

"Essentially, all life depends upon the soil ... There can be no life without soil and no soil without life; they have evolved together."  
- Charles E. Kellogg, 1938

Healthy soils are essential to maintain the quality of our food, the purity of our water, and the cleanliness of the air we breathe. Our health and that of our children, and the health of generations to come, depends on the way we manage our soil.

## Healthy Soils Australia Ltd

### Our PURPOSE is

To create an active network that shares common values and provides a platform to reconnect the vital role of soil health with food integrity and human health.

### Our MISSION is

To raise awareness of the benefits of healthy soils, and assist land managers to adopt innovative management options to increase living carbon in their soils, to

- increase soil productivity and capital value
- increase nutrition in our food and better health for people and animals
- restore plant and 'pest' balance, water retention, and environmental balance
- decrease chemical input into soils, and
- facilitate natural carbon sequestration from the air to the soil.

### We DO THIS by

- providing free access to a wide range of reliable and relevant research, practical information, and discussion on soil remediation solutions on our website, at conferences and at regional workshops
- promoting the recognition of the capital value of sequestered soil carbon and a fair price for land managers who sequester it, and
- presenting soil related issues to government, business and the community.

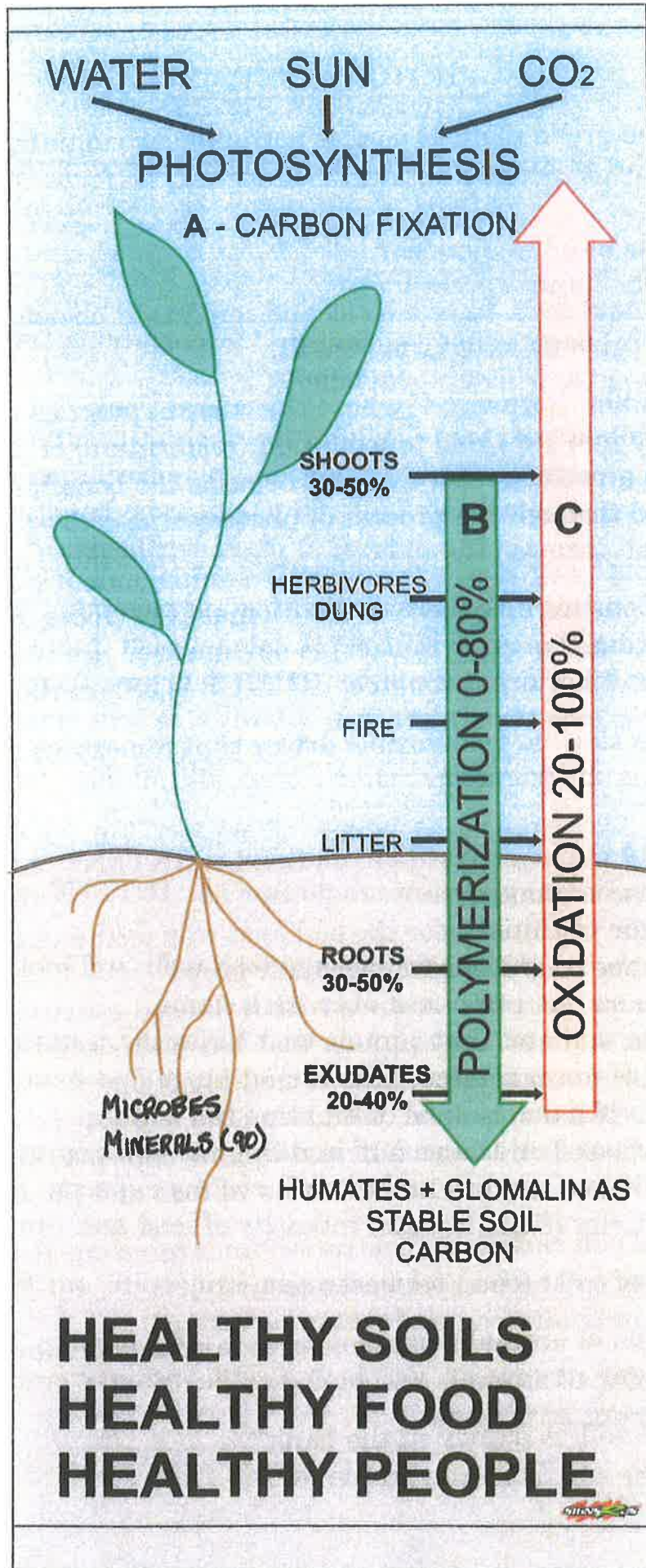
### Healthy Soils

Healthy soil is alive with trillions of minute organisms which recycle and free up nutrients to drive plant growth. More plant mass means greater productivity with lower production costs. More nutrient availability and balance means better quality food. More living organisms mean better soil structure and plant growth, slower water movement through the soil, increasing soil water retention and reducing erosion.

