

# How and why to make a sponge bed

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## Part 1 Why sponge beds

Sponge beds make soil which is both full of nutrition and biology which grows plants which make us healthy.

If you have 10 minutes why not hop into my time machine and find out for yourself why they are some important.



This is not just a run of the mill time machine but a very special one. It actually belonged to Steve Jobs<sup>2</sup> who was recreated from DNA from his toe nail clippings which had been stored in the Apple museum.

It was the model which stopped Apples decline and made then the most powerful corporation on the face of the globe for the second time. Its distinguishing feature is that it enables the passenger - that's you - to become identical to the people of the era we visit.

It was made in 2080 after Apple took over all National States to become the Global Government and just five years before the world riots which occurred which overthrow the Apple Global Government when people got fed up with everything they made falling to bits after two years as part of their policy of planned obsolescence and people wanted to go back to local Government.

If you don't have the time I will set it for ten minutes ahead so you can read about how to make a sponge bed but it is quite a trip so why not hop in and go for it.



That's great - lets go back 800,000 years when the first sort of humans were evolving. You have turned into a rather unimpressive creature about half your normal size - not much to see here so let's go to 100,000 years ago.



Wow have you grown, you are now a full scale human - stronger and fitter than most modern humans - and live a hunter gatherer existence just moving around to get food from wherever you can.

But life is not all that great - your kids keep on dying in infancy so very few survive beyond five years.

This created a nasty streak in you as you keep on attacking other tribes - killing of the men and capturing the women - just so you can have more kids. This aggression is one of the nastier sides of human evolution.

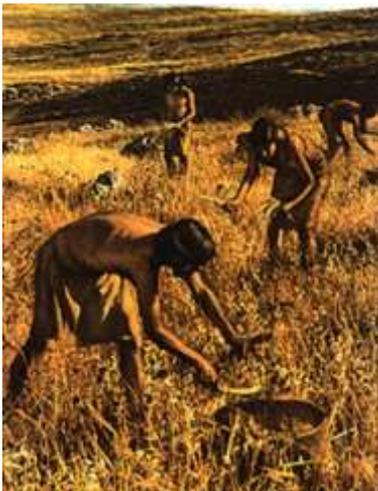
But if you get past five you are likely to be fit and healthy with very few diseases. On the other hand it is a pretty nasty world with lots of creatures trying to kill you - climate that can change wildly and if you have an accident - which is very common - then you are pretty sure to die.

But if you survive the trauma of a world of conflict you will be put in charge of caring for the kids and may live to a ripe old age. This is the origin of the grandparent syndrome which still exists in current humans.



But you have been creative and made a number of inventions - spears and bows and arrows are pretty useful but probably the most important invention of all time is the needle and thread.

This enables you to make close fitting clothes rather than the drafty old bear skins and survive the cold spells and enabled you to spread out over most of the globe.



OK that's enough of that - let's move forward to 10,000 years ago. You have now discovered agriculture which has changed your life for ever. You now have some control over your food supply so worrying about where you next meal is coming from has reduced and you are much more likely to survive but you are still exposed to bad seasons.

But there has been a cost - you are now much smaller - yes you have shrunk - and are living in permanent settlements in much larger number than when you were tribal - and this has made you very prone to disease and epidemics which strike you without warning.

Life may be better but is far from ideal.

Let's scan agriculture which has been changing dramatically - now you have refined the art of selective breeding and are growing much more productive crops which bear little resemblance to the wild varieties. You have got the techniques of using animals for ploughing down to a fine art and are ploughing up you fields on a regular basis.



But something does not seem quite right - the soil seems to be getting harder and less productive. But you learn the art of crop rotation and that certain plants will restore the soil and have even learned that just digging up and adding a bit of undisturbed soil to add to your fields seems to improve the soil dramatically. You have no idea why because you have no idea of soil biology or mycorrhizal fungi.



So let's nip forward to fifty years ago - what a change. You have now invented machines of mass destruction and still go to war for no apparent reason.



But you have learned that armies have to be fed - after all it was that great war monger Napoleon who said that an army marches on its stomach.

This has led to the development of processed food - or as some cynics say 'food like substances'.

But you have really caught onto this whole concept of processed food - it is cheap and tasty and has become a stable part of your diet. It is produced in factory style farms with little concern about the damage to the soil and the nutrient level of the food or the environment



But you have developed one of the great inventions of all time which rivals the needle and thread - antibiotics - which is really the only way that you can live in large populations and avoid the recurrence of epidemics which wipe out a large percentage of the population.



But - and this is one of your most remarkable failings - you feed these to your animals which you crowd together because it is cheaper that way. This has led to the development of anti-biotic resistance and a name change from homo-sapience to homo-stupidous.



But you have developed some remarkable tasty new foods - like ice cream - full of fat and sugars - not very healthy but great for an occasional treat. You have also filled you shops and supermarkets with processed food which is still full of fats and sugars and is almost impossible to avoid.

Whereas life expectancy has been increasing this is now reversed and your kids will probably not live as long as you because of epidemics like diabetes, heart attacks and strokes.

Anyway - like most Apple products - the battery has gone flat on the time machine so it is time to get out and see how and why to make sponge beds. Batteries are always going flat because the accountants refuse to accept the 20 cents to put a proper hardware switch in and insist on a software switch instead so they are never really off.

