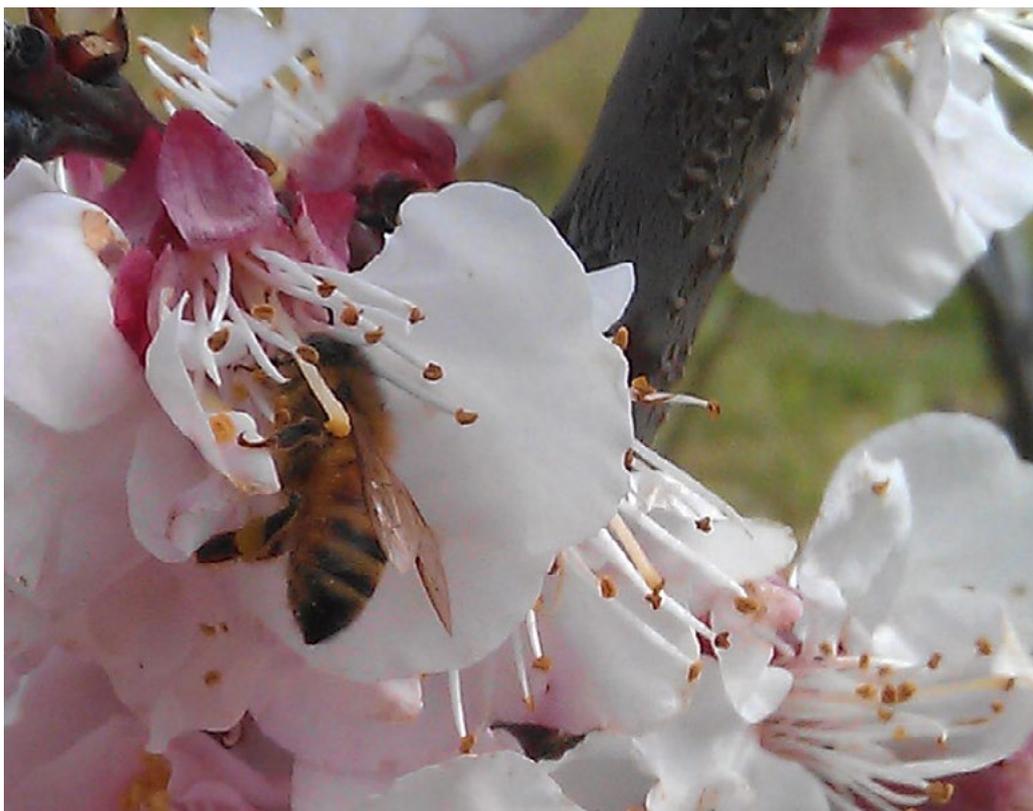
Fruit trees produce fruit as a result of sexual reproduction, which means that the female parts of a flower have to be fertilised with the male pollen, usually from a different plant.

For many fruit trees the pollen needs to come from a different variety altogether and not all are compatible, so it's important to make sure all your fruit trees have the right pollinisers close by.

The only drawback of this system is that the potential harvest of each variety is halved, and that one variety is usually more dominant than another, causing it to take over the tree.

Another way to solve this problem is by planting **two trees in the same hole**, and subsequently treating them as the same tree when applying pruning principles etc. While still reducing the potential harvest of each variety, this system helps to solve the dominance problem.

Successful pollination depends on a number of factors, including the timing of flowering, the weather and the number of pollinators available. Even when varieties are not listed as pollinisers, they may still pollinise each other under the right conditions.



If you can't include all the appropriate pollinisers you need in your garden due to lack of space, you can increase the chances of pollinisation by:

- 🍏 including varieties that tend to be universal pollen donors;
- 🍏 matching varieties by their harvest dates—two early season cherries have a greater chance of pollinising one another than one early season and one late season.
- 🍏 encouraging a wide diversity of plants in your garden (including weeds!) to encourage a range of different insects which will help to pollinise your fruit trees; and
- 🍏 having your own beehive, or hiring one for spring; this is not usually needed in the home garden but has been proven to increase pollination rates even when there are plenty of native and feral pollinators available.

PEACHES AND NECTARINES

All peaches and nectarines are self-fertile—they don't need another tree to pollinise the fruit.

APPLES

Apples are slightly more complicated than other fruit. Most apple varieties are diploid, and generally have some degree of self-fertility, although this varies widely and you'll usually get better results if you have a companion tree that flowers at the same time.

However some apple varieties are triploid, which means they don't produce sterile pollen that can be used to fertilise other trees (though some triploids are partially self-fertile). Triploid varieties only need to be planted with a diploid that flowers at the same time, but are often planted with two other diploid varieties which then fertilise each other as well as the triploid.