Modern farming practices release carbon from soil by decreasing soil microbial life through the overuse of expensive pesticides, herbicides and fertilisers which destroy the balance between microbes and plants. Although fertiliser initially stimulates growth, it burns off soil carbon into the air, decreases microbiology and ultimately inhibits plant growth. As well as the burning of fossil fuels, current farming practices cause a carbon imbalance in the air.

Balance can be restored by managing techniques which use plants and grazing animals to build carbon into the soil, sequestering it from the air through photosynthesis. Plant growth can be greatly facilitated by boosting the army of soil microbes which make nutrients bio-available to plants.





## PHOTOSYNTHESIS

“The green plant is a solar powered carbon pump”.

What does the banner show us?

We, as land managers, have a clear and important choice to make for pathway **A** to give us long term benefit.

**EITHER** to follow pathway **C** where the current practice of high input farming methods lead to oxidation (respiration) of the biomass back into the atmosphere as  $CO_2$  and negates the benefit of extra energy gained through the process of photosynthesis,

**OR** to adopt pathway **B** where innovative management practices create conditions for up to 80% of the biomass i.e. (roots, root exudates and other organic matter) is polymerised, (converted by fungi etc) into long term humates. **HUMUS** is 58% carbon.

“Soil carbon is the one measurable driver that underpins all life”.

How?

1. The land manager wants to do this i.e. **INTENT**, a new paradigm of thinking.
2. Create the conditions for the soil food-web (soil biology) to want to be there, i.e. put a roof over their home.
3. Feed the soil and the animals with balanced nutrition.
4. Minimise management actions that harm this symbiotic system. If harm is done, take remedial action
5. Stay focussed on the goal of building the soil engine's capacity for resilience, water and nutrient cycling capacity, sustainable productivity of quality and quantity of food and fibre.

This process of soil carbon sequestration underpins our future on this planet, especially our food and water security.

Planned grazing of animals and biological farming of crops are the key management strategies.

“Carbon in the soil, is money in the bank”.

## We are the leaders we have been waiting for

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### Abstract

- Rebuilding the city country bridge
- Communicating new knowledge
- Influencing the perceptions of urban dwellers
- Healthy soils, healthy food, healthy people

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### Introduction

As farmers we need to drive the biological revolution to understand and increase the role of soil carbon in our lives. I am a farmer, my father was a farmer, our farm has the same problems as everyone else – squeeze 2-4% extra production out of the land each year just to stay solvent. How? By using expensive inputs of chemicals and fertilisers. In the process we are destroying our most valuable asset – the soil. Where are we going with this approach? 'Up the creek without a paddle' and we are inadvertently helped there by contemporary science, industry farm input businesses and university trained consultants. The people we believed knew the answers have let us down simply because they don't understand the system we are working with. Environmental Laws (e.g. vegetation management and leasehold land laws) also make it hard to manage the land, generally achieving little, but satisfy a false perception held by a minority.

### Following nature's plan

Why are we here today? There are two issues: understanding the role of carbon to fix our soils and using this revolutionary story to rebuild the city country bridge.

Unhealthy soils are sending us broke – our natural 'piggy bank' of natural soil fertility, based on soil carbon, is run down and cannot service us anymore. Current practices that attempt to fix this only compound the base problem, leaving us with 'unhealthy soils'. Declining soil structure, water holding capacity, mineral holding capacity, etc, leading to compaction, low soil biodiversity, erosion, chemical imbalances and declining soil microbiology, all give us poor soil health.

The good news is there is a solution and it costs less than the previous so-called quick fixes. The solution builds up our base asset – soil, increasing (the piggy bank carbon in soil).

### What is the solution?

Soil biology! Victorian DPI taught farmers about soil biology in 1920! Since the so called 'Green Revolution' in farming methods, 'soil biology' has been bashed about, taken for granted and put aside as too hard and complicated. However, without soil biology we have nothing. Soil biology, as the 3<sup>rd</sup> factor that makes up the soil, has a greater impact on soils than physical or chemical properties of soil.