## Part 2 Diabetes sucks



There is a global epidemic starting with a [fat tummy](#) - more formally known as the metabolic syndrome - which leads to diabetes, heart attacks, strokes and can accelerate cancer.

Highly processed sugar and flour are the root cause but they are highly addictive which create cravings which come from our gut biology and can be virtually impossible to resist.

This can be largely remediated by eating fruit and vegetables freshly grown in nutritious, biology active soil. Minerals, vitamins, phytonutrients can improve health and it seems likely that they can even improve gut biology.



Sponge beds were developed to enable most people to grow some of their own healthy food. Even if they do not have their own garden they can still grow healthy food in a wicking bed - as long as they know someone with a garden or are part of a community group who can use a sponge bed to make biologically active soil.

Sponge beds are just so cheap and easy. The bulk of the nutrients simply come from recycled waste so only a small amount of minerals need to be added. If you choose the right plants and can live with a bit of a messy looking garden they produce food with minimal work. Many plants like Kang Kong, Purple Amaranth and many of the spinaches just grow by themselves.

This article is not aimed at experienced gardeners who may find the methods described as messy and some scientists may be uncomfortable with the holistic - rather than reductionist approach - but the aim is to take the best available knowledge at this time - to develop a system which even the most inexperienced grower can benefit from.

Diabetes is exploding at such an alarming rate that rapid action must take precedent.

### **Sponge beds are about making soil - but more**

Well not actually about making soil out of nothing - but converting dead earth - such as heavy clay or bare sand or soil that has been overworked - into healthy soil which will grow healthy plants which will make us healthy. The ultimate aim is to change the gut bacteria to fight off diabetes.

The bulk of earth is simply inert particles often largely silica, the particles may be quite large as in sand, much finer as in silt or really fine as in clay.

There must be a range of minerals in the soil to grow healthy plants and if they are not in the earth they must be added - this is a very mature technology so I will only summarise.

### Widely reported deficits in a modern diet

The table below shows the minerals that plants need to grow well, the primary and secondary elements and the elements that we as humans need to be healthy. Some minerals such as iron and zinc are needed by plants but in small quantities. We need these in much larger amounts.

Others like selenium and iodine are not needed by plants but are essential for our health. Selenium is needed for our DNA to reproduce accurately (and avoid cancer) while iodine is essential for brain function. Over the years of continuous farming these trace elements have become denuded from the soil.

Bio-essential trace elements are critical to life. These include iron, cobalt, selenium, copper, zinc, molybdenum, vanadium and cadmium. The elements are linked into the chemical structure of the cells and become a natural nutrient for survival. Cobalt is a central atom in the structure of vitamin B12, whereas zinc is essential for growth, magnesium guards against heart disease, Type 2 diabetes and prostate cancer.

<b>Elements needed by plants</b>	
Elements available from the air or water	carbon, oxygen, hydrogen
Primary elements from the soil	N, P, K
Secondary elements	Ca, Mg, S
Trace elements	Mn, Fe, B, Zn, Cu, Mo, Cl, Co
Widely reported dietary deficits	
<b>Elements needed by plants but we may need higher doses</b>	Ca, Mg, Zn, Fe, Cu
Essential extra elements needed for health	Selenium, Iodine, Vanadium, Chromium
<b>Vitamins humans are generally short of</b>	Omega 3, B12, B6, E, K

*However the farmer has little incentive to add the minerals which **we** need but the **plants** do not.*

*Selenium is used by our cells for the reproduction of our DNA and there is a view in the medical profession that lack of selenium in our diet is an issue with cancer which is caused by rogue cells not reproducing correctly.*

*Lack of iodine is well recognised as a cause of loss of brain function – a polite way of saying it makes people stupid or imbecilic.*

*I often come across interesting snippets (which are probably totally useless). It is well known that fertile women need extra iron however another snippet balances the sexes.*

*Apparently male semen contains a high proportion of zinc, enough to drain the body of its normal intake.*

*So the message is clear for men; - either give up sex or get some more zinc into your bodies.*

The main purpose of sponge beds is to create soil using soil biology however biology cannot create minerals out of thin air - so if there insufficient they must be added if.



Calcium is needed to break up heavy clay particles and for soil biology. While experienced growers may prefer to have their soil tested to determine the exact amount of minerals that need to be added - I am mainly concerned with helping inexperienced growers who may not want to bother with soil testing.

Recycling is a key part of the sponge bed process so many minerals will be added to the soil so my simplistic advice is to make sure you have plenty of calcium - I use both gypsum and dolomite - and add trace elements from one of the many packs available commercially.

## **Oxygen and water**

However plants need oxygen and water.

To get oxygen to the plant roots means that the soil must have a high void content and to hold water the voids must be small with a surface chemistry which attracts water and preferably there must be a maze of interconnecting channels to allow air to enter.

There are two critical minerals which turn earth into soil - calcium and magnesium.

Calcium tends to separate the soil particles while magnesium tends to make them coalesce into a stodgy glue.

Many stodgy clays are high in magnesium which is essential but what is important is the balance between calcium and magnesium. I have no knowledge that adding excess calcium can cause problems so my advice is that if you have a heavy clay to be generous with the gypsum and dolomite.

## **Bacteria, fungi and worms**

Making sure you have enough of the needed minerals is essential but not enough by itself. There is a biological process which turns earth into soil, it starts with the bacteria which are microscopically small and will coat the soil particles with glue which can make them hydrophilic or water loving ready for the next stage.

