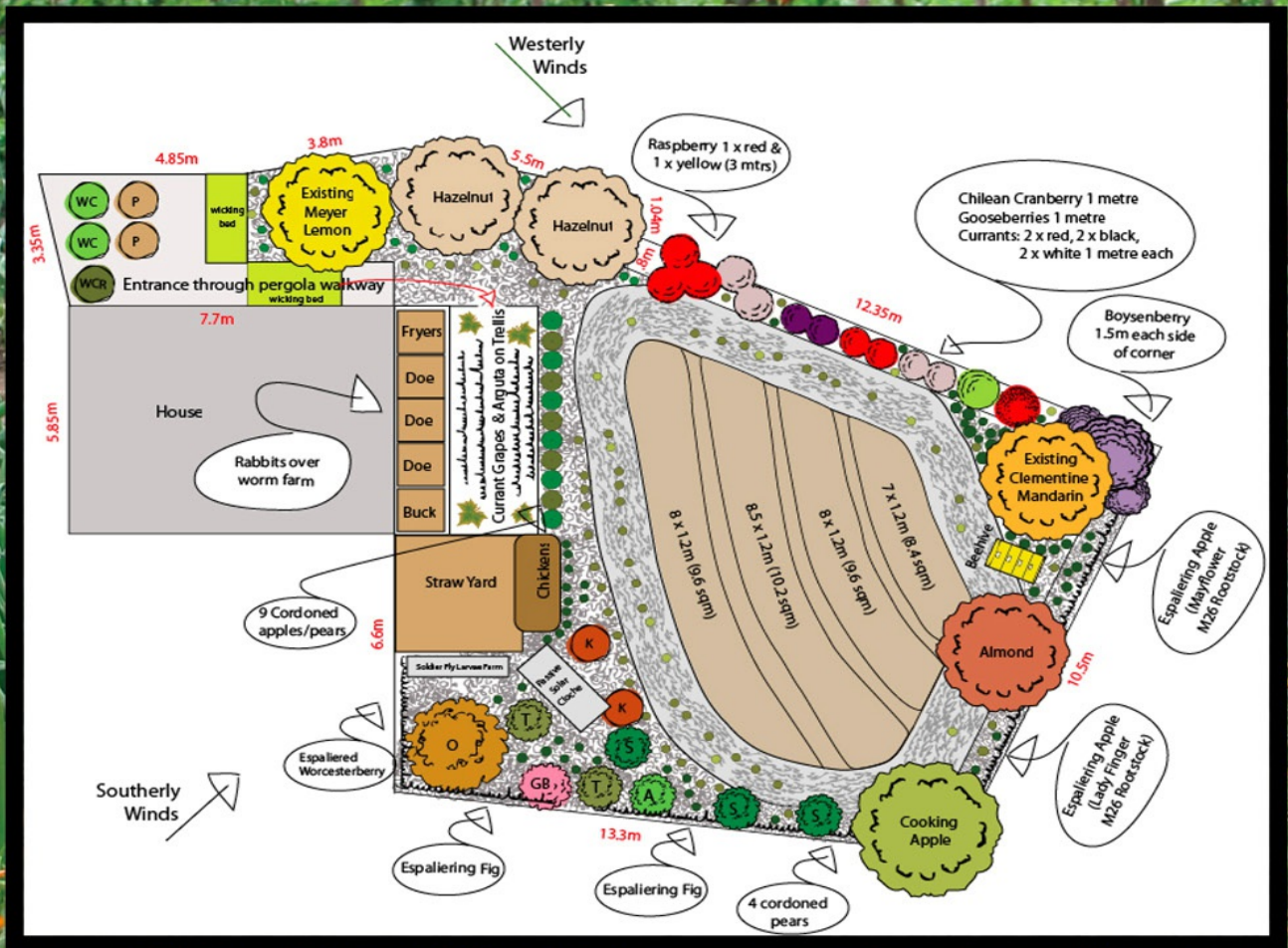


THE KOANGA INSTITUTE

200M² URBAN GARDEN

BOOKLET



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& KOANGA INTERNS

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INTRODUCTION

Our aim is to inspire and empower urban dwellers by setting up models of urban gardens designed to produce the actual nutrition required by a family. After many years of research around what constitutes a nutritious healthy diet capable of maintaining human health and DNA for future generations, we fully endorse and support the research done by Weston A Price in the 1920's and 30's, and the work now of the Weston Price Foundation www.westonaprice.org.

This is our first model. The design is included at the end of the booklet, and if you go to our website www.koanga.org.nz, you can follow our progress and ask questions. You can also come to one of our Open Days and see the garden. Our Urban Design workshop will be taught in the garden.

PLEASE NOTE:

We regard this design as Stage 1. It provides only around 1/2 the essential daily requirements for calcium and vitamin A. We can see how we can add elements to this design to bring nutritional levels up to the daily requirements, however it is a process for gardeners to learn to house, manage and feed animals in a safe, healthy, happy way.

We imagine getting this level of nutrition from 200m² will bring most families' nourishment up significantly, and we would then look at adding one or more of the following once competence and confidence was achieved at this level:

- Pond or aquaponic system
- Pigeon loft
- 1 more doe in the rabbit system, or a guinea pig tractor
- Raising meat chickens over summer on soldier fly larvae and comfrey
- Milking sheep or goat

All of these decisions will be dependant on many things, but most 200m² gardens could incorporate several of these elements which could bring daily levels of Vitamin A and calcium up to the recommended requirements.

It is also entirely possible that required levels could be reached by harvesting or buying resources from the wider environment:

- Fish
- Raw milk cheese from small dairy farms that we see emerging on land surrounding towns and cities

THE BRIEF

We gave the following brief to our Permaculture Design students over 4 Permaculture Design Courses, and each time the urban design group came up with different and wonderful ideas. Some groups had guinea pigs for the Vitamin A and traditional fat, some had snail farms, and one group a penned sheep or goat (being fed from the wider area), for the calcium and vitamin A. We then did a final design based on the best of all of them that we felt were practical, socially acceptable at this point in time, and possible now.

We have an urban, low income family in a large city near the ocean who are super resourceful, with common sense and basic handy man (and woman) skills, who are very keen to learn and would like a design for their 200m² urban garden to produce as much as possible of the key elements of nutrition needed to keep their family of 2 adults and 2 children (aged 4 and 6) healthy.

They are eating following the principles of the Weston Price Foundation*, which are based on the principles of all indigenous peoples visited by Weston Price in the 1920s-30s (see following pages for details).

They are concerned that high quality food is not easy to buy and is not affordable, and that it is likely that this situation will rapidly become worse. In particular it is difficult to obtain high enough levels of Vitamin A, calcium and high quality traditional fats and oils in an industrial diet.

They have been given some money (\$2,000) which they want to use to establish this garden, to enrich their lives in every way. (Check www.koanga.org.nz to see what we have spent so far.)

They live in a Mediterranean climate, cold in winter (maybe 20 frosts between 1-5 degrees celsius below), normally very hot and dry in the summer, with free draining sandy loam soils and a water table around 70cm below the surface. Rainfall annual average is 1600mm.

