

Re-making my Gbiota beds

Colin Austin © 13 Mar 2018 For Gbiota club users only

Please Note

I first drafted this on the 6th Mar to let club members know of a few issues I was having with movement of the water across the rows. I had made some modification to the shape of the liner which has made a substantial improvement to this water flow which members needed to know about quickly before they started to build their beds.

Basically the change was from a saucer shaped channel to one with a flat base with a shallow lip. This worked so much better that I was tempted to try a simple flat sheet on another bed.

I though this may be a bit silly but sometimes you just have to try things as sometimes silly ideas actually work - and it did.

So now I am in the process of modifying just one line on the original bed so I can compare designs under similar conditions. (The soils are very different).

I have also automated the compost flushing - more details later.

We are now right in the middle of our rainy season which is a bit late this year. I suggest you contact me or at least watch for updates if you are about to make your beds.

Original article on the 6th Mar

I have had some problems with my Gbiota beds and decided to rebuild one of them. I am rushing this update as we are getting new members daily and I wanted to make sure they had the latest info and can avoid my problems.

One of the beauties of having a closed club is I can say it how it is without worrying about image. It is not all bad news - I have never seen so many worms in a garden bed so I think we are winning on the soil biology front.

Also some plants such as Purple Amaranth, Kang Kong, Spinach, Okra and comfrey have really flourished. These are pretty aggressive plants for water and will hunt it out. Others like lettuce and radish have just gone to seed and the Chinese cabbages have just been decimated by insects. These are common problems in Queensland summer but can also indicate a lack of vitality but the real problem is poor germination between the rows leading me to the conclusion of poor water distribution.



Let me just review why and how I built my beds the way I did. Wicking beds are great for small areas. The picture shows a classic open Wicking Bed - a very well tested and reliable system suitable for small scale production.

But there are some billion people suffering from diabetes. They need to eat some food which is rich in minerals and phytonutrients and have an active internal plant biology which will improve human gut biology. I wanted a system which could produce this food on a significant scale at a low cost.

The idea was to use multiple rows of modified open wicking beds, which could be up to 100 metres long using an external water reservoir which could supply large volumes of water automatically by a pulsed system.

The system is really very simple, create a gentle slope, dig a narrow channel, line with plastic film, lay in a holey pipe, make a pond for the water reservoir and make a pump, manifold and drainage system to return excess water to the water reservoir. There also needs to be a system of introducing compost tea to the water system.

All fine in theory but what about in practise.

Practical side of Gbiota beds

I wanted to use a pond pump - they are cheap and have an open impeller so can handle quite large amounts of dirt. They have only a small head - a metre or so but perfectly adequate for my needs. The most convenient spot was just outside my shed where I have power. (A commercial user would probably use solar which is perfectly adequate).

But my shed was in the middle of the block so I had to reverse the slope. I have no experimental data on the amount of slope required but I know a bit about flood irrigation so I guessed that 1 in a 100 would be fine. That would mean about 70mm in my 7 metre bed.

I needed to get some soil to create gradient. My existing soil is terrible basically a silt sitting half a metre above a clay layer. I also wanted to inoculate the soil with a highly active biology.

Soils and levels

Now I happen to live near Baldwyn Swamp one of the features of Bundaberg, a really nice nature reserve which is why I bought this house. This is biology heaven. Water flows in from the surrounding farm land, there are umpteen wild creatures and above all millions of bats. Each night they go out and scavenge fruit from the poor local farmers then cover the swamp with double strength poop.

Even better there is a water weed *Salvinia* which is a real pain and the local council was more than happy for me to take as much as I wanted. I really could not have asked for a better biologically active mulch for my earthworks.

I am going to engage in a bit of self-delusion and say that as this decomposed it upset the levels so I no longer had a nice uniform slope. The reality may be that I just got the slope wrong (but why admit it when I have a perfect excuse).

But let me give you two pieces of advice.

Make sure that any mulch you use in your base is well composted labile (fresh) compost will settle and is also has an open structure which does not wick well - wicking needs a fine compacted structure with small pores.

Measure the slope by laying out a piece of plastic and making sure water flows uniformly along the length. It is very difficult to guess a small slope by eye. Fine if you have laser levelling kit otherwise check by the water test.

The world's most effective soil moisture monitor

In a previous life I ran a company making sophisticated electronic soil moisture monitors. That's why I now use an old fashioned wood augur I bought from the market for \$8 - I know it works.

I could see that the surface soil between the rows was dry but my augur told me that underneath the soil was moist. So I put a row of radish seeds across the rows, gave it just one watering and waited. They grew fine over and near the pipes but between the pipe - nothing. It is nice to have an experiment which give a clear result even if it is not what you want.

I had a water distribution problem - no doubt about it.