This carried out by fungi will bind the particles into granules forming the desirable tilth of a good soil.



Then finally the macro biology - particularly the worms but there are many other creepy crawlies - which bore through the soil making the desirable channels for air to permeate through the soil (and provide air and drainage).

But the biology needs moisture which is the other part of sponge beds. Water in the soil moves by surface tension to areas which are the most hydrophilic or water loving. This requires a combination of particle size and surface chemistry.

The rotting layer of organic material is highly hydrophilic (except for gums leaves) and forms what is commonly called a hanging water table - this is not quite as effective as the liner in a wicking bed but is still a very practical way of storing water.

These two features - the active biology and the hanging water table are the essence of what sponge beds are all about.

## History of sponge beds



It is almost twenty years since I started to experiment with wicking beds - they went viral and are now all over the world but I failed to successfully promote them to commercial scale horticulture.

My original idea with the sponge bed was that they had many of the benefits of wicking beds - particularly water holding capacity - but avoided some problems such as damage to the liners on large beds and the lack of contact with the surrounding soil which is a source of soil biology (although this can be solved by using open

wicking beds which don't seem to have caught on in the way that closed wicking beds have).



Initially my interest was in providing the trace mineral and phytochemicals which are an essential part of healthy eating and need soil biology to make minerals available to the plants.

However as I studied I realised that eating fruit and vegetable grown in a biologically active soil may be a way of improving our gut biology which we are now learning is critical to health - particularly in avoiding the

cravings which make dieting so difficult.

A sponge bed has two distinct features - it has a layer of highly absorbent organic material which literally acts as a sponge to hold large volumes of water and has an active and beneficial soil biology.



In conventional growing we use soil to grow plants. In sponge beds we use plants to grow soil (then use the soil to grow plants which will make us healthy). Sponge beds work by using plants to create soil with an active biology.

There are thousands of different species in soil biology - so many that we do not have the technology yet of growing individual species and adding them one by one

to the soil. So we need to look upon soil biology as an ecosystem which will contain both beneficial and harmful species and create the conditions which favour the beneficial species and hope they will out-compete the harmful species.

Adding compost or compostable material will certainly increase the soil biology which is highly beneficial but will encourage the growth of the decomposer species. But plants have a symbiotic relation with soil biology and certain types of plants will exude specific sugars from their roots which will encourage the biology which is more beneficial to the plants.



This is very easily seen by digging around the root zone (rhizosphere) of different types of plants - for example sunflower will encourage the growth of mycorrhizal fungi.

Although you cannot see the fungi with the naked eye you can see the grey colour of the hyphae and feel the change in texture of the soil in the rhizosphere - by contrast the rhizosphere under a gum tree will typically look and feel similar to the surrounding mother region - gum trees are pretty useless as clay breakers.

### **The eco-system approach**



The essence of the eco system approach is to accept that in any system there will be beneficial and harmful biology - the essence is to provide the conditions that benefit the beneficial biology which will out-compete the harmful.

While this may seem obvious it is in direct contrast with the traditional reductionist approach of trying to totally eliminate the harmful biology (usually by aggressive chemicals and antibiotics) then re-introduce known beneficial biology.

The limitations of this approach are that it is virtually impossible to totally eliminate all harmful biology and that as we have limited knowledge of what makes a beneficial biology we will only introduce a small variety of the needed species.

One of the fundamental principles of biological management is to have a broad spectrum of biology.

### **Changes in food supply**

Historically food has been in short supply and expensive for most people. Now it is cheap and abundant. But is it not just about quantity - it is quality.

Traditionally agriculture involved small mixed farms - a broad mixture of animals and crops - with manure the main fertiliser. The recent change in agriculture has been totally dramatic with the wide spread adoption of mono-culture, artificial fertilisers and antibiotics. This has resulted in an all-out war on our soils. Minerals and trace elements have been dramatically reduced and the soil biology decimated.

Home cooking has been substantially replaced by convenient processed food or fast food outlets. We almost have no control over what we eat - supermarkets are

brimming full of a multitude of different packets but with similar contents - sugars, fats, salts, high fructose corn syrup or the likes. It is a battle to find a packet of old fashioned oats for breakfast among the multitude of sugary breakfast cereals.

What can be done about this?

My approach - up to my [Yunnan trip](#) - was to focus on methods of growing fruit and vegetables in nutrient and biology rich soils. I still think this is essential but now realise this is not enough ([it is a conditional theory](#)) - we need to focus on changing our gut biology which can create almost irresistible craving for sugary foods.

It seems a reasonable hunch (seems likely but as yet unproven) that the easiest and most pleasurable way is simply by eating food grown in a biologically active soil. Fruit and vegetables are naturally pre-biotic (feed beneficial gut bacteria) while fresh biology would be transferred to the food - and hence our tummies - acting as probiotics - particularly if excessive peeling and cleaning are avoided.

### **Practical ways of changing our gut biology**

The following is a basic description of the system I am using based on my particular circumstances. This is not intended as rigid prescription but more to cover the basic principles which can be applied to suit the local situation. Different regions, soils and climate may require different approaches.

My aim has been to develop a pragmatic overall system which works as a total entity rather than becomes absorbed in highly specialist technologies.

