

July Biological Farming Roundtable Notes

What: The Biological Farming Roundtable was held at the NutriSoil Production and Education Facility on Thursday the 30th of July 2015.

Why: The aim of the Biological Farming Roundtable is to use papers/articles written by leading biological thinkers to initiate discussion and to help farmers learn and apply the information on farm.

Who: This Roundtable discussion is based on the article: *Five principles of Soil Health written by Dr Christine Jones*

Let's start solving the problems instead of treating the symptoms.

Principle One – Living Groundcover Matters. Actively growing green cover is the number one priority for restoring top soil.



Christine encourages us to consider ourselves as Sunlight Farmers:

The rules for sunlight farming are:

1. Build photosynthetic capacity
2. Enhance photosynthetic rate

How can we build photosynthetic capacity?

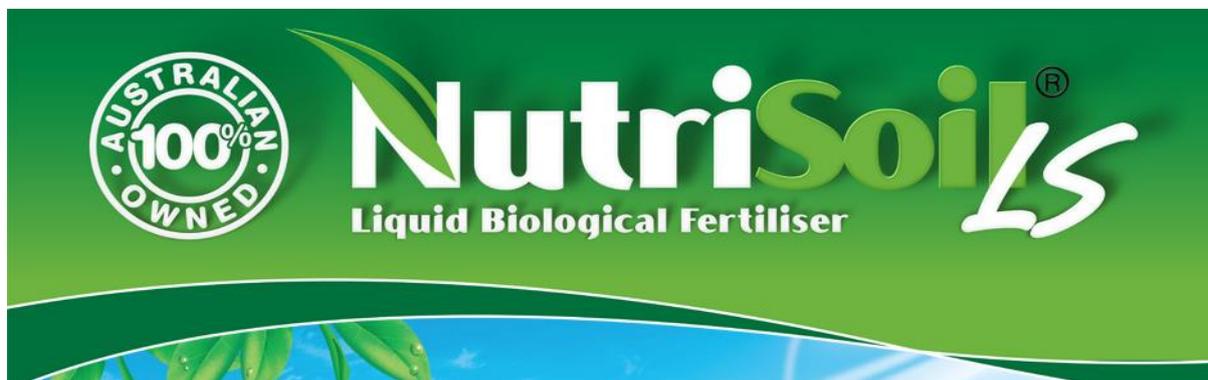
- Green groundcover 100% of the time



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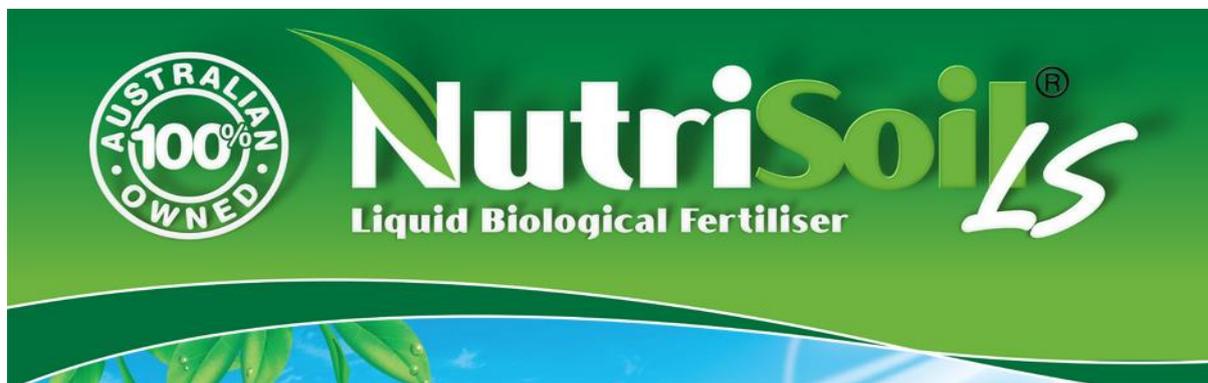
- Companion planting – e.g. On farm in Aria Park - planting perennial clovers and medics in wheat and barley crops to increase photosynthetic capacity and Nitrogen fixation.
- Peas with canola to increase mycorrhizal fungi presence.
- Plant warm season and cool season species to keep as much green living plants all year round where possible. In dry hot times if green cover is not achievable, the dry matter will assist the soil to hold water moisture for longer and provide a protected canopy for microbes.
- Plant broadleaves and species with thick leaves that create good solar panels for photosynthesis to work at its optimum. – In this area (NSW, VIC) plants grown for this reason are: Oats, Chicory, Big clovers, Phalaris, Fescue.
- Plant species that have large taproots that will have access to water deeper down in the dry times and encourage good soil structure. e.g. Chicory, summer growing, deep rooted.
- Pasture cropping. More leaf for more photosynthesis to occur.
- Diverse cropping strategy e.g. following a winter crop, plant a warm season cover crop with as much diversity as possible. Decrease times when soil is in fallow (no green plants means no photosynthesis occurring to feed soil life)
- Increase the water holding capacity of the soil to increase plants access to water in the dry seasons
- Increase ability of your soil to cycle nutrients. Healthy plants hold on longer in the dry times and are more resilient in the cold times.
- Calcium availability is important for structure. If calcium is limiting there were two options discussed:
 1. Feeding your biology which will make nutrients available in the correct ratio to your plants with good farm management systems supporting this OR
 2. Application of small amounts of lime e.g. 250kg p/h with a biological fertiliser or stimulant e.g. NutriSoil to feed the biology which in turn will assist in making the calcium more available OR
 3. Correcting the nutrient ratio's with small amounts of minerals along with a biological stimulant.
- Biodiversity in the soil – Increase diversity of microbes and plants



