WESTERN MINERAL FERTILISERS
WM FERTILISERS
Update
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LEADERS IN BIOLOGY AND MINERAL FERTILISERS

Top Results in Independent Research Trial

In this Newsletter Update we present a summary of results from one of many independently conducted research trials. This is some of the most exciting work that we have been involved with & quantifies what we have been seeing on farm. It also addresses the call from farm advisors and agronomists for independent trial data. These trials show the success of our mineral/biological programs. Not only do they out perform conventional programs dollar for dollar, but will start addressing serious soil health issues, while reducing reliance on high chemical inputs & escalating farm input costs.

Stephen Frost (Managing Director)

Rehabilitation – *PASTURE* Re-Establishment

Pasture - Introduction:

Silicate minerals have the potential to be utilized in the rehabilitation of soil[1] (particularly in mine site reclamation). Mineral ores are relative slow to weather[2]. Micro-organisms such as mycorrhizal fungi have the ability to selectively acquire nutrients [3,4,5,6,7] (e.g. inorganic P, K, iron & silicon) for host plant species by colonizing & biologically weathering mineral ores, as found in Silicate based mineral fertilisers. Silicate minerals also show potential as soil ameliorants– such as liming agents, increasing ion exchange capacity; water holding capacity; organic carbon storage and turnover; and coarse pore volume in clayey soils [8,9,10,11].


Pasture September '04

The objectives of part of this project is to assess possible improvements in soil properties through the addition of silicate mineral fertilisers and enhancing microbial activity in ameliorating hard setting soils and pasture establishment.

Amelioration of hard setting soils

Iluka Mines commenced the trial in April 2004 to evaluate the addition of amendments in influencing hardsetting subsoils, following mineral sand mining east of Capel, WA. The subsoil in this area was returned to the mine void during the summer period of 1999/2000. Approximately 500mm of subsoil originating from this area was spread over the underlying clayey overburden. By 2001/2002 this subsoil had hardset to a depth of 300-400mm, becoming friable during winter rains, & hardset again from October 2002 to April 2003. *Hardsetting observed in this reconstructed subsurface limits the effectiveness of rehabilitation plants due to a combination of limited soil moisture availability & impeded root penetration. This is reflected in limited pasture growth at this site.*

Prior to trial establishment, four trenches were installed for description & base line sampling. Soils characterised by an upper 200-300mm sandy topsoil (organic carbon concentrations of approximately 2.1%, average clay 3.86±0.94% & silt contents 2.06±0.27%). Average bulk density values are 1.44±0.18 g/cm^3 & stable micro- & macrostructure. The topsoil is acidic, with low electrical conductivity values. Base saturation & exchangeable acidity however indicates that base cations occupy the exchange complex. The subsoil by comparison has higher average clay contents (6.46±3.37%) & higher bulk density values (1.77±0.08 g/cm^3). Although the microstructure is stable, the macrostructure is highly unstable. A higher exchangeable aluminium & exchange acidity, with corresponding lower base saturation occurred in the subsoil.

In part of the trial, one hectare plots, each with four 2,500 m^2 subplots were established each with separate treatments. Treatments including silicate mineral fertilisers (insoluble P, no N) and were applied in June 2004.

Pasture species including clover & ryegrass were established during the 2004 growing season. Following seeding, the pasture was allowed to grow without additional inputs and cattle were excluded from the trial. The topsoil (0-100mm) and plant material were harvested in the first week of October 2004. The herbage was then incorporated into the soil to increase organic matter and water holding capacity within the topsoil. Soil samples were analyzed for a range of nutrient and chemical properties while herbage material was collected for production calculations.

Four treatments were applied to this part of the trial:

- **Treatment 1 (Control):** Control plots (no treatment);
- **Treatment 2 (WMF):** Western Mineral Fertilisers "Natural" (no **N**, no water soluble **P**) Silicate-based mineral fertiliser (200kg/ha) & WMF Microbes (20L/ha);
- **Treatment 3 (WMF x2):** "Natural" (no **N**, no water soluble **P**) Silicate-based mineral fertiliser (400kg/ha) & microbes (20L/ha);
- **Treatment 4 (HiAn - High Analysis District Practice):** high P, K and N fertiliser.

Soil Rehabilitation – *PASTURE* Re-Establishment (cont…)

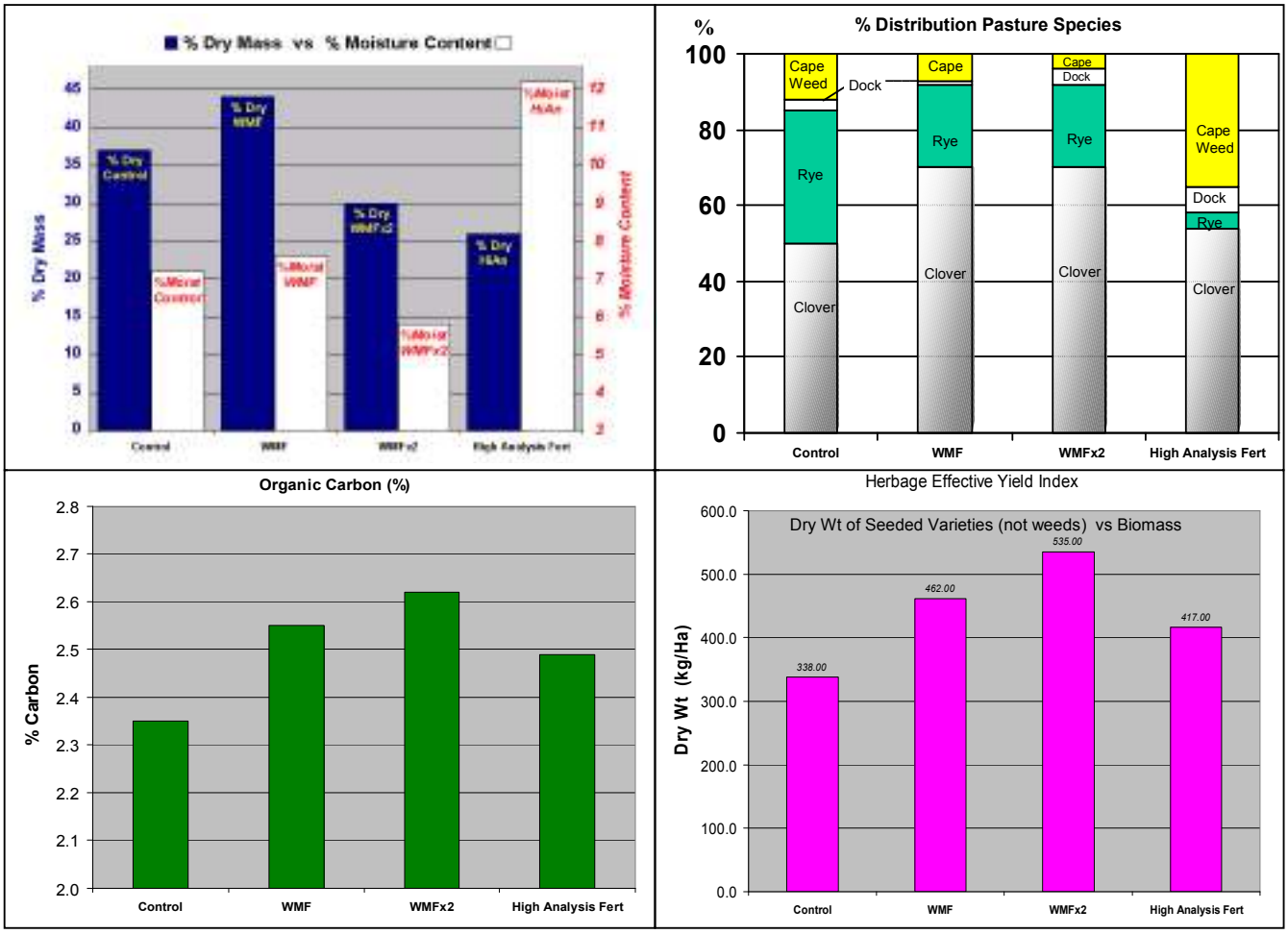
Pasture - Preliminary Results:

1st data set collected after 3 months (October 2004). Although trends were difficult to ascertain, the following was identified :

- mean organic carbon percentages were higher than the pre-trial for all treatments, although significant differences were observed between Control and WMF, WMFx2 and HiAn;
- mean pH (water) values were higher than pre-trial with significant differences for WMF and WMFx2;
- mean pH ($CaCl_2$) values generally lower than pre-trial values although significant increase observed for WMFx2;
- mean nitrate levels were lower than pre-trial values, although no significant values were observed. This reflects the (no **N**) status of the Natural WMF fertiliser. HiAn?
- mean ammonium levels were lower for control, WMFx2 and HiAn, and elevated for WMF (perhaps indicating greater microbial activity in this treatment);
- significant increases were observed for Colwell *soluble* P concentrations for WMFx2 (contains no water soluble **P**!) and HiAn. T*otal* P values are yet to be ascertained;
- mean trace element concentrations were generally lower than pre-trial values except for WMFx2;
- Manganese concentrations were significantly lower than pre-trial for all treatments except WMF;
- mean exchangeable cations & exchangeable bases showed no significant differences compared to pre-trial concentrations except for exchangeable potassium & magnesium which was significantly higher for WMF;
- Ca/Mg ratios were significantly lower for WMF – indicating a better calcium and magnesium balance.
- % Moisture Content was significantly elevated in HiAn, and subsequently % Dry Matter was significantly lower in this high N treatment.

Pasture - Herbage Sampling:

The distribution of pasture species indicate that clover dominates the pasture with ryegrass having a greater percentage in the control and WMF treatments. Capeweed (*Artotheca calendula*) and Dock (*Rumex* species*)* also appear in a greater percentage in the **High Analysis District Practice** treatments.



Pasture - Conclusion:

The preliminary results from this pasture trial indicate that there is increased dry matter in pasture, improved production (based on dry weight) and better pasture species composition (& less weeds) when using a combination of WMF beneficial microbes and "Natural" Silicate based mineral fertiliser. This "Natural" fertiliser used specifically for this trial contains no soluble Nitrogen; & Phosphorous only as insoluble P (usually WMF's general pasture program – uses a combination of some N, soluble & insoluble P). Data indicates good conversion of the insoluble P to bio-available P. The mineral levels (eg soluble P, exchangeable potassium & magnesium, Ca:Mg ratio etc) also show signs of becoming better balanced and more available to the plants. The HiAn treatment contained high analysis N – leading to rapid cell elongation, high moisture content, less dry matter, more fragile plants, which would result in lower feed value, resulting in more feeding time, higher energy out put = poorer weight gain in animals.

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