They have every weekend to work in their garden, and in the summer, evenings as well. They dream that this garden can be their fun, their work, their play, their connection with nature, their connection with their own ancestors.

They also dream that the skills and resources this garden might produce could enable and empower them to take the skills to their wider community.

Weston A. Price was a dentist and dental researcher in the 1920s/30s. He had noticed that the health of his clients was deteriorating down through the generations and understood, without evidence, there must be a connection to diet. He was totally committed to find the link and an 'ideal diet' for human health maintenance.

As a result of his years of research within the USA he designed his own research project and visited many groups of indigenous peoples who were at that point still eating their traditional diets. He studied their health and the food they were eating. He came to the conclusion that they were unbelievably healthy (as documented in Nutrition and Human

Degeneration), and eating eight times the minerals western people in the USA had in their diets at that time, and five times the fat soluble vitamins Weston people had in their diets at that time. He also discovered that all indigenous people followed the same principles in their diets, however they all had widely varying diets because their environments differed widely.

The Weston A. Price dietary recommendations based on the characteristics of these traditional diets are:

1. Eat whole and unprocessed foods.
2. Eat beef, lamb, organ meats, poultry, eggs from organic pasture fed animals.
3. Eat wild fish, shellfish and fish roe from unpolluted waters.
4. Eat full fat milk products from pasture fed cows, preferably raw and fermented.
5. Use animal fats, especially butter, liberally.
6. Use traditional vegetable oils only - extra virgin olive oil, expeller-expressed sesame oil and flax oil, tropical oils like coconut and palm oil.
7. Eat fresh fruits and vegetables (preferably organic).
8. Use whole grains, legumes and nuts that have been prepared by soaking, sprouting or sour leavening.
9. Include lacto-fermented vegetables, fruits, beverages and condiments.
10. Prepare home-made meat stocks.
11. Use filtered water for cooking and drinking.
12. Use unrefined salt and a variety of herbs and spices.
13. Make your own salad dressing using raw vinegar and traditional oils.
14. Use natural sweeteners in moderation (honey, maple syrup, rapadura etc.)
15. Drink unpasteurised wine or beer very moderately with meals.
16. Cook only in stainless steel, cast iron, glass, or good quality enamel.
17. Do not use a microwave oven.
18. Use only natural food-based supplements.
19. Get plenty of sleep, exercise and natural light.
20. Think positive thoughts, and practise forgiveness.

Weston Price found that indigenous people had well over 12,000 IU of fat soluble Vitamin A in their diets daily, and over 1500mg of calcium in their diets on a daily basis. In our experience these are amongst the most difficult elements to get enough of in an industrial diet, and if we can design our diets to include the levels recommended by the Weston A. Price foundation, then most other minerals and vitamins will be taken care of if we also follow the Weston Price principles as previously listed.

Some groups of people he studied ate no meat, but large quantities of fermented milk and cream, others beans and grain but a lot of animal fat or butter. Some ate mostly meat, some mostly fat. All of them had 30-80% of their daily calory intake in the form of saturated fat. These seem to be the biggest challenges for today's industrial society.

Please see www.westonaprice.org for more information.

KEY DESIGN ELEMENTS

In this design we provide fresh vegetables on a daily basis, year round. We can also provide fresh fruit on a daily basis, as well as dried fruit out of season within 3 years. We can provide olive oil and pickled olives for daily use, as well as nuts on a regular basis after about 3-5 years also.

The nuts, fruit and vegetables will go significantly towards maintaining the health of this family, however we still need more Vitamin A and calcium than these items will provide.

We chose rabbits as being the most suitable animals to keep for meat, fat and specifically Vitamin A, and chickens as providers of high quality fat and Vitamin A as well. It is the animals in indigenous people's diets that provided the sacred food, the fat soluble vitamins that they recognised they needed to maintain their health.

Living near the sea there could be some way that a regular fishing trip or fish buying/bartering can be arranged. It is possible in New Zealand at least to buy fish heads, fish frames, pigs heads etc. for quite a low cost that can add to what we have in the 200m² garden.

The key elements of this design are:

1) Sacred Food high in Vitamin A, minerals, traditional fats and oils

- Vitamin A will come from rabbit livers, but also from occasional chicken livers, and from bone broth using all of the animal parts, especially heads.
- Recommended Levels of Vitamin D should be achieved by working in the sun and through eating eggs daily and rabbit/chicken fat.
- The family will get their calcium from rabbit bone broth, with more minor amounts from the chickens that have finished laying, eggs, small amounts from nutrient dense fruit, vegetables, herbs and nuts, and olive oil, as well as significant calcium, other essential minerals and hormones from nettle tea and other weeds such as chickweed and cleavers.
- Traditional fats will come mostly from eggs, olives and nuts. Olives, almonds and hazelnuts are a feature in this design to maximise oils and minerals. Nutrient dense vegetables contain high quality fats and oils, especially Omega 3 and 6. Animal fat will come from small animals such as chickens and rabbits who store their fat around internal organs rather than in the meat or under the skin.

Nutritional Content of 200m² Urban Garden Produce:

Product	Calcium	Vitamin A	Fat
Rabbit Meat (54g serve per day, or 100g every second day per person etc)	9mg	-	8g
Rabbit Liver 30g a week using chicken figures because rabbit unavailable) *a	-	2500 IU	-
2 cup/300g each of rabbit broth, with offal and internal fat *b	200mg	4100 IU	20g
Casseroles/stews including broth	100mg	2000 IU	-
Soaked Nuts 1/4 cup	100mg	-	12g
2 Eggs	50mg	245 IU	5g
Nutrient Dense Vegetables 200g (very high Brix veges store Omega 3 and 6)	200mg	-	-

Olive Oil 2 Tbspns per day	2mg	600 IU	28g
Nettle/chickweed/cleavers/raspberry leaf/horsetail teas	20mg	-	-
TOTAL	681mg	9,445 IU	73g
Minimum Daily Requirements	1500mg	12,000 IU	-

*a) We understand the quality of feed an animal eats effects/determines the quality of nutrition the animal provides for us. Our rabbits eat no pellets or grains, only high Brix / nutrient dense greens and roughage.

*b) The calcium in broth is far more easily absorbed than calcium in vegetables, nuts and meat.

2) Maximum production of highly nutritious fruit and nuts all year round

(see Fruit Ripening Chart)

- We chose heritage varieties of vegetables and fruit to maximise nutrition.
- The fruit trees we have chosen because they have a wide range of vitamins and minerals, with fruiting time year round and many things that can be stored. We chose heritage fruit species that are known to contain high levels of nutrition e.g. berries and apples, goji and Arguta.
- Remineralisation of the soil (see Strategies & Techniques)
- Potential vege garden area is maximized by keeping fruit trees vertical, and using all possible vertical and high horizontal spaces (whilst ensuring possible year round fruit and nuts).
- Maximization of edges and vertical spaces with espaliered and cordoned trees (apples, pears) and vines (grapes, Arguta) which allows for maximum length of ripening time, and maximum varieties for different end uses.
- We've chosen fruit trees and the almond on dwarfing rootstocks to ensure they will not outgrow their spaces.