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- Grazing matters. Overgrazing will decrease photosynthetic capacity because the leaves of the plants (solar panels) have been removed. Root systems may also be compromised leading to soil degradation.

How can we enhance photosynthetic rate?

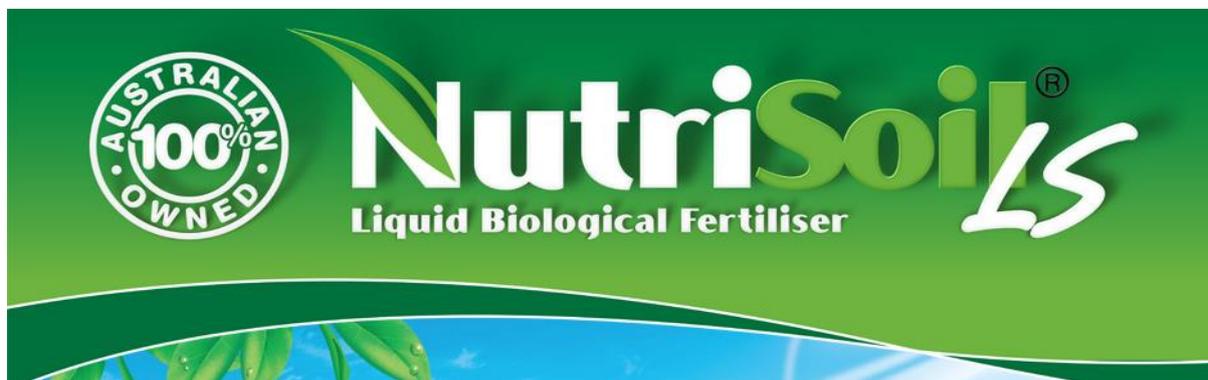
- Eliminate or reduce the use of synthetic fertilizers, fungicides, and pesticides. These all reduce photosynthetic rates of plants. Bio stimulants used by the group included:
 - NutriSoil worm liquid and castings
 - Milk
 - Spreading Manure
 - Coal dust
 - Paramagnetic powders
 - Molasses
 - Fish
 - Chook manure
- Think holistically, use animals to graze crops providing fertilisation in urine and manure which also feeds the microbes. Animals can be used to heavily graze before sowing to reduce the need for heavy cultivation. Correct grazing also stimulates microbes.
- Increase brix rate of plants – higher brix levels result in less pest infestation. Pests do not find a sweet plant palatable.
- Nutritionally balanced plants have a white energy field. Insects do not attack white energy fields. Plants with nutritional deficiencies have colours in their energy field, inviting pests into attack. (See work of Phillip Callahan and Carey Reams).
- High use of synthetic fertilisers are resulting in soils lacking oxygen. Soils with inadequate oxygen levels result in inadequate nutrient exchange between plant and soil.



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Principle Two - Avoid Aggressive Tillage. Tillage can look like it's done something great but what it's doing is giving you a short term flush of released minerals. The long term effect is depleting soil carbon and organic nitrogen as well as harming the soil fungi and earthworms.

How are people managing this?

- Using less harmful cultivation machines e.g. direct drilling, chisel ploughs, using rakes to scratch out weeds and chains to knock them over, press wheels etc.
- Using animals to graze heavily a number of times before sowing directly into the pasture
- Increasing soil health so minimal tillage is required e.g. less weed burden in healthy soils, increased water holding capacity and good aggregation.

Principle Three – Limit Chemical Use. Using water soluble P such as MAP, DAP and Superphosphate inhibits root formation.

Products used at sowing as an alternate to water soluble P:

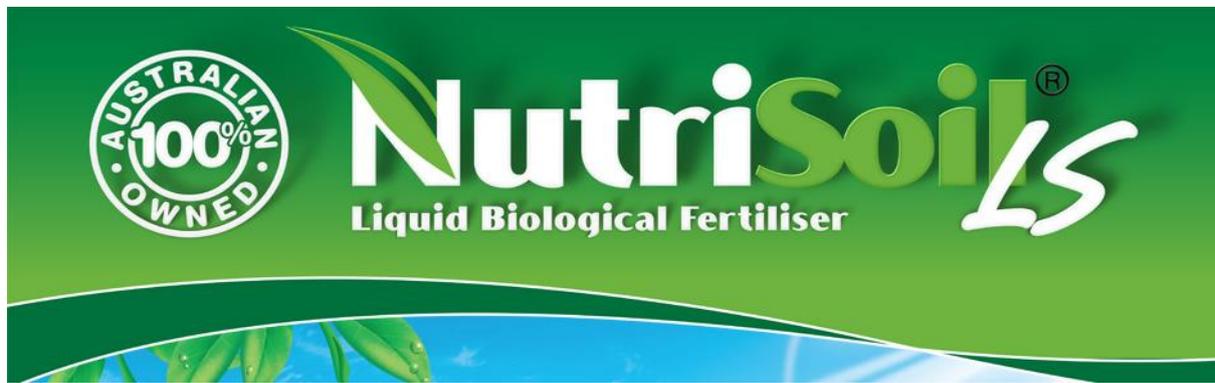
- Worm Casting – high in available phosphorous and humus. Worm castings and leachate have been through the biological conversion process in the gut of the worm. All nutrient is available and recognisable to the plants.
- Coat seeds with NutriSoil and then use in furrow or liquid inject – Seed is coated with an available nutrient, humus and beneficial microbes for disease and pest protection from the worm liquid.
- Fish to feed fungi
- Increase mineral cycling by planting more plants. In the Euro (VIC) area 8 species were planted – Perennial Rye, Sub Clovers, Turnips, Chicory, Pasture Radish, Vetch, and Crimson Clover. Mineral cycling increases because there is more photosynthesis forming plant exudates to feed microbes. Microbes extract the minerals from the soil and make them available to the plant.



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Principle Four – Microbes Matter Life in the soil provides the glues and gums that create soil aggregates. Microbes are essential for making nutrients available to plant.

How are we looking after these microbes?

- Ground cover – plants feed the microbes and create a buffer from extreme heat and cold.
- Limit chemical usage which harm microbes. Chemical fertiliser usage also makes microbes redundant. When the plant is fed high synthetic inputs from the top e.g. Nitrogen, the plant reduces its dependence on the Nitrogen Fixing Bacteria in the soil. When the relationship between plant and microbes is disturbed, the biological processes are made redundant. Microbes then reduce in numbers because they are not receiving food from the plant.
- NutriSoil feeds the plant an available nutrient while also increasing microbial diversity, mass and mycorrhizal fungi
- TM – stimulates microbes
- Reduce tillage which kills microbes
- Compost teas

Principle Five – Diversity Matters Every plant exudes its own unique blend of amino acids, nucleic acids, phenols, auxins, gibberellins etc. These have different effects on soil microbes and hence on plant nutrient uptake.

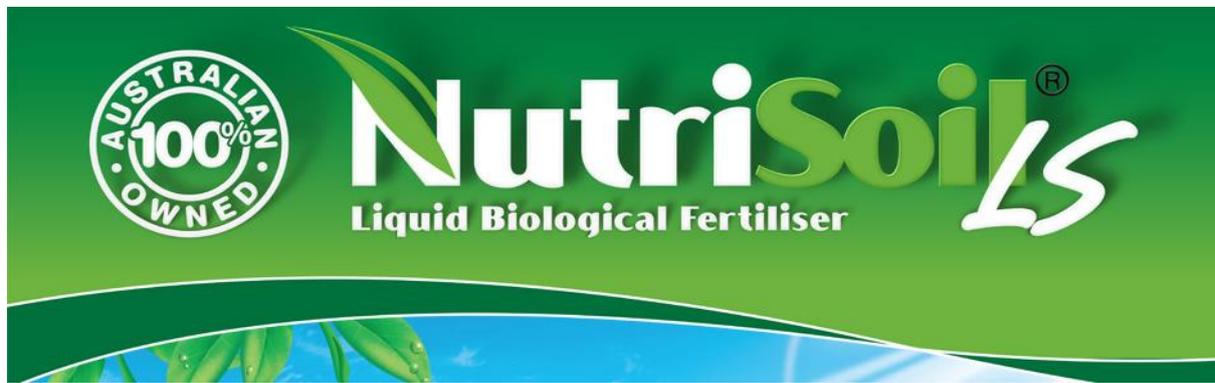
- What is pasture cropping? Annual crops are grown into dormant perennial pastures. Pastures may be temporarily by grazed or selective herbicides used to enable the successful growth of the crop.
- Colin Seis was recognised as the pioneer of Pasture Cropping in Australia. Gabe Brown was recognised as the pioneer of Pasture Cropping in America.
- Planting large numbers of diverse pastures can be considered a permanent soil building recipe, the plants and root systems will build carbon and contribute to good soil structure.



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- Diverse planting strategies increase the organic matter content of our soils (approximately two-thirds of organic matter increase comes from roots).
- Companion crops provide a cover to protect the soil surface, prevent evaporation, increase organic matter and can feed livestock after the crop is harvested.
- Discussion was held regarding the difficulty of growing green plants in hot dry summers with limited rainfall. In these conditions if plants are there for the purpose of dry matter when they are not able to be green, there is still a significant benefit to the soil. E.g. cover to buffer hot temperatures for the microbes, food for the microbes, increased water holding capacity of the soil.



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