## Part 3 Organic material and the horse shoe composting system

Sponge beds require significant volumes of organic matter. It is not over critical how this is obtained but I am heavily into recycling - anything and everything - so have developed the horse shoe composting system which allows me to be extremely lazy and recycle potentially toxic matter at the same time - to me two highly desirable features.

I am a bit of a recycling fanatic and I don't expect other people to follow me but this is the system I have developed which works fine for me.

But there is an even more important reason for me. Xiulan - my wife - was a surgeon and likes things to be neat tidy and clean and simply does not share my love of mess - every couple has their problems.

The open end of the horse shoe faces away from the house so when we are on the veranda we are looking at attractive plants.



I planted Senna Alata - one of my favourite 'soil plants' it has a really deep root system for pulling up nutrients from deep in the soil, is a legume for fixing nitrogen and is extremely drought tolerant. When established it grows really fast producing abundant foliage for sponge beds.



However the leaves turn black when they get frost. Xiulan did not approve so she pulled out all my 'soil plants' and replace with more attractive plants but life is always a compromise. Happy wife - happy life.



I live in an eco-village with lots of green waste, grey water and a composting toilet. These obviously contain pathogens so I do not want to use them directly. I make a horse shoe with plants which give abundant green foliage. In my climate Queensland arrow root, sena alata, comfrey etc grow really well.

I put all the waste (and that means anything which is vaguely compostable) into the centre of the horse shoe and just let them do their own thing. It may take several years for some of the large pieces of wood to decompose. I don't worry about all those rules that composting enthusiast insist on - like no grapefruits skins or onions, or carbon nitrogen ratio - in it goes.

I do not use any of this material directly as it may contain pathogens but will harvest the leaves growing from the outside of the horse shoe hoping the plants filter out the pathogens. I have been doing this for years and am still alive.



An alternative to the horse shoe method is to use the boundary as an area for producing green matter. Here I have planted Senna Alata - one of my favourite soil trees.



Another is Queensland Arrow Root and bananas have the desirable thick broad leaves - they are a bit frost sensitive though. But you need to choose what grows well locally - I have a feeling that bananas would not do too well in Anchorage.

## Part 4 Inoculants

Soil biology breeds incredibly fast so while some starter or inoculant is required only a small amount is needed to get the process going.



I am fortunate as I live on an eco-village with virgin areas with a broad spectrum of biology which has evolved to be suited to the local climate.

It is in a very dry region just south of the main monsoonal rains and north of the winter rains - it is the same latitude as the Simpson Desert.



But we do have an excellent system of dams and creeks which supply us with water all year round.

I have monitored the growth over the years - particularly of fungi - and select soils from these regions. Bacteria are pretty resilient and the birds and animals will re-infect the soil but fungi are particularly important for soil regeneration.

In the wet season I look for areas where there are fungal fruit (e.g. mushrooms) and extract soil from these areas when I need the inoculant.

### Feeding the inoculants

The inoculants must be fed to grow. It is like running a miniature farm with very small animals - but if you don't feed them they simply won't grow and breed. Most soil biology cannot photosynthesise (apart from algae etc.) so their food has to come from plants.

This can come in two forms - either from dead plants as they decompose or from sugars which are exuded from the plant roots. In a farm with full scale animals the farmer can select the animals he wants and breed from them. Soil biology is a bit different - at this moment we really do not have the technology to select the specific breed we want and breed that in isolation (may be one day).

In a natural inoculant - as I am using from a mature eco-system - there will be thousands of different species. We have some control over which species will prosper by how we feed them.

If we feed them exclusively from rotting vegetation we will encourage the growth of the decomposers - on the other hand if we feed them from plants exuding sugars from their roots we will encourage different and more beneficial species - in fact different types of plants will attract different types of soil biology.

### So what plants should we grow?

Now there is a question. I have searching for the answer for a long time but this could be described as a technology in its infancy. Google '*plants that attract insects*' and you will get thousands of pages but Google '*plants that attract soil biology*' and you are in for a disappointment.

I have found some of the best sources in old agricultural books dating back to the 1800's where using plants to improve soil was common place. They may not have known why it worked but they knew it worked.

Top of the list must comes sunflower which is now known to attract mycorrhizal fungi. I have been using sunflower for some years now and it really works - although you cannot see the fungi directly it is so perfuse that you can readily see it is there even with the naked eye.



But it is wrong to just use one plant - far better to make up a seed mixture to get a broad spectrum. I always include Lucerne, clover and oats into my mixes together with what may be readily available.

A number of companies supply green manure mixes - which I have added to my basic mix but they are usually much more expensive than buying seeds in bulk from an agricultural supplier.

Many of the herbs are promoted as beneficial - I use comfrey and basil which are extremely vigorous growers. . Others such as thyme, rosemary, yarrow and tansy have also been promoted but I have not tested.

Other plants which have been promoted are mustard; turnips; sunn hemp; sorghum; soybeans; cowpeas; millets; turnips; camellia; cilantro; chicory; dill; sorghum; rape; cosmos, chicory; hemp; indigo; buckwheat and phacelia. There is no information on what species of biology these plants attract.

There is a wide open field here for further research.



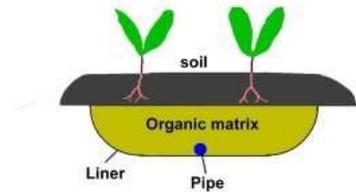
Comfrey is a very useful plant for extracting nutrients from deep in the soil.

The key is to have a broad as possible spectrum to create maximum diversity.