3) 40m² of vegetable garden bed (see Koanga Beginner Gardener Booklet)

- For the garden we chose BioIntensively managed beds because this is the most efficient and sustainable strategy for maximum production of nutrient dense food. If you are not familiar with BioIntensive gardening or how to grow nutrient dense food, I suggest you get a copy of our Beginner Gardener Booklet and our How To Grow Nutrient Dense Food Booklet.
- We have planned the garden so that we are growing heritage vegetables, because we know by the taste and from science that they contain far more nutrition than industrial vegetables.
- We have chosen specific vegetables that contain high levels of nutrition, e.g. Dalmatian cabbage aka Collards etc.
- We have chosen vegetables that crop heavily per square metre (see Koanga Beginner Gardener Booklet).
- We have chosen a range of vegetables that will ensure there is something every day for our family to eat throughout the year, especially for making wholesome soups, stews, stir fries, and salads!
- If you follow the instructions and do a great job of taking care of the soil (see Beginner Gardener Booklet) you could expect to get the following harvest from your vege garden

over 1 year, whilst improving/growing the soil:

Summer Garden

- Tomatoes: 40kg
- Basil: pick daily for 3 months plus 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
- Sweetcorn: 240 cobs

Winter Garden

- Carrots: 80 kg
- Beetroot: 80kg
- Daikon: 90kg, excellent raw, cooked or fermented, edible leaves
- Peas: 1.5kg
- Broadbeans (Shellout): 6kg
- Silverbeet: 20kg
- Cabbage: 20kg
- Leeks: 50kg
- Broccoli: 20kg, includes eating stems and leaves
- Plus more!

4) We include wicking beds on our concreted area to maximise ways to increase food production and nutrition in this small area

- Crops that produce well in these beds are potatoes, peppers eggplants, and herbs. If you google "wicking beds" you'll find many designs.

5) We have chosen to include some box gardens to grow other crops that suit these beds, to help maximise production/nutrition

- We'll grow waterchestnuts in a bath, Kang Kong and watercress in a plastic lined box, kumara in 2 boxes, and potatoes in 2 boxes.

6) We include a solar drier to maximise use of all crops

- We will dry our nuts after soaking them
- We will dry any excess fruit on a daily basis
- We will dry any excess green vegetables so that they can be powdered and added to soups and stews
- We'll have an ability to harvest and store any crops that may be in local parks, waste areas, road sides

- Watch out for a Koanga booklet on Solar Driers in summer 2014.

7) We include a small biochar maker to help remineralise the soil by adding biochar to the chicken scratch yard / compost.

8) Top Bar Beehive for honey, pollen and propolis

9) The Garden Action Plan (see Koanga Beginner Gardener Booklet) shows you which crops may or may not easily be saved for seed - as you will see a significant amount of seed could be saved from and for this garden.

STRATEGIES & TECHNIQUES

We'll use the following strategies and techniques to achieve production of our animals, fruits and vegetables in a regenerative way:

1) Multiple systems in place to produce our own chicken and rabbit feed

- Dynamic accumulators (comfrey, French sorrel, yarrow, chicory, alfalfa) planted everywhere, including rabbit tractor path, which is excellent chicken, rabbit, and compost food
- We will do a bit of foraging from nearby parks and neighbours, especially in the first years
- Tree prunings from tagasaste, legumes and apple trees for rabbit food and compost
- Chicken scratch yard will be where the compost is made for the garden as a whole and all kitchen waste will go in there for the chickens to turn over. Attention will need to be paid to adding sufficient carbon so it remains aerobic and the chickens can actually turn the heap. The idea is that the chickens can actually live and lay well entirely by eating the decomposers in the compost plus green material like comfrey.
- Seaweed as it comes in during storms for the chicken scratch yard.
- We will check out our parks and vacant places around our area and see what possibilities there are for guerrilla planting to the advantage of residents. Especially things like large nut trees, comfrey, fruit could be shared by groups of people, trees and plants that produce biomass for compost making and feeding rabbits and potentially other animals. There may be specific trees that produce seeds that are good food for fattening pigeons for example.

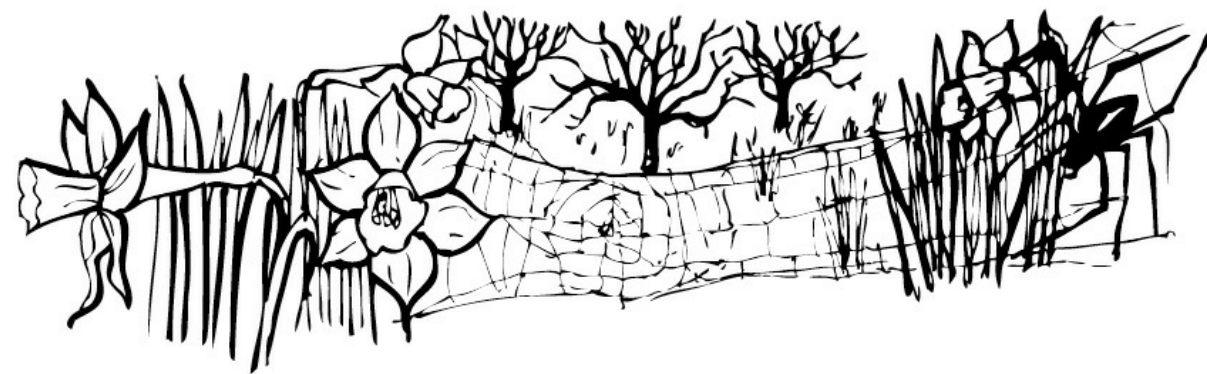
2) Remineralisation for soil, plant, animal and human health!

For the whole design to work we need to re-mineralise the soil... so as well as designing in mineral accumulators (as above) there will need to be a focus on finding local sources of minerals, recycling all nutrients, making and using biochar, and buying in what is missing will be critical. A soil test will be done in the beginning and we will buy a refractometer. It will be critical for the family to understand that if they have vegetables that aren't nutrient dense, then feeding these vegetables to their rabbits will simply recycle the deficiencies. Their goal must be to produce nutrient dense plant material to feed themselves and their animals, so those minerals can be recycled through them!

- Recycle all bones through bone ash in the compost
- Recycle all brown cardboard and clean white paper we can find through the compost or worm farms
- Collect all leaves we can in autumn from wider area, as well as neighbours' hedge prunings, which may also be great for feeding rabbits
- Create a neighbourhood project to chip council prunings and either use as wood chip, and/or make biochar... a group could get the council contract to do the local area tree maintenance

- Harvest seaweed and salt water at any possible time (ideally monthly) to ensure the health of our soil, animals and family
- Catch fish or barter for fish to increase our calcium, vitamin A and traditional fats and oils intake, and to have more bones to burn to return to the compost
- Forest garden – 5-6 layers. A major part of the design to re-mineralise the soil and maintain soil fertility lies in designing the garden to have multiple layers as in a forest garden. E.g. deep rooting herbs, ground cover, legumes, herbaceous woody perennials, low growing shrubs, legumes to 3 metres, canopy fruit trees in full sun, as well as many mineral accumulators
- We will invest with our neighbours in a chipper to harvest carbon from urban trees and parks to maintain the mulch for fruit trees and berries, compost carbon for the chickens and also use as extra feed for the rabbits

3) The family will need choose good genetics for animals, trees, ground covers and vegetables, so heritage lines are very important. The best possibility is heritage breeds selected for health and production on a non-industrial nutrient dense diet.