I thought it may be the soil not wicking properly. I picked a couple of spots across the pipes laid some rotted grass cutting in one strip and a cotton cloth in another. Worked fine - the soil between the pipes looked nice and moist.



One of my favourite tricks to improve wicking is to plant sunflowers. They grow fast, have a dense root system and encourage mycorrhizal fungi - great soil conditioners.

I also tried a second pipe - a bit like a home-made dripper tube - above the ag pipe. This certainly increased the water consumption but there was no real indication that it has improved the lateral flow.

Something was not quite right but I did not know what.

Silly old fool SOF



In the technology business you can have what seems a great idea but you seem to need patch after patch to get it to work. That's a clear signal that the idea was stupid in the first place of you didn't really understand what was happening. This is a very depressing situation. I certainly felt depressed - I am supposed to study food and know that food can make you depressed so I even began to worry about that - which made me even more depressed.

My character is lacking many virtues - lack of obstinacy is not one of my failings. There was something I just did not understand and I need to find out what. I could see little option but to take the whole bed to bits and see if I could work out the basic cause of the problem.

I have replace the liners of many wicking beds - it ising hard work - shovelling tons of soil out then back in again - just for one little hole in the plastic where you misjudged the fork.

But there was one redeeming feature. I used to live in Melbourne with its idiosyncratic climate. By comparison the climate in Bundaberg is like paradise - at least for ten months of the year. Even summer is lot cooler than the 40+ of Melbourne but we do have the monsoon season where for a week of so it rains, not cats and dogs or even horses and cows there is no word for Bundaberg rain - it just makes you wish you had started to build that ark last week.

So it was monsoon time - let's get stuck into it and see if I can find out what is happening. Actually it was really quite easy to clear away the soil and watch what happened as the water flowed down the pipe.

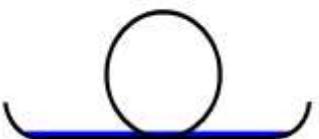
There was a time when I was young when I had a self-image that I did a lot of very stupid things but occasionally had that little flash of cleverness. Now at 78 I am reconciled to being a SOB (silly old bugger) just one step up from being a DOF (doddery old fool). But I looked at the water trickling through the pipe and just could not believe I had been so stupid. I really needed to find a new TLA (three letter acronym).



I had thought (or more correctly not thought) that I should make the channel saucer shaped with the ag pipe sitting at the bottom of the saucer. Now I was watching the water flow down the pipe and could see what was happening. I didn't actually cry but had a neighbour been watching they would have wondered why I was banging my head on the ground.



The answer was just so obvious. The water flowing down the pipe is just a trickle - about a litre per minute so it is actually only a mm deep inside the pipe.



I should know that wicking is not a terribly strong force and needs just the right conditions to work and even then needs a good area to work. The way I had made my bed just gave a very small contact area between the soil and water so not enough water was getting out of the pipe and into the parent soil.

I needed to change the system so there was a significant flat area so the water could flow out of the pipe and into the surrounding soil.



It was also obvious that I only needed a very small lip on the edge of the plastic. In my next experiments I will see how small I can make that lip and not loose water by leakage.

This rather poor picture shows the water spreading across the base of the channel.

Quick walk around latest bed



Let's follow the water. It starts from the main water tank which catches rain water from my shed. In Bundaberg we either have too much or too little rain so I have rigged up a float valve so I can top up as needed. This does give me a check on how much water I am using.



Underneath all these weeds and rubbish is the feeder tank. This is really too small at 40 litres but does the job. I have pulled the pond pump out of the water. You can also see the outline of a cane toad - they make wonderful pets if you would like to come and collect - absolutely free - as many as you would like.

You can just make out the float valve from the water tank.



The pipe takes the water to the distribution system at the top of the block, there is a tap for adjusting flow. The setting is made so the header tank does not empty in the 10 minute irrigation cycle, that give about 40 litres plus the water that flows in from the main tank. That could supply just over 1 mm of water but if the soil is wet the extra just flows back into the header tank. I irrigate every two hours giving me a capacity of 12mm per day. We can have an evaporation of 10mm per day. The crop factor for the veggies would be under 1 but I have trees which takes extra water so the net crop factor would be around 1 so 12mm of water per day should be adequate.



I am still using a regular compost bin for household compost and flush manually at the moment. I will automate when I get my round tuit I have ordered from Amazon. I have lots of jobs I will do when I get around to it.



Opposite is a wide angle view of the bed itself. There is absolutely nothing to see as all the pipes etc. are buried underground. The width of each channel is 200mm and the plastic liner width is 270mm and the base of the bed is 150mm under the surface. I would have like to make the pipes deeper but I was a bit locked in by the level of the header channel. I have planted across the rows so I can see how the water is spreading.



The water returns to the header tank by an

underground pipe and channel. I use the vertical pipes to look at the flow returning from the pipes.