## Part 5 Practicalities of making a sponge bed

The soil must be kept moist to grow biology - there are several way of irrigating.

Open wicking beds - essentially a pipe laid over a liner is one very effective way.



The plastic liner can be very narrow - little more than a cover to stop the water leaking out of the holes in the pipe - which is very convenient to make or it can be much wider which stores more water but runs the risk of damage to the liner over time.



The picture shows an open wicking bed growing Senna Alata which I made almost ten years ago and keeps on going. You can just see the filler pipe - I put one at either end to check for blockages as the bed is much longer than a conventional wicking bed.



Another method is to make terraces and simply flood irrigate. The Chinese have been doing this for years. It is moderately water efficient but you need a large volume of water quickly to flood - otherwise the water will just soak in.



It helps to find a couple of young holiday makers who have overspent their budget and for a few bucks will do the grunt work.

The beds must be flat - the easiest way is simply to flood the beds and move the soil around as needed.

If all this is too difficult you can still use sprinklers which do not require any earth work.



When you have the base prepared simply spread the organic matter uniformly over the base. There are no rules on how thick - the more the merrier - so basically put on what you have.

Now cover the organic material with what soil you have, may be when you start you have to use what you have got but once you have the first bed established you can use this as a source of quality soil.



It must be thick enough to provide a bed for the 'soil plants' to grow. 50mm is the absolute minimum but it is much better to aim nearer 200mm if you have the soil.

You now need to add the inoculant and seeds, I usually mix them together but that's just because I am lazy. Then apply a covering of soil - 5mm is fine (but I make mine bigger as the '*blank*' birds insist on digging up the seeds - a hazard of living in a bush setting) - then water in.

Now if you are an enthusiastic gardener comes the difficult but - just do nothing (apart from sitting on the veranda and drinking red wine) for several months.



You think I am joking? Your nice neat bed you have put all that work into will go absolutely feral - just a mass of rampant vegetation.

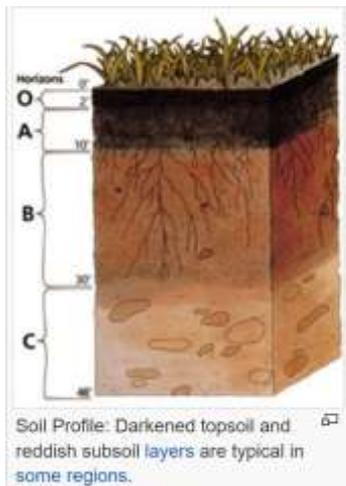


When the sunflowers have seeded and you are the proud owner of a flock of grossly overweight parrots it is time to clean up the mess.



I have tried using seed trays but they actually made more work in finding them so it is simply a question of taking your weapon of choice - I use a slasher on the back of my trusty tractor - and chopping everything down.

## Geo-physical and biological classification of soil horizons



Classic methods of classifying soil have been based on the geology or physics of the soil.

Another method is to look at the biology. The very top layer - typically made from leaf litter - decomposes to form a very fine tilth which is suited for seed germination.

Just below this is the layer full of the fine roots and below this is a layer where the much coarser tap roots penetrate and below that is the mother earth.



After clearing the growth we are left with a layer which is full of roots - the rhizosphere which is where the bulk of the soil biology lives.

But the coarse texture is not really suitable for planting seeds - they need a much fine texture.



I use a layer of fine texture soil to provide a seeding layer. This can be any good fine soil - I like to use vermicast or worm casting.

So far we have just made a good quality bioactive soil - now we have two options - we can simply grow the plants in place or we can transfer the soil to wicking beds.

## Part 5 Growing something

### Wicking beds or direct planting

We now have two options. We can grow in the soil directly or take the soil and use this in a wicking bed. We simply dig up the soil which is full of roots and is rather coarse and put in the base of the wicking bed then cover with a fine soil or vermicast for germinating crops.

### Growing in situ - starting the bed



Once the bed is prepared you can grow plants in the normal way. However having put all that work into growing the biology I like to make sure I maintain it.

Soil biology has been around for billions of years and is highly resilient so all you have to do is let it get on with and avoid killing it. This means avoiding harsh chemicals and not working the soil.

It is just a reality of life that the soil which will form my growing zone will be full of weed seeds so although I don't like leaving the soil without plants I will let the weeds germinate and mow them as they come up and finally scrape the surface (with the bucket from my tractor or a hoe if I am feeling fit) until I have got rid of most of the weeds. I am surrounded by natural bush so weeds are just something I have learned to live with and tell myself they are highly beneficial for the soil biology.

If I am direct planting I will simply cover the seeded area with another layer of soil or vermicast. After germination I will keep the surface mulched with grass clippings or my compost leaves after running through a shredder.

### Problems and snags

This all sounds pretty simple on paper however like so many things in life - when you get round to doing it there are snags and problems.

My problems come from living on an eco-village surrounded by bushland. Weeds are a major problem as seeds are simply blown in on the wind. We don't use any chemicals to control weeds and removing by hand just is too much grunt work.



Weeds are pioneering species and can be highly beneficial for soil improvement but many varieties seed prolifically (which seems a feature of weeds).

I attempt to out compete them with plants they are actually useful. Pumpkins just grow like weeds on my place so I just let them take over until winter - put my long boots on to avoid the snakes - and harvest the pumpkins then out with the slasher on the back of the tractor.