POST NOTE

Ideas we'll look at once we have the initial plan working well:

- It is easy to see that once this garden is up and running there would be a lot of potential for selling seeds, seedlings and trees grown from cuttings, seed etc. If that were a priority to get extra income or for bartering a significant tree may have to be removed to make room for that, alternatively a greenhouse could be built on the entire concrete area instead of wicking beds and tubs with plants etc.
- It is also easy to see that anybody who is managing such a garden will soon become the teacher in their street! Another source of income or bartering potential!



KOANGA URBAN CHICKEN 101

We have 1 rooster and 8 chickens (Legbars which are egg producing chickens rather than meat chickens, although they do have good breast meat) in a deep litter scratch yard of 2.4 x 2.8m, with a fully covered roof and chicken mesh walls (mesh size to keep sparrows out is ideal), holding 50cm deep aerobic carbon/compost materials being turned by chickens.

They have several roosts at varying heights over the compost, a solid south wall behind them, two nesting boxes, and a dust bath with wood ash and sand inside under nesting box so they can't poo in it.

Harvey Ussery's book *The Home Chicken Flock* (see www.koanga.org.nz) is our favourite chicken book with great information and many ideas for providing non-industrial feed sources.

Our long term/medium term goal is to have chickens fed only on decomposers in compost, soldier fly larvae from a soldier fly farm (you can use Google to find a design), and worms from a worm farm under the rabbits (see *Rabbit Cage Design*), plus mineral accumulating greens such as chicory in winter, comfrey from September to May, and alfalfa, plus many other greens growing in the forest garden surrounding the 40m² BioIntensive garden beds.

It may take a few months before achieving the desired levels of decomposers in the compost heap plus a compost that can easily be turned by chickens - it will need experimenting to get the right size carbon in there, it looks as though a chipper/mulcher to mulch the tagasaste branches eaten by rabbits will provide best possible carbon, plus compost crops from the 40m² garden which will also have to go through the chipper so chickens can turn it easily.

In the meantime we are buying organic maize, nixtamalising it (soaking it in woodash for several days) before feeding, to increase the minerals available for no extra cost.

Red combs show the mineralisation level of chickens. The more nutritionally dense food you feed them, the longer their combs will stay red, the longer they will lay, and the higher the egg quality will be.



LAYING HEN MANAGEMENT

Morning

1. First thing in the morning check chickens' water, clean as often as necessary to keep clear and fresh
2. Run your eye over each chicken to see that they are active, bright eyed, and red combed
3. On a weekly basis check and fill if necessary the dust bath (sand and wood ash/diatomaceous earth)
4. Enter chicken yard and fork up a pile of compost so they can turn it over (if they aren't already doing that), getting them used to eating the decomposers, forking in the day's compost/chicken bucket from the house... until they can do it themselves
5. Throw them a bunch of greens, in Summer lots of comfrey from urban garden is great (comfrey is high in protein and low in fibre, excellent chicken feed), plus as much dark green mineral accumulators as possible including grass, clover, chicory, sorrel, plantain, tagasaste, dock

Afternoon

6. Collect eggs, ensure hay is fresh and clean in egg boxes
7. Give them soaked corn and feed as much as they can eat with nothing left over for rats in the night or birds early in the morning and to encourage compost feeding in morning. Add 1 tablespoon of chicken minerals to corn at point of feeding to chickens and 1 tablespoon of seaweed meal whilst building worm and soldier fly systems.
8. Learn to handle chickens to do a monthly check on health etc., instructions in Harvey Ussery's book

KOANGA URBAN RABBIT 101

Our goal is to be able to provide 1-2 rabbits for the kitchen each week, fed solely from food harvested in either urban garden or local foraging, no brought commercial feed. We will keep 2 does so each doe will be bred every 12 weeks, leaving plenty of time for recovery and ensuring health and raising large babies that grow fast!

Rabbits are quite particular when it comes to what goes into and leaves their bodies. Because their leafy diets include so much cellulose, rabbits produce two different types of excrement – the first are hard, light-brown droppings (which will be made into mineral-rich vermicast by the worm-farm below), and darker, soft pellets or caecotrophs, which the rabbits eat – if you see this, don't be alarmed! Like cows chewing the cud, rabbits re-ingest these droppings to further digest their food and extract as many nutrients as possible.

Another aspect of their unique digestive system is rabbits' inability to process gas; because they cannot burp or fart, gassy foods like grass can make a rabbit very sick and, as a result, we have to watch what they are fed.

Rabbits feed on herbs, forbs, and leafy weeds, and can eat a lot – about 1.5 cups of leafy greens, stalks, and dry material per kilogram of body weight each day, and 3 times as much when they're pregnant. Our bunnies particularly like clover, plantain, chickory, and dandelion leaves; some other rabbit-approved foods include radicchio, endive, silverbeet, raspberry leaves, dandelion leaves and flowers, and, occasionally, carrot tops. The darker the better! Light coloured plants have little nutritional value for rabbits and should be avoided.

Rabbits like most animals, are creatures of habit, and if they are not used to something, it may take a while for them to get used to eating it!

In addition to the leafy stuff, we include 50% stalky material in each bundle of green feed – plant stems, chickory branches and fruit tree prunings, willow, tagasate, alfalfa hay, meadow hay, but NOT fruit: small amounts of certain fruits are ok, like strawberries, apples (though NOT the seeds, which are poisonous to rabbits), pears, cherries, blueberries, grapes and bananas. However, because of its high sugar content, fruit is like junk food for rabbits, and should be avoided.

We will buy local meadow hay and alfalfa hay rather than pellets containing many dubious ingredients. I suggest if you don't have access to hay or alfalfa hay that you begin with only 1 doe and get to know your local feed sources and build up skills and feed resilience before taking responsibility for more does and babies.

The following foods are toxic to rabbits, and should NOT be fed to them:

- Brassicas, including cabbage, swede, turnip, kale, broccoli, cauliflower, Brussel sprouts, kohlrabi
- Amaranth
- Foxglove

- Lettuce
- Lupine
- Laurel
- Oak
- Nuts or Seeds
- Horse Chestnuts
- Poppy
- Potato leaves, sprouts, or peels
- Rhubarb leaves
- Soybeans or soybean vines
- Tomato plant parts

This list is limited to what can be found in our area, there's more info online.

