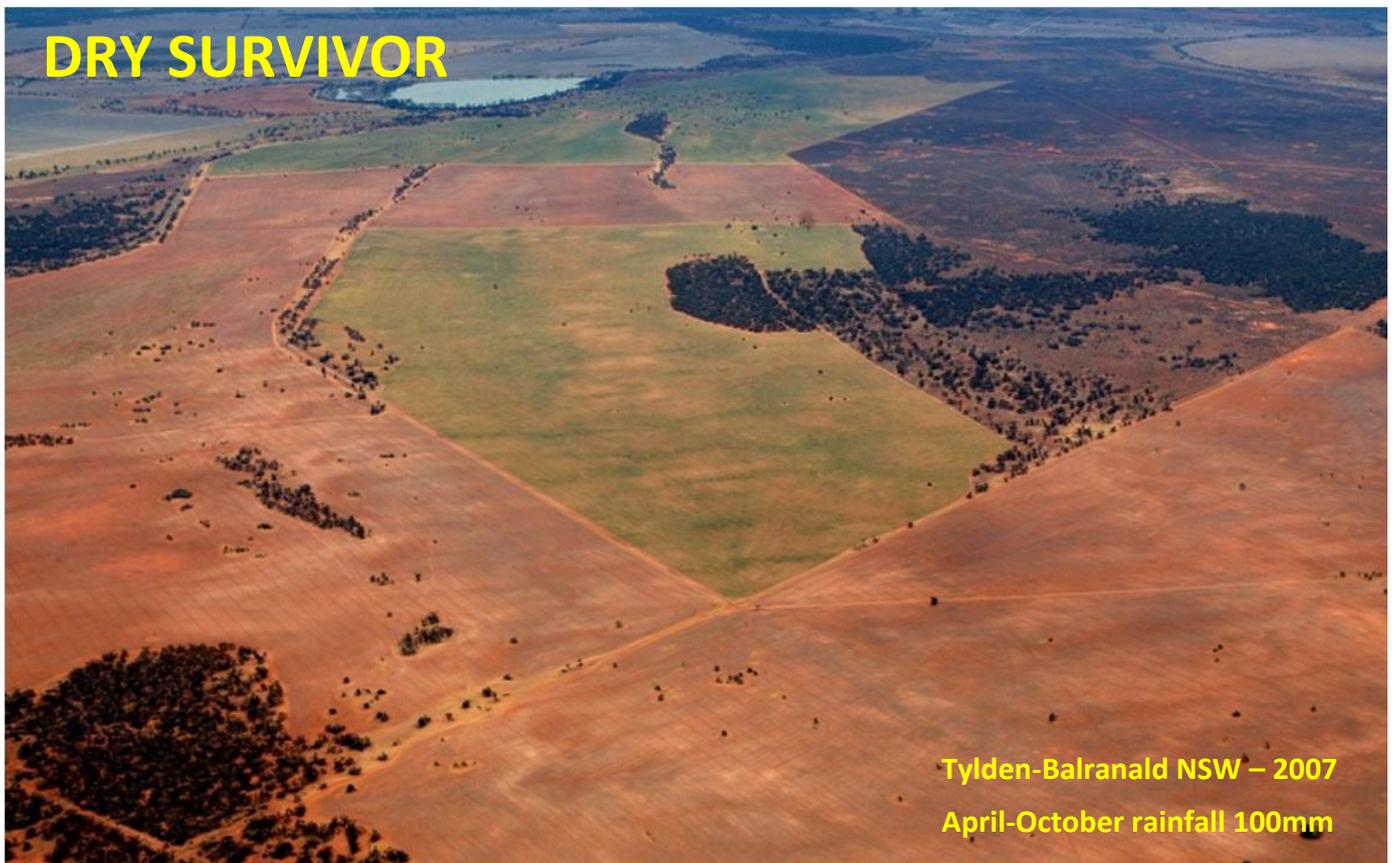




## Information Overview



***Carbon Based Chelating  
Agent & Soil Remediator***

**Proven for high crop productivity  
and  
rebuilding healthy soils**

**The Problem:** Australian soils, as with most soils worldwide, are now, on average, 25% of their pre-European settlement carbon levels.

Food security and production have been dependent on synthetic inputs that are price linked with increasing world fuel pricing. Degraded soil is a by-product of the so-called 'Green Revolution' of sustained high output food production.

Soil compaction has increased, causing a decline in water infiltration, water holding capacity and micro aggregates in our soils.

Soil cation imbalances and a decline of active fungi in our modern industrial agriculture systems, relative to high and increasing active bacteria, negatively affects plant nutrient access and correlates with lowering **Soil Organic Carbon (SOC)**, lowered nutrient availability to plants and high fertiliser, chemical and tillage costs.

In short, we are killing our soil. The challenge we face is maintaining high food production and restoring the quality of our soils.

**Too Salty:**



**Too Sandy:**



**Too Much Clay (Compacted):**



**Toxic:**



**The Solution:** Restore the cation balance, fungi and bacteria ratios, relevant to the soil use, within environmental and financial constraints, while utilising solid and liquid fertilisers that include humic and fulvic along with *Arbuscular Mycorrhizal* inoculums and other specific microbes, this is what **humates** do and is at the very heart of soil and plant nutrition management.

The catalytic function of these inputs, soil minerals and biology stimulates higher plant photosynthesis activity and provides improved carbohydrate production in plants resulting in increased root levels and microbial exudates root deposition - correlating into increasing SOC trends. Nitrogen and phosphorous fertiliser usage is reduced from normal practice, reducing NO<sub>2</sub> emissions.

## What are Humates?

**Humates** are “**Viagra**” for soil and a natural chelating agent for slow release as well as toxic remediation.

In primary school, we learn that “matter” can be neither created nor destroyed....it just changes form.

Carbon is one of those elements that exist in all forms of life...that's why it is used to pinpoint the age of fossils and ancient ruins....that's the process of carbon dating. Humates, which are composed of various forms of carbon, are naturally occurring material that is very rich in humified organic matter and humic substances.

Humates are now recognised as the single most productive input in sustainable agriculture. They consist of humic and fulvic acid along with the raw humates (prehistoric plant matter) from which these powerful natural acids are derived.

Humic acid is a powerful fungi promotant. Beneficial fungi (including mycorrhizal fungi) are the missing link in many soils. It stabilises nitrogen and improves nitrogen efficiency and uptake in soils. Humic acid complexes phosphate to reduce lock-ups and, as such, is also an ideal additive with diammonium phosphate (DAP) and monammonium phosphate (MAP). Humates are the only known substance with the ability to hold onto every other nutrient in the soil which enables heightened nutrient absorption. Humates contain an auxin-like growth promotant that can enhance cell division and elongation. In addition, they increase the permeability of plant cells to increase nutrient uptake by up to 40%.

Soils that have been on conventional programs may contain excessive elements, heavy metals and toxic chemicals.



**“Business as Usual”  
Conventional Synthetic Only Fertiliser**

**Humates “Changes the Game”**

Humates serve to buffer the effects of these substances, especially sodium, to lessen their stress effect on your crop.

Humates are a cost-effective and multi-purpose tool that have the ability to do all that we have named. They also have pH buffering capacity to help neutralise the problems associated with pH extremes. With a Cation Exchange Capacity (CEC) of 450, humates also aid in moisture and nutrient retention and improve soil structure by promoting fungi to create a crumb structure for better water and oxygen intake and improved root penetration.

Research identifies components of humic substances based upon their solubility in water as follows:

- Fulvic acid: soluble at any pH, smallest molecular weight, dominant in O.
- Humic acid: soluble at pH > 2, medium molecular weight, balance in O and C.
- Humin: insoluble at any pH, largest molecular weight, dominant in C.

Of these, humic and fulvic acids are the more effective components and research shows that the presence of humic substances in soil will:

1. increase soil water retention,
2. provide available carbon to soil,
3. promote growth of living cells (auxin-like type of hormone),
4. chelate cations in soil (high CEC), and
5. solubilise hydrocarbons into water phase (similar to a surfactant).

