

THE KOANGA INSTITUTE  
**BEGINNER GARDENER**  
BOOKLET



**KAY BAXTER**

Copyright © 2013 by Kay Baxter  
Illustrations Copyright © 2013 by Franzi Corker

Published by Koanga Institute  
[www.koanga.org.nz](http://www.koanga.org.nz)

Printed on 100% recycled paper

## Contents:

Introduction .....	2
1. Making Decisions & Getting Organised .....	3
A) Start Small .....	3
B) Full Sun .....	3
C) Shelter .....	4
D) Aeration .....	4
E) Water .....	5
F) Nutrition .....	6
G) Tools & Equipment .....	9
H) Seeds .....	10
I) Cost .....	11
J) Last but not Least - Time .....	11
2. Action Time .....	12
3. Double Digging .....	14
4. Bed Preparation .....	18
5. Compost .....	20
6. Bone & Shell Ash .....	24
7. Liquid Fertiliser .....	25
8. Worm Farms .....	28
9. Crop Rotation .....	29
10. Seed Propagation .....	31
11. Transplanting Your Seedlings into the Garden .....	37
12. Help with Management .....	38
13. How to Find & Use Environmental Fertiliser Products .....	39
Garden Action Plan .....	40
Crop Rotation Planner .....	41
Garden Map .....	41

# Beginner Gardener

*Based on the '40m<sup>2</sup> Salads, Stir Fries, Soups & Stews' Garden*

Using our 'Salads, Stir Fries, Soups & Stews' 40m<sup>2</sup> garden model could provide you with the following vegetables over a 1 year period if the instructions contained within are followed, and the recommended fertiliser used, whilst developing your own home fertiliser strategies as described within this booklet:

## **SUMMER GARDEN**

Tomatoes: 40kg

Basil: *pick daily for 3 months with enough to store pesto and dry basil for many meals*

Cucumber: 30kg

Red Kuri pumpkin: 40kg (20 x 2kg pumpkins)

Delicata pumpkin: 20kg (60 pumpkins)

Courgettes: 7kg

Lettuce: 100 small hearting plus another 100 in a second planting

Welsh Bunching onions: *enough to pick some every day for raw or cooking*

Sweet Corn: 240 cobs

## **WINTER GARDEN**

Carrots: 80 kg

Beetroot: 80kg

Daikon: 90kg, *excellent for raw, cooked or fermented dishes, edible leaves as well*

Peas: 1.5kg

Broadbeans (Shellout): 6kg

Silverbeet: 20kg

Cabbage: 20kg

Leeks: 50kg

Broccoli: 20kg, *includes eating stems and leaves*

... and more.

***At supermarket prices the value of this food is \$2,300!***

If you get half of that value the first year you'll still be way out in front plus there are so many other benefits of gardening.

The Seed Collection to go with this Booklet is \$176, the fertiliser (if you buy Nature's Garden from our website) will be around \$50, the booklet is \$15 - a grand total of \$229. Maybe you will need an extra \$150 for a new spade and fork, as well as some seed raising mix and seed trays.

Take the plunge and go for it, you'll never look back!

# INTRODUCTION

I learned a lot about gardening from my grandmother... Jesse Baxter. I saw that she got enormous pleasure from being able to 'give' whenever she felt the need. Sometimes it was eggs from her chickens, sometimes plums from the spreading plum tree with a double graft and a swing under it, sometimes silver-beet, and very often flowers. Flowers are soul food and she loved flowers.

Having a garden is all about nourishment - nourishing one's soul, nourishing one's body, one's family, and community. It is all about being able to give, to make connections and support each other, which is the best feeling!

If there is any small part of you that feels as though you'd like to step back into that world of being able to put the veges on the table from your own garden, of being able to have something to give, of being able to feel proud that you too can do it, then now is the time to begin!!!



I'm not going to pretend this is the only way that beginners could begin a garden. There are so many ways that even getting through to decide how to begin could take an entire book. We have to begin somewhere, so I am going to lead you through what in my experience is a great process to follow. This way will mean you learn how to improve your soil, and your vegetables will improve in quantity and flavour each year.

*If you are working within either a **HAND OVER A HUNDY** group ([www.handoverahundy.co.nz](http://www.handoverahundy.co.nz)) or a **PERMABLITZ** group ([www.permablitz.net/what-is-a-permablitz](http://www.permablitz.net/what-is-a-permablitz)), or any other kind of gardening group, it will be fun to work through this process together.*



# 1. MAKING DECISIONS & GETTING ORGANISED

---

**R**ead through the points A.) to J.) and answer the questions as you go.

## A.) Start Small

It is really important to start small. Do not take on more than you can easily cope with, both physically, financially, and time wise. The success of your first garden, or that of your child's, will play a large part in determining if you/they ever garden again. You are the designer so make sure you design it to be successful!

A 10 square metre garden could be more productive than a 100 square metre garden if it is done well (and the bigger one isn't). This booklet is based on a 40 square metre garden model which will need approximately

- ⚙ 10 - 30 hours to double dig and develop
- ⚙ 1/2 hour daily for maintenance

**Q.)** Do I have this amount of time? If not, am I willing to make it available?

YES

NO

## B.) Full Sun

Make sure you have chosen a sunny spot for your garden, full sun is essential for optimal plant growth. Go and check out how many square metres of potential garden space you have in full or close to full sun.

**Q.)** Do I have a 40m<sup>2</sup> sunny spot for my garden?

YES

NO

## C.) Shelter

To grow good vegetables your vege garden must be sheltered. Some people have relatively sheltered spaces and others don't. Wind cloth is good if you can't wait for the shrubs and trees. The following annual plants could be appropriate to use as fast, close shelter, while you get other things sorted: Inca marigold (grows to 2m), Jerusalem artichoke (to 2m), Globe artichoke (to 1m), Corn (to 2m), Sorghum (to 2.5m)

**Q.)** How will I ensure that my 40m<sup>2</sup> garden is sheltered?

---

## D.) Aeration

Vegetables need 50% of the soil to be air to grow well. To achieve high production of nutritious food in an efficient and sustainable way you must be able to deeply aerate your garden soil. The easiest simple way to do that for home gardeners is double digging, which means digging down to a depth of two spade depths. (Most of us are quite capable of doing this without hurting ourselves, see later instructions.)

If you are physically unable to do this please find a way to get support. All around us in our communities we have people willing and able to help others. Do you have a 'Permablitz' or 'Hand Over A Hundy' group in your local area? They are spreading all over Australia, NZ, and other countries. Check their websites and see if you can organise a group in your area if there isn't one already. Would your local school horticulture class be able to help? Ours is always more than willing. If you have a Permaculture group in your area they might be willing to show you or help you. Do you have a young person down the street willing to help you, or perhaps even your local church has somebody who would actually love to help you get this step behind you?

### **The deeper you prepare your soil,**

the deeper the plant roots will go,

the more plants you can plant per square metre,

the more productive your garden will be,

the more efficiently your time and resources will be used,

the less water you will need per plant,

the less water stressed the plants will get

- and so it goes on.

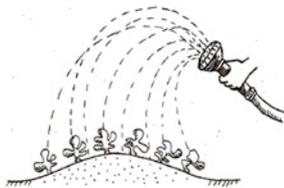
PS: You don't necessarily have to keep double digging each time you plant. If you follow all the steps here your soil will rapidly develop structure that will help keep the air spaces there. If there is 50% air there you don't need to double dig.

## Q.) How am I going to get my garden dug?

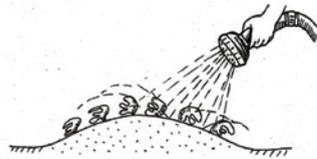
### E.) Water

Moist soil and regular watering is essential for efficient production. Have your garden only as big as you have water to irrigate, or have time to water. You will need a minimum of 5 litres per square metre of garden bed per day during dry periods when it is not raining, or 250 litres of water a day for a 40m<sup>2</sup> garden. If you have dry summers and you need to store water for 3 months you will need 180,000 litres for a 40m<sup>2</sup> garden! **You could put on less water... you will then get far less production per square metre or per plant, and potentially water stressed plants which may attract insect attack. The most efficient system is to make your garden as big as you can supply the optimal amount of water every day it needs it over summer.**

Your soil and your plants prefer it if you water as though it is raining, i.e. water up into the air so it falls by gravity, rather than downwards by force onto the soil, which also compacts and erodes the surface.



Correct Watering Method



Incorrect Watering Method

The deeper your plant roots can go, the less water you will need. The more humus/carbon/compost there is in the soil, the less water you will need. The greater the surface area that is shaded by plants or mulch, the less water will be needed as well.

**Q.) Do I have time to spend 5-10 minutes per day watering every 10 square metres of my garden? (The time it takes will depend upon how much water flow or pressure you have. There may be ways you can improve your system and shorten time taken to do the watering.)**

YES

NO

**Q.) Do I have enough water to water my garden all through summer?**

YES

NO

**Q.) Will I need to reassess my garden size so I do have enough water?**

YES

NO

## F.) Nutrition

Just like us, our soil life (worms, microbes, fungi etc.) needs nutrients to remain and/or grow healthy, and our plants need nutrition to grow strong and healthy in order to nourish us. They also need to be strong to set strong seed to enable the next generation to thrive! The very best way to create healthy plants is to take care of the life in the soil. If you use chemical/industrial fertiliser, you will probably be killing the microbes in your soil. Our soil microbes are essential to growing nourishing food because it is the microbes that unlock the minerals and make the minerals available to our plants in the form that support them to grow strong, resist pests and diseases, and nourish us.

