



Gardening – a learning guide on sustainable food production at home

This section of the **Sustainable Living learning guides** talks about ways to grow vegetables in your own backyard.

Growing food is for many people the first step on the journey towards a more sustainable lifestyle and it is a very rewarding and exciting activity with many benefits.

When working in a learning or study group, we suggest you choose beforehand which *activities* you would like to try, from the options here (*each of the eight is highlighted in blue*). Some require more preparation than others and it will be up to the group's host or leader to decide how much work to put in beforehand, collecting materials.

Those activities that you *don't* want to try as a group can be read out or left for use by individuals back at home. Please note the minimum times indicated next to the activities – as you won't be able to do them all in 2 hours! Many groups look at the gardening topic over two sessions, perhaps including a garden visit, so we recommend that and have produced the notes in two parts.

Why grow food?

Before launching into any activity, it is important to become clear about why it may be a good idea to grow some food in your backyard.

Activity 1- To grow or not to grow – 10 min

Within the group, collect the different reasons why people may be maintaining a vegetable plot. Discuss briefly.

Note for host: Things that might be mentioned here are:

- *Fresher than in shops, less handled, less packaged*
- *Tastes better and tastes and looks more interesting and varied*
- *Know how it has been grown and what went on it (avoiding pesticide residues)*
- *Gardening is a healthy activity, it helps me keep fit*
- *Rewarding to harvest my own vegetables and cook seasonal recipes as crops change through the year: a contrast to supermarket 'sameness'.*
- *Food security – unreliability of global supply chain in part due*

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Satisfying summer garden harvest.

Further reading web-links:

[Health benefits of gardening.](#)

[Global food crisis risk](#) (2012)

[Food miles](#)

[Airfreight of fruit and veg – implications.](#) (Download PDF)

['Peak phosphorus' limitations.](#)



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to peak oil, climate or earthquake disruptions, water shortages, increasing fertilizer prices.

- *Home grown can be fresh from garden or surplus preserved (bottled, dried, frozen)*
- *Reduces carbon emissions (by eliminating long distance transport, and mostly no oil-fuelled production machinery is required)*
- *No artificial nitrogen fertiliser needed, if you compost, and mulch and add occasional minerals and animal manures.*

What to grow?

In order not to waste time, it makes sense to grow only what our family and friends like to eat. We also have to think about the amount of space we have available and what we can realistically maintain. We may consider starting with things that are easy to grow (like silverbeet or zucchini) before graduating to the trickier candidates (e.g. Peppers or eggplant need the warmth/shelter of greenhouse or cloche).

Activity 2 – Meet and what do you eat – 10 min

Talk within the group: Has anyone any success stories or experiences with crops that grow well in your climate and soils.

In pairs, try interviewing your partner about their likes and dislikes when it comes to vegetables. When you're finished, hand what you've noted to your partner – an excellent reminder to take home and put on the fridge!

Here's a list of easier to grow and harder to grow vegetables (but you might have 'green fingers' and find them all easy!):

Easy to grow	Medium	Harder to grow
Silverbeet	Carrots	Eggplant
Spinach	Parsnip	Capsicum/Peppers
Lettuces	Tomatoes	Cucumbers/gherkins
Radishes	Beetroot	Melons
Zucchini/courgette	Celeriac/celery	Kumara
Pumpkin	Turnip	(these plants need more warmth)
Beans	Broccoli	
Annual herbs (parsley, chervil, coriander)	Brussels sprouts	
Potatoes	Cauliflower	
	Kohlrabi	

Where to place your garden

If you do not already have a 'vege patch', the next important question to consider is where to place your vegetable plot. Whether you own a large piece of land, a small section or only a balcony – you can garden anywhere!



Enjoy eating fresh. Also your surplus produce and delicacies can be dried, bottled, frozen or pickled for later in the year.

Further background reading:

Climate zones for growing:
<http://www.gardengrow.co.nz/zones/>

Tui Planting calendar:
<http://www.tuigarden.co.nz/page/planting-calendar>



Producing cauli and broccoli takes lots of nitrogen and some pest control effort, such as beneficial-insect attracting flowers planted close by.