The symbiotic relationship of the living soil with the living plant is the driving force behind carbon sequestration.

Carbon is the one measurable driver that underpins the natural system from which all life is derived. Carbon feeds the bugs the bugs feed the plants etc, etc and we have diversity – plants manufacture complex carbon compounds that sustains soil microorganisms. You can't have one without the other. If we are not building or maintaining carbon at optimum levels we are not sustainable. Without diversity in the soil (i.e. healthy soil) we wont have biodiversity above.

### ***Farmers can lead the change***

Farmers need to join and lead this change in mindset to generate a critical mass. We must show leadership so that others will follow by our example. Once we have the critical mass the vested interest – if we give them room – will start supplying the inputs we need to keep the process ongoing.

Every time we spray chemical out over the land I never feel good about it – especially insecticide or residual herbicides. We should feel good about what we are doing, after all we are the salt of the earth and I believe we need to develop a 'husbandry' approach to soil.

I have been to all kinds of soil workshops and I have realised that until we focus on the real driving force in our soil, carbon, we will continue at a point of stalemate, where we see no improvement in our soil 'asset'.

Carbon – soil biology and creating the right environment for it to work in is the big picture and if we don't take that path we will always be running into dead ends! We run out of technology i.e. zero-till precision farming – great but only part of the equation to promote soil health and sustainable production. When talking soils we should use the words 'Rejuvenate', 'Regenerate' rather than 'Sustainable' – we don't want to sustain our current poor soils, we want to nurture and rebuild them.

### ***Soil Carbon Credits can help***

When I first heard about Carbon Credits I took the high ground and thought polluters should stop polluting. Since coming down out of my tree and understanding where advocates of soil Carbon Credits are coming from, I have shifted my high moral stance.

Natural resource management problems nearly all come from diminishing carbon in the system through poor management. Australia spends billions of dollars on NRM catchment issues – some real – some imagined. If farmers were paid to increase carbon in soil – and we need to do this anyway – the potential benefits are huge. Remember we have to alter our mindset to achieve the right set of circumstances to follow this path, but there is nothing like a carrot to move the donkey!

Farmers can increase their productivity while improving soil health and become sustainable and are happier making the changes. Also, it's win-win, as farmers are paid credits for improving their asset i.e. base soil fertility through 'carbon'. **We have never had it so good.**

All the people involved in NRM that are currently 'very busy' rolling out schemes with no real long term benefit could be doing something productive. We will create conditions where NRM issues can be resolved by themselves. Money from the Telstra sale could then be spent on other projects like infrastructure i.e. water, transport, long-term development of northern Australia etc.

### ***Healthy soils produce healthy plants and healthy food***

Scientists in India fed rats three food types representing food that three distinctively different groups of people consumed (Tomkins & Bird 1989):

Group 1 – Hunzacs from Karakorums Mountains – closed system – holistic farming.

Group 2 – Sikhs merchant class Indians – better food than average.

Group 3 – Lower caste Indian – poor food.

The results showed that the 'Hunzacs' rats lived happy, social, long lives with no disease; 'Sikh' rats were 'middle of the road', with some disease; while 'Lower Caste' rats were aggressive, killing each other and had every disease under the sun.

We are what we eat! The food in supermarkets is ordinary simply because of the way we grow it and we are continuing to engender unhealthy soil. Unhealthy soil means unhealthy people – just like the rats.

### ***Diseases and insects***

In *unhealthy soil* i.e. one in which soil biology does not thrive – the carbon is static or declining and the soil needs fertiliser to grow a payable crop. Unhealthy plants grow because conditions in the degraded soil inhibit that vital symbiosis that soil biology stimulates in plants to make extra sugars that move as exudate back to soil microbes, therefore, plants with low sugar levels, in nature's eyes, are deemed as unhealthy so predators help cull them out.

Low sugar plants fall into the infrared spectrum and (wait for it) insects communicate through infrared, so they pick up where these plants are and consume them. Even that perfect looking crop all pumped

up with fertiliser is unhealthy. Plants that are naturally healthy do not emit the infrared spectrum and are not seen by the insects. A case in point: Stewart Larson from Casino has been using compost and compost tea for 11 years and stated "I don't even check my soybeans because I know they will be alright". How is that for confidence! What is more, he is happy doing his farming and sleeps at night, confident that he is producing top quality food from healthy soil.

By leading this 'mindset' revolution into a more natural system of farming, carbon farming, regenerative farming and biological farming – farmers are leading the way for all Australians to enjoy a better healthier lifestyle through healthy food, leading to less overall national health costs and generally better productivity. Also, we are improving our natural capital i.e. carbon in soil and improving greenhouse equations by sequestering carbon from atmosphere. In doing this we will improve the image of farming in the general population's perception.

This leads me to the second part of my brief.

## **A communications strategy for rural and regional Australia**

### ***Portrait of a Leader – "My Mate Dave" and the Model Farm***

Dave Daniels, 'Tarvallon' in the Kilcummin District, was brought up on a mixed grain and cattle farm and achieved a "Diploma from Gatton" in the good old days. Back home he helped run the farm using knowledge gained from his stepfather on farm and modern science. Dave is considered a 'Bloody Good Farmer'. The soils on Dave's farm were run down and thus he started using P and N fertiliser so they could continue growing 'good' crops and use all of the available moisture in the soil. Using zero till precision farming, Dave quickly realised that the soil was still on a one way ticket to nowhere as the soil was getting harder, compacting and where soils used to stay wet for weeks after rain they were now dry within 10 days. More fertiliser was needed each year and still the soil condition worsened.

### ***Dave's trials***

What to do – Dave makes a big decision – the number one part of changing the mindset. He goes to Bio-Farming school run by Bart Davidson at the Resource Consulting Services (RCS). Dave learns about symbiosis of plants with life in soil. A busload of local farmers go on a "bio-junket" to St George, Moree and Casino to look at biological farming practices such as using compost tea. Dave comes home and starts the change.

When spraying herbicide Dave now uses fulvic acid to buffer the spray and enhance fungi in the soil to minimise the damage – this costs nothing. Over the last couple of seasons two crops of sorghum have had the compost tea but as there was minimal rainfall the enhanced root development was marred by the lack of moisture and the end result was not conclusive. Dave also flirted with Guano as a starter and this seemed to help the crop that was grown 12 months later. He also found that Incitec and DPI soil tests were a waste of time. The Soil-Foodweb biology soil test found that the soil was missing VAM, which had been destroyed by the use of MAP. By using 20-30 kg/ha of MAP for the last 25 years of farming Dave has doubled his unavailable P in the cultivation (from 260ppm to 560ppm) compared to the original grass country – this equates to \$1,700,000 of P over his whole farm. Using Soil Foodweb Institute soil tests and bio tests (Albrecht and Reams methods), Dave learnt more about the dynamics of biology and chemistry in the soil. Dave is now unlocking the unavailable P using the soil biology.

The 2006 wheat crop had compost tea made from Nutritech 4:20, at 23 L/ha and 20kg/ha Guano. This is old basalt downs soil and in three months, Dave has doubled the available nutrients in the soil. The downs soil has been turned into top scrub soil with no VAM and hardly any fungi (Table 1), so Dave is at the bottom of the J-curve and hopes to move up in production and quality of the crop, improve soil/plant water use efficiency and base fertility. If the soil carbon is doubled the water holding capacity is doubled too. The results speak for themselves. Through soft farming methods Dave created the right environment to begin to rejuvenate the soil.

**Table 1. Comparisons for Brigalow scrub soil (high nutrient soils c. 100 km from 'Tarvallon'), 'Tarvallon' untreated Downs soil site and Downs soil site treated with compost tea. Where Scrub soil samples are not available 'optimum' levels are given in brackets.**

	Brigalow scrub (or optimum)	Downs Untreated	Downs Treated
Total fungal to total bacterial biomass	0.42	0.02	0.05
Active to total fungal biomass	0.05	0.37	0.20
Active fungal to active bacterial biomass	0.25	0.86	0.13
Plant available N supply from predators (lbs/acre)	<25	<5	25-50
Plant leaf total N (%)	(2.5-5.0)	2.53	4.25
Plant leaf total P (%)	(0.15-0.4)	0.15	0.26
Plant leaf total K (%)	(3.5-5.0)	1.37	2.24
Plant leaf total S (%)	(0.15-0.4)	0.10	0.20
Plant leaf total C (%)		38	43
Plant leaf total Cu (ppm)	(6-12)	176	10
Plant leaf total Zn (ppm)	(20-60)	143	26
Plant leaf total Mn (ppm)	(30-100)	165	122
Plant leaf total Fe (ppm)	(25-100)	4,036	524
Plant leaf total B (ppm)	(6-12)	16	7

With total plant biomass, bacteria and fungi at optimum levels one should see a move up the J-curve – this has been found by the work done around Moree by Bart Davidson.