Having strong healthy microbe populations is the key to strong healthy plants, strong healthy animals, and humans. The best things we can do to encourage a strong microbe population is to provide ideal conditions for them. That means:

- 50% air in the soil, we have already dealt with that
- Adequate moisture, as in E.) above
- And funnily enough, the right minerals.

That means if we are able to put the minerals the plants need into our soil for the microbes, they will proliferate and their growth and death cycles will release the minerals for our plants who will love it and be stronger, grow faster, taste better, be more nutrient dense and keep better. If there is a deficit of any of the minerals needed by plants to grow then that will affect the plants' ability to uptake all the others.

I'm afraid most of us have soils that have been largely stripped of the minerals they once contained. We can assume that we are dealing with degenerated soils that need remineralising to grow super healthy food. In this booklet we use compost heaps, worm farms, crop rotation and growing selected carbon crops as our ways of providing nourishment for our soil.

### Compost

I believe making great compost is the best thing we can do as home gardeners to remineralise our soils, however if we use the plant material (weeds) from around

our own gardens we will be more than likely simply recycling the deficiencies in our demineralised soil. We need to understand that making compost with poor quality materials, or materials that do not have all the essential minerals needed by our plants, will not give us good quality compost. We must learn how to make excellent compost which uses the high quality carbon and minerals we put into the heaps to create humus, a living biological form of carbon which is the amazing part of our soil that holds on to water, holds on to the minerals and also is a home for the microbes.

Great compost is also about providing our microbes with the minerals they need so they in turn can provide them to our plants in the best form for them - just the way our plants grew for ever, before we mined the carbon and the minerals with our modern food production methods and killed the microbes the same way.

We can all make great compost, and making great compost is the key to this method being successful. I strongly recommend you don't buy commercial compost. Most commercial compost is anaerobically made, very acid and makes the soil unsuitable for growing nutrient dense vegetable roots and microbes. More details on compost making on pages 20-23.

### **Worm Farms**

Keeping a worm farm is another great way to ensure you are adding available minerals to your garden, so long as you also feed your worms lots of minerals too. See page 28 for details on how to build your own worm farm.

### **Carbon Crops**

Carbon crops are those crops we can grow in our gardens that are efficient carbon accumulators. They can also be food crops, e.g. corn. When we harvest the corn to eat, or whatever other crop it might be, we make compost with the remains, and as the stalks decompose in the presence of air, moisture, microbes and minerals, they create high quality humus, the basis for healthy soil and healthy plants.

The best carbon sources produce tough brown materials - leaves off deciduous trees in autumn, straw (not hay which is just dried grass and not high in carbon), and dry carbonaceous crops such as corn stems, sunflower stalks, lupin stalks, grain stalks such as rye, wheat, barley, millet, amaranth, quinoa, Jerusalem artichoke stalks, weeds with tall strong stems such as lamb's quarters, fennel stalks, chicory stalks, sorghum, and broad beans.

### **Crop Rotation**

Crop Rotation is critical for the maintenance of healthy, minerally balanced soil and nutrient dense food production. We follow the pattern **Heavy Feeders** followed by **Roots and Legumes** followed by **Carbon Crops**, followed by **Carbon Crops** again, and back to the beginning again. Our Koanga 40m<sup>2</sup> **Salads, Stir Fries, Soups & Stews** Garden is designed to include this rotation, see colour insert.

## Nutrition in the Short Term

If you choose to make compost in your first spring it will not be ready to use (in a temperate climate) until the next planting season, i.e. autumn. Some of you might have good enough soils that you will harvest a reasonable or even an excellent crop of veges anyway. Many of you will not be able to successfully grow good veges without doing one of the next options whilst your compost is brewing:

- 1.) Buy some high quality soil/microbe enhancing fertiliser. In NZ you will pay approx. \$2 per square metre in the first season if you apply 400g of EF:Nature's Garden per square metre initially. This is the best fertiliser we can recommend (available from Environmental Fertilisers, [www.environmentalfertilisers.co.nz](http://www.environmentalfertilisers.co.nz)). A fertiliser program is included on page 39
- 2.) Failing 1.) above, I would
  - get some garden lime, mix it with raw sugar, molasses or vermicast, and apply a fine dusting lightly each month. Then collect some fresh cow manure from cows eating grass only, and make your own liquid brews, using burnt bones and shells, seaweed, manure, comfrey, and lime or eggshells as described on pages 25-27 or
  - buy a general purpose garden fertiliser which may get good growth the first season. Possible as a short term easy option or
  - accept that your veges may not grow well, and almost definitely won't be nutrient dense, until the compost is ready in 6 months.

**Q.)** Which of the above options will I choose?

---

## G.) Tools and Equipment

To do a great job of your project you will need a few basic tools. Having these at your service will make a huge difference to what you will accomplish. They are:

1. A D-handled spade, preferably with the flat surface/foot rest so you don't push onto a narrow edge which will ruin your footwear
2. A D-handled fork
3. A garden rake
4. A piece of plywood, or a board to stand on when planting your bed or preparing a previously double dug bed
5. A garden hose and a fan for your hose that means you can water as though it is a rain shower and won't compact your soil or a good watering can.
6. 10 or 20 litre buckets can be very useful for making liquid fertiliser in or carrying compost or compost materials, and sometimes barrels can also be useful. See instructions on pages 24-27 for a bone barrel, and liquid fertiliser barrels.
7. Some kind of weeding hoe. It is pretty easy to get these tools from second hand shops over time, the old tools are way better than most modern tools.
8. Collect some 6cm deep containers and put drainage holes in them to be your seedling trays, we use macrocarpa seedling trays and we know many people use recycled pallets to make their own wooden trays. There are all kinds of containers you could recycle and use. The depth is critical for growing high quality seedlings.
9. Either buy some seed raising mix (Daltons is the only one I've seen in NZ that does not contain fungicides) or make your own (recipe on page 31). I suggest you keep any bought seed raising mix for very small seeds, and you make your own for any large seeds such as corn and beans and peas etc. That way you will be able to tell which are your seedlings and which are the weeds, where it counts! PS: If your seed raising mix contains fungicides you will have no beneficial fungi on your plant roots, essential for growing nutrient dense high brix food.
10. A place to raise your seedlings that gets full light but is protected from the rain and wind. Possibly a very light place in a porch or verandah. An outside bench that has an overhanging roof is ideal in a sunny situation.
11. I highly recommend that you buy a refractometer that includes full instructions for set up and use, as well as charts with Reams figures to



compare and analyse your readings with it (see [www.koanga.org.nz](http://www.koanga.org.nz)) or buy one between a group of gardeners, or see if your Hand Over A Hundy, local organic or Permaculture group can buy one etc. These tools tell you how well you are going with building high health soil, and also how nutrient dense your veges are. If you test your plants weekly at the same time of the day, noting weather and following refractometer guidelines, you'll soon have a good idea how healthy your soil is. The idea is to test each week after lunch one day, and then feed them and test again after ½ an hour - you will see if the fertiliser you are using is making your plants and soil happy or not. If the reading goes up it is helping grow soil and happy plants, if not it is not useful and if the reading goes down it is having a negative effect on your soil community and plants. It is the best way of getting immediate feed back I know of and it helps you decide what to do.

## H.) Seeds

The seeds we use are a vital piece of the puzzle here. Our heritage seeds are the only seeds that have been selected, saved and bred to nourish people. They are also the only seeds that evolved in living, minerally dense, microbially rich soils. Our seeds are the link between our bodies and Papatuanuku, Mother Earth. We have co-evolved with our heritage seeds and animals, we are one!

We are also the ancestors of the generations to come. The seeds have been passed on down the line for 10,000 generations, it is our responsibility..... it is our gift.... to also pass them on down.

There is any amount of science these days to actually show that there is many times more nutrition in vegetables and fruit grown from heritage seeds than there is in the food in the supermarket, which is almost all grown from hybrid seed or worse today. Hybrid seed is actually unable to absorb some key minerals from the soil that are essential for our health (e.g. manganese) because of enzyme blockers in hybrid seed. Seed grown on soils that have been treated with Round Up are known to be unable to grow to nutrient dense vegetables, and the seed is affected down through the generations. Vegetables grown in soil treated by Round Up also continue exuding through their roots over many generations toxins that kill the microbes in the immediate vicinity of their roots.

It is also widely acknowledged that nutrition, or malnutrition plays a role in every known disease/illness.

**It's time to stand up, it is time to become the gardeners again, it is time to reclaim the seeds of our ancestors, it is time to take responsibility.**

**Become an activist and plant heritage seed.**

## I.) Cost

This project could potentially be done for very low cost the first year if you are resourceful and can get the list of things you need together one way or another. You may be time rich and find this a relatively easy thing to do. You may be time poor and rather spend the money to get your garden humming as fast as possible. Either way, or a combination of both, can work.

If you brought all the recommended tools, seeds and fertiliser, new from the shop, it could cost you for a 40m<sup>2</sup> garden (as described in the *40m<sup>2</sup> Salad Stir Fries Soups and Stews* model garden here) \$45 for the fertiliser, and another \$600 for new tools and gear, plus \$176 for the seeds. That is a one off investment. (You could even save most of your own seeds from this garden... you'll need a copy of *Save Your Own Seeds*, another Koanga Booklet, or you can find all the information on our website.) I found in my new first year garden here recently that my investment was all returned and more in the first summer. You save a lot more than you would have spent on vegetables normally because you end up using vegetables instead of other things you would normally buy (e.g. pasta, noodles and refined processed foods). This investment is also pretty much all you need for a far larger garden which makes it even better. It is possible you could get your tools from second hand shops, or friends and family, and you could use rotted cow manure, and lime for your fertiliser the first season and your cost could be almost nothing.

## J.) Last but not Least - Time

The success of your garden will depend upon you having the time to put into it, or enlisting somebody else's help. You will need to have 5 minutes each day over summer for watering for each 10m<sup>2</sup> of garden you have, less as the garden gets bigger. On top of that you will need time on a weekly basis to have a good look at what is happening in your garden... your observation skills will be your greatest gift... and take whatever action is needed. At times that will mean double digging, raising seedlings, weeding, or applying fertiliser of some kind etc.

You will need about 1/2 hour each week to do everything else needed to maintain 10m<sup>2</sup> of garden bed, apart from watering. As your garden gets bigger your time will be used more efficiently and it will take far less time.

If you are new to gardening I suggest you make your garden 40m<sup>2</sup> if at all possible. That is big enough to be able to grow a lot of food, grow your own compost materials so you have high quality compost for the next season, and big enough to rotate your crops each season, and get the feel for what it's like to do a really good job of it. That will require around 5-10 minutes per day of watering time plus around 2 hours a week to do other things. In total that will make an investment of 3 hours a week. If you do it well you could be rewarded with far more value than you put in.



## 2. ACTION TIME

---

So... You've made some decisions, it is now Action Time!

### 🌸 June/July/August

If you are going to be turning grass or a green area into a garden bed then use old carpet, plastic or cardboard well in advance now to cover the entire garden area to weaken/kill the grass and make it easier to dig. It takes 3 months at this time of the year to seriously weaken grass.

### 🌸 August

Collect all the tools, seeds and equipment you will need as in G.) on page 9.

You can buy the **Salads, Stir Fries, Soups & Stews Collection** from Koanga ([www.koanga.org.nz](http://www.koanga.org.nz)) where you will receive all packets of seed needed to plant the summer and winter garden from this Booklet, including carbon crops. Alternatively follow the **Salads, Stir Fries, Soups & Stews** Garden Action Plan on the colour insert so you can see which seeds or seedlings you need to buy, and how many of each you need to grow for your garden.

Understand the Garden Action Plan. Check out all of the colour insert so you know what the garden will look like when planted (Garden Map), what your garden rotation will look like (Crop Rotation Planner), when to plant your seeds, when the seedlings will go into the ground etc.

### 🌸 September

Organise seedling trays and seed raising mix (see recipe later on page 31).

Collect materials to make a compost heap over a couple of weeks - if you are part of a *Hand Over a Hundy* group you could do this together the first time. See details on page 20 for what you could use.

Choose your option for nourishing your soil as in F.) on pages 6-7. You may need to read pages 25-27 to decide on your options as well. If you have chosen to make your own liquid fertiliser, you will need to collect barrells and/or buckets

and a watering can (as described on page 9). Once you have the equipment, organise a collection day for materials and make your liquid fertiliser on that same day. Making your liquid fertiliser now will ensure you have it to use on your garden this season, as it takes 4 weeks to mature. If you choose to buy your fertiliser for the first garden, buy it now. You might find help with sourcing it on page 39.

Check out your Garden Action Plan on the colour insert and see when each seed needs to be planted into seed trays. Plant your seeds. We generally plant all heavy feeders as listed in the Garden Action Plan in the two weeks before full moon, and our roots and legumes 2-5 days after full moon each month they need planting. Mark the dates into your calendar sheet and plant on correct days. Follow the Koanga Moon Calendar on [www.koanga.org.nz](http://www.koanga.org.nz) if you need help to choose good days for planting according to the moon phase. Follow instructions on pages 31-36 for planting seeds, pricking out and taking care of seedlings.

## 🌸 **September/October** (before Labour weekend or early November)

Now is the time to begin your garden bed preparation. I suggest you follow the steps on pages 14-17 and do 30 minutes of focused digging each day until your muscles adapt and you get stronger and faster and can last longer easily. If you only have weekends for digging then put 30 minutes in the early morning and 30 minutes each evening aside to get 1 bed dug each weekend until it is all completed. As you finish each bed, complete the bed by forming or shaping it ready for whatever form of fertiliser or compost you have prepared, see page 18.

## 🌸 **October**

Make your compost heap following instructions on pages 20-23

Collect any stakes you might need for tomatoes or beans or for growing cucumbers or pumpkins up as marked on your garden plans.

## 🌸 **Late October - Mid November** (depending on climate zone)

**By now your beds will be dug, your seedlings will be growing and your fertiliser will be ready to use. First of all congratulate yourself! You have done the hard part, this next part is the fun part.**

Time to plant your garden. Check with local gardeners to find out when they are planting their tomatoes, which will be a good time to put your garden in. Be sure to talk to somebody who has been gardening in your area for a long time. Seeing tomato plants for sale in the garden centres is not a sign it is time to plant them. Most years the first tomato plants get killed by frost and everybody goes and buys more! Follow planting seedlings instructions on page 37.



## 3. DOUBLE DIGGING

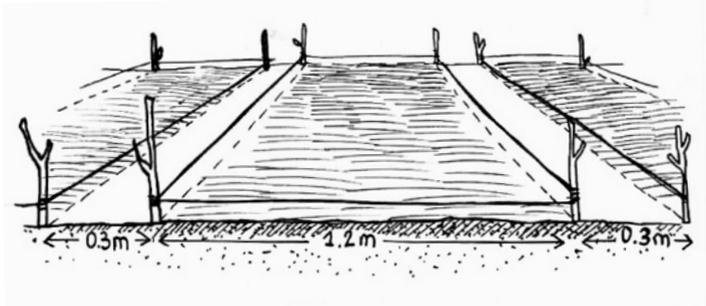
---

**Method 1:** If you have smothered (until dead or weak) or removed the grass.

**Tools required:**

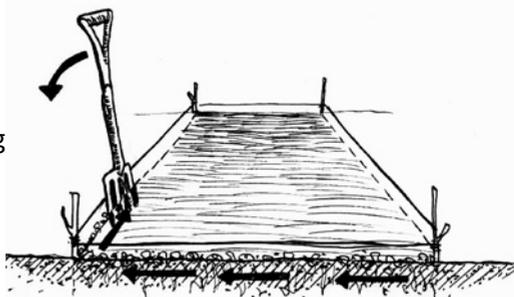
- ✿ D-handed spade
- ✿ D-handed fork
- ✿ Digging board (a piece of plywood or roofing iron etc. to stand on)
- ✿ Rake
- ✿ Buckets to hold soil from first spit removed from bed

1. Remove any plastic/carpet/cardboard you used to weaken or kill the grass.
2. Use sticks or pegs and string to define the edges of your beds. You must be able to reach the middle of each bed from both sides without standing on the bed. A good path width is 30-40cm depending on the size of you feet. My paths are 30cm wide. The narrower the path the less weeding! My bed widths are 1.2m. For a small person 1m wide is great, for a taller person maybe wider.



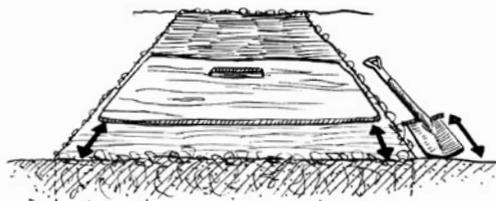
3. Before beginning any digging you must check the moisture levels in the soil. You cannot do a good job of aerating the soil without damaging the structure if it is too dry or wet. It must be moist, but not sticky. You may need to water the bed a day in advance, or even soak the bed over several days, or you may need to leave it to dry out or even cover the beds to keep off the rain.
4. Fork around the edges of the beds to open up and define clearly. Go around each entire bed, pushing the fork into the ground as far as it will easily go, with a little wiggle and body weight if necessary, and then lever the handle back towards the ground so that the earth lifts, but do not take the fork out,

then push the fork back to upright position and remove it. You are not turning any soil over or even removing it from the ground. Doing this all around the bed will help make the double digging process easier and help to keep the edge clear later when you may have a mess. You will regret it if you miss this step out, it is very important.

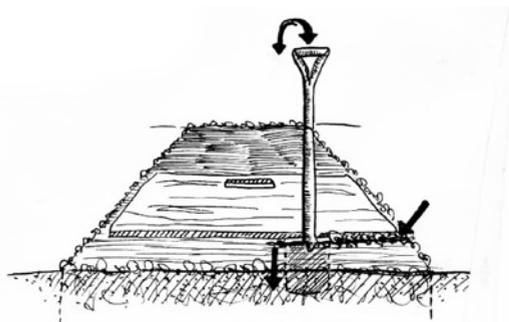


5. Now you are ready to begin digging!

- Place your digging board one spade depth (the depth of the flat metal digging part of the spade) back from the end of the bed. (If you are digging into lawn or previously undug bed you will not need a digging board, but once a garden has been dug you will need it to not compact the garden soil.)



- Using your spade, put it into the soil along the edge of the board as far as you can easily push it, lifting the soil but then pushing the spade back and pulling it out as you did with the fork around the edges of the bed.



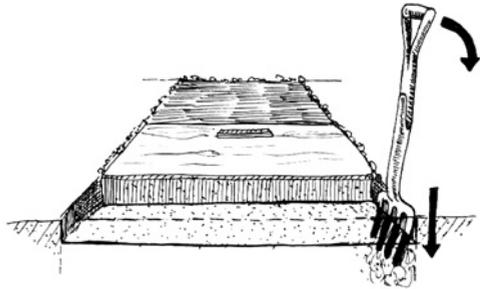
- Go to the left hand end of the strip in front of the board and half way between the edge of the board and the end of the bed put your spade in and use your body weight to push it into the soil and then push down on the handle of the spade and pivot the spade so that the end of the spade with the soil on it lifts. Put the soil into a bucket or container to use later down the bed. Pull the spade back so that it goes into the soil along the edge of the board and



repeat the movement. Continue along the board until you have emptied all of the top soil from the first trench into a container. Be sure to only take 'topsoil', which will look darker and more full of life than the lower often lighter coloured soil. It doesn't matter how shallow the top soil is, only remove topsoil.

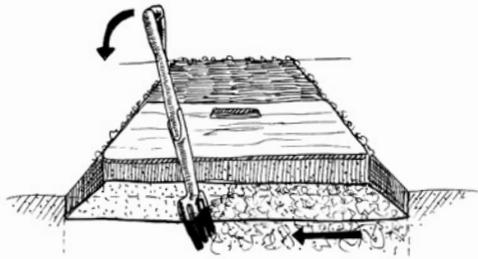
6. Now you are ready to open up the second spade depth down. If this soil is really heavy it will make a huge difference if you add 2-4cm of sand on top of this layer before opening it up.

- Stand on the path at the left hand end of the trench, push the fork into the subsoil as far as it is easy to, right against the edge of the trench, use your body weight on the fork to push it down. Push with your body weight on the handle of the fork backwards, and lift the soil.



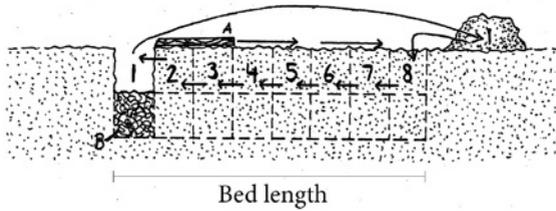
Do not lift it out of the ground at all, just up to aerate that layer of soil, so plant roots can get down, and water can drain away.

- Now stand on your digging board, turn around and face the left. Push your fork into the trench using body weight, about 20cm from the end of the bed and use your body weight to bring the handle of the fork back towards the ground again aerating the soil but not removing it or turning it. Pull the fork out and continue down the trench until you reach the other end, right up to the edge of the bed.



7. Pull your board back another spade depth, and repeat Step 5, but instead of putting the soil from the second trench into a container you simply put it onto the top of the first trench that has been lifted up (aerated) somewhat by the fork. The best way of putting this top soil onto the trench in front is to simply push down on the handle of the spade with your body weight then slide the front of the spade forward and tilt it up so that the soil falls down without being turned over at all. No body twisting or lifting, and the soil micro-organisms go back in the same layer they were to begin with!

A - Digging Board  
B - Forked Up Subsoil



8. You should have the hang of it now. Once you know what you're doing, do it very consciously with efficient and safe movements before speeding up. I find an hour each morning in spring and autumn when the beds are ready is great aerobic exercise and wonderful for the tummy muscles!
9. Continue on down the bed until you end up with an empty trench at the other end where you need to use the top soil you took out of the first trench.

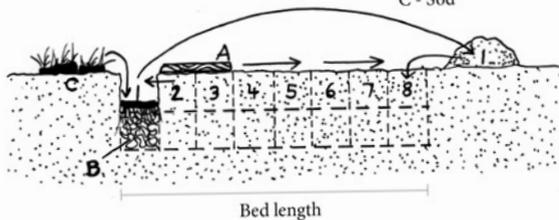
## 10. CELEBRATE! THAT IS AN AWESOME ACHIEVEMENT!

### Method 2:

If you come to do your double digging and the grass and grass roots are still there, I suggest you do the following. We've done a lot of it and it works very well.

Define edges of beds as in Step 1 above. Then instead of removing a spade depth of soil from the first trench simply take the sod off. Put that aside for now. Then follow the instructions as above, but when you've forked the bottom of the first trench to aerate it and you have the sod ready on the top of the second trench, place the sod upside down on the bottom of the first trench. Continue along just as above but removing the sod and placing upside down on the bottom of trench in front before taking the first spit of soil and then forking the next trench to aerate it.

A - Digging Board  
B - Forked Up Subsoil  
C - Sod



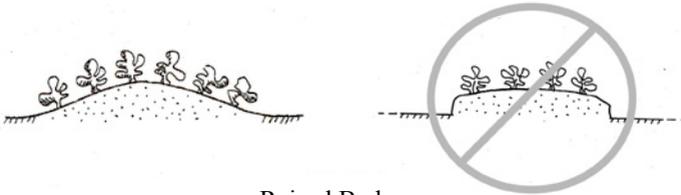


## 4. BED PREPARATION

---

Now that you have double dug this bed there are a few more steps before you achieve a bed that is ready to plant into.

1. Take a garden rake and rake from one side of the bed, and then the other, smooth out the soil so that it is evenly spread all along the bed and the bed is shaped as in diagram below.



Raised Beds

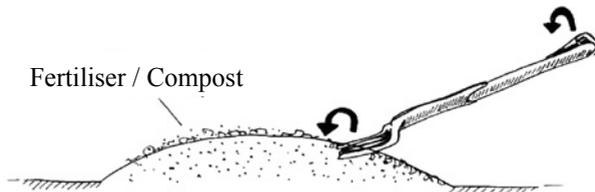
It is really important to have the edges of the beds gently curved, rather than straight vertical sides. The bed needs to look as though it is an arc, or part of an orange skin where the rest of the orange is under the earth, so that you can plant the whole width of the bed and make full use of the hard work you have done. It also helps to stop the birds from destroying the edges of the beds, and it means loads less weeding because the leaves of the plants will grow right out over the edges of the beds and over the edges of the paths. If you have lots of heavy clumps of soil you may find you can break them up with your hands or a heavy hoe. Do so if you can. If you have cloddy pieces of subsoil on the surface you have gone too deep with your spade when taking off the first trench, and you may need to remove them from the bed. Do not worry at this stage about smallish lumps, ignore them!

2. Now is the time to apply compost and/or fertiliser to your bed. I always try and apply 2 - 3cm of home made compost to each bed every time I plant the bed. If you have compost apply it evenly over your bed now.

It is always a good idea to apply lime when applying compost. Dust the surface of the soil, one handful per square metre evenly over the bed. If applying

well rotted cow manure or well rotted other manure, apply 2cm evenly over the bed. If applying fertiliser, apply now too.

Once you have your compost and fertiliser evenly spread over the bed, take your garden fork and insert it 10cm into the ground, on an angle as horizontal as possible, and do a wrist twisting action to mix it into the top few centimetres where it can be of most value to the plants. Do this all along the bed. It may require going along each bed three or four times to cover the bed.



2. Rake the bed as before and then once you are happy with the bed shape (see diagram on opposite page) have a look to see if there are any lumps sticking up on top of the bed. If so take the rake again, and with the end of the rake straight down onto the clumps just push them down until they're level with the top of the bed. Down like this they will not fry out and become rock hard, but will remain moist and will be broken up quite fast into friable soil.



Pushing Clumps down with a Rake

3. Give your bed a light water following the method in the Watering section page 5. Your beds are now ready to plant. See instructions at the end of the Transplanting Your Seedlings section, page 37.



## 5. COMPOST

---

We make compost heaps as follows using these four materials:

### 1. Carbon Crops

High carbon, tough brown material: leaves off deciduous trees in autumn, straw (not hay, it is just dried grass and not high in carbon), and dry carbonaceous crops such as corn stems, sunflower stalks, lupin stalks, grain stalks such as rye, wheat, barley, millet, amaranth, quinoa, Jerusalem artichoke stalks, weeds with tall strong stems such as lamb's quarters, fennel stalks, chicory stalks and sorghum, broad beans etc. These plants are very good at providing organic carbon that creates humus in our compost and is the energy source for all life forms. It is also this material that keeps our compost heaps aerobic (or full of air), that is critical to making high quality compost.

### 2. Green Vegetation

Fresh weeds, green grass, kitchen wastes, animal manure. Comfrey, alfalfa, sorrel and chicory are great because they bring in a lot of minerals to your heap. These plants are called mineral accumulators. Green material provides nitrogen that enables the micro-organisms to develop their bodies. I also add a little manure if available to my green layer. Even just 2 litres of cow manure mixed with water to make a bucket of liquid manure poured over the heap will really get things moving, as it adds hugely to the micro-organism population in the heap. Manure is not essential.

### 3. Soil

Good bed soil with valuable micro-organisms will help to start the decomposition process. The soil will keep down flies and odours, help the pile to hold water, and therefore allow the pile to decompose more slowly, which will ensure an easier-to-maintain compost pile.

## 4. Minerals

As mentioned earlier our soils these days are mineral deficient. Plants require 84 odd minerals to grow to their potential or to be nutrient dense. If any of these are missing or in short supply it will affect the health and nutrient density of your crops. If we wish to be eating food that is able to provide us with the minerals our bodies need to maintain our health we must ensure they are in the soil so they are also available for our plants. Providing our plants with the minerals they need is the best way to avoid pest and disease problems.

**CALCIUM** is the most critical mineral for plant health and is almost always at very low levels in our soil. The best way to remedy this is to add it to our compost heaps. We add calcium to our compost by adding sprinkled layers of burnt bones or shells (see page 24 for instructions to make burnt bones/shells), or crushed shells such as oyster and paua which are easy to crush. You could also buy lime from the garden centre (it's very cheap) and add it to your heap, or from the local lime quarry. There are plants that concentrate calcium, such as comfrey, alfalfa, oats and lupins, so they are excellent ways to increase calcium levels. Growing lupins or oats as your carbon crops over winter will mean you have high quality calcium for your spring compost heap. Having a comfrey patch or an alfalfa patch near your garden or compost heap could mean you can harvest the patches to add them to your compost heap in Autumn. This will help ensure you are adding calcium and minerals to your soil and improving the nutrient density of your vegetables.

**PHOSPHOROUS** is the next most critical generally in short supply mineral. Plants and leaves you can add to your compost or worm farms to ensure you improve your available phosphate levels are comfrey leaves (lots of them!), casurina needles, apple tree leaves, bone ash (see page 24), alfalfa hay or freshly cut green alfalfa, and animal manure, particularly chicken (not from industrial chickens), and even better pigeon manure which is excellent.

**SEAWEED, SALT WATER AND FISH WASTE** are the key to ensuring you have all the minor minerals in your compost and then your soil, once you have the calcium and phosphate taken care of. If you are close to the coast or have friends that are able, be sure to collect seaweed whenever you can. Any kind of seaweed is great, and the salt doesn't matter. Simply pile it on your heap as the mineral layer, and even feed to your worms. Sea water also contains the full range of minerals your soils and plants need so you can collect clean salt water and apply it over your compost heap in a watering can. 10 litres of salt water per compost heap will be a great addition. If you catch fish then ensure your fish guts go into the compost heap, and the bones once you have finished with them go into your bone barrel (see page 24).

Other important sources of a **WIDE RANGE OF MINERALS**: the more of the following you can add to your compost heap, the higher the chances are you will be able to grow nutrient dense food: leaves from deciduous trees when they fall in

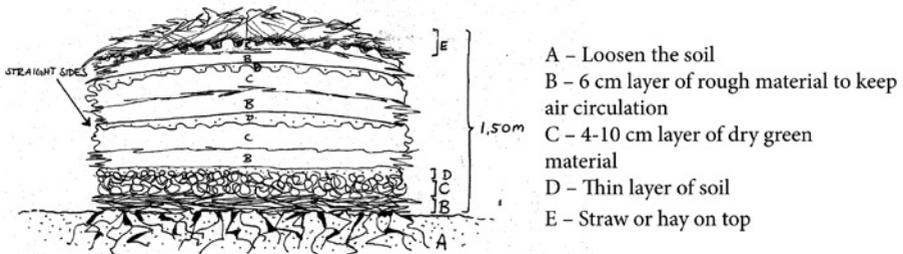
autumn, yarrow, nettle, comfrey, egg shells, bone dust (see page 24), many different kinds of animal manure (including horse, cow, chicken), seaweed, chamomile plants, sawdust (only a little sprinkle each layer), wood ash (also only a little dusting each mineral layer), human urine, dandelions, chickweed.

**EF:Nature's Garden** is a great fertiliser because it has all the minerals you need to grow great soil and nutrient dense vegetables, so one way of improving the quality of your compost/soil/vegetables is adding EF:Nature's Garden to your compost heap on the mineral layer, especially in the beginning if you don't have enough other things to use. On a heap 1.2 x 1.2m add 2 cupfuls per carbon layer.

## Building a Compost Pile

When building your pile, imagine building up a lasagne - flat layers and vertical sides!

- First, with a fork, loosen the soil 25cm deep where you will build your pile. This area should be 1.2 metres square minimum so the pile will have enough mass to ensure good decomposition. Loosening the soil helps to provide good drainage and aeration.
- Put down a 6cm layer of rough materials, which can help to aerate the pile: twigs, small branches, corn or sunflower stalks and so on.
- After the first layer of rough materials add a layer of your carbonaceous material, e.g. corn stalks, lambs quarter stalks, lupin stalks etc. Make sure this layer is about 6cm high and laid on flat in and the sides are vertical.
- Next layer is green material, weeds, manure etc., again 6cm high flat and with the edges straight up.
- Next layer is soil, a sprinkle of soil up to 1cm will ensure minerals are held in the heap, smells are kept down and microbes are happy.
- Next put on any minerals you are adding, e.g. burnt bones, lime, seaweed, manure, salt water, EF:Nature's Garden etc.



Building A Compost Pile

Make your compost 'lasagne' layers, watering each layer as you go. You will need to water every layer that goes on to ensure even moisture throughout your heap. When you take a handful of compost material from the heap and squeeze it you should get 1 drop of water coming out to be at the correct moisture level to ensure good compost.

Continue to add layers until your pile is about 1-1.5 metres high. You can use your hands to pull out the sides of the pile as you add layers, to keep the pile square, or round, and the sides vertical.

Cover the top of the pile with extra soil, slightly mounded in the middle, to maintain the moisture in the pile, and to encourage rain to run off if heavy. A light layer of straw on top of the soil during the rainy season will keep out excess moisture and will prevent the pile from becoming soggy.

Water the pile as needed to keep it moist, check the moisture in the middle of the pile from time to time. It is easy to either under-water or over-water the pile.

Let the pile decompose or 'cook' for a total of three to six months.

### **The compost is ready to use when:**

- ✿ most of the original ingredients are unrecognisable
- ✿ its smell is fresh and woody like fresh spring water, or like the earthy smell in the bush
- ✿ material is dark brown or black, soft and crumbly

### **The four most important elements in building compost are to:**

- ✿ have enough air in the pile (if it wobbles like a big jelly once it's 80cm high you've got it right)
- ✿ use as many different compost materials as you can
- ✿ focus on making sure you have at least half of your ingredients dry hard stems (high carbon material). Hay is not high carbon, see list on page 20 for details.
- ✿ keep the compost evenly moist when making the heap



## 6. BONE & SHELL ASH

---

We collect all of our animal bones and shells after we've finished with them in the kitchen, in a barrell at the back door with a screw top (so we can't smell them). When the barrell is full we light a bonfire and get it big and hot enough that it will continue burning once we put the bones on it. After tipping the bones and shells on top add more wood to cover the bones then leave until it has all burned up and cooled down. If the fire was hot enough the bones will disintegrate when touched.

The burned bones and shells can then be kept in a bucket with a lid. They are calcium hydroxide now so quite alkaline, and not for children to play in. We use this ash to spread fine layers all through the compost heap, a great way to recycle bones and shells. Calcium and phosphate are the major minerals we add to our heaps when we add bone/shell ash.



## 7. LIQUID FERTILISER

---

**M**aking liquid fertiliser is an easy thing to do, however I regard it as a short term solution only. When we soak material (e.g. comfrey or manure) in water, the minerals contained by the plant that are water soluble, go from the rotting material into the water. We then pour this over our soil or plants to help them grow.

Using this method can create as many problems or more than it solves in the long term, because these water soluble minerals are not usually held in the top soil where the plant roots need them, they often either run off or soak down to pollute ground water or waterways. Soluble minerals such as nitrogen, when not held by humus or carbon in the soil (which is very often with poor soils and liquid fertiliser), can also create reactions in the soil that make weeds and plants grow fast and actually use up soil carbon rather than sequestering it.

If our gardening systems 'use up' the carbon or humus in the soil we create deserts eventually... we are certainly degenerating the soil, which we can no longer afford to be doing. It is possible to be gardening organically but degenerating the soil fast. I did that once and learned a hard lesson.

All of this means that if we use liquid fertiliser we must use it carefully. It is always best if we use it in combination with some form of carbon which holds the minerals in a stable form for the plant roots to use as needed. Forms of carbon that can be used are vermicast, white sugar, raw sugar, molasses, humates (liquid), and fulvic acid. In a home garden I would add 1 cup of vermicast from the worm farm to a watering can of liquid fertiliser such as manure, comfrey or fish. Mix well before applying.

Liquid fertiliser is a short term solution to get things humming, the long term solution is to put all the things you can make liquid fertiliser with in the compost heap. Following are ideas for making various liquid fertilisers.

### Liquid Manure

Only make liquid manure from grass fed animals, never from cows or chickens eating GE feed, which almost every major herd and flock is in New Zealand today. Cow manure is great, I think it's the best. You can also use rabbit manure, or your own chicken manure (What are you feeding your chickens? Almost all commercial feed contains GE soya beans and also corn). Manure tea is great to get things growing again after rain or if there is a deficiency of nitrogen. It is especially good for heavy

feeders such as broccoli, silverbeet etc.

To make manure tea simply hang an onion bag with about 10kg of manure in a 200 litre barrel filled with water for a few days, agitating daily, then use the resulting tea. I refill the barrel with water again and use the second lot of liquid.

Alternatively, you could just put 1 litre of any kind of manure into a 10 litre bucket and stir daily for 7 days. I don't dilute this liquid, but use it on all heavy feeders. Add a carbon source as described above.

## Liquid Comfrey

Liquid comfrey is great for tomatoes, potatoes, eggplants, pumpkins, cucumbers, and peppers to keep them fruiting all summer. It is high in phosphate, potash, and calcium, as well as many other minerals.

To make liquid comfrey, fill a barrel or bucket to the top with wilted comfrey leaves, then fill with water. Stir daily, and once the green leaves have disintegrated, remove the fibrous stalks with a garden fork. The resulting liquid will be perfect to feed tomatoes, peppers and eggplants and all other gross feeders, undiluted, but with vermicast or sugar added as above.