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Activity 3 – Map your plot – allow at least 30 min

Draw a rough scale plan/map of the outdoor space at where you are meeting now (**Host could prepare this beforehand and copy**). Take a walk around outside and look for places where you might install a garden. The first important skill any budding gardener should master is observation – taking a good look at what nature is providing. On your map, mark down the following aspects that are listed here in order of importance, A to D:

A. Sun

In order to garden successfully, you will need as much sun as you can possibly get. You can still garden in a shady place, but you will greatly limit your options of what plants to grow. Mark shaded spaces on the plan. Remember the mid-day sun angle above the horizon will differ with the seasons, so adjust for that. On the sides of your plan/map, mark where the sun rises and where it sets on both the shortest and the longest days of the year: this will be two sunrise directions at the East and two sunset directions at the West.. To find magnetic north, use a compass (Magnetic north is 20 Degrees east of solar north) or check for the sun if you meet close to lunchtime The sun is in its highest point, the solar north at midday in winter and 1 pm in summertime as clocks are forward by an hour.

B. Wind

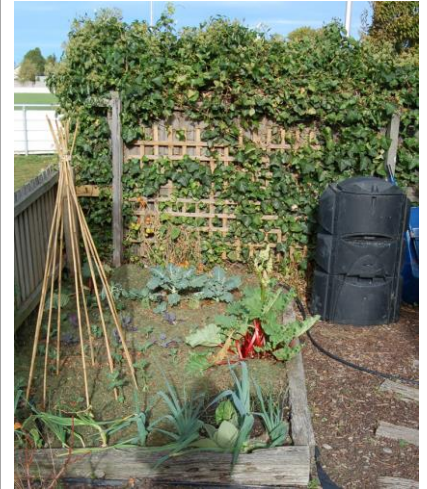
The elements on our islands can be quite rough, so wind is always a consideration. Plants exposed to too much wind will show stunted growth, are weaker and thus more susceptible to pests and diseases. Wind also reduces soil moisture, especially hot wind in the summer. Mark the [prevailing wind](#) direction(s) on your map and look for spots that provide natural wind shelter. Ideally, you are looking to filter the wind through trees or shrubs, rather than blocking and diverting it, which buildings and solid fences do.

C. Water

Look at the soil on your site. Are there any spots that are damper / wetter than others? – Mark those on your map or plan as well. For your veg garden, you want to avoid the swampy, waterlogged areas, unless you choose to garden in a raised bed above the current ground level, with sides to hold up the soil.

Even with the best mulching, you are likely to have to supply water to your vegetable garden in summer. Mark any sources of water supply (taps, but also roof areas that could be used to

A growing space can be small. This UK family grew NZ\$1,659 (£899) worth of food (weighing 83.66 kg) on their 9 foot by 6 foot London balcony and a few windowsills (about 5 sq m): [see their story](#). that's an average \$32 saved off the weekly food bill!



This small vegetable plot faces the midday sun (note photographer's shadow) and uses a trellis at the south side for climbing crops. Black bin is for compost-making (it will get too hot there in summer, but OK in winter)

For those who want to know the exact position of the sun at any time of year (great for building projects as well), check out this [amazing little tool](#) from NIWA.

A set of NZ [wind rose examples](#), (created from *The New Zealand Weather Book* by Erick. Brenstrum 1998, Craig Potton.)



Joanne made sure that this raised bed was close to a tap, and used a timer to ration the water.



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capture rain water and fill a tank) and consider your hose route – where it won't trip you.

D. Soil

You may be surprised to find this item last on the list. While soil quality and structure is of course important for growing, your starting soil can always be improved and worked with, so it does not need to be a main consideration in selecting a site. However, you need to know a little about soil characteristics – you can learn more about that here: <http://www.permaculture.org.nz/node/67> or try this simple soil test, as a group activity in your host's garden:

Dig into your soil, about a spade deep. Take a handful of soil, wetting it slightly if necessary. Try rolling it between your hands to make a tube, ribbon or snake, then bend it as if to make the snake 'bite its tail'. If you can form a full loop, you are dealing with mostly clay – if you can't make the soil stick together at all, you have sandy soil. Being able to roll the soil, but have it break up when you bend it indicates a good mix of sand and clay – a 'sandy loam'.