Humic substances are safe to the environment and all living organisms. A carbon source can be used as a soil amendment, foliar spray and fertiliser enhancer to boost crop production, strengthen root development and improve soil quality. It can also be used as a flushing agent for hydrocarbon components in soil and as a microbial growth promoter for soil remediation and waste treatment in manure pits.

### Humate Benefits at a glance

- An easy to use, free-flowing and sediment-free formulation compatible for a wide range of applications.
- Features a natural chelating agent which acts to convert metallic elements into available forms to ensure increased nutrient absorption.
- Complexes minerals, phosphate and lime to reduce lock-up.
- Enhances root development and encourages vigorous root systems which increase plant uptake of essential nutrients and moisture from the soil.
- Features a CEC of between 500 & 1000 which assists with the retention and stability of both moisture and nutrients.
- Acts to increase the permeability of plant membranes which, in turn, improves crop nutrient uptake.
- Builds plant Brix levels thereby assisting in the counteraction of stress in plants and drought resistance.
- Exercises a role in the natural detoxification of pollutants in the soil through the absorption of poisons and increasing the breakdown of toxins.

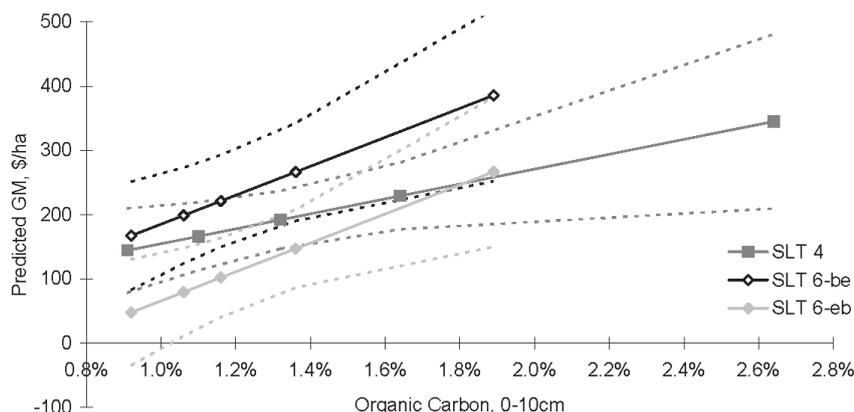
The addition of **humates** will provide improved sustainability for agriculture and will established equivalent production expectations as those associated with normal fertiliser programs but with significant additional benefits:

- Improved yields in cropping and grazing, whilst simultaneously improving the physical, chemical and biological soil parameters - this is the major benefit of **Humates**.

As illustrated below, CSIRO Land & Water researchers demonstrated farms with SOC of 1% had expected \$160 GM/ha profit. In the same region, farms with SOC of 2% had expected \$380 GM/ha profit.

CSIRO Land & Water

Technical Report 17/97



- Rebuilds soil organic carbon (SOC), increasing the soil carbon levels by between 0.1% and 0.3% annually, depending on soil type and annual rainfall, leading to higher productivity in cropping and grazing.

**ATMOSPHERIC CO<sub>2</sub> ABSORPTION INTO FARMLAND SOILS**  
**MEASURING PERIOD 1997 – 2010**



**Total of 41 sites over 12 farming properties**  
 Soil analysis to a depth of 150mm.  
 0.1% soil carbon increase per annum equates to 5.52 tonnes CO<sub>2</sub>/ha/annum.

- Enables the aggregation of “Carbon Credits” for resale. NB: First Australian Carbon Credit Auction in April 2015 yielded \$14.25 per carbon credit, being each tonne of carbon sequestered per hectare per annum.
- Higher production for given rain/irrigation levels due to:
  - Improved water use efficiency
  - Irrigation water savings
  - Faster water infiltration
  - Higher soil water holding capacity
- Remediation of soils to high productivity, eg:
  - Salt affected
  - Compacted
  - Sand
  - Clay
  - Toxicity from:
    - Heavy metals
    - Chemical contamination
  - Denuded - physically and biologically



A striking visual illustration of the influence of the addition of **Humates** on light sandy soil.



Australia

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