Liquid Fertiliser



Liquid Comfrey Barrel

## Liquid Seaweed

Seaweed fertiliser is full of the entire range of minor minerals, plant activator enzymes, growth promotants, hormones etc. etc. Amazing plant food and plant tonics. Most gardens benefit from an application of some form of seaweed, the easiest way is simply add seaweed to the compost heap just as it comes off the beach.

Liquid seaweed can be easily made by collecting seaweed and putting it through a shredder, or even simply using as it is. Half fill your barrel with seaweed, or chopped seaweed, then fill with water. Stir every day or two and after a month you will be able to begin using the tea. I use it all over the garden. The seaweed will take a long time to break down completely so you can just keep adding water and using the tea until it is all broken down. I apply with a watering can to the soil, and seedlings. If you don't have access to fresh seaweed you can always buy seaweed meal and use that.

## Kina Juice

I know a lot of people who collect their kina (sea urchin) shells in a bucket near the garden, fill it with water, and as the shells and contents dissolve in the water over time they use that as a liquid fertiliser. The same thing applies as with all other liquid fertilisers, it is best to add a carbon source. Kina shells are a great source of calcium and many minerals.

## Urine

Urine is a source of nitrogen that some of us will be able to utilise in our gardens. Urine can be a great liquid fertiliser. If it has not been in contact with humanure it contains no pathogens and does contain many minerals. Once again it will need to be mixed with a carbon source or it will almost certainly burn up soil carbon because it contains more nitrogen than most soils can hold as it is applied. Dilute it 1:10 and add a carbon source before applying.

*I used to be revolted by the weird looking pointy ended sluggy things that live and grow and wriggle around in these liquid feed barrels, until I realised they were the larvae of hover flies. Hover flies are very important beneficial insects and pollinators in our gardens, so I leave the lids off the barrels most of the time to encourage the adult flies to lay their eggs there.*



## 8. WORM FARMS

---

Worms are great at turning our kitchen scraps or industrial food waste into valuable nutrition for our gardens. Vermicast is high in humates (the complex forms of carbon that are part of soil humus, that hold the water, the minerals and the microbes in the soil for us). Vermicast also contains many minerals and is high in microbial life.

Worm farms can be very simple. I prefer a simple box structure with a lid but no bottom. Put in scraps and layers of garden weeds and animal manure, keep it moist, add lime and seaweed and as many forms of material to bring in a wide range of minerals as possible, eggshells crushed are great.

You must have the right kind of worms for this to work well. There are many many kinds of worms - you need tiger worms. Somebody you know may already have a worm farm and you can get some from them, or you may need to buy them from Trade Me or some other place.

Worms need a moist but free draining situation, and will just keep on eating until they turn your food into vermicast. You can then begin a new worm farm and take the worms on top and the food that is left on the surface of the farm to begin the next worm farm and use the vermicast. You can use it in seed raising mix, on the garden beds, in liquid fertiliser etc.



## 9. CROP ROTATION

---

Crop Rotation is an important part of nutrient maintenance, maintaining soil and plant health, and so growing nutrient dense food. Different plants absorb and hold in their bodies different ranges and ratios of minerals, so rotating crops around the garden over the years means you will use the minerals most effectively, and have the best chance of producing mineral rich crops all the time.

Rotating our crops also helps make the best use of soil fertility (and all the effort required to keep it fertile) by putting the plants that need the most nutrients in the places where the most nutrients are, and those that prefer less fertile conditions in the ground after those requiring more nutrients.

Another reason for rotating crops is to avoid disease and pest problems. Several of our potentially serious garden pests and diseases can be avoided by rotational cropping.

Our rotation system includes four rotations:

1. Heavy feeders
2. Roots and legumes
3. Carbon crops
4. Carbon crops (again)

### List A - Heavy Feeders

This is a list of *heavy feeders*. These are crops requiring high nutrient levels.

- 🌸 silverbeet, chard, spinach
- 🌸 all the brassicas: cabbage, cauliflower, broccoli, kale, Brussels sprouts
- 🌸 onions, leeks, garlic
- 🌸 celery
- 🌸 pumpkins, squash, courgettes, cucumbers
- 🌸 melons
- 🌸 eggplants
- 🌸 tomatoes
- 🌸 peppers
- 🌸 salad greens

## List B - Roots and Legumes

Those that follow the heavy feeders are the *Roots and Legumes*.

- ✿ all root crops: potatoes, beetroot, swedes, salsify, parsnips, kumara, scorzonera, turnips, radish, daikon, ulluco, yacon, carrots, yams, swedes
- ✿ all the legumes: broad beans, peas, beans

## List C - Carbon Crops

These are the crops that we include so that we are growing enough carbon (in the stems of the crops, as well as in their roots) to ensure we will be able to make high quality compost so we will be growing soil and high quality vegetables. These crops are only regarded as carbon crops if they are left in the soil until they are at the seed stage. Once a crop has reached 10% of its flowers open, it can begin to be regarded as a carbon crop; the longer you leave them in, the higher the carbon content of the plant. Many of these carbon crops also provide us with food.

- ✿ corn
- ✿ wheat, rye, oats, barley
- ✿ millet
- ✿ sorghum
- ✿ amaranth
- ✿ quinoa
- ✿ lupins
- ✿ broad beans, tic beans
- ✿ sunflowers
- ✿ Jerusalem artichokes
- ✿ Globe artichokes, etc... all things with fibrous strong stems.

**Half of your garden each summer and winter must be planted in carbon to be maintaining and improving your soil carbon or humus levels.** This is essential if you are wanting to be growing nutrient dense food.

If you are using the Koanga *Salads, Stir Fries, Soups & Stews 40m<sup>2</sup>* Garden Plan, your rotation will look like this, see colour insert.



## 10. SEED PROPAGATION

---

### Seed Raising Mix

If you are making the mix yourself, which you can easily do, use 1/3 garden soil (put through a screen or sieve), 1/3 well made compost (put through a screen) and 1/3 river sand or sand from the building department at your local hardware store. This mix will grow the best seedlings of all. No fertiliser is needed to germinate seeds, but the life in the compost will help create healthy roots and plants. If your compost is not yet top class with a lot of minerals in it you may need to add fertiliser to the seed raising mix. I add *EF:Nature's Garden* which is kind to young roots and also helps them grow fast and strong.

If you are buying seed raising mix, be aware that all the commercial ones I've seen except Daltons in New Zealand, contain fungicides and other toxic substances that will kill the natural life supporting systems for seedlings as well as any potential bad ones. It is important to choose one that is fairly fine with not too many large lumps, large pieces of pumice, stones, wood etc. This is especially important when sowing fine seeds.

If you think your mix may be a little too rough you can always try sieving it to remove some of the larger lumps, but remember a nice fine mix with a good texture will work best. Also the mix should not be wet and not bone dry, but slightly moist and easy to work with.

### Seed Trays

You can use any container to grow seedlings, however to grow strong roots the container needs to have a depth of 7.5cm (3"). Seedlings need a lot of room to grow a good healthy root system. You will notice this when it is time to prick them out. If they do not have adequate room and the roots hit the bottom too soon and stay that way for a while until they are ready to prick out, they will become stressed and can even go into a state called 'premature senility'. This is where they start to fruit or flower very early while still at seedling stage – broccoli and marigold seem to be most affected by this.

The key in organic seed production, when you are re-using containers, is to keep everything clean.

# Seedling Propagation

Propagating seeds and managing to grow good seedlings is not as hard as you think, and there are lots of advantages to doing it. You can use the seeds of your choice for a start. You are far more likely to achieve nutrient dense vegetables if you've used heritage seeds and grown strong seedlings.

You are far more likely to have success with your garden if you grow your seedlings in trays first rather than direct sowing. You'll have far less damage by slugs and snails, less bird damage to large seeds such as corn and peas, less seed rotting because it's too cold, and far more efficient use of the bed space.

## Step One: Organising Your Materials

The first step here is to organise the materials that you will need. These are:

- Seeds (see the *Salads, Stir Fries, Soups and Stews* planner on colour insert)
- Seed raising mix (either brought or home made, see opposite page)
- 4 x seed trays (6cm deep minimum, around 30-40cm long and 30cm wide)
- A fine nozzle for your hose or watering can to water the seedlings

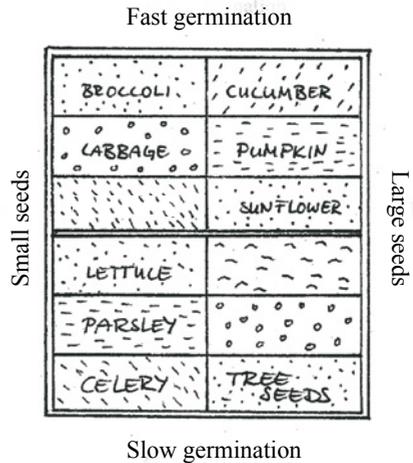
## Step Two: Organising Your Seed

Once you have collected all of your seed, divide it into piles according to the month it is to be planted (see colour insert). Place the seeds to be planted each month in different envelopes. Take the seeds to be planted first, possibly in September or October, and organise your seed into groups.

The basic idea is that you want to group similar sized seed together in a tray so that it comes up roughly at the same time. After a few goes you will get the hang of this and it should make things easier.

With the *Koanga Salads, Stir Fries, Soups and Stews* 40m2 garden you will have the following seeds in late September / early October to plant: *tomatoes, cucumber, basil, peppers, chives, lettuce, Welsh bunching onions, courgettes, pumpkins, peas, beans, beetroot, carrots, and sweetcorn.*

Divide them into the following groups (check out the planting instructions on the packets, this will help you put them into groups as well):



Grouping seeds according to their characteristics

1. **Peppers, tomatoes, basil:** All are small seeds that take a little time to emerge, and as it says on their seed packets, they need extra warmth to germinate well. All need pricking out (instructions for pricking out follows).