Once you have completed your map/plan, you can look for the best place to site your vegetable garden: maximum sun, minimum wind and good access to water... Where will it be?

Activity 4: 'Lasagne gardening' - creating a no-cost, no-dig garden bed –(allow 1.5 hr for 1 sq m garden or 15 min for a much smaller demo version)

This activity can be undertaken inside by way of a demonstration box on a ground-sheet, or you can take it outside and install a real plot to use, which is more satisfying. However, it needs a bit of preparation of materials. **You could instead choose to only watch the video (20 min)** <http://www.youtube.com/watch?v=kZugARiOJCQ> – the layers used in this video are slightly different – and note that there are many variations possible, not one single method. But the important thing to remember is to alternate green and brown layers when selecting your materials at a volume ratio of about 1 green to 2 brown. The 'green' are items rich in nitrogen and often fresh (e.g. grass mowings, fruit peelings, raw manures) and the 'brown' are rich in carbon, and often drier (e.g. small twigs, dried leaves, straw, shredded paper).

Materials list needed for a full size 1m² version –(for a demo version, just a few handfuls of each are enough and replace the pallets by using a cardboard box)

- Two untreated timber shipping pallets (pick up from industrial areas – avoid the ones that are painted, as these will be reused and contain fungicide chemicals)



The extent of soil cracking indicates the mix of clay and sand. This example will not bend much.



This used to be lawn but it was the sunny spot, better suited to veges. Raised beds aided the conversion. (SL participant in Gore)



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- 40 litres of compost
- One bale of hay, pea-straw or several wheelbarrows full of leaf mulch
- Old newspapers or cardboard (enough to cover 1m² to a thickness of 1 cm)
- Manure (sheep or composted horse manure, not fresh horse manure as that's too full of weed seeds)
- One wheelbarrow load of grass clippings or other green garden waste
- Watering hose, connected to tap.

Bed Step 1: Build the box sides

In order to build the raised garden box, remove the underside two or more slats (the “feet”) off the shipping pallets. Take a saw and saw the pallet into sections – 3 or 4 top slats wide, depending on how high you would like your garden bed to be. Using a hammer and a few nails, join the sections together at the corners into a square. Done!

Bed Step 2: Place your box

Your newly assembled square metre garden can now be moved to the position you have determined in the previous exercise. If you are placing it on a grassy or weedy spot, run the lawn mower over it on a low height setting before you place your garden. Generally no digging is required, but deep rooted weed roots such as dock and thistle may need to be removed!

Bed Step 3: Fill your box

It's now time to fill your garden lasagne-style with layers of your collected materials. After placing each layer, make sure you water very well. All materials should be wet like a pressed out sponge. Start with a layer of newspaper on the bottom – at least 1 cm thick and well overlapping to exclude light from the grass or weeds below. Then sprinkle a layer of manure or blood and bone (as fertilizer and to attract worms). Follow by a layer of brown material (fluffy hay or leaf mulch) – about 20 cm thick. Your next layer will be green material (grass clippings, kitchen veg scraps or young weeds without seed heads), this should be about 10 cm thick. Repeat until you have **overfilled** your garden box – the heaped materials will settle by almost half to final depth, so don't be shy! After the top repeat of a brown layer, cover with your compost/soil.

Bed Step 4 (which could be immediate): Plant!

With this method, you can plant out your garden straight away (For larger plants, you may want to increase the thickness of the compost layer around them slightly). Just make a hole into your compost layer and plant into that. Water well. You can use newspaper or leaf mulch or any other mulch on the surface around plants to retain moisture. Newspaper will have to be weighted down – pea gravel is good - or it



Lily builds a demonstration raised bed. First a layer of paper to smother weeds, then pea straw...

Pallet timber is very useful not only for building garden beds, but also for compost bins and many other purposes. You will find many uses and building instructions online. The timber is generally untreated (treated timber will be painted, so stay away from coloured pallet), which means that no nasty chemicals can leach into your soil. CCA treated (copper-chromium-arsenic)- timber should be avoided in an organic garden, as the arsenic might travel through the soil into plant roots, although manufacturers claim that it is safe, being chemically locked into the wood. While untreated wood will rot over time, you will get a good few years out of pallet wood before you need to repeat this exercise.

Another version of a pallet garden – this time vertical – can be found here: <http://lifeonthebalcony.com/how-to-turn-a-pallet-into-a-garden/> and examples of their use in relocatable Christchurch public gardens here: <http://www.greeningtherubble.org.nz>

Further reading:

NZ Wood recommendation regarding [use of treated timber](#) to edge raised gardens: **FIX LINK**



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will blow away.

Your other option – for example if making the bed in winter- is to let the garden box sit for a few months for the materials to compost and settle. Cover with newspaper or a porous weed mat to control weed growth, check moisture (and water it) occasionally.

Seed sowing

Each seed is a plant in waiting. Given the right conditions and proper care each seed will grow into a mature plant. Seeds come in many shapes and sizes, from the dust-like seeds of lettuce to the large coconut. Some commercial seeds come with a coating of fungicides, often brightly pink or green coloured. These chemicals are meant to protect the seedling from diseases. You need to be careful handling seeds treated in this way and make sure your hands are properly cleaned after handling them. Organic gardeners do not use them and as a small-scale gardener you can take good care of your seed and young plants, so it is very likely that you don't need these chemicals. If you want to grow plants that should do well under organic conditions try and use organically grown seed, which also will not be coated. Often you find many different variations offered of one type of cultivated plant, e.g. for lettuces: *Great Lakes*, *Triumph*, *Ice King*, *ButterCrunch* etc. These are called Cultivars. Cultivars are bred for difference in their crop yield, their seasonal preference, colour and other appearance, growth habit, resistance and tolerance to pests and diseases and much more. Sometimes the term Variety is used synonymously with Cultivar. This is strictly speaking not correct, as a variety refers to a variation that occurs naturally in the wild. Seed catalogues will give you a good description of a cultivar's characteristics so you can pick the right one for your conditions, time of the year and other preferences.

Activity 5: Seed shopping – 20 min

This hardly needs explaining – but for a keen gardener it can be lots of fun going catalogue shopping with friends. Some seed companies (Kings seed www.kingsseeds.co.nz for example) offer discount prices for larger amounts ordered – so why not organize a few seed catalogues for the learning group and put a group order together? In most instances, you won't need a whole seed packet to yourself either (who needs to grow 300 lettuces in a year?), so sharing packets and exchanging is great and saves money. All you need are some spare envelopes for storage and pens to label them, including the last year that seeds are viable for (from packet).

It can also be very entertaining to examine all the different varieties offered and maybe some members of the group have experience with them? – You can work together to create a planting schedule for the seeds ordered, based on the information in the catalogue (or on the packet). See also the NZ Gardener Magazine sowing chart or others if available on the Sustainable Living downloads page.

Advantages of growing from seed

Of course you *can* buy seedlings at garden centres, nurseries, hardware stores or supermarkets and transplant them into your garden. However, the

Lasagne gardening:
<http://organicgardening.about.com/od/startinganorganicgarden/a/lasagnarden.htm>
See also book references, later.



You can get organic seeds in NZ from Kings, Koanga, Eco-Seeds and Yates, among others.



Autumn sown green brassica Mizuna (Latin name *Brassica campestris chinensis*) and the red Mizuna (*Brassica rapa*) can provide hardy winter green leaves with a spicy flavour, eaten when small as mesclun or harvested mature in 6+ weeks. Cultivar varieties include 'Oriental Early', Kyoto, M7565, Red Coral.

Other Asian cold weather leaf crops worth trying include Bok-Choy, Pak-Choy, Misome, and also Rocket, Mustard and Swiss Chard (silverbeet)

There are downloads available from Sustainable Living website about growing a variety of veg crops.



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best way to ensure that everything in your garden has been cultivated organically is to grow as much as possible yourself from seed. This should also help you save money: for example a packet of lettuce seed may cost two or three dollars but will give you over a hundred lettuce plants; if you spend your three to four dollars on seedlings you might receive 8 plants. Sharing fresh seed purchases with friends in the same growing season gives best value for money.

When planting purchased seedlings, pay attention to the following 'tips':

- due to growing and distribution logistics, most commercial seedling plants have been grown for too long in too small a container with insufficient food. Check the bottom of the container for emerging roots – pick the seedlings with the least roots poking out below.
- End of season 'sale' plants are usually pot-bound and not worth buying. When transplanting a pot-bound plant you need to tease out the tangle to spread the roots out widely – which often means pruning a fair bit of them off. This increases the transplant shock – so the younger the seedling being moved (provided it has four or more leaves), the better!

Sowing seed outside

The least work and cheapest method of raising plants is by sowing seeds directly into prepared soil in the garden or in containers. Some plants, such as root vegetables, should definitely be grown this way. Radishes, parsnips and carrots, for example, don't like transplanting and roots tend to fork if you move or disturb them. This seed sowing requires a return visit to thin out the seedlings. This is the source of 'baby carrots' just a few centimetres long.

Activity 6: Ground preparation – 20 min

As a group, discuss different ways to prepare the soil for sowing.

What you are trying to achieve is a fertile, weed-free seedbed area with fine crumbly soil. Here are some ideas:

- Remove perennial weed roots below the surface (couch or twitch grass, docks, thistles, oxalis)
- Creating a 'false seedbed' by letting annual weeds germinate on a newly weeded bed, then flaming or hoe-cutting them off (don't till the soil, or you will expose the next layer of weed seed to the light)
- Sifting – the sieve mesh determines the soil particle maximum.
- Add compost – a few centimetres on top of bed, or buried in a trench below (the latter especially if using EM Bokashi, which is too rich in nitrogen for direct contact with seeds)
- Work compost into topsoil or leave it on top as a mulch in spring – it may be too dry to do this in mid summer.
- Digging, tilling and raking (pros and cons)
- Mention alternatives like raised sheet mulched 'lasagna' beds, constructed in layers like a lasagne, if it's a new vegetable bed created on what was yard or lawn.

Once the seed is planted, most outside seedbeds will require some sort of

A note on hybrid seed:

Some seeds are first generation Hybrids (F1 hybrids). This means they are the result of a cross between different parent plant cultivars. These hybrids often grow and fruit very vigorously but will not breed true to type, meaning that if you save your own seed from those plants in the summer – if they produce seed - they will not have the same properties as the original hybrid seed. Seed savers therefore avoid buying F1 hybrids.



Beet and parsnip (shown here), are crops best sown direct in spring, whilst leeks can be started in a seed tray and transplanted later, and are hardy over winter



EM Bokashi is a way to ferment kitchen scraps with limited air (anaerobic) within a drained and lidded container, originally used in Japan. The active part is a mix of 'effective micro-organisms (EM) from soil, such as actinomycetes, lactic acid bacteria and yeasts. They are usually bought carried by wheat bran, in an airtight plastic bag'. Suppliers include Zing. <http://www.zingbokashi.co.nz/stockists.htm>

Read about how to make and use



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protection. Bird netting on a simple frame will protect seeds and young seedlings. Many seeds benefit from a cover while germinating, so once you have planted the seed, firmed the soil and watered well, cover the ground for a week or two with fine soil/compost or wet newspaper, or planks of non-treated timber or with hessian. Check regularly and remove the cover as soon as plants emerge, or they will die from lack of light.

Sowing seed indoors

However, it may be more appropriate to produce seedlings other than root crops under frost-shelter in Spring and plant them out as seedlings later, if the ground outside is still too cold for early germination and you seek an early start for your plants and thus an earlier harvest, safely ahead of the autumn frosts. 'Indoor' could be a large cloche or a greenhouse as well as inside a house. Sealed water containers are useful as heat stores that can warm up in sunshine and let out their stored heat overnight, within a cloche or greenhouse.