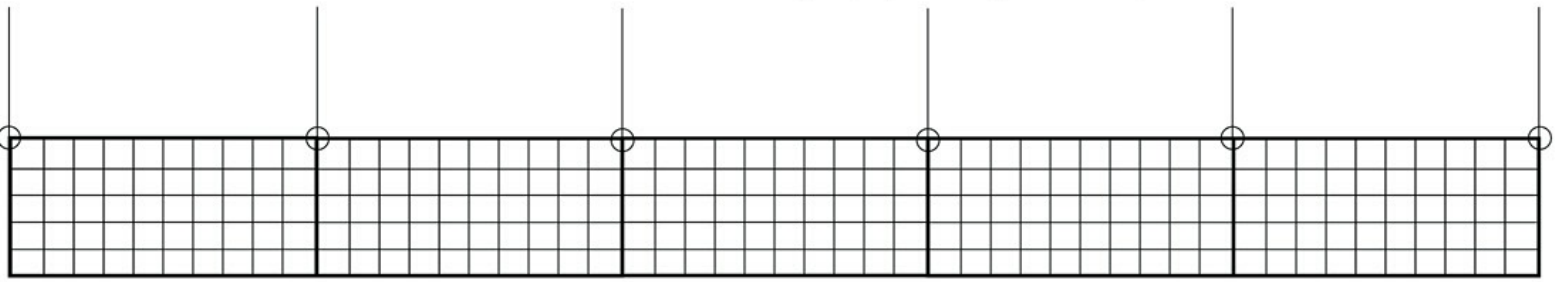
RABBIT CAGE DESIGN

Five Cages to be installed across the garden facing wall of the house (see diagrams below) - 2 cages for does, 1 cage for buck, and 2 cages for fryers (weaned young).

- 1m² per rabbit, 45cm high so that the rabbits have room to stand up.
- Mesh size no larger than 25mm on the bottom (we will use 19-13mm). This is so that the rabbits do not get sore feet. If it is too large they hurt their feet, if it is too small the faeces pellets cannot fall through the holes.

Front View

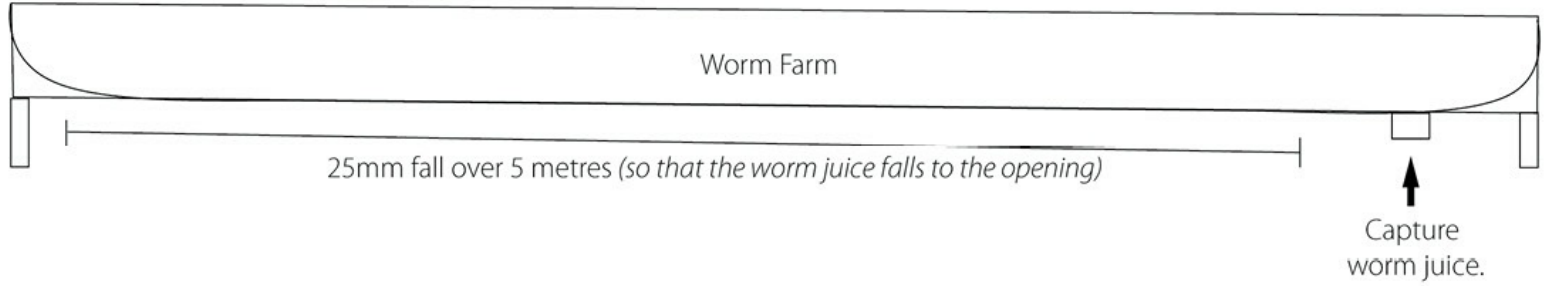
5x rabbit cages (suspended by wire/chain)



Worm Farm

25mm fall over 5 metres (so that the worm juice falls to the opening)

Capture worm juice.



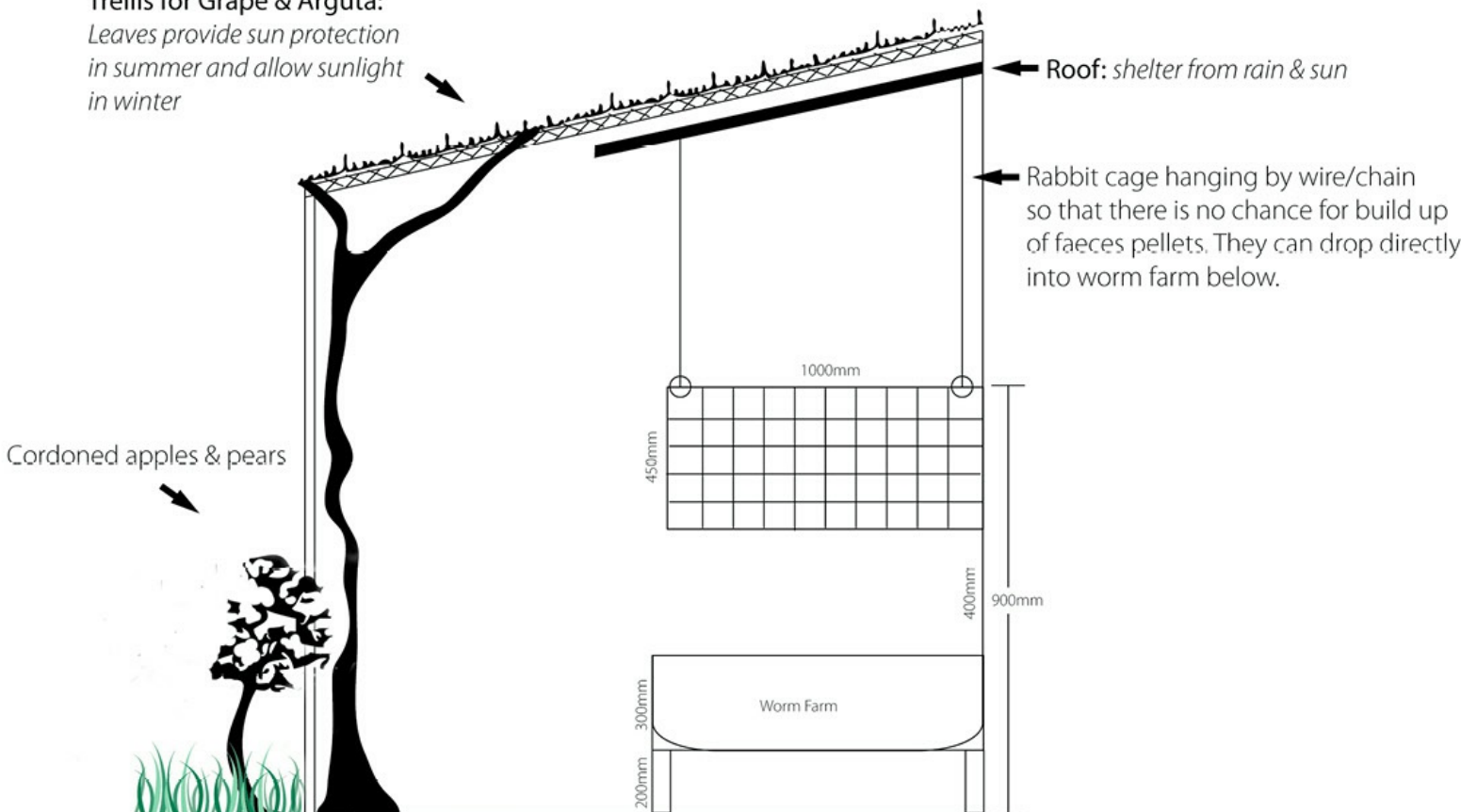
Side View

Trellis for Grape & Arguta:
Leaves provide sun protection
in summer and allow sunlight
in winter

Roof: shelter from rain & sun

Rabbit cage hanging by wire/chain
so that there is no chance for build up
of faeces pellets. They can drop directly
into worm farm below.

Cordoned apples & pears



BREEDING STOCK

NZ White is the world's most popular meat rabbit due to gaining weight quickly, with Californian White being a close second due to having a high dress out weight. Our rabbits are a cross between the two, common in New Zealand.

- We will stagger the production of litters in order to easily manage the number of baby rabbits.
- Each doe will produce about 40 young each year.
- 1 doe will be put into the cage with the buck for mating. (She will get territorial if we put him into her cage).
- The nest will go in just prior to birth of the litter or she will ruin it.
- 31 days later she should give birth to 8-11 young. We may lose 1 or 2.
- At 2 weeks they open their eyes and leave the nest.
- The does wean their kits at 4 weeks (28 days) when we will put them into a separate cage. They are now called fryers and can be moved around the rabbit tractor track surrounding the 40m² garden. During wet and cold months they will prefer to be in a dry cage.
- Eating age 13-16 weeks or 2.5kg live weight. We found using no grain or industrial pellets, they took a little longer to reach eating size if there wasn't unlimited tagasaste.
- We will rebreed the mother again 4 weeks after her last litter is weaned. We could rebreed 5 days after birth to step up production but it is preferable for the mother to give her a break
- At 3 years replace all breeding stock. Swap out breeding mothers with daughters and bring in a new buck.

See Rabbit System Calendar below for full year rotation of 2 does.

RABBIT SYSTEM CALENDAR

Doe 1

	Sun	Mon	Tue	Wed	Thu	Fri	Sat
						Mar 1	2
	3	4	5	6	7	8	9
	10	11	12	13	14	15	16
	17	18	19	20	21	22	23
	24	25	26	27	28	29	30
<i>Litter 1</i>	31	Apr 1	2	3	4	5	6
	7	8	9	10	11	12	13
	14	15	16	17	18	19	20
	21	22	23	24	25	26	27
	28	29	30	May 1	2	3	4
	5	6	7	8	9	10	11
	12	13	14	15	16	17	18
	19	20	21	22	23	24	25
	26	27	28	29	30	31	Jun 1
	2	3	4	5	6	7	8
	9	10	11	12	13	14	15
	16	17	18	19	20	21	22
<i>Litter 2</i>	23	24	25	26	27	28	29
	30	Jul 1	2	3	4	5	6
	7	8	9	10	11	12	13
	14	15	16	17	18	19	20
	21	22	23	24	25	26	27
	28	29	30	31	Aug 1	2	3
	4	5	6	7	8	9	10
	11	12	13	14	15	16	17
	18	19	20	21	22	23	24
	25	26	27	28	29	30	31
	Sep 1	2	3	4	5	6	7
<i>Litter 3</i>	8	9	10	11	12	13	14
	15	16	17	18	19	20	21
	22	23	24	25	26	27	28
	29	30	Oct 1	2	3	4	5
	6	7	8	9	10	11	12
	13	14	15	16	17	18	19
	20	21	22	23	24	25	26
	27	28	29	30	31	Nov 1	2
	3	4	5	6	7	8	9
	10	11	12	13	14	15	16
	17	18	19	20	21	22	23
	24	25	26	27	28	29	30
	Dec 1	2	3	4	5	6	7
<i>Litter 4</i>	8	9	10	11	12	13	14
	15	16	17	18	19	20	21
	22	23	24	25	26	27	28
	29	30	31	Jan 1	2	3	4
	5	6	7	8	9	10	11
	12	13	14	15	16	17	18
	19	20	21	22	23	24	25
	26	27	28	29	30	31	Feb 1
	2	3	4	5	6	7	8
	9	10	11	12	13	14	15
	16	17	18	19	20	21	22
	23	24	25	26	27	28	Mar 1

Doe 2

	Sun	Mon	Tue	Wed	Thu	Fri	Sat
						Mar 1	2
	3	4	5	6	7	8	9
	10	11	12	13	14	15	16
	17	18	19	20	21	22	23
	24	25	26	27	28	29	30
	31	Apr 1	2	3	4	5	6
	7	8	9	10	11	12	13
	14	15	16	17	18	19	20
	21	22	23	24	25	26	27
	28	29	30	May 1	2	3	4
	5	6	7	8	9	10	11
<i>Litter 1</i>	12	13	14	15	16	17	18
	19	20	21	22	23	24	25
	26	27	28	29	30	31	Jun 1
	2	3	4	5	6	7	8
	9	10	11	12	13	14	15
	16	17	18	19	20	21	22
	23	24	25	26	27	28	29
	30	Jul 1	2	3	4	5	6
	7	8	9	10	11	12	13
	14	15	16	17	18	19	20
	21	22	23	24	25	26	27
	28	29	30	31	Aug 1	2	3
<i>Litter 2</i>	4	5	6	7	8	9	10
	11	12	13	14	15	16	17
	18	19	20	21	22	23	24
	25	26	27	28	29	30	31
	Sep 1	2	3	4	5	6	7
	8	9	10	11	12	13	14
	15	16	17	18	19	20	21
	22	23	24	25	26	27	28
	29	30	Oct 1	2	3	4	5
	6	7	8	9	10	11	12
	13	14	15	16	17	18	19
	20	21	22	23	24	25	26
<i>Litter 3</i>	27	28	29	30	31	Nov 1	2
	3	4	5	6	7	8	9
	10	11	12	13	14	15	16
	17	18	19	20	21	22	23
	24	25	26	27	28	29	30
	Dec 1	2	3	4	5	6	7
<i>Litter 4</i>	8	9	10	11	12	13	14
	15	16	17	18	19	20	21
	22	23	24	25	26	27	28
	29	30	31	Jan 1	2	3	4
	5	6	7	8	9	10	11
	12	13	14	15	16	17	18
	19	20	21	22	23	24	25
	26	27	28	29	30	31	Feb 1
	2	3	4	5	6	7	8
	9	10	11	12	13	14	15
	16	17	18	19	20	21	22
	23	24	25	26	27	28	Mar 1

- Doe Mated
- Doe Giving Birth
- Kits Weaned (Fryers)
- Fryers Ready to Eat
- Doe Pregnant
- Doe Suckling Kits
- Fryers in Tractor / Fryer cage

RABBIT TRACTOR

This is a cage that sits on the ground 1m x 2m. It is moved on to a new spot every day so that the young rabbits can be in contact with the ground, thereby gaining contact with vitally important micro-organisms. They will also be able to eat the nutritious herbal ley ground cover consisting of alfalfa, clover, and Chicory. Yarrow, comfrey and French sorrel will also be available for them to eat.

This 'Rabbit Tractor' will move in a clockwise direction around the edge of the vegetable garden on a 1.3m track (see design map). This has carrying capacity of approx. 8 rabbits.

