

How urban agriculture can combat hidden hunger

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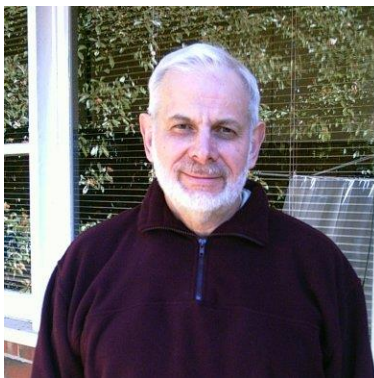
Abstract;-

Advances in agriculture and the green revolution are producing a surplus of food rich in energy but lacking in essential minerals, vitamins and phytochemicals.

Recent research shows that our bodies have a highly developed system of neurochemicals, chemical signals which sense these deficiencies and create a 'hungry beast' within us making us crave more food – results obesity, diabetes, heart deceases, strokes etc. China now has the highest incidence of diabetes globally.

This talk describes how a simple system of urban agriculture can combat this imbalance using minerals, soil biology and selected plants to balance our diets by providing high mineral and vitamin rich food and how this system, well established in Australia, can be modified to meet the unique conditions in China.

Author details;-



Colin Austin is one of Australia's leading innovators pioneering computer aided engineering so his company grew to become Australia's leading exporter of technical software.

He took a major about turn deciding to devote his time to environmental issues particularly the regeneration of water and soil. He pioneered the development of wicking beds which are now widely used in Australia. When his Chinese wife developed diabetes he studied the relationship between diet and health and learned that while our food system had made enormous improvements in productivity producing an abundance of energy rich food it lacked essential mineral and

vitamins which was leading to a major health epidemic of obesity, diabetes, heart decease and stokes.

He realised he could develop a second generation wicking bed system incorporating minerals, soil biology and selected plant to balance our diet. He is now studying what needs to be done for this system to be adopted in China.

Three sorts of people

It is usual in a talk to have what they call the warm up line, to allow for late comers and let people get used to your voice. Now I am giving this talk in English as my Chinese is at the level if I ask 'which way to the railway station' it comes over as 'is your mother a camel' - which is not good.

Now I once made a joke - there are three sort of people in the world – those that are numerate and those that are not. No one ever seemed to get the joke, the best I got is the question 'what does numerate mean?' and I would explain skilled with numbers but no one ever asked me what the third group was.

Now there really are three sorts of people in the world.

The first group I call the Armageddonist, those people who think the world is coming to an end and we will all be destroyed by climate change, toxic pollution, food shortages or whatever is the doom and gloom topic of the day.

The second group is the naïve optimists, they say that we have never had it so good; we are better fed, have more material possessions, more free time and are more secure than ever before.

I am a member of the third group, which unfortunately is a small group, who says that you are both right but man is an intelligent creature and if we use our ingenuity and intelligence we can overcome these very serious and real environmental threats.

Ample productive capacity

I am very lucky, I saw the importance of computers in their very early stages and wrote computer aided engineering software which literally changed an industry and led to greatly improved productivity and quality. But I was just a small cog and now the computer engineering has given us untold capacity to produce products. China alone could supply the entire world with all its manufactured goods.

My company became the leading exporter of technical software in Australia which I sold to give me the resources to pursue my environmental interest. I can now experiment and research ideas which excite me even if they seem totally daft and which would never receive formal funding.

Is water the key problem?

I used to think that water was the most critical resource on earth, particularly water for food production – irrigation water. I did a whole bunch of experiments on how to use water better to grow our food; this eventually led to the wicking bed technology which is the subject of the talk.

But let me tell you I was wrong. Water is a totally renewable resource which we chronically waste, largely to pollute our waterways with toxic chemicals and destroy our soils. But my job is to develop technology and the technology exists to solve our water problems, it just needs political will to make use of this technology, but I am not a politician and have no political skills so I can have no impact on how we use our water.

Deceases of affluence

But there is an even bigger problem than water and I can do something about this. This problem is food but not in the way you may think. We do not have a food shortage, in fact modern agriculture is so efficient that we are producing enough food to provide double the current world's population with all the energy they need.