Despite this disadvantage, triploid varieties have several advantages, including producing large vigorous trees, large fruit, having good natural disease resistance, and being quite resilient in difficult conditions. Triploid varieties include Mutsu, Gravenstein, Bramley, Blenheim Orange, Jonagold, Ribston Pippin, Newtown Pippin, Roxbury Russet and Stayman's Winesap.

Apart from the triploid issue, the main consideration with apple pollination is to try to choose apples which flower at the same time. One of the most useful apple trees to have in your garden is the Granny Smith, which is known to be a good polliniser and a mid-season bloomer, which gives it a fair chance of fertilising both early, mid and late flowering varieties to some extent.

Some varieties of apples are known to be quite self-fertile, including Rome Beauty and James Grieve.



PEARS

Two of the most useful varieties as pollen donors are **Packham's Triumph** and **Beurre Bosc**, which between them pollinise most varieties of pears, including many of the Asian pears.

CHERRIES

Most cherries will pollinise other cherries if their blossom time matches. Stella is a universal polliniser, so an excellent choice for a home garden. Other universal pollen donors are Merchant, Vista, Vega, Noir de Guben, and Valera. Several cherries are self-fertile, including Starkrimson, Sunburst, Simone, Lapins, Burgsdorf, Sir Tom, Sir Don, Dame Roma, Sweetheart and Stella.

A note of caution: due to genetic incompatibility there are a few combinations that won't pollinise each other even if they flower at the same time. These include:

- Early Rivers—Bedford—Summit
- Van—Venus—Regina
- Vega—Victor
- Early Burlat—Hedelfingen
- Sylvia—Rainier—Celeste—Hudson—Merton Late
- Merchant—Sam—Vic
- Chelan—Tieton

But don't worry, most of the common cherry varieties are included in our Fruit Tree Database with a listing of their more well-known pollinisers.



“

Most cherries will pollinise other cherries if their blossom time matches.

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PLUMS - JAPANESE

Santa Rosa is partially self-fertile, and will also pollinise most other Japanese plums as long as they flower at the same time.

PLUMS - EUROPEAN

All European plums pollinise each other (as long as their flowering times coincide). Common European varieties include **d'Argen**, **Angelina**, **Greengage**, **Coe's Golden Drop**, **Damson**, and **President**. Random plum trees in the street will normally be European; pollination is very rarely a problem.

APRICOTS

As long as apricots flower at the same time they will usually pollinise each other. Many varieties are self-fertile, including **Castlebrite**, **Glengarry**, **Royal Rosa**, **Caselin**, **Improved Flaming Gold**, **Katy**, **Castleton**, **Mariem**, **Bulida**, **Story**, **Piet Cillie**, **Goldcot**, **Tri-Gems**, **Watkins**, **Harogem**, **Trevatt**, **Morocco**, **Moorpark**, **Westley**, **Mystery** and **Tilton**.



MAXIMISING SOIL FERTILITY...

EFFECTIVE SOIL NUTRITION RELIES ON RETURNING THE NUTRIENTS TO YOUR SOIL AS MUCH AS POSSIBLE, RATHER THAN DISCARDING THEM AS 'WASTE'.

NUTRIENT CYCLING

It makes sense to let the fallen fruit from your fruit trees rot on the ground so the nutrients can return to the soil....doesn't it? But leaving fruit to rot on the ground can lead to disease in the trees and fruit next season, so what's the solution?

To answer that, first we need to understand what we mean by the "nutrient cycle". It's the continuous movement of nutrients between the soil, plants, and animals, so that instead of having any waste, everything that grows in the garden is returned to the soil. Of course, some nutrients such as carbon and nitrogen also cycle through the air and water—harnessing them is all part of using the nutrient cycle in organic growing.

WHY DO ARTIFICIAL FERTILISERS EXIST?

The introduction of super-phosphate and the "green revolution" early in the 20th century originally led to massive increases in agricultural productivity. But, under the soil, microbes were killed. The ancient, permanent, self-perpetuating system of fertility was largely wiped out.

Chemical-based agriculture is now dependent on these artificial fertilisers and, because the natural fertility system is so damaged, is actually more of a hydroponic model of "in and out" nutrient cycling, where the nutrients removed from the farm (e.g., as fruit) are calculated and replaced each year with the

same amount of nutrient in artificial fertilisers.

There's a certain logic to this, in a sterile system that doesn't have healthy soil full of microbes that recycle the nutrients and provide free fertiliser to the plants.

However, there's a downside to using artificial fertilisers. They damage the soil, they can make our plants more prone to pests and diseases, and the price keeps going up—as farmers are already experiencing—and it's only going to get worse. There's also a whole school of thought that since the green revolution our food has become progressively less nutrient dense as a result of fertiliser-dependent growing methods.

Organic gardens and orchards differ from chemical-based systems by re-creating self-sufficient, fertile soil that doesn't need any artificial fertiliser, is cheap to look after, highly productive, healthy, and creates a secure and permanent food system.

WHERE DO NUTRIENTS COME FROM?

But where do the nutrients come from to replace the nutrients that leave the garden as fruit and other produce that we eat? What do we even mean by nutrients?

We're talking about "macro-nutrients" such as carbon, nitrogen, phosphorus, calcium, magnesium, potassium, sodium and sulphur, which are all needed in reasonably large quantities

AT A GLANCE...

Recycling fallen fruit, prunings, and other garden 'waste' back into the soil is part of a healthy nutrient cycle in an organic garden, but needs to be done in such a way as to reduce the chance of spreading disease.

This week we show you how to save money, improve your soil, and make your fruit trees healthier by reducing waste and keeping valuable nutrients in your garden.

for plant health.

Then there are all the "micro-nutrients", or trace elements, such as boron, copper, iron, manganese, zinc, molybdenum, and cobalt, which are all essential though only tiny amounts are needed.

Surprisingly to many people, most soils already have enough of most elements, and the need to add specific nutrients to your soil is quite rare! Many have come from the original bedrock, or have been brought in as various types of organic matter. Plus, plants take carbon and nitrogen directly from the atmosphere and put them into the soil.

The problem is that many of the elements are not present in a form that allows the plants to take them up—and that's where having a healthy population of soil microbes is absolutely key. If you've got lots of different types of microbes in the soil, they eat the organic matter (and each other), which turns the nutrients into a "plant-available form" that can then be absorbed by the plants.



Compost — it's the key to soil improvement and nutrient cycling



Chooks are fantastic recyclers



Click here to listen to the audio version of this article.

BEWARE ARTIFICIAL FERTILISERS

Most of the artificial fertilisers you can buy at your local garden shop will do more harm than good. These artificial fertilisers are usually harsh and salty, and may kill off all the wonderful worms, bugs, and microbes that you need to encourage to live in your soil. Look after your soil by sticking with natural and organic fertilisers.

WHAT'S A CLOSED-LOOP SYSTEM?

We can aim to create a 'closed-loop' garden, where the nutrients cycle between plants, animals, air, and water. Waste from the animals and plants are then returned to the soil to close the loop. Of course, no growing system is completely self-contained, because it constantly interacts with every other system on the planet through sunlight, air, water, and bedrock.

Traditionally this would have included recycling human waste, but these days it's less culturally acceptable to put human sewerage into our gardens. Of course, it's still relatively easy to do so, and many resourceful food growers use composting toilets or worm-based septic systems, but for health reasons it's got to be done properly, so if you're interested get some specialist info first.

If you're not doing that, then some of the nutrients from your garden are lost each year in the produce you eat. However, most of us are buying food constantly (and therefore bringing more nutrients home), so as long as we're returning our food scraps to the garden somehow, we can go some way to balancing the losses into the sewerage system.

To make sure your soil contains a good store of all the nutrients it's a good idea to occasionally bring in fresh organic matter from a variety of different sources, but of course the food we bring home from other sources will also be contributing nutrients, so in most cases there shouldn't be a deficiency problem. It's much more important to make sure the nutrient that is in your soil can be used by the plants.

LET'S REDEFINE WASTE

On a practical level, how do you create a closed nutrient loop in your

garden? The first thing to do is get rid of the idea of "waste" from your head—there is no such thing! If it was once growing, then it can be returned to the soil.

COMPOST

Compost is a great way to recycle not only food scraps, but also small prunings in your garden, or larger prunings if you have a way of chipping them first. If your prunings are disease free, and you can chip them, they can be put straight back on the garden as mulch. We won't go into detail about compost here, because we'll be looking at different compost systems in coming weeks.

If you can't chip them, larger prunings can be used for firewood, or buried to slowly rot back into the soil.

Animals are an important part of the loop but, as that includes all the tiny animals in the soil, it doesn't mean you have to get a whole lot of new pets! Worms are one of the most productive recyclers in the world, and even unit dwellers with balcony gardens can harness their amazing powers!



Regularly change the source of organic matter you put around your fruit trees, to make sure you're supplying a good balance of nutrients to the soil.



WORMS

Have a simple worm farm, and never have to throw food scraps or waste paper out again! Worm farms can be built on any scale from a polystyrene box that sits in the garage or laundry,

through to a converted 400kg apple bin. You can build worm farms directly on the soil in your garden, defined by a few hay bales, but if this all seem too hard, make a simple worm tower by burying one end of a vertical piece of poly pipe in your garden and dropping your food scraps in to the pipe. If all else fails, bury your garden scraps in your garden in a different spot each week, and the worms will take care of them!

CHOOKS

If you have the space, chooks make marvellous recyclers. You can use recycled weeds, fallen autumn leaves, or chipped prunings from your garden to provide them with food or deep litter, and in addition they'll clean up all sorts of pests and very obligingly produce excellent fertiliser that can be aged or composted before putting back on the garden. Plus, you'll get eggs!

BIGGER ANIMALS

The larger your garden, the more scope you have to include larger animals that can carry a bigger share of the recycling load for you, converting grass, problem weeds, and even food scraps into meat and manure, plus other products. Sheep, goats, or cows can all play a part in the closed nutrient loop of your system. In a properly planned system, animals not only help to recycle the nutrients, but also have a net positive impact on the environment by sequestering carbon from the atmosphere into the soil (check out "holistic management" if you want to know more about this).

That's why we aim for a closed nutrient-cycle system, but that also assumes we start with a perfectly balanced and nutrient-rich system, which most of us don't have. Therefore, we need to add lots of organic matter and microbes, while reducing the amount of nutrient that leaves by recycling all our garden and kitchen scraps back into the soil—over time, this builds up a nutrient-dense, self-sufficient, and productive system.

GROWING YOUR OWN FRUIT TREES FROM SEED

Growing your own fruit trees from seed is easy, cheap and nearly always successful, and now is the time of year to be collecting apple and pear seeds and storing them over winter, to start your new trees next spring.

Given the right conditions, seed from apples, pears, peaches and nectarines will normally produce a lovely strong, vigorous tree – this is called a seedling.

In commercial nurseries, cherries are always grown from roots in a stoolbed, but that's not to say they won't grow from seed, it's just very unreliable and hard to get them to germinate. Likewise, apricot seeds may germinate (though it's hard to get them to), and most apricots commercially are grown on plum rootstock that is grown from cuttings.

It's important to understand that a seedling tree is never the same as the parent – so a seed from a Jonathon apple will not produce a Jonathon tree. Why? Because fruit is produced by sexual reproduction, which means the flower that produced that apple was fertilised with pollen from a different tree. That means the seeds in that apple are genetically a mix of its two parents (just like people), and will produce a hybrid of some sort.

IS FRUIT FROM A SEEDLING EDIBLE?

This is one of the questions we're frequently asked; unfortunately there's not a yes or no answer, because every seedling is different and unpredictable. Peaches and nectarines often produce edible fruit from seedlings, but it's much more hit and miss with apples and pears.

That's not to say the fruit won't be edible, it may indeed be quite tasty, but it will take several years to find out, and it's important to understand that even if it's edible and delicious, it's not the same as the parent, and you've lost the characteristics of the original rootstock.

Of course if you do decide to graft a mature seedling tree once you've tried the fruit, there's nothing lost except time, and you'll still get a great tree in the end.

Growing a tree from seed is a slightly unknown quantity, because you are not producing a tree that is genetically identical to its parent, as you are with a cutting. However it is accepted practice for peaches,

nectarines, apples and pears.

A seedling rootstock is likely to be large and very vigorous.

SEED SAVING

Collect your fruit or seed at the end of the fruit season. Granny Smiths are a good seed variety for apples, clingstone peaches are good for peaches and nectarines and Packham pears are good for pears, but it's worth trying any variety. It's best to use organic fruit (the seeds are likely to be of higher quality), but any fruit will do.

Extract the seed either by cutting the fruit to get the seeds out, or just let the fruit rot away, leaving the seed behind. Don't worry if there's some flesh left on the seed (e.g. peaches);

you can either just let it rot away, or gently wash it off with water, but don't scrub the seed, or wash it with any detergents or chemicals.

Mix the seed into clean, fine sand (as you'd find in a children's sandpit), making sure the seeds are completely covered.

Keep the sand moist throughout winter, then in early spring (when you notice the buds start to swell on your trees), remove the seeds from the sand and plant them into your garden or tree nursery.

Don't worry about having to remember when - your only job is to keep the sand watered regularly until we give you all the detail you'll need on planting the seed out at the right time!



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.

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