RABBIT MANAGEMENT

1. Feed as often as necessary to keep their feed trays with feed in them
2. Fill feeders each evening with brought in meadow hay
3. In morning feed a mixture of grass, plantain, chicory, clover, dandelion chickweed, puha, comfrey, sorrel etc., enough to keep them busy until 10am. May need topping up at morning tea time to last until lunch time
4. Feed either tagasaste or willow or alfalfa hay (brought in) in afternoon
5. Check water manually each day to ensure it's running
6. Rake out droppings in worm farm under rabbit cages daily to ensure even spread
7. Do a quick check daily for signs of ill health or poor spirits
8. Clean out cages daily, it is essential cages are kept very clean
9. When pulling out stripped branches, pile up ready to put through mulcher
10. All the loose hay and feed that drops outside of worm farm can be used as mulch for cordoned apples, grape and Arguta kiwifruit in front of rabbits

RABBIT IN THE KITCHEN

The only parts of a rabbit you should throw out are the tail and feet. Here's a breakdown of rabbit parts and some of the ways we can use them:

Head: Heads traditionally are used in stews and stocks.

Bones: Like any set of animal bones, rabbit carcasses can be roasted and boiled to make stock and rabbit jus.

Heart: Rabbit hearts and other offal (except the intestines and stomach) can go into farces and charcuterie.

Liver: Rabbit livers have a reputation for tasting mild and clean. Rabbit liver pâté is a perennial favorite, as are deep-fried livers

Kidneys: Poach rabbit kidneys in butter and add the morsels to a ragoût of livers, bacon, shallots, herbs, and sherry vinegar. You also can render the precious fat surrounding the kidneys; just finely grind the fat, slowly heat it, and strain it. The rendered rabbit fat, just like lard, can be used in pastry dough and for frying.

Lungs: Can go into the stock

Shoulder (or foreleg) and hind legs: Our favourite dish is rabbit stew, see below.

Belly and saddle: The thin rabbit belly is attached to the saddle, a cut of meat that you can debone much like a chicken breast. The saddle also yields two thin rabbit tenderloins; the small pieces of meat tend to get lost in a dish, so it's best to stuff them back into the saddle. You can leave the belly and attached; wrap belly around the saddle (and stuff with vegetable fillings) to prevent meat from drying out. Common saddle preparations include roasting and frying.

Rib rack: Compared to beef or pork ribs, rabbit rib racks come in a "Barbie-sized" portion, but they are still good on the BBQ and then the bones into broth.

RABBIT STEW

(from Change of Heart by Kay Baxter)

- 1 large rabbit, cut into pieces
- 1 bouquet garni
- 3 Tbsp lard, tallow or coconut oil
- 8 slices or bacon, cut into small pieces
- 3 cloves garlic, sliced
- 1 cup red wine
- 1 onion, finely chopped
- 12 small new potatoes

Sear rabbit pieces in lard, remove from pan. Add garlic, onion, bouquet garni, and sauté 3 minutes. Add bacon, sauté 5 minutes, return rabbit, add red wine and 3 cups of water. Place a lid on dish and simmer gently for 1.5 hours or until very tender. Add potatoes and continue simmering until cooked.

BIOCHAR IN THE URBAN GARDEN

Once we discovered that rabbits did so well on locally harvested tagasaste, and we saw how many tagasaste branches we ended up with in a pile as a waste product each week, we saw the opportunity to use a chipper (possibly a shared chipper/shredder, with many neighbours) to chip them up, along with neighbours' hedge trimmings and prunings from parks, fruit trees etc. We could then use the chips as a carbon resource in our chicken straw yard/compost heap. Eventually this will produce high quality humus when mixed with chicken manure (laying hens lay 0.5kg per week of manure!) and scraps etc.

We also saw that we could use these branches to make biochar. Biochar is essentially finely ground charcoal that is added to the soil and is not biologically active, but hosts and holds much water, minerals and microbes.

This biochar also gets added to the chicken scratch yard, and becomes part of our compost heap, subsequently used to build soil on our 200m² urban garden. Adding it to the compost means the biochar will be fully charged before being added to the garden, and so will not remove minerals from the soil to charge itself once in the bed.

If you'd like to understand more about how biochar, and how biochar together with high quality compost grows soil at very fast rates, read *The Biochar Solution* by Albert Bates. The Koanga Institute will be publishing a *Make Your Own Biochar Booklet* around March/April 2014.



RESOURCES

KOANGA PUBLICATIONS:

- Growing Nutrient Dense Food Booklet: Why and How to Grow Nutrient Dense Food by Kay Baxter
- Save Your Own Seeds Booklet: Based on 30 Years Experience in New Zealand Conditions and Situations by Kay Baxter
- Beginner Gardener Booklet: Based on the 40m2 Salads, Stir Fries, Soups & Stews Garden by Kay Baxter
- Koanga Garden Guide: A Complete Guide to Gardening Organically and Sustainably by Kay Baxter
- Koanga Garden Planner: A Home Scale Guide to Regenerative Food Security by Kay Baxter
- Design Your Own Orchard: Bringing Permaculture Design to the Ground in Aotearoa by Kay Baxter
- Change of Heart: The Ecology of Nourishing Food by Kay Baxter & Bob Corker

OTHER RECOMMENDED BOOKS:

- The Biochar Solution Carbon Farming and Climate Change by Albert Bates
- The Home Chicken Flock by Harvey Ussery

Please see www.koanga.org.nz for more great books on regenerative living.

KOANGA WORKSHOPS

Solutions for Regenerative Living To Support Your Urban Garden Journey

We actively pursue and accumulate the knowledge and skills required to live regeneratively and simply in Aotearoa. Empower yourself with the practical skills to turn your dreams for sustainability into reality, and understand your own health in relation to our environment. Our workshops are full-on learning experiences - prepare to see the world through different eyes!

Workshops are subject to change. See www.koanga.org.nz for further information. All workshops will be held at the Koanga Institute, which is part of Kotare Village, near Wairoa in the Hawkes Bay.

- Permaculture Design Course
- Traditional Food Processing and Storage Workshop
- Small Animal Selection/Breeding/Management Workshop
- Prepare and Cook Nutrient Dense Food Workshop
- BioIntensive Gardening Workshop
- Growing Nutrient Dense Food Workshop
- Growing Soil, Food & Health Internship (10 weeks)
- Appropriate Technology Internship (5 weeks)
- Plus more!

Please visit

www.koanga.org.nz

for more information

FRUIT RIPENING CHART

Type of Fruit	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1 Almond <i>Garden Prince</i>												
1 Apple <i>Reinette d. C. free standing</i>												
2 Apples <i>various varieties espalliered</i>												
7 Apples <i>various varieties cordoned</i>												
1 female <i>Arguta</i> Kiwifruit												
1 Boysenberry												
3 Chilean Cranberry / Guava												
3 Currants <i>Black</i>												
1 Currants <i>Red</i>												
2 Currents <i>White</i>												
2 Figs <i>Adriatic (late), Black (early)</i>												
1 Goji Berry												
2 Gooseberries												
1 Grape <i>Currant</i>												
2 Hazelnuts <i>Merv de Bolwillier, Barcelona</i>												
1 Lemon <i>Meyer</i>												
1 Manderine <i>Clementine</i>												
6 Pears <i>various varieties</i>												
1 Olive <i>Leuccino</i>												
1 Worcesterberry												

■ months when produce is ripe and available to be harvested ■

Apples espalliered / free standing

2 <i>Reinette du Canada, on M26 rootstock</i>	Cooker/keeper. Green skin, brown russet when ripe, medium size, super heavy, reliable healthy cropper, tart full of flavour, cooking only.
1 <i>Lord Nelson on M26</i>	Early reliable cooker.