2. **Lettuce:** Small seeds that need pricking out

3. **Onions:** Need to be scatter sown, not pricked out, but will go into the garden after 6-8 weeks in seed tray

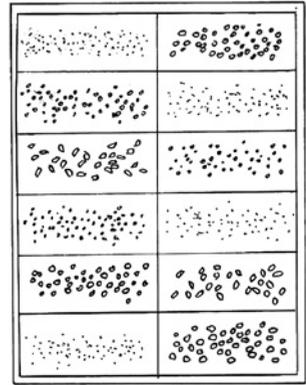
4. **Carrots:** Must be direct sown into the garden rather than a seed tray

5. **Cucumbers, Courgettes, Pumpkins:** large seeds that come up fast and block the light from others, need pricking out.

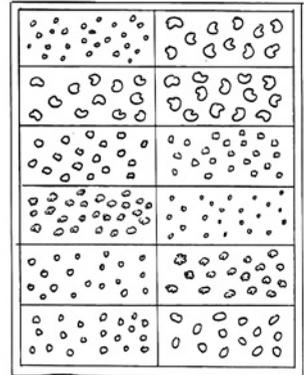
6. **Peas, Beans:** large seeds that come up fast but don't need pricking out. They are scatter sown into trays and directly transplanted into the garden when around 3-5cm high.

7. **Beetroot:** scatter sown into trays and not pricked out so needs to have a space of its own for a month.

8. **Corn:** scatter sown in trays transplanted into garden when about 3cm high.



Sowing small Seeds that need Pricking Out



Scatter Sowing Seeds

### Step Three: Sowing the Seeds

So now you have your material together, fill up the seed tray with seed raising mix to about 1cm from the top of the tray. If sowing large seeds like beans, leave a little more room. Make sure to fill the corners of the tray well and pat the mix down slightly. You are now ready to sow the seeds. Here are a few things to keep in mind when sowing your seeds:

1. Keep similar seeds together.
2. Always sow a few more seeds than you need so you can choose the strongest seedlings for your garden. If you need only 1 courgette and you grow 3 or more, you can always give the others away or pot them up and sell them.
3. Aim to cover each group of seeds with fine seed raising mix that is the same depth as the depth of that seed.

4. With seeds that are scatter sown, the idea is to place them on the seed raising mix in their permanent position approximately 2cm apart.
5. Smaller seeds are planted more closely and then pricked out and grown on before going into your garden.
6. Make sure you label each variety as you sow it in the tray. We often cut up old plastic containers into strips, or sometimes we buy ice block sticks.

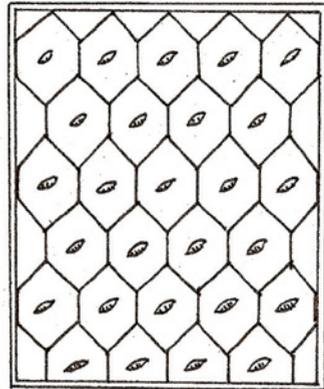
### Scatter Sowing Seeds

Find your pile of seeds that are to be scatter sown into trays. If you have beet-root or onions, make sure they go in a different tray to beans, peas, corn, and pumpkins because they will be there far longer.

The onions and beetroot can be scatter sown in a tray so that the seeds don't quite touch each other. The peas and beans and some of the corn will go into another tray, and a tray for the rest of the corn.

You can either simply scatter sow your seeds over the seed raising mix at approximately 2cm diagonal spacings, or you can get a piece of chicken mesh with around 2cm holes and place that on the seed tray. You can then place 1 seed in each hole and your spacing will be done for you. They will all end up in 2cm diagonal spacings.

Once you have your seeds sprinkled in rows or placed on the right centres, they need to be covered with fine seed raising mix. All seeds should be covered with a layer of mix that is the same depth as the thickness of the seed, so a large bean might need about 6-10mm of mix on top, for an onion seed 2mm.



Sowing seeds into chicken mesh

### Sowing Seeds that will be Pricked Out

First of all I use my fingers to make lines in the seed raising mix so that there are enough spaces in the tray to sow each type of seed. Depending on the size of the seed tray you can sow up to 12 types of seed into one tray.

For the smaller seeds we lightly sprinkle bands 3 - 5cm wide of seeds into its space in the tray and cover with fine soil as deep as the seeds are in width.

## For Both Large and Small Seeds

Once your seeds are covered over, pat the tray lightly and give it a water with the watering can or hose but don't blast the soil – try to water gently and disperse the water evenly over the tray. Place in the greenhouse or warm spot where you can keep the temperature as even as possible – around 20° C is best. Also keep the soil moist, water lightly each day if the mix on top dries slightly – remember those small seeds on top are very close to the surface and it will stress them or even kill them if they keep drying out. This is why you need to keep the environment as stable as possible, to reduce any stress they might have.

### Step Four: Pricking Out

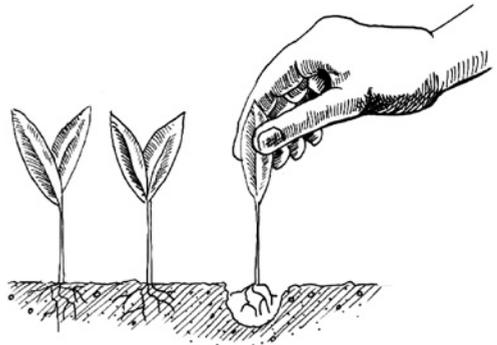
Check your tray every day until you notice the seeds begin to poke through and emerge from the soil. Water lightly each day. Wait until they have their first pair of leaves...usually between 3 - 10 days. When this happens you can transplant or prick out these seedlings into another tray for further growth.

This needs to happen as the seedlings will be getting crowded and tend to go upwards and develop long skinny stems which will develop weak spindly seedlings, so they need more room to grow and must be pricked out. You can use the same sized tray filled up to the top with seed raising mix or potting mix – as long as it is not too lumpy - that either has very good quality compost or some added fertiliser (I recommend *EF:Nature's Garden*, otherwise a general purpose seedling fertiliser). Make sure you fill the corners, level it off and pat down lightly.

The seeds which were sown using chicken mesh frames on 2.5 – 3cm centres already (corn, beans, pumpkins, peas, beetroot, onions) will go straight into the garden once 3 - 9cm high, they will not be pricked out again. Check their seed packets for specific instructions.

The next step is to dig up and separate your rows of seedlings – I like to use a small kitchen knife with a point to help separate out the seedlings from each other. In this way you can fit roughly 6 -10 different varieties of seeds into one tray depending on how much you need to sow of one particular kind.

Separate each seedling as you go so the seedlings roots are exposed to the air only as long as necessary to plant it. **When handling the seedlings, try to touch only the leaves – they do not like their stems to be touched as they bruise easily and this will stress them.** I usually hold the tips of the leaves gently while separating the roots from the rest with the point of the kitchen knife.

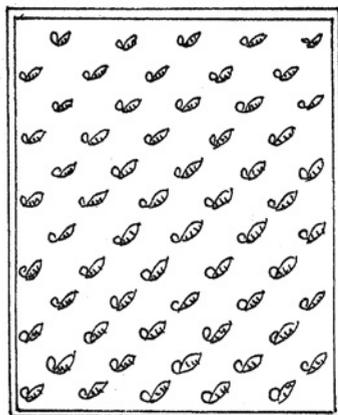


You want to place the seedling into the new tray with its roots well buried and the new leaves only just emerging from the soil - it is easiest to do this while holding the tips of the leaves and lowering it down into the little hole you will have made for it.

Try to plant each seedling 2–3cm from the next one so they are all evenly spaced. This takes a little practice and time but is worth it.

When you have pricked out as many as you think you need – I always do about 20-30% more than I think I will need in case any die or get eaten by slugs when they are planted up in the garden - water lightly with weak fertiliser solution (possibly your own liquid fish, manure or seaweed etc.) and keep in the greenhouse or similar.

The seedlings should stay in the tray until 6 – 9cm high and around 4 weeks old. At this stage most will be planted into the garden. If your seedlings are not looking strong and healthy and ready to go into the garden, the seed raising mix or soil they are in does not contain enough nutrition and you will need to feed them well regularly.



Pricking out seedlings at diagonal spacings



## 11. TRANSPLANTING YOUR SEEDLINGS IN THE GARDEN

---

Look at your garden plan which is based on our rotation and also how much space each seedling needs.

All of the Koanga seed packets have instructions on them which tell you the best measurement we have found for diagonal spacings when the seedlings are pricked out for the first time into their trays, and then again when they are transplanted into the garden. This information is on your Garden Action Plan on the colour insert.

We have Odells' lettuces that are planted at 10cm diagonal spacings, so the first row will need 11-12 seedlings in it for a bed 1.2m wide. Always begin across the bed, not along the bed. When planting the second row, plant them in the diagonal spaces between the seedlings in the previous row. That gives each seedling optimal space and its share of the soil nutrition to grow to its full potential. If you have dwarf beans, they also are planted on diagonal spacings, usually 20cm. Climbing beans, peas, and corn are all planted in rows (or in the case of climbing beans sometimes around a tpee of poles).

Once you have planted your babies, give them a gentle water (pretend it's raining) and then water them a little each day to keep the surface of the soil moist and alive and breathing. Your seedlings will now grow best if you keep the surface of the soil open and weed free. I hoe the soil surface every week, to avoid the unnecessary job of weeding bigger weeds if it is left too long.

