TRIAL SUMMARY

Independent Field Trial Summary

Grow Safe® Mineral Fertilisers & Microbial Products

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AM FERTILISERS
CREATORS OF GROW SAFE®

Company Profile

The premium Grow Safe® mineral and microbial products by Australian Mineral Fertilisers (AMF) have been the culmination consistent performance in over forty-five scientific investigative trials - statistically designed with replications and randomisations both on paddocks and in pots - conducted by independent agencies including the University of Western Australia (UWA), involving commercial broad acre and pasture production systems. Ever since its inception in the farm nutrition market, AM Fertilisers have developed a range of premium granular fertilisers combined with millions of beneficial soil microbes including that of Bacillus, Pseudomonas, Trichoderma, Azotobacter, Rhizobium and Mycorrhizae (VAM) species. Their performance and long-term benefits of sustainably improved productivity –both in terms of quantity and quality.

Over the past twenty years their premium products have been designed to be compatible with wider soil and plant types (beyond pasture and cropping) to include horticulture, turf and home garden applications. Grow Safe® products have been designed to establish a healthy rhizosphere with balanced biology along with sixty trace minerals (locally sourced through silicate minerals) that help replenish critically important micro-nutrients that ensure the health and productivity of various systems encompassing surrounded ecology. The obvious outcomes of incremental yields of better qualities at significantly reduced production costs along with the added benefits of improved soil health, Nutrient Use Efficiency (NUE), Soil Organic Carbon, improved Root: Shoot ratios & enhanced Biomass - all that constitute the Natural Capital (NC) of land – realised in majority of the cases can be easily translated across the other vistas as all the grasses are basically cereals. Some of the trial highlights are mentioned here for the perusal of end-users and for reference purpose and their details can be supplied on request. These trails were conducted in large scale cereal crops which enables consistent growing conditions, inputs and growth which are all comparable for product efficacy.

Grow Safe® Trial Summary

The majority of the eleven on-field evaluation multi-year trials (conducted by 6 independent agencies like DAFWA, Living Farm Ag- Research, MEAG Soil consultancy, Ferti-Tech, FACEY & RAIN groups) run for assessing the performance of Grow Safe® 'Mineral + Microbe products' have significantly resulted in higher NUE (Nutrient Use Efficiency) and yielded at least equally well as any of the 'Acid Fertiliser Products'(e.g., conventional products like DAP, MAP, Urea and Liquid N, with various crop protecting chemicals including seed pickling) despite the fact of having half the amount of major nutrients, viz., Nitrogen and Phosphorus compared to the latter programs.

The **Esperance** wheat trial (2009) had highlighted the superiority of Grow Safe® mineral fertiliser with a seed coating of beneficial soil microbes in terms of enhanced NUE (113%-N & 110%-P) and improved Yield (8 %) over the compared DAP product. It confirmed Grow Safe® products' ability to boost the NUE of Nitrogen and Phosphorus; reduce the crop fertiliser requirement compared to the conventional products. This considerably reduced the production cost and improved the crop quality & yield. All these benefits were realised despite the paddock being acidic (pH=4.8) and depleted with low soil organic carbon (1.2 %) pointing at the greater efficiency and efficacy of Grow Safe® products.

The trial in **Tincurrin** on wheat (2008) through Ferti-Tech had demonstrated enhanced Root: Shoot ratios (≈ 0.3-0.4) in all the treatments with Grow Safe® mineral and microbial fertiliser while their counter treatments with conventional product (MAP) had the least (≈ 0.18-0.2) indicating their ability to enhance the greater volumes of root-biomass that in turn enabled the wheat plants to establish well and yield better (34 to 46.8 % increment) over their conventional counter product. The significant jump (nearly doubled) in the plant uptake of Phosphorus (0.35%) along with the other trace mineral

nutrients like Zn & Mn among the plants treated with Grow Safe® products from the average conventional P uptake (0.19%) and ending up in 46 -63% additional gross marginal return ($$) over the conventionally fed crop.

Similarly, the trial conducted at **Mt Madden** (2006) has also endorsed the benefit of Grow Safe® mineral and microbial fertiliser in increasing plant root-biomass volume (≈ 50% vs 27%) and their surface area in comparison to their conventional (MAP) fertilisers (890 vs 360) reflecting their better accessing of the nutrients like Phosphorus due to their volume and increased Mycorrhizal colonisation (>10 times) and obvious additional yield increment (15%) and gross returns $$/ha (>36% over conventional program).

Increased dry matter in pasture, improved production (based on dry weight) and better pasture species composition (and less weeds) with Grow Safe® products (Mineral +Microbes) in comparison to their counterparts under conventional (DAP/MAP) programs were salient observations with pasture in **Capel** during the 2004 trial.

The latest findings off **UWA** glass house trials on sub-clover depict the greater ability of Grow Safe® Products in infecting the roots and colonizing them with VAM (Vesicular Arbuscular Mycorrhizae) compared to the standard NPK conventional product (being published). The benefits become more obvious even in the qualities of the products as recently indicated by denser grains (with significantly higher amounts of trace elements) off the cereals fed with Grow Safe® minerals and microbes.
There are also many anecdotal testimonials by the users of various Grow Safe® product ranges in variety of systems including home gardens and turf situations. In Western Australia, the celebrity horticulturalist and ABC radio presenter, Sabrina Hahn, is the Grow Safe® brand ambassador who can verify the efficacy claims of the mineral and microbe fertiliser products. Their overall tangible benefits extend genuine potential in bringing resilient sustainability of every plant-soil system through basic balancing act between various components of biology, chemistry and physics enriched with enhanced WUE and NUE.

Independent Trial List

1. **Evaluating Grow Safe® (AMF Minerals + Microbes) vs Conventional Fertiliser Programs**
    - 2006-07 (Lake King), 2008-10 (Esperance), 2008 (Goomalling & Hyden) – MEAG Soil Consultancy.
    - 2008-09 (Bruce Rock), 2009 (Pithara), 2010 (East Maya), 2011 (Buntine), 2011 (Dowerin) – Living Farm Ag Research.
    - 2008 (Tincurrin) – Ferti-Tech and FACEY Group.
    - 2007 (Ravensthorpe) – RAIN Group.
    - 2005 (Pindar), 2006 (Pithara) –DAFWA.

Treatments: **AMF NPK Crop Plus + seed dressing microbes** vs **DAP/MAP & other products**
Findings: These trials have consistently proven that AMF's combined 'Mineral + Microbe programs' have significantly resulted in **higher NUE** than and **yielded at least equally as well** as 'Acid Fertiliser Programs' despite having **half the amount of Nitrogen and Phosphorus Units** compared to the latter programs.

2. **Evaluating the benefits of Seed coating of AMF Microbes**
    - 2014 (Cranbrook- Gillamii, non-wetting soils) - Living Farm Ag Research.
    - 2009 (Esperance) – MEAG Soil Consultancy.
    - 2008 (Bruce Rock), 2009 (Katanning), 2011 (Dowerin) – Living Farm Ag Research.
    - 2007 (Gairdner - Barley) –FertiTech.

- 2004-06 (Buntine) – Liebe Group.

Treatments: **AMF Mineral Fertilisers +/- seed dressing microbes.**
Findings: There was a positive **Yield** increase (up to **24.5 %**) and **NUE** response on treating seeds with AMF microbes. These trials confirm that mineral fertiliser programs when combined with beneficial soil biology: 1) boosts the **NUE of Nitrogen and Phosphorus**; 2) eventually reduces the required amounts of fertiliser (N and P units) compared to conventional non-biological programs; and 3) thereby help lowering **production costs** without compromising the quality & crop yields but improving them instead.

3. **Assessment of Grow Safe® (AMF Minerals + Microbes) and Nitrogen Management**
    - 2014 (Tenterden – on wheat + canola) –Living Farm Ag Research.
    - 2007 (Lake King), 2008-10 (Esperance), 2008 (Goomalling & Hyden) –MEAG Soil Consultancy.
    - 2008-09 (Bruce Rock), 2009 (Katanning), 2009 (Pithara), 2010 (East Maya), 2011 (Buntine), 2011 (Dowerin) – Living Farm Ag Research.
    - 2008 (Tincurrin) –FertiTech and FACEY group.

Treatments: **AMF Mineral Fertilisers and seed dressing microbes** tried with **No extra N** vs **various Nitrogen inputs**: such as Liq-N, Urea, SOA, DAP, or WMF-N.
Findings: AMF Grow Safe® program **improved NUE** and **increased N mineralisation** due to enhanced microbial activity; **WMF-N** was the preferred choice over **SOA > Urea > Liquid-N** in that order.

4. **Comparing Root: Shoot ratios in Grow Safe® (AMF Minerals + Microbