

## Full Circle, Four Years In

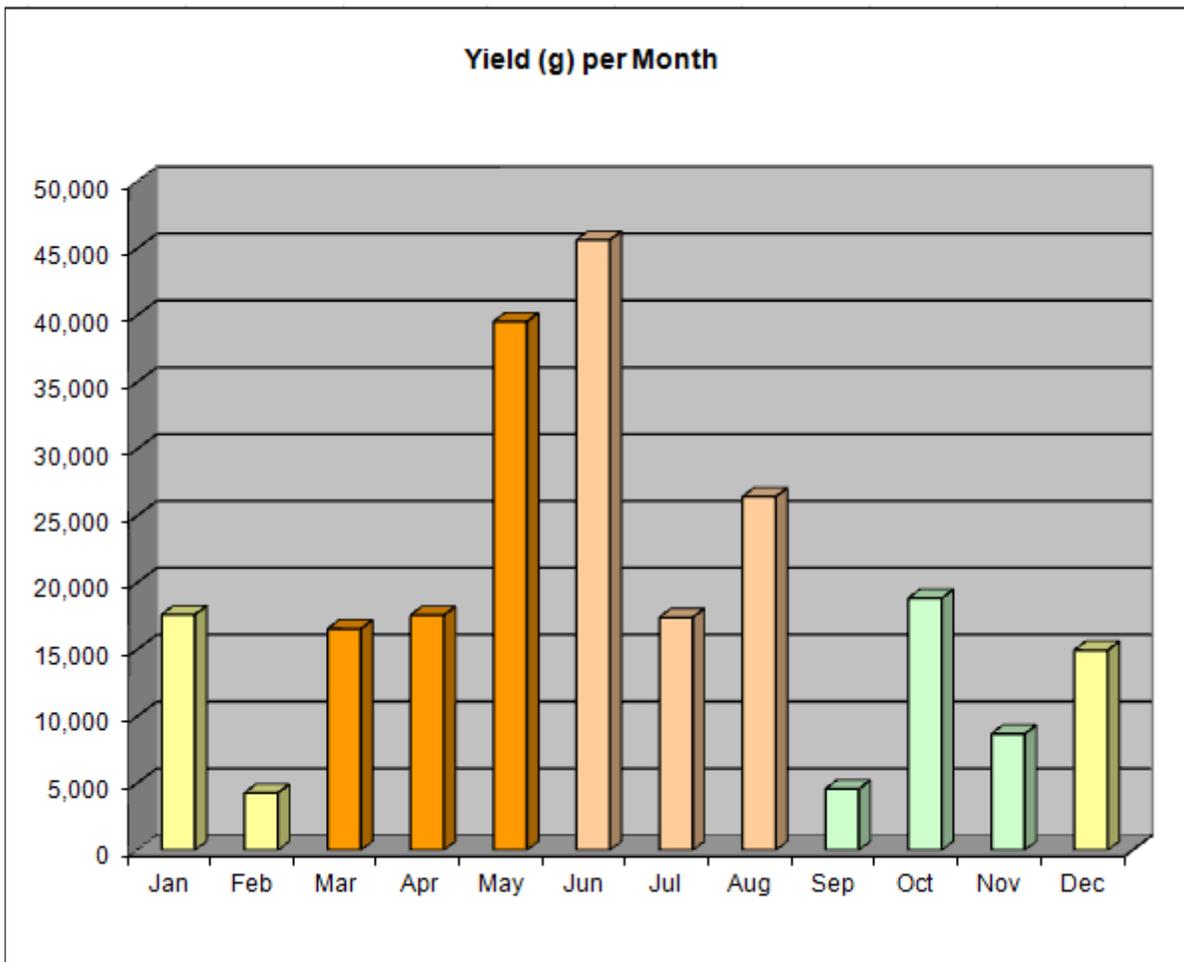
Here are the annual figures for the garden yields for the period of Oct 2011 – Oct 2012, the garden's *fourth* year. The annual production for this garden was:

- first year: **133 kg**
- second year: **204 kg**
- third year: **196 kg** (*as a consequence of a minor disaster!*)
- fourth year: **234 kg**

The total garden bed area is 686 sq. feet (64 sq. metres).

The average monthly amount of produce was **19.5 kg**.

Here are some statistics which break this down further:



This graph is color coded for season – yellow (summer), orange (autumn), brown (winter) and green (spring)

If we look at the monthly production figures:

	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>
Jan	22,203	6,385	14,769	17,620
Feb	10,860	13,891	9,478	4,282
Mar	11,018	16,700	20,813	16,563
Apr	3,748	49,056	15,413	17,584
May	15,566	28,277	5,304	39,538
Jun	11,251	40,136	39,995	45,658
Jul	14,341	3,085	44,176	17,417
Aug	4,128	21,804	–	26,446
Sep	11,155	846	4,426	4,577
Oct	11,252	19,351	20,393	18,846
Nov	6,149	1,170	9,542	8,701
Dec	9,556	1,274	10,067	14,960
<b>Total</b>	<b>133,235</b>	<b>203,984</b>	<b>196,386</b>	<b>234,203</b>
<b>Average</b>	<b>11,103</b>	<b>16,999</b>	<b>16,366</b>	<b>19,517</b>

*Note – the years listed correspond to a 12 month cycle from Oct-Oct, as the garden was first completed in that month. For example, the year 2011 refers to the period Oct 2011-Oct 2012.*

If we break down the figures by type of produce (fruits, vegetables and berries), we can see the how much produce we got in each of these categories.

## Fruit

<b>Fruit</b>	<b>(g)</b>
apple	8,682
apricot	4,183
babaco	31,916
cherry guava	2,298
feijoa	203
grapefruit	5,826
lemon	9,884
lemon guava	2,352
lime	438

mandarin	64,523
orange	4,594
pepino	250
plum	12,813
pomegranate	12,968
<b>total</b>	<b>160,930</b>
2010	117,247
2009	127,723
2008	53,636

The yields of fruit have increased steadily as the fruit trees establish themselves. The trees are still very young at 4 years of age and have only started to produce reasonable quantities. In the following years their yields will increase further, and some trees which still have not produced fruit will push the figures even higher when they reach a productive age.

The total of 160kg of fruit is quite good considering that the two largest and heaviest bearing trees, a fig tree and a mulberry, were blown down by the a severe wind with an unripened crop still on their branches. The figures would have been higher if they survived, but they have been replaced with young trees which will take a year or two to start producing a decent crop.

I have managed to add a few extra trees into the garden, a white sapote, wampi, almond, finger lime, a second fig tree and I have room for one more tree which I will decide on in the near future. While not trees but bearing fruit, I have also added a passion fruit to extend my vertical garden, and a dwarf banana too, so the future looks very fruitful!

## Berries

<b>Berries</b>	<b>(g)</b>
blackberry	43
goji berry	465
mulberry	1,140
raspberry	5,416
redcurrant	15
strawberry	768
youngberry	3,130
<b>total</b>	<b>10,977</b>
2010	7,116
2009	4,021
2008	2,584

The berry harvests have increased the most dramatically, nearly 11kg of berries from 7 berry species. Since then I have added many more species to the garden – loganberry, thornless loganberry, boysenberry, tayberry, silvanberry, lawtonberry, marionberry, thornless blackberry, native raspberry. Vertical gardening can radically increase the productive garden space while occupying very little garden bed space.

## Vegetables

<b>Vegetables</b>	<b>(g)</b>
asparagus	2,000
broad beans	14,342
carrots	556
climbing beans	2,892
edible canna	2,820
jerusalem artichoke	11,420
lettuce	2,740
oca	400
perennial chilli	512
potato	892
pumpkin	1,583
rhubarb	1,767
salad greens	775
silverbeet	3,088
snow peas	865
sweet corn	4,869
sweet pepper	26
tomato	2,658
water chestnuts	480
yacon	5,600
<b>total</b>	<b>60,285</b>
2010	70,013
2009	70,231
2008	75,052

The vegetables remain more or less constant at an average of 70kg, I produced 10kg less vegetables this year, mainly from not harvesting produce or not bothering to put in seedlings! These figures show that annuals will produce more or less the

same amount of harvest for a given amount of space and effort, they don't increase in productivity over time being so short-lived, lasting a single year.

I can increase yields here by being more systematic with planting seeds and seedlings on time, planting more root crops which are the most productive of the vegetables, and harvesting the produce instead of forgetting about it and letting it go to seed. The point is we all can grow annual vegetables, it's no big deal, this just demonstrates that you can grow a reasonable amount of vegetables in an intensive perennial food forest system in a very small space.

## Projected Yields

This garden is only starting to get established, that is the nature of perennial systems, they do take time. This garden has the potential to increase in productivity over the next few years to much higher levels than the present ones. Now for some conversions of yields, to see how this demonstration food forest system stacks up with other food production methods.

Now, if we look at my garden, still quite new at four years of age, its best production to date is:

- 234kg/64 square metres

To convert this to acres, we do some simple maths:  $4047/64 = 63.23$  (so you can squeeze approximately 63 of my whole gardens into one acre!)

Now, a bit more math to get the yield per acre:  $234 \times 63.23 = 12,773\text{kg/acre}$

The calculated yield per acre:  $218 \times 63.23 = 14,796 \text{ kg/acre}$ , almost 15 metric tonnes per acre.

So, my 4 year old garden that is producing the equivalent of **14,796 kg/acre (36,561 kg/hectare)**, in other words, close to **14.8 metric tonnes per acre (36.6 metric tonnes per hectare)**!

*(Conversion factor – 1 Hectare = 2.4710439 Acre)*

For my non-metric friends, that's the equivalent of **32,619 lbs/acre (80,602 lbs/hectare)**

*(Conversion factor – 1 Kg = 2.2046 lbs)*

It's important to note that I haven't factored in the harvest figures of any of the herbs harvested, and there are a serious amount of herbs in this garden. Furthermore, unlike many conventional gardens, this system is highly productive and produces another high value output – plants and trees! Useful plants grow so well, that they multiply with great ease, I'm forever pulling up spare plants and providing them to community gardens and local gardeners, for free. Either that or I mulch them and add them back to the soil... I propagate many tree cuttings for very little effort, and usually have dozens of trees a year to show for such little effort. Over the last four years, this garden has easily produced many thousand of dollars worth of plants and trees. So, it's not just a sustainable, intensive food production system, it's almost a small production nursery due to the fertility of the system.

## Conclusions

Considering that it takes an average of 2 hours a week to maintain such a system, and that it's chemical free, weed free, and almost completely pest free, this is living proof that Permaculture really works!

This project, even at its current early stages, is evidently a successful proof-of-concept for the productivity of food forest systems. It clearly shows food forest systems can be scaled down to urban backyard sized gardens, and they do work extremely well at this scale. This four year study has conclusively proved the point with hard facts and figures, but this study is by no means over.

## **The Future...**

The effort of weighing and recording all produce from a garden every day for four years is quite labour intensive, I'm doing this all on my own, as one person, so I have decided to take a break for a while, and resume the counting at a later point. It's clear that productivity is steadily rising, the intention is to give the garden some more time, then begin recording the yields once again. This is a long-term study. so I'm sticking with it, but I'm hoping to feature some articles on other gardens I've been working on in public spaces, and hopefully follow their progress also.

Stay tuned for more, as we push the boundaries of urban agriculture further, and show what really is possible!