Quality not quantity – deceases of affluence

It is not the quality of food that is the problem but the quality. We are suffering from what is called the deceases of affluence. We are literally killing ourselves by eating the wrong sort of food full of energy but lacking the essential minerals, vitamins and phytochemicals (chemicals produced by plants) which are essential for health. I am talking about obesity, diabetes, heart decease, strokes and may be even cancer.

Now even though I have no political skills this is something I can do something about. I can provide individuals with the technology of growing their own food which is rich in these essential minerals, vitamins and phytochemicals. The challenge is that now much of the world's population lives in cities, often in high rise apartments, with apparently nowhere to grow their own food.

That is what this talk is about so;-

Welcome to this Shanghai Wuhan talk about wicking beds.



I guess many of you would have heard of wicking beds and may think they are just a way of saving a bit of time and trouble by not having to water plants so often.

This may be true but is missing the point of modern wicking bed technology. To my mind it is like thinking about a horse and cart as a means of transport.



Original wicking bed was simply a sheet of polythene buried in the ground to catch and store erratic rainfall or irrigation water to avoid loss of water and nutrients beyond the root zone. They were originally conceived as a way of providing sustenance food in periods of droughts in poor countries but the idea has caught on with many thousands of beds being made by enthusiastic gardeners.



But we should really be moving on from the horse and cart era to the era of high speed trains.

Wicking beds provide a solution to the problems of our modern diet which in countries like the US and Australia is leading to obesity causing diabetes, heart disease and strokes and some doctors think even cancer.



Diabetes is now the number 1 expenditure by Governments on health care.

I first came to mainland China when Deng Xiaoping opened up the country – one of the most far reaching events of the modern era. That was some thirty years ago but I have two distinct recollection of that time.



The first was the swarms of bicycles which were everywhere; the second was that people looked slim and fit.

Then as I revisited China over the years the electric scooter challenged the bicycle and now cars are everywhere.

For many China is prosperous country.

But there is a price on this prosperity, China has now surpassed the US and India to become the number one country for diabetes. Some 100 million Chinese now suffer from diabetes.

How diet affects health

In the next section of this talk I want to look at how diet affects health and what we can do about it.

One of the great benefits of modern society is the internet particularly Google alerts. This gives you a daily update on recent developments in your field of interest and over time gives you a much better understanding than a single search.

I have several Google alerts including one on diet and health so every morning I read articles connecting diet and health.

There is an overwhelming amount of information about diet and health from all sources qualified health professionals, people with their own pet remedies and companies trying to sell some magic solution, either diets or pills, which will make people thin and healthy – the get rich quick conmen.

The volume of information is almost overwhelming with so many different opinions it has been a challenge to make sense of it.

How do we make sense of this?

The classic approach is to look for a consensus among the scientific community. When I first started there seemed to be no consensus with experts arguing their case with other experts, it made the debate on climate change look benign.

The aim of science is to come up with a general law which is universal. I was trained as an engineer and we can look to basic laws, often very simple laws like Newton's laws of motion, the laws of thermodynamics or strength of material. These laws can be applied in almost to design anything, simple or complex, from an aeroplane, car, washing machine or toaster.

But medical science is different, people are different so what may work for one person may not work for another so we have to rely on a statistical approach to develop laws which are true in general but may not be true in a particular case. Eating hamburgers and hot dogs may make most people fat and liable to get diabetes but there are some people who could eat greasy fatty foods all the time and never get fat.

But a particular individual who is told they are diabetic or more likely is not going to be happy to be told that there are some three billion people in the world who are diabetic. That is no comfort at all, what they want to know what do I have to do so I don't go blind (diabetes is the most common cause of blindness) or have my feet or hands chopped off.

A doctor monitoring a patient will look at specific results, such as blood sugar readings, for an individual and then decide what remedies may help based on general laws.

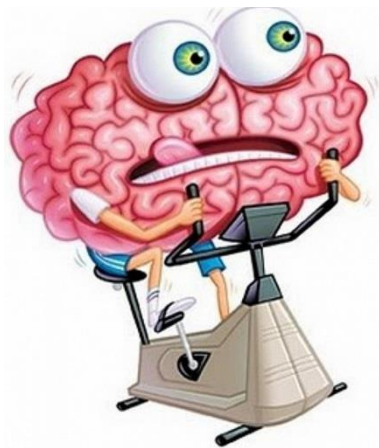
But laws based purely on statistics can be very misleading – for example there is a high degree of correlation between smart phone use and diabetes but that does not mean that an individual that throws away their smart phone they will be cured of diabetes. We need an understanding of the mechanisms, how does this work.