To gain better success in your first growing endeavours, sowing seeds in trays or pots inside will give you better control of both the germination process and watering, ensuring higher success in producing viable seedlings. Seeds in containers indoors can be started much earlier in the year (e.g. vegetables can be sown in late-winter and planted out under the frost protection of transparent cloches in early spring) and also avoid competition from weeds in the early stages. It is also a much better way to start slow-germinating crops such as parsley.

Activity 7: Sowing seed – 15 - 30 min

This is a great activity to share, but requires some preparation...

What you need:

Containers, Seed, Seed raising mix, garden sieve (mesh is coarser than a flour sieve), Soft pencil to write on labels – of wood, metal or recycled plastic strips. Strips from old venetian blinds are good.

There are many types of proprietary pots and trays available, but you can use any shallow recycled container for seed sowing purposes, from cream cheese pottles to margarine or ice cream tubs. Just make sure you clean them thoroughly before use. They must have adequate drainage holes present or added in the bottom.

Seed sowing Steps

1. Fill your container with seed raising mix.
2. Tap the container to settle the mix and level it off with a straight edge board, a ruler or by hand. The surface should be about 5 mm below the container edge.
3. Firm (but not compact) the mix. The finished surface should now be about 10 mm below the edge.
4. Sow the seed thinly and uniformly over the sowing surface.
5. Cover the seed if required (normal rule is 2x the seed diameter) with sieved mix. If in doubt, cover shallowly.
6. Some seeds require light to germinate – the packet will tell you. Don't cover those, just firm the seed into the surface.
7. Water the container well. Containers with very fine seeds should

Bokashi compost [here](#). (page at Marlborough District Council website, includes PDF leaflet download)

A simple organic DIY seed raising mix

The purpose of a seed raising mix is to get seeds germinating and grow them only until the seedlings are big enough to be transplanted into a mix containing more nutrients, which is known as a potting mix. Too 'rich' a seed raising mix (i.e. too high a nutrient content) can actually delay and impair germination, and favours mould (damping off).

Seed raising mix Ingredients, sieved together:

- 3 litres mature compost, (preferably organic, or a worm-cast compost)
 - 3 litres *washed* river sand – avoid sea sand as the salt on it kills plants!
 - 3 litres leaf mould /compost
- Add lime only for brassica seedlings (e.g. cabbage, cauliflower, broccoli).

As an alternative to plastic pots, try making folded newspaper pots, see instructions here:

<http://www.instructables.com/id/How-to-make-organic-planting-pots-using-old-newspa/>

The seedlings in these pots are planted along with their pot, later.

DIY Potting mix

A potting mix is a nutrient-rich growing medium which will allow the young seedlings to be grown on for some time until they are ready to be transplanted outside. These mixes need to contain more nutrients than seed raising mixes but don't need to be as finely sieved, as the plants have already germinated.

- 3 parts of mature compost, in ratio to 1 part of leaf-mould compost or composted bark, and
- 1 part of washed river sand

You can optionally add the following ingredients to make it a 'state of the art' potting mix:

- 100 g of bentonite clay or zeolite
- 10 g of Gypsum
- 15 g of Dolomite
- 10 g of Rock phosphate
- 10 g of ground kelp (seaweed)



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be watered from below, standing the container in a shallow tray of water. Watering from the top may wash seeds out of place.

8. Optionally, cover the seed tray with glass or plastic to conserve moisture, but check frequently.
9. Regularly check container and water when necessary. Never allow to dry out. Remove glass and/or paper once germination has occurred.
10. Place the container in an undisturbed spot (warm it from below, if required, in early spring). Make sure the tray is in the shade. If not in shade, cover the glass with a weighted or taped sheet of newspaper to keep out direct sun until germination occurs. Continue growing there until seedlings are about long enough to be handled by their leaves (not stem) for the next step, called pricking out.

Pricking out

When seeds have germinated and are large enough to handle, they will need to be thinned to prevent overcrowding. This is done by transferring them from the seed raising mix into containers filled with potting mix. This process is also called 'pricking out'.