Insects are certainly an issue but as this is a dry climate so apart from fruit fly we do better than most areas in Australia. Even the cane toads make no impact. The worst are the grass hoppers and despite my no poison rule I have to resort to pyrethrum.



But animals and birds are in a different category. I keep out the kangaroos with a big fence - even though it is taller than me they can easily jump over it but I chase them out with the zero turn mower which goes like a rocket and they now seem to have decided there is voodoo on my place. But that still leaves the rabbits and possums which can wipe out an entire crop overnight.



Birds are another issue. We have a system of lakes to supply us with water in the dry season so we have large numbers of water birds ducks, herons, spoon bills, ibis and the dreaded water hens. They are so destructive that I have to resort to netting. When the sunflowers are in seed there are so many parrots that their weight breaks the stems.

There is a plus that they are bringing an additional stream of biology on their feet.

No till and no poisons sounds good in theory but surrounded by bush and wind borne seeds there is a problem with weeds - I solve this by extensive use of mulch around the plants. This is also adding nutrients to the soil as it decomposes.

Decomposing organic material absorbs a lot of nitrogen so I need to replace this - typically with manure - I also make sure the calcium levels are maintained by adding gypsum and dolomite and one of the aims is to get trace elements into our bodies so I add rock dust and a trace element mix.

But in addition I maintain an eco-zone on the borders of the bed and sometimes in strips.

### **The eco zone**

I really don't like leaving soil with nothing growing - this is what keeps the biology active. I will quickly make eco-zones which will act as a reserve for the biology. Typically these are around the edge of the bed but I also divide the bed into strips with the eco-zone forming paths.



This picture shows a bed I have just planted out. The rows of mustard greens I have transplanted and surrounded with mulch - I have sown my seed mix in rows and they have just germinated - as they grow I will trim them back so they don't go feral (like when I make a new bed) but otherwise I will leave them undisturbed to act as a reserve for the biology.

This is just my method of making biology rich soil, there are many others and basically soil biology is pretty resilient so if you stop killing it with chemicals and excessive tillage it will flourish.

## Maintaining a bed



Once a bed is established it is best left with minimal disturbance. However it is quite practical to add extra material by simply digging and filling a trench. I like the one third principle of making a trench no more than one third of the bed and letting this settle and allowing biology to move in from the adjacent mature regions.

Next time a second trench can be dug next to the old trench and again for the third trench.

The principle is simple - always leave some mature part of the bed undisturbed to re-inoculate the new area.

## Biology active wicking beds



One aim of this project is to enable people who do not have a garden to eat fruit and vegetables grown in nutrient rich -biologically active - soil. People living in apartments obviously cannot grow their own biologically active soil but they can grow plants in a wicking bed on their veranda.

I see that there is a strong desire for people to have some contact with nature and gardening groups are springing up as community groups - often encouraged by local councils.



The biology active soil can be readily transferred to a wicking bed putting the coarse rhizosphere in first then covering with a fine layer of soil on top for seeding.

Don't follow the often promoted method of using stones and cloth at the base of the bed - simply mix up some soil and vermiculite and put this in the base of the wicking box.



As vermiculite will absorb almost its entire volume so will hold far more water than a stone mix but will also allow the roots to penetrate the entire box so there will no problem with stagnant water.

Another method which gardening groups can use is to plant out baskets of vegetables into the biologically active soil. The baskets can then be lifted out and placed in a bucket to make a small but effective wicking box.

## Making gardening easier



The aim is to encourage people to become healthier by growing and eating fruit and vegetables grown in nutrient and biology rich soils. I am really targeting the non-gardener but hopefully the experienced gardener will benefit.



It is therefore important to make it as easy as possible. The best way of doing this is to get someone else to do the work for you while you take on the important jobs like pouring the red wine.

These pictures show our granddaughter sorting seeds while grandmother and daughter transplant seedling into a wicking bed. They are such great workers I tried to auction them on E-bay but got no offers.

## What to grow?



The simple answer is what you like to eat. However the aim is to encourage people who are not gardeners to improve their health by eating fresh fruit and vegetables.



The key question is what tastes good.



Keen gardeners will spend hours tending their plants but this is not for everyone and there are some plants which take minimal looking after.

There are some plants which will self-seed or propagate by themselves and really only need an occasional watering. Kang Kong (left)





Egyptian and Singapore Spinach, purple Amaranth and mustard greens are my favourites and grow really well in my subtropical climate.

Silver Beet and English Spinach may be better suited to colder climates.



Chinese vegetables like BokChoi, Wombok are both nutritious and very easy to grow but the insects appreciate them as well as people.



All legumes are healthy providing lots of critical fibre.



Don't get hung up on prescriptions eat a variety of vegetables you enjoy - there is a good reason we were given taste buds.

## Part 7 Curing diabetes

You may wonder why I put so much time and effort into this project. The answer is simple - I want to cure my wife - Xiulan of diabetes. By cure I don't mean just stabilise her blood sugars or a bit of reversal - I mean off all medication. If in the process I can help other people - that is a bonus.

You may think this is a ridiculous objective considering all the medical expertise, resources and cash devoted to diabetes. My reply is simple.

Modern syndromes - like diabetes - are a life style condition which are not well served by our current medical system which tends to treat the symptoms not the cause - in reality diabetes is not a simple medical problem. They are the results of the interaction between our genes, the environments and especially the food we eat.

The food we select to eat depends on preferences for cheap and easy and lack of knowledge about food. Cheap and easy food leads to a bonanza for junk food because it is cheap and easy to produce and manipulate and is a dream for marketing because it can be filled with components which are addictive - like sugar - which keep people coming back for more.

Quality food on the other hand is much more expensive and requires greater knowledge to grow and simply cannot compete on a large scale.

Diabetes requires many skills to combat. Not least is psychology. Xiulan early life and attitudes were formed in the Mao Tse Tung era - following the great famine in which it is estimate some 60 million people died of starvation - she was shipped off - as a solo child - to the wilds of Xinxiang - essential Mongolia - as peasant labour. Fear of not having enough food is ingrained - she always cooks far more food than we can eat at one meal.

After a period of this harsh treatment she was selected to train as a surgeon where she was indoctrinated on the importance killing of all bacteria by a combination of cleanliness and harsh chemicals.

Manure, including human manure was the only source of fertiliser so people avoided eating fresh food - everything had to be cooked. Packaged food with its association of cleanliness was prized.

I have a great respect for the medical profession but there is simply no pill you can take which can reverse this upbringing. Her early upbringing may have been extreme but most sufferers of diabetics would have their own story to tell.

Medical science may hold diabetes in check but a real solution requires a broad spectrum of expertises - changing a culture ingrained from youth may be the most challenging.

I am not at all convinced that these psychological issues will be resolved in the consulting room - but I am convinced that here is significant therapeutic value in

growing and eating some of you own food. This is why I have aimed to make the sponge bed as easy to use as possible - running the risk that it may be viewed as over simplistic by experienced gardeners and the scientific community.

Changing gut biology is a critical component of the system and I recognise the high level of expertise in both soil and gut biology. But I am not interested in writing high technology scientific papers - I did enough of that when I was young and now at 76 I will leave that to the talented youth.

My aim is an easy to use system that is technically sound enough to work but is universally accessible.

## **Pre and pro biotics**

A key aim of this project is to improve our health by changing our gut biology.

This is new area of science but we can be certain from recent research that gut bacteria is crucial to health - it can affect our moods, make us feel hungry or full and change our weight.

We know that fruit and vegetables are powerful pre-biotics meaning they will modify our gut bacteria by feeding the beneficial bacteria which in turn will out-compete the less beneficial bacteria.

Of course if we pig out on ice cream and sugary foods the less beneficial bacteria will still prosper however much healthy food we eat (see [Yunnan trip](#)).

But if all the beneficial bacteria in our guts have been destroyed (for example by excess anti-biotics) then they need to be re-introduced. We know this can be done by faecal transfer which if you understand this means poking someone else's pooh up your bum is unlikely replace footy to become a popular Saturday afternoon entertainment.

Of course you can buy products labelled pro-biotics from the local chemist. I have tried these and the only affect I could detect was that it made my wallet a bit lighter.

But humans have been supercharging their gut biome for thousands of years - it just hasn't received the scientific attention that the topic deserves.

## **Transferring biology from the soil to our guts**

Now we come to the critical issue how to transfer the soil biology to our tummies and probably even more important how to make sure the right biology gets transferred.

Dr Josh Axe's book 'Eat Dirt' contains specific methods of transferring biology from the soil to our guts. There are plenty of books on Amazon - just search soil and gut biology. Many of these are written by Doctors who say they are practising 'functional' medicine which means they rely on case histories from their patients rather than the double blind statistical method with control groups.

They promote roots crops that are eaten fresh without cooking like radish, carrots celery etc. to provide effective transfer from their skins - if they are just washed and not peeled or scrubbed. The leaves of green vegetables also have a surface coating of bacteria which can be transferred to our guts.

We need a better understanding of soil and gut biology which comes from serious research. I have found plenty of work linking diet and gut but have yet to find work that covers the full spectrum from soil biology to gut biology which would look at what plants we should grow, how we prepare the food and even when and how we eat.

How can we fill this gap?

## **Innovation and science**

There is a widespread view that innovation is a linear process - starting with experiments in the laboratory - leading to the development of scientific laws which enable entrepreneurs to develop commercial products.

The reality is that many of the major technological changes have come from some enterprising person coming up with a solution which works to solve a real world problem but without the benefits of mature scientific understanding - just a hunch that it would work.

The industrial revolution started with the invention of the steam engine to pump water out of flooded mines. Thermodynamically terrible - but it worked.

The steam engine, the car and aeroplane were not invented because of the development of the theories of thermodynamics and aerodynamics.

Some struggling inventor showed that they worked and were important - this then encouraged the research to develop the fundamental laws of science.

## **Development of dietary theory - facts and fantasies**

This is very much true of the theory of diet and health. Google 'blue zones' and spend a happy afternoon looking at where our understanding of dietary theory has come from.

The extended life span of the Greeks, Okinawan's and Guatemalan's and other long lived people in the so called blue zones have not occurred because of some revolutionary new dietary theory coming out of the lab which said that omega 3 is highly beneficial so go out and eat lots of sardines because they are rich in omega 3.

Quite the opposite - the populations in the blue zones have been living long lives for centuries - way before diabetes was a word in common usage. It is only recently that science paid attention and then struggled to develop the science to explain why.

This led to a better understanding of omega 3 and particularly the omega 3/6 ratio which has led to globally improved diets. The understanding that comes from rigorous science can lead to major improvements - the scientific method is incredibly powerful - but sometimes it needs a kicker to get the process started.

Often that kicker does not come from the lab but from observations of what happens in the outside world.

## Science is powerful but can be beneficial or harmful

Some developments from the lab have proved totally disastrous for our health - hydrogenated fats (trans fats) and high fructose corn syrup have harmed billions and killed millions of people.

They were never properly tested in real world conditions to find out their affect (but they have made some companies a lot of money).

Similarly with many diets - they may be based on some scientific theory but again in the real world they simply do not work.

## It should work

This has led to the complete reversal of the meaning of the word 'should'. At one time it meant it **will** work. It has now come to mean - it was designed in the lab to work so is **should** work but in practise it does not. This is a complete reversal of meaning from will to won't work.

Don't believe me? Next time something does not work on your computer ask your service supplier and you are likely to get the reply 'well it **should** work but it does not and I am *'blanked'* if I know why.

## Sorting fact from fiction

We live in an age of communication never experienced before - which **should** be beneficial. But the internet is just riddled with Charlatans promoting quack remedies which do not work.

My favourite is Goji berries which are promoted as some exotic super food which will solve all your health problems and are sold at some exotic price. My wife - Xiulan - comes from China where Goji berries are simply ordinary - she pokes Goji cuttings into the soil and they just grow at virtually no cost - it is so easy.

Our understanding of the importance of gut biology is still in its infancy but we know that improving gut bacteria is beneficial to health and that diet is a major factor in creating a healthy gut bacteria but we do not as yet understand the mechanism of how diet change gut bacteria.

## Diet 'it should work'

My Chinese wife Xiulan is Diabetic and because of language I have a lot of contact with the doctors and diabetic councillors. They are competent and caring and the pills keep her blood sugar under control but I have preferred to try their restrictive dietary recommendation out on me first as I am not diabetic and a natural pig - I just love food.

You do lose weight (at least for a while). But the effect on the body is to make me feel limp - lethargic and lacking in energy and craving the next meal while the effect on the mind is worse I feel foggy, forget things and generally a bit dopy.

But despite the millions spent on combating diabetes we are going backwards. There are over 4,000 amputations for diabetes every year and if you want real world

confirmation all you have to do is walk around any shopping mall to see how many people are fat.

## Avoiding a punch up

I am a bit of an introvert and avoid conflict so I don't walk up to strangers saying 'you are very fat - have you got diabetes and if you don't you soon will' but my wife will strike up conversations with other Chinese and it is surprising how many have diabetes.

We have to accept that although the current dietary approach - even if theoretically valid - which is debatable - is just not working in the real world.

We may have some control over the symptoms but we are not solving the root cause.

Diabetes is a disease from poor diet - I have long held the view that we need to go back to a diet largely based on plants grown in nutritious and biologically active soil. Hence my work in developing the sponge and wicking bed systems which enables almost anyone to grow healthy food which will improve their health.

I have also focused on ensuring the system is ecologically sustainable as we are facing an impending crisis in our agricultural methods.

However my trips to [Yunnan](#) to study people who have some of the best soils in the world showed people were still fat. Coupled with the recent scientific work on gut biology has convinced me that just focusing on getting adequate minerals, vitamins and phytochemicals is not enough - we have to look at managing gut biology.

To be practical and widely acceptable this has to be done by diet.

## Gut biology - crowd research and the process of science

My arguments that there is a transfer of biology from the soil to our gut are not based on the deep scientific understanding that I would like.

As ordinary people we do not have access to the high tech equipment like scanning electron microscopes, MRI machines and mass spectrometers of modern science.

However what we can do as part of a crowd research project is to test this system on ourselves and answer the crucial question which should be applied to all new technology '**does it work in practise**'.

All we need to test if it 'works in practise' is a set of bathroom scales, a tape measure and an objective assessment of whether we feel healthier (as assessed by energy levels). It would be highly desirable but not essential to have scientific measurements of gut bacteria before and after.

If we can demonstrate the 'it works in practise test' then we may be able to convince the scientific establishment to cooperate with their sophisticated resources to developing a better understanding of why it works.

## Crowd research and science - a two way street

I have no doubt that if this system really does work - but to date I have only tested it on one person silly enough to be the Guinea pig - me. To be convincing we need a significant number of people who have adopted the system and showed benefits.

The proposed crowd research project needs the skills and resources of the scientific community to refine what is essentially an empirical technology at this moment.

However crowd research is a two way street. It offers a closed loop testing process - one of my criticisms of dietary advice is that it is open loop - this is the way it **should** work and if it is not working for you then you are not doing it right. The fact that the dietary advice may be wrong never seem to be raised.

But there is another even more important aspect. Crowd research successfully utilising technology provides an effective way of applying the sophisticated technology being developed in our research institutions.

We have to accept that the current promotion of the 'eat less exercise more' has been a failure. Apart from being technical over simplistic (polite for wrong) it has just been ignored by the population at large.

We live in the internet age where personal contact has an enormous impact on how information is spread. It is far more effective than any high cost publicity campaign and is probably the dominant reason for the scientific establishment to cooperate with crowd researchers.

## The appeal

If you are motivated to try these somewhat empirical approaches to changing gut biology then please let me know how and tell your friends to get more people involved then we may be able to motivate the urgently needed scientific research.

Colin Austin

colinaustin@bigpond.com