For a long time I read about many trials, which I am sure are statistically correct, but I could see no mechanism. I am an engineer and since I was a small boy I have taken things to bits to find out how they worked.

Also I see the many diets that are being promoted, diets like the Atkinson, poleo, low fat vegan etc. and I see that often they are in conflict, meat is healthy - meat is bad etc. I also see that many of these diets do not give lasting weight lost, they may work for a while then most people just give up and go back to eating in their old way. Then I began to understand.



There was an underlying assumption in the trials that our bodies are like some dumb machine, like an old steam train. You feed the boiler with fuel and the engine produces energy. You feed a person fuel like hamburgers and the body produces energy.



But then I came across some research that was done in the UK which explained many things. We are not some dumb machine, the body produces neurochemicals, chemical signals from our stomachs which report to our brains the current state of our food needs and the brain then signals us what and how much more to eat.

We are not some dumb machine but an intelligent creature.



Mankind has have been on this earth for almost 200,000 years most of the time as hunter gatherers collecting wild plants and catching and eating animals as best we could. All this time our bodies and particularly our brains were evolving to cope with these difficult conditions. We do not have strong claws or massive teeth or horns like other wild animals; we survived and prospered because of the evolution of our brains.

Agriculture barely goes back 10,000 years which in evolutionary terms is not very long, so essentially we have evolved as an intelligent creature as hunter gatherers.

The food supply was erratic predominantly from a wide variety of plants supplemented by a lucky animal kill. The wild plants growing in virgin soil would have provided plenty of minerals and vitamins but limited energy. Our intelligent neurochemicals would have evolved to primarily to tell us that we needed more energy and it would be a good idea to go out and slay a passing mammoth.

Agriculture and the green revolution



The introduction of agriculture completely changed that picture which again was transformed in recent times by the green revolution. Our staple food now comes from a very limited range of plants such as rice, wheat, corn and soy which have been genetically selected for very high production supplying large amounts of energy.

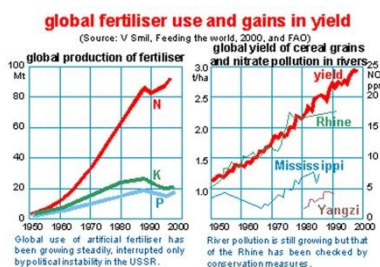


The green revolution has given us the capacity to produce large amounts of energy; we are currently producing enough energy to supply double the current world's population. Of course there are still many people who are undernourished but this is largely due to political instability, war and poor distribution.



However the green revolution and the politics and economics of food production have fundamentally changed agriculture. It is now very dependent on both fertilisers and irrigation. In the west it is largely controlled by major corporations who operate the food processing industry but by their purchasing power essentially control the farms.

Fertiliser use has increased dramatically, particularly of nitrogen, which has led to a major increase in production.



Much of the fertilisers is produced synthetically base on oil. We now have a very good understanding of soil and plant chemistry. The process of photosynthesis on which all our lives depend require carbon, oxygen and hydrogen which plants get essentially from the atmosphere. They also need the primary nutrients such as N, P, K, and the secondary elements Ca, Mg, S which are required in moderate volumes.



The micro nutrients Mn, Fe, B, Zn, Cu, Mo, Cl, Co are needed in smaller quantities essentially as catalysts.



However we humans require more elements such as selenium, iodine, vanadium, chromium etc. which the plants do not need themselves but will be absorbed by the plants if they are in the soil. And this is where the problem really starts. Smart farmers using soil tests know exactly how much of the primary nutrients to apply. We now have computer controlled fertiliser spreaders which will apply just the right amount to each section of the fields based on soil samples or even aerial surveys.

We need more than plants

Most farmers also recognise the importance of the secondary elements and will supplement with calcium, magnesium and sulphur by adding gypsum and dolomite to the soil.

In much of our agricultural land there have been sufficient trace elements that farmers have not needed to worry too much unless there is a serious deficiency, however this is becoming more common as each crop takes more of these elements from the soil.