Apples cordoned

1 <i>Ladyfinger</i>	Round dessert apple, more well known for its qualities as cider apple, bright red, streaky skin covered in a golden russet when ripe, looks stunning, sweet, juicy, full of flavour.
1 <i>Early Strawberry</i>	A small flattish, very sweet, early dessert apple. Green/yellow skin with bright red streaks when ripe. Delicious flavour, great texture.
1 <i>Mayflower</i>	Flat round, green skin with russet, excellent eating, cooking, storing, drying, loads of flavour.
1 <i>Astrakhan</i>	Late, old fashioned, bright streaky red skin dessert apple, good keeper.
1 <i>Captain Kidd</i>	Good disease resistance and excellent quality. A deep red apple with bright red streaks all over, superb flavour, used as a dessert apple.
1 <i>Jonathon</i>	A crisp juicy, sub acid large round green skinned dessert apple with a red streaky patch when ripe. Originally from Port Albert, ripens mid season.
1 <i>Northern Spy</i>	Delicious, juicy, rich sub acid aromatic, white fleshed, fine grained, tender dessert apple. Green pale yellow skin in shade, streaky red purple in sun.

Pears cordoned on dwarf rootstock

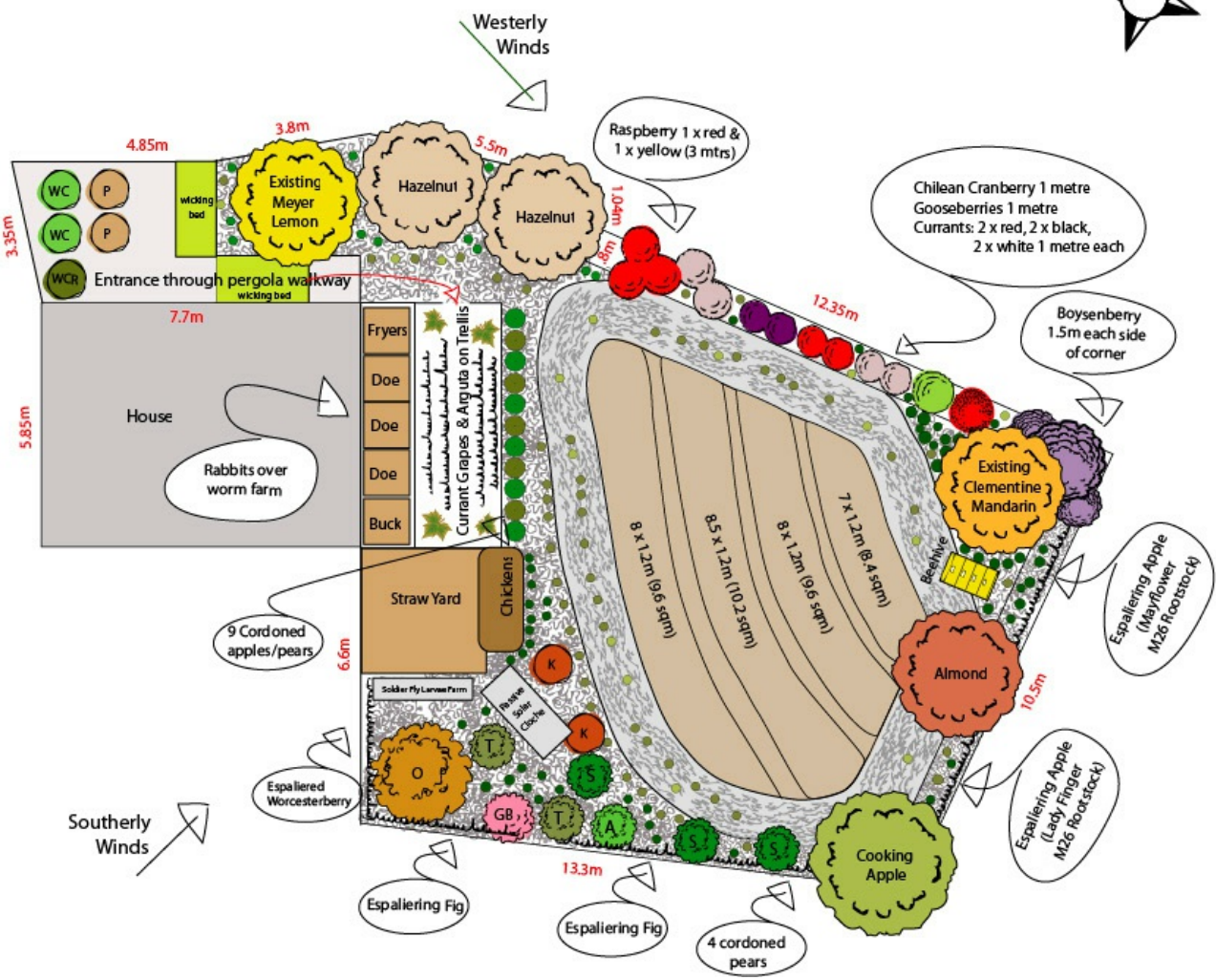
1 <i>Bon Cretian</i>	Superior flavour, ripe early Feb. Good dessert and bottling.
1 <i>Seckles</i>	Pollinator of all other pears that need pollinators. Excellent small sweet fruit, the old "honey" pear of Bohemia. Ripe end of Feb through March. Self-fertile so does not need a pollinator.
1 <i>Triumph de Vienna</i>	Excellent dessert pear. Ripe March, after Bon Cretian. One of the very best pears for flavour and texture, large brown russet.
1 <i>Kieffer</i>	Large, yellow, russety skin, crisp, sweet, juicy, firm, excellent keeper, ripens late March.
1 <i>Bert's Early</i>	Early small sweet round dessert pear. Ripe January. Self fertile (does not need a pollinator).
1 <i>Winter Nellis</i>	Great late eating pear and excellent keeper, brown rusted skin and very sweet. Good pollinator.

Hazelnuts

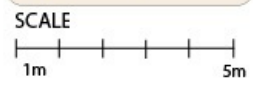
1 <i>Barcelona</i>	A selection from Oregon of a popular variety. A high quality nut large and very presentable. Excellent table nut requiring pollination.
1 <i>Merv de Bolwillier</i>	A large nut which also sheds its pollen quite late. Excellent pollinator.

KOANGA URBAN GARDEN DESIGN DIAGRAM

KOANGA 200m² URBAN GARDEN



- Olive
- Tagasaste
- Moeraki
- Acacia Retinodes
- Siberian Pea Tree
- Water Chestnuts
- Water Cress
- Kumara
- Potatoes
- Goji Berry
- Cordoned pears & apples
- Rabbit Track (1.3m wide with Herbal Ley)
- Existing Concrete
- Herbal Lay, including PMAs (Perennial Mineral Accumulators)
- Comfrey
- Alfalfa
- Chicory



BOOKLETS PRODUCED BY THE KOANGA INSTITUTE

Growing Nutrient Dense Food by Kay Baxter

Save Your Own Seeds by Kay Baxter

200m² 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