Regular soil aeration and a daily sprinkle with water is all I do other than my twice a month - before and after full moon – liquid feed. If I was confident that my soil was so good it was producing nutrient dense food of the highest degree, I would not bother with liquid feeding. It is a very good way however of making sure our plants are getting as much of what they need as possible if there are any doubts. Liquid seaweed and fish, and maybe liquid lime would be my first choices for foliar feeding. For plants like tomatoes, peppers, eggplants and corn I use the watering can to feed the soil around their roots as well as foliar feeding the leaves, as they are all in the ground a long time and we want as much fruit off them as possible. Liquid comfrey and liquid cow manure are my first choices for feeding these plants. Liquid comfrey is fantastic for tomatoes, being high in potassium.



## 12. HELP WITH MANAGEMENT

---

For further information about how to take care of the your plants such as tomatoes and potatoes, check out the Koanga website [www.koanga.org.nz](http://www.koanga.org.nz) or our moon calendar in the Koanga Garden Guide giving you ideas about possible monthly maintenance etc.

And if you are keen to follow up with your winter garden, make sure you are organised well in advance, with plans and seeds.

The Koanga **40m<sup>2</sup> Salads, Stir Fries, Soups & Stews** collection includes everything you will need for your spring planted summer garden, as well as your autumn planted winter garden for the first year.

Please see the *Koanga Garden Guide*, *Save Your Own Seeds*, *Growing Nutrient Dense Food*, the *Koanga Garden Planner*, and our website [www.koanga.org.nz](http://www.koanga.org.nz) for more information on BioIntensive gardening, growing nutrient dense food, saving your own seed and more.

# How To Find and Use Environmental Fertilisers' Wonderful Products!

It is very difficult to buy garden fertiliser that we know will provide the complete range of minerals needed by growing plants in the balance they need them, in a form that is not water soluble (which means it would wash away with the next rain). This is an essential bottom line for growing nutrient dense vegetables, and growing soil!

Environmental Fertilisers exist to provide just such products. They mostly only sell to farms etc., but home gardeners can get the following by going to the Koanga website [www.koanga.org.nz](http://www.koanga.org.nz) and ordering them online. If you don't live in New Zealand, check out your local sources of 'biological' fertiliser. (In Australia there is NutriTech that I know about, in America Acres USA has loads of contacts.)

The following is the fertilisation system we have developed using this fertiliser over many years now. It is the fastest and cheapest way we know to achieve nutrient dense food while you get your other systems up and running, e.g. high quality compost, worm farms, liquid feed etc.

When planting your garden beds for the first time using this fertiliser, add per square metre:

- 🌸 200g of EF: NanoCal (a form of calcium attached to carbon so it stays in the plant root zone)
- 🌸 400g of EF: Nature's Garden

Fork that into the top 5cm, then transplant your seeds or seedlings.

I then apply

- 🌸 100g of EF: Nature's Garden on the surface of the bed, and then water the seedlings in with
- 🌸 EF: Fish Plus at the rate recommended on the container.

If the crops are heavy feeders as listed on page 29 you may need to repeat

- 🌸 EF: Nature's Garden 100g per square metre each fortnight along with the EF: Fish Plus to keep them growing well. Watch to see if you need it.

We also foliar feed using

- 🌸 EF: Vegetative Foliar each week for the first 4 weeks to give plants the best possible start and encourage nutrient dense production

# GARDEN ACTION PLAN - 40M<sup>2</sup> “ SALADS, STIR FRIES, SOUPS & STEWS ”

Summer Crop	Cultivar	Diagonal Spacing	plants p.m.	Metres	No. plants	When to Plant Seed	DS/SS/PO*
Lettuce	Odell's	10cm	100	1 (a)*	100	early Sep	PO
Onions	Welsh Bunching	30cm	9	1	9	early Sep	PO
Beetroot	Cylindrical	10cm	100	1	100	Sep	SS
Daikon	Tokinashi	20cm	25	1	25	Sep	PO
Beans Dwarf	Kaiapoi	20cm	25	2	50	Sep (b)*	PO
Tomato	Watermouth	50cm	4	2	8	early Oct	PO
Basil	Genovese	15cm	36	(c)*	36	early Oct	PO
Cucumber	Port Albert	1m	1	1	1	early Oct	PO
Courgette	Long Green Bush	1m	1	1	1	early Oct	PO
Pumpkin	Delicata	1m	1	1	1	early Oct	PO
Marigold	Naughty Marietta	30cm	1	3	3	early Oct	PO
Zinnia	Chromosia	20cm	-	(d)*	10	early Oct	PO
Sunflower	Lion's Mane	30cm	-	(e)*	6	early Oct	PO
Carrot	Oxheart	10cm	100	1	100	Oct	DS
Beetroot	Cylindrical	10cm	100	1	100	Oct	SS
Beans Pole	Green Emu	10cm	20 (f)*	1	20	early Oct	PO
Beans Pole	Dry Dalmatian Pean	10cm	20 (f)*	2	40	early Oct	PO
Corn	Early Gem	30cm (g)*	6	5	30	early Oct	SS (h)*
Corn	Golden Bantam	30cm (g)*	6	5	30	mid Oct	SS (h)*
Corn	Rainbow Inca	30cm (g)*	6	10	60	Late Oct	SS (h)*
Carrot	Yellow Austrian	10cm	100	1	100	Nov	DS

(f)\* best to plant 20 at a time and plant more every two weeks - by the time you have the patch full you'll be eating them and can continue planting to fill gaps

(g)\* will need to be in a warm frost free spot and may need to go out in October under a cloche to begin with

(h)\* will be planted under and around tomatoes so don't need separate space

(i)\* flowers to be planted on ends of beds or randomly in gaps or edges

(j)\* plant on ends of corn beds

(k)\* make a bamboo or tre tree 2m high tipi using 10 poles then plant a bean each side of each pole

(l)\* corn is planted in 2 rows per bed and plants 30cm apart in the row

(m)\* transplant into garden as soon as leaves are 3cm above the seed tray soil, feed weekly in seed trays

(n)\* plant 5cm apart in 2 rows along each side of the bed, along the bottom of 1m high netting or alternative

(o)\* lettuce to be planted under cabbages

(p)\* cress to be planted under kale and broccoli

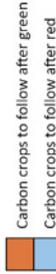
(q)\* transplant into garden when 2-4cm high

(r)\* to be planted after peas come out

Winter Crop	Cultivar	Diagonal Spacing	plants p.m.	Metres	No. plants	When to Plant Seed	DS/SS/PO*
Onions	Welsh Bunching	30cm	10	1	10	early Jan	SS
Leeks	Lyon	10cm	100	1.5	100	early Jan	SS
Beetroot	Cylindrical	10cm	100	1	100	early Feb	SS
Turnip	White Ball	10cm	100	1	100	early Feb	PO
Peas	Southland Sno	5cm (l)*	40	2	80	late Feb	SS
Silverbeet	Swiss Chard	30cm	10	1	10	early Feb	PO
Cabbage	Dalmatian	50cm	4	2	8	early Feb	PO
Lettuce	Odell's	10cm	100	(j)*	15	early Feb	PO
Lettuce	Winter	10cm	100	(j)*	15	early Feb	PO
Celery	Nutty	30cm	10	0.5	5	early Feb	PO
Broccoli	De Cicco	40cm	7	1	7	early Mar	PO
Cress	Upland	20cm	25	(k)*	15	early Mar	PO
Carrot	Oxheart	10cm	100	1	100	early Mar	DS
Daikon	Tokinashi	20cm	25	1	25	early Mar	PO
Turnip	Ohno Scarlett	10cm	100	1	100	early Mar	PO
Oats	Carbon crop	10cm	100	5	500	early Mar	DS
Calendula	Mix	(d)*	-	-	-	early Mar	PO
Broadbeans	Scottish	40cm	9	3	27	mid Mar	SS (l)*
Oats	carbon crop	10cm	100	5	500	early Apr	DS
Oats	carbon crop	10cm	100	1000	1000	early Apr	DS
Broccoli	De Cicco	40cm	7	1	7	early Apr	PO
Kale	Red Russian	40cm	7	1	7	early Apr	PO
Chinese Greens	Mesclun	-	-	1	1	early May	DS
Beetroot	Cylindrical	10cm	100	1 (m)*	100	late May	SS
Carrot	Yellow Austrian	10cm	100	1 (m)*	100	late May	DS

Heavy feeders

Roots and legumes



Carbon crops to follow after green  
Carbon crops to follow after red

DS/SS/PO\* - DS: Direct sow into garden beds evenly over area allocated on plan

SS: Scatter sow into seed trays leaving a little row around each seed, transplant into

garden beds when seedlings are 3cm high

PO: sow seeds into trays close together, prick out at 2.5cm diagonal spacings into another

tray when first leaves appear and transplant into garden when 5cm high

Please see the *Koanga Garden Planner, Save Your Own Seeds, Growing Nutrient Dense Food* and the *Koanga Garden Guide* for more information.



## Booklets produced by the Koanga Institute

### *Growing Nutrient Dense Food*

by Kay Baxter

### *Save Your Own Seeds*

by Kay Baxter

### *200m<sup>2</sup> Urban Garden*

by Kay Baxter, Joanna Cathie and Koanga Interns

### *Beginner Gardener*

by Kay Baxter

### *Building a Rocket Stove*

by Tim Barker

Check out our website for more information on workshops

[www.koanga.org.nz](http://www.koanga.org.nz)