Widely reported deficits in a modern diet

Elements needed by plants	
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	
Elements needed by plants but we may need higher doses	Ca, Mg, Zn, Fe, Cu
Essential extra elements needed for health	Selenium, Iodine, Vanadium, Chromium, Yttrium ?
Vitamins humans are generally short of	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 one 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. This may just be the most motivating part of this entire talk.

The great meat debate



The amount of meat we eat is steadily increasing with affluence. Many dieticians blame this increase in modern health deceases on this increase in meat consumption. This is a debatable issue and to me this is not so clear cut.

There are many tribal people living on land which is too poor or with and adverse climate so they cannot grow crops and largely depend on meat – yet they appear to be perfectly healthy.

But that is not the sort of meat we eat. Much of our meat comes from animals that are fed crops likes corn which are deficient in minerals and if the minerals are not in the feed they cannot be

end up in the meat.

Wild animals and tribal cattle range overlarge distances often in hilly country which has never been farmed so eat nutrient rich plants with plenty of minerals. May be we are blaming meat when we should be looking at the way we produce meat.

When I was in Shenzhen I saw local people selling a wild pig in the street. Judging by the interest and rapid sales it seems they appreciated the improved quality of naturally grazed animals.

Our food system - surplus of energy - deficient in minerals

We have a food system which provides us with a surplus of energy but is deficient in trace elements, mineral vitamins and phytochemicals.

But we are equipped with intelligent neurochemicals which have evolved over thousands of years.

It is there to protect us.

It senses that we are not getting enough of the essential minerals and vitamins and sends out emergency messages.

Eat more – eat more – eat more.

But what do we tend to eat? - Food with more of the same, food with an excess of energy but still lacking in these critical minerals etc.

This is at the core of the problem of diseases of affluence.



We may be strong willed and resist for a while but we are almost doomed to fail. We have this hungry beast inside us saying '**give me more food**'. It is not going to go away, it is going to keep on and on until we feed it what it wants.

It will only shut up when we give it the food that our bodies really need, which is not yet another hamburger, it wants real food with lots of minerals and vitamins. Our bodies have an **irresistible craving**. Trying to eat less simply does not work. We have to give our bodies what it needs the minerals, vitamins and phytochemicals it needs.

This is why diets generally fail. We start off with good intentions and our will power overcomes the signals from our body. But our body signals have been developing over thousands of years to protect our bodies and keep on telling us to eat; eventually we develop an overwhelming craving for more food.

To ensure we get a full complement of micronutrients, evolution wired us with a drive, powered by neurochemical rewards, to seek out those micronutrients and the variety that supplies them.

But we eat more of the wrong food so the diseases of obesity spread like wild fire and diabetes, heart disease and strokes spiral out of control.

The world's worst health problems are, in short, diseases of civilization.

Now this is what I have learned and understood from my early morning reads from Google alerts and trying to make sense of all the mass of information.

Let's have a look at what some of the experts say.

What the experts say (quotes)

The United Nations Food and Agriculture Organization (FAO) tells us that a third of humanity suffers from what the organization calls “hidden hunger,” which is defined as a diet ample in calories but insufficient in nutrients and micronutrients. Anemia from iron deficiency, goiter from iodine deficiency, and blindness from severe vitamin A deficiency lead the list as the worst problems.

Vitamin B12, iodine, magnesium, cholesterol (yes, cholesterol is a vital nutrient), vitamin D, calcium, fiber, folate, vitamin A, omega-3s, vitamin E and iron — each is plentiful in the same foods we have eliminated from the modern industrial diet and each is vital to brain function and physical well-being.

Furthermore, scientists are in the early stages of understanding the phenomenon of “bioavailability” — that the lack of a given vitamin or micronutrient is not simply remedied by adding a given amount back through a supplement. The body’s ability to absorb those nutrients is greatly influenced by the presence or absence of other nutrients.

For instance, people eating a full complement of healthy meats tend to not need added vitamin C at all. Eating spinach with lemon helps the body absorb much more of the iron in the green’s leaves. Eating eggs and cheese together delivers a better uptake of vitamin D and calcium. Variety supports our internal complexity.

Yet making this all an issue of omega-3s or carbohydrates misses the point. There is no single focus or magic bullet or wonder micronutrient, no matter what the marketers might tell you. There is only diversity.

The search for the Holy Grail (if it exists).