Activity 8: Pricking out seedlings – 10 min

Again, this is a great activity to try in the group. Prepare either by having a tray of seedlings grown ready to transplant (plant seeds 5-6 weeks before the session, depending on germination time, usually stated on seed packet or by purchasing some small seedlings from a garden centre.

What you need:

- A variety of pots
- Seedlings (pre-grown or purchased)
- Potting mix
- Water

Put seedlings that you have grown (or bought) on a table and get the group to observe and comment on how they look. Check for & discuss signs of vigour, colour, food deficiencies, damage by pests and disease. Note that they are best handled by leaves not stems when small.

Pricking out steps

1. Fill a suitable container with potting mix.
2. Tap the container to settle the mix and level off. The mix should be just a few mm below the edge and firm but not compacted.
3. Water (preferably by soaking from below, then draining), a few containers of potting mix that the seedlings will be transplanted into later in the session. Allow 10 minutes.



Charlotte has silverbeet and leeks in her garden over winter – which meant planning ahead in late summer to get them sown and transplanted.

Time-saving tip

Pricking out can mean a lot of extra work, and some seedlings do not survive it. To avoid the shock and the 'double – handling', seeds can be sown directly into a fine seed mix layer above a coarser potting mix, sown at the final distances apart, provided the potting mix is not too rich in nitrogen (avoid any amendments of the mix with blood and bone, or dried blood), otherwise germination will be reduced and algae or mould growth become more likely.

This way your seeds will germinate in the seed mix, but will continue to grow with their roots reaching into the potting mix once they are long enough. In this method the horizontal seed spacing has to be greater at the start, so you need more seedling pots.



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4. Make little transplant holes into the mix with the tip of a pencil or dibber.
5. Carefully ease each seedling from the seed mix with the help of the tip of a pencil. Handle them by their leaves, never the stem, as you risk crushing it.
6. Insert each seedling into a transplant hole and firm around the base with your dibber. Do not force or crowd roots into the hole. Seedlings should end up planted a little deeper in the potting mix than they were growing in the seed raising mix.
7. Space seedlings evenly and give them enough room all around to grow to a size where they can be transplanted outside (usually when several cm long).

Prick out seedlings as soon as they can be handled. Leaving them too long increases the chance of transplant shock and makes transplanting difficult. However, there will always be a small shock for the young seedling and after transplanting it will be set back in its development by a week or two.

Hardening off

Before the seedlings can be planted outside they need to be acclimatised to the colder outdoor conditions. Do this by placing the containers first outside during the day and bringing them in at night. Then later, also leave them out at night, close to the house. Give the seedlings about 3 -4 days to 'harden-off' in this way before transplanting them out.

This organic gardening learning guide continues in a second part: covering crop and soil maintenance, alternatives to toxic chemicals, crop rotation, organic fertilisers, and controlling pests and weeds. Download it from the [SL website](#) free if you are registered there in a member Council area of NZ.

Further reading suggestions (for library loan or purchase):

How to grow your own food – A Manual for people who like to eat – Hamilton Permaculture Trust
<http://hamiltonpermaculture.org.nz/purchases/how-to-grow-your-own-food/>

Organic Vegetable Gardening. Xanthe White. 2009. Godwit, NZ.

The Permaculture Home Garden. Linda Woodrow. 1996. Viking, Aus.

Lasagna Gardening A New Layering System for Bountiful Gardens. Patricia Lanza . ISBN 0875967957, Rodale Press, USA.

All new square foot gardening – Mel Bartholomew – ISBN 1591862027 – Cool Springs Press USA. Also *Square Foot Gardening.* Mel Bartholomew. ISBN 1579548563 Rodale, USA.

One Magic Square- Grow your own food in 1m² Lolo Houbein. 2008. Wakefield Press, Aus.

Creative sustainable gardening in NZ. Diana Anthony. 2000. Bateman. ISBN 1869534344

Organic Gardening: A grower's handbook for New Zealanders. Moira Ryan. 1995. Bateman.

Your notes