Dave has doubled his yield potential and quality and his soil is improving in physical, chemical and biological condition – all with one application of compost tea worth \$8/ha and Guano value of \$10/ha. Carbon levels are up 0.5% in three months – this would take us 5-10 years of non-sustainable farming to burn that out. I mean is this good or what!

Dave is leading the pack in our area and has the data to prove it. We need more leaders like Dave to show the way for us to follow. How many of us are sitting here in this room with good stories like this that we can capture the hearts and minds of the urban dweller and create in them that "warm fuzzy feeling" about what we do and why. Handled properly we can use the media to tell this revolutionary story of what is happening on the farms and the flow-on consequences. What is more, they will keep telling the story as long as we are credible – the media will run this story for nothing.

The flow-on effect is when politicians do their polling about agriculture and the environment and the polls tell a favourable story for us thus changing the politics.

Carbon means healthy soils – healthy plants – healthy food – healthy people.

Remember: understand and rejuvenate your soil and be intimate with the processes in the soil.

#### Soil, air, water, carbon, people

Farmers giving healthy food – better sustainable environment – less pollution – arresting global warming.

Without adequate biology in the soil we have DIRT – Dead Inert Retrograded Terrestrial.

The way forward for farming is to embrace and understand our soils and the life therein. This combined with precision farming will lead the way to a new era for farmers leading the nation to a healthy happy productive future.



Regardless of how high your 'penthouse' is we are beholden to the health of the life in the soil as it is the key to all life above the soil.

Water, sunlight, air (oxygen, hydrogen, nitrogen), calcium and carbon are integral to life. The interdependence of plants and biology in the soil is the powerhouse that makes these elements of life keep in balance and create, sustain and generate new and healthy life.

The previous Chairman of Logan City who once was a forester purchased an old disused 500 acre dairy farm twenty minutes south of Brisbane. It was overgrown with Lantana, weeds, woody shrubs and young trees. He understood what trees were indigenous and set about with axe, Tordon and fire to manage the 500 acres. In time he had a managed forest with grass and trees, all of which were healthy and growing. Next door is a National Park. People got to know that if they found a koala they could take it to the managed forest as the koala would not stay in the National Park or the State Forest. Due to mismanagement the forest was too thick – the trees unhealthy with no fresh shoots or young trees able to grow. In the managed forest the trees were healthy with fresh shoots full of minerals due to healthy soils. People do make a difference.

Water, air, sunlight, carbon, plants and soil need people to nurture and enhance this system that nature has given us. Without people with the right 'mindset' this system struggles and succumbs – becoming unbalanced. This mindset is not a religion but enlightenment – with many pathways to achieve an end result.

### **Changing mindsets and shifting paradigms – a holistic approach to land management.**

We do not see things as they are – we see things as we are. We construct our own reality.

Do you make a living from the land or do you make a living in partnership with the land?

Every farm needs a family who understand and nurture the living soil – who are involved with nature's processes that are the basis of all living things.

This story will sell itself. We have to create it. To do that we need to make it a real living story:

1. Change our perception – the click of the mind, the strength is in letting go – we construct our own reality. Embrace this biological revolution that we are so much a part of – we are of the soil.
2. Knowledge of how to go about working with the soil to gain benefits of nature's gifts i.e. carbon sequestration.
3. From recent research carried out by the NFF – city people are looking for a reason to like farmers but only hear what the environmental movement tells them. We will become the true environmentalists and give them a reason to like farmers no one can shake!

## **CONCLUSION**

- Building your asset
- Feeling 'happy' about your relationship with your land – knowing your management is long lasting.
- Better bank balance.
- Good story to tell – healthy soil, healthy food, healthy people.
- Political landscape will change for the better.
- To influence other people's perceptions we have to understand their perceptions and what is important to them.
- Look after your mates in the soil because they are working for you and will make you money.
- Farmers will become empowered to regain control over their destiny.

We as farmers have to 'alter our mindset' of what the real drivers are in our business. We are not just cattlemen, crop farmers or woolgrowers – we farm the soil. So lets start working on understanding our natural capital.

### **References**

Tomkins P, Bird C (1989). 'Secrets of the Soil' Penguin, London pp 90-98