On my current trip to China, which is really the home of medical plants, I thought I should at least look for that magic plant which would solve these health problems. I was deeply suspicious that I would find such a plant – it seemed to me unlikely that there would be any pill or plant you could eat which would mean you could eat as much as you liked including the proverbial hamburgers and hot dogs.

I was therefore surprised when I came across not one but a bunch of plants and pills that made this claim. Being a suspicious engineer who is into underlying mechanisms I wanted to see if there was any explanation on how they worked.

Again I was surprised when I found an explanation. This was that the plants produced sugar like substances which were chemically very close to sugar but not quite - so they fooled our intelligent neurochemicals into thinking that we had plenty of sugars on our bodies when in fact we did not have real sugar. We felt full and stopped eating.

Fooling our intelligence system

They are fooling our intelligence system but is this good? Our intelligence has been developed over thousands of years to protect us, which it has done admirably. These plants (and some drugs) are treating the symptoms of overeating and obesity without looking at the real cause which is a lack of the essential minerals in our diet.

We need to attack the real cause which is a lack of balance between energy and minerals in our diet.

Healthy plants

The good news is that I have also come across a whole range of plants which make excellent foods. This is a job for me to sort out when I get back home but let me just make one point. These beneficial plants are 'converters'. They can take minerals from the soil and convert them into beneficial phytochemicals which will improve our health.

But there is no such thing as a free lunch, the essential minerals must be in the soil in the first place and the soil must have the soil biology, the fungi, bacteria, worms etc. which make the minerals available to the plant. It is a chain – the minerals feed the biology – the biology feeds the plants – the plants feed us.

There is no short cut.

Evaluating Possible solutions



Many people have realised this fundamental problem and have tried various solutions. Taking dietary supplements e.g. pills is widely used, but this may not be such a good approach. We need a whole range of minerals and vitamins working together. Many minerals are highly toxic in excess which would need proper medical supervision to get the balance right.. It is also an expensive approach which is really only available for the rich.



Farmers markets and organic shops have been springing up all over western countries. These are no doubt help but the emphasis has been more on avoiding chemical sprays which can make affect the appearance of the produce. Just because produce is organic is no guarantee that it contains the needed minerals, vitamins and phytochemicals.



This will only be incorporated into the plant if the grower makes sure the mineral are in the soil, and there is active soil biology to release the minerals to the plants. This is not a legal requirement for organic certification.

The permaculture and alternative life style movement has caught on in countries like Australia but the reality is that this is only available to a limited number of highly dedicated people. Trying to grow all your own food means a severely restricted range of foods depending of the season. Most people like to have grapes in winter as well as for a few

months each year.

Such movement are highly commendable but are unlikely to develop into a mass movement which will provide nutritional food to the majority of the population. We must also recognise the reality that the food industry is dominated by large transnational corporations who have major political power and can restrict competition. It is a sad fact but in many countries the days of the traditional family farm are over.

So we need to look for practical solutions which will work.

Finding practical solutions

I may be critical of our modern food system but we must recognise that it has brought great benefits. It provides us with an abundant supply of food at low prices with a whole range of foods available throughout the year. It is providing us with all the energy we need.

Sun Tzu in the Art of War said never face stronger army – go behind. It would be stupid to try and overthrow the current food system dominated by massive transnational conglomerates.

Rather we should work with the system but overcome its limitations by supplementing our diet with food containing the essential mineral, vitamins and phytochemicals our bodies need.



Technically this is not a problem, we know exactly to grow food with the right nutrients.

First we need a supply of the required minerals. Volcanic soils are full of minerals. We don't have to go to EBay or Alibaba buy your own active volcano, we are talking about micrograms so we only need very small quantities we are easy shipped.



Next we need the biology to break down the minerals. Mycorrhizal fungi, worms and the other soil biota. These grow naturally by themselves. We just need samples of the key breeds and they can be readily cultivated in a nursery.



Then of course we need the plants. We can dream about some wonder plant that will save the world – but that is a bit of a fairy story. The reality is that there are a wide range of vegetables and medicinal herbs which will take up the mineral to generate the vitamins and phytochemicals which our bodies need. There is no magic needed here.

Now we come to the wicking beds which make an easy way to grow these high nutrient plants in a small area without too much work.

In Australia a significant proportion of the people are growing food, particularly vegetables. The wicking bed technology has played a significant role, overcoming one of the big problems in Australia of limited water.



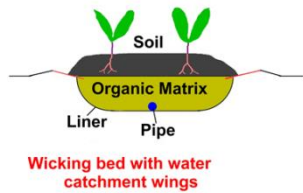
However the bulk of the population live in suburban houses with an adequate garden so growing your own food is relatively easy. Even in the city centres where an increasing number of people live in apartments the local council has often set aside an area for communal gardens with local residents having their own small area of allotment. This has proved quite a social boon as they form an unofficial social club where local residents can meet and talk.

Gardening is the most popular hobby in Australia with most localities having an organic growers club.

However to apply this technology to China required some serious rethinking of both the technology and the social aspects. The population density is much higher in China; Shanghai has the population of the entire Australian continent. Most people live in apartments but most of these have a veranda or Yangtai which is still capable of growing food, also roof tops and some communal gardens are available.

I will now describe the basic wicking bed technology and how this can be modified to suit conditions in China.

Wicking bed technology



The principles of the wicking bed system are simple. The base, which is water proof is typically filled with organic material and with a pipe to distribute water along the length of the bed. A top layer is home for the plants which are maintained moist by water wicking up from the base.



The operation resembles the classic flood and drain system in which a pot is flooded, expelling all the air, then pulled up to let the water drain out sucking fresh air back into the soil.

This creates a breathing action. The water level must drop to get this air movement e.g. a deep cycle system



Wicking boxes can be as simple and cheap as an old vegetable box, with a hole poked in the side and a pipe to flow the water to the bottom of the box



Note the drain holes about 1/3 from the base.

The large pipes diameter which may run across the base increases water storage.



This is the size of a typical garden wicking box made from a plastic sheet draped over a frame; rigid boxes are now more popular



Typical sunken bed with the plastic lining to soil level



Typical back garden with multiple beds



Beds are often built in shade houses to protect the plants from sun and insects.



Larger beds can be built into the ground. Simply dig a trench line with plastic, lay in the distribution pipe, fill with organic material then back fill.

The final soil level must be above the natural soil level to allow drainage.

Soils



Soils are a critical part of wicking bed technology. They must have a high porosity, be hydroscopic and have a full range of nutrients particularly the trace elements.

Worms are an integral part of the system as they help release nutrients. Powerful worms like the Amyanthus variety will bore through the soil leaving large holes which act as a water reservoir.



Minerals are added to the bed and soil biology such as mycorrhizal fungi used to break down the minerals and make them available to the plants which in turn will produce the vitamins and phytochemicals needed for health.

Some people use stones or sand covered with a porous film. If you use the right soil it will hold plenty of water and the roots can grow into the entire box. Using a highly porous hydroscopic soil is a superior system.

The 'YingYang He' (fertility box) system for China

Basics of system



The system is so incredibly simple. Take one large bucket.



And a simple household sieve



The internal bucket is experimental to separate water and nutrient to give more water storage, otherwise use as a conventional wicking bed and fill with soil and compost.

The essential minerals, worms have not been added at this stage.



Drainage holes are essential to prevent saturation.

Wicking beds in China

The wicking bed system is mature and well established in Australia but needs adapting for China, this is the current development project.

The objective is to enable a typical Chinese family living in an apartment to grow enough nutrient rich food with the needed mineral, vitamins and phytochemicals to balance the energy rich food commercially available.

I want to give you my ideas on how the wicking bed system can be modified to suit China. Before I get into the technicalities can I just talk about some of the social issues?

It is envisaged that many families will want to grow their supplementary food in their Yangtai or veranda although some may have access to a roof top or local allotment, which may be more practical if space is available.

There is no doubt that the statistics show that China has a serious health problem. I have been keeping my eyes open in the last couple of months I have been in China and it is very clear that the older generation is slim and extremely fit. I watch the exercise groups which are everywhere, they are predominantly older ladies dancing and stretching in ways I cannot even contemplate. I have a clear vision of an old lady, who must have been in her eighties hanging upside down from a climbing frame.

However while most Chinese are still slim there is a clear trend that the younger the person the more extra weight they are carrying. It is a common site to see overweight kids leaving school munching on hot dogs (one of the worst foods).

Can vegetables imitate the wine effect?

There appears to be a far better fresh food distribution system than in Australia. Local farmers bring fresh product into the numerous local markets or sell on the street. I have to say that the quality of the food looks far superior to that I grow back home. But I have visited farms and the way they grow is very different to mine.

As far as I can see they use very little fertiliser and my Chinese is just not good enough to ask them if they understand about trace elements but I guess maybe not. However you don't have to speak Chinese to see them rotary hoeing their fields (which is the quickest way of killing soil biology) and spraying their fields with insecticides.

By comparison my vegetables look terrible. I try and use organic methods and avoid using toxic sprays relying on beneficial organisms (my green house is full of cane toad, spiders and lady birds) but they only manage rather than eliminate the mass of insects that invade my block and devour my produce.

On the other hand I put a lot of effort into the soil nutrients and biology so I would feel pretty comfortable that my nutrient level is significantly higher. But if a spray free approach was adopted when wicking beds are introduced there will undoubtedly be an issue in trying to persuade the Chinese that the produce is actually healthier.

How do you convince people that a product that looks inferior, is probably more expensive and is worth more?

This is not a unique marketing problem. You can buy a bottle of cheap wine for as little as \$5 but a decent wine will cost \$20 and a special event wine \$50. There is no apparent difference in the appearance yet people seem perfectly prepared to pay the higher price.

Compost

Another potential issue is compost. I have emphasized the importance of soil biology, but that are living creatures that needs to be fed, just like us. Compost is the natural food however there could be distinct rejection of composting. In Australia composting is universal and almost a social function with friends and neighbours inspecting the compost pile, picking it up and smelling it to see how it is maturing.

Now I know from firsthand experience that sorting out waste food to make compost is not too welcome. I got all the plastics mouldings to make a 'yingyang he' type wicking beds, I got some worms from a local farmer (not the breed I wanted but a start) and went to assemble it in our family yangtai. I didn't get too far, I was firmly instructed by the female members of the family to take it all up to the roof.

Now I see that many yangtais have flower pots so I have no idea whether this resistance to growing vegetables in the yangtai is my family issue or more wide spread.

To my mind it is just so convenient to have food growing close to where you are going to eat it.

However all was not lost, I found other people were using the roof top to grow vegetables and they did have buckets of kitchen waste for compost. They were certainly interested in my experiments with my Yingyang he but it was very clear that my Chinese was no way up to explaining how it worked.

Getting enough production

One challenge is to get enough production to be useful in the limited space of a typical Yangtai where only a couple of square metres may be available.

The method I have been trialling in Australia is the wicking basket.

I call it the 'chop and chew' method. With many plants you can simply chop off the outer leaves to eat now and the plant will quickly put out new shoots. (It has been scientifically established that the regrowth has the characteristics of young plants.)

The 'Swap and go' system works well with the chop and chew method and is particularly suited to food distribution in China. Many vegetables may take two or three months before they are ready to eat and then produce fresh food for another month or so. With the basket system it is just not necessary for the family to grow all their plants from seed. A professional grower can mature a basket where the plant is producing food. This increases the production in the apartment many times.

This may also be a resolution to the compost aversion problem if it eventuates.

The basket full of almost mature plants can then be delivered to either the apartment or to one of the many vegetables stalls which abound in China. The customer returns the used basket to the store on a replacement basis.

From my limited observations it appears that the Chinese are fanatical about having their vegetables fresh. Each day they seem to buy a complete plant with the roots and at the end of the day the store keeper just throws away the unsold plants.

Careful selection of plants is important. Fast growing vegetables like KangKong provide a great deal of bulk while other green vegetables like the cresses and Red Amaranth are good sources of nutrients. Tomatoes and the climbing bean make good use of height.

Conclusion

It would seem to me as a non-Chinese that the 'Yangying he' wicking system has a lot of advantages for China. There is no doubt that China is developing the major health issues as countries like Australia are suffering.

It appears that some form of Chinese organisation is needed which will

- 1) Provide educational service on diet and health and the importance of minerals, vitamins and phytochemicals
- 2) Provide practical instruction on how to set up and manage a YingYang he wicking bed
- 3) Locate and provide distribution for the specialist minerals
- 4) Set up nursery capabilities to propagate mycorrhizal fungi and appropriate breeds of worm
- 5) Arrange for local growers to mature plants in baskets ready for distribution
- 6) Arrange of distribution of matures baskets to either retail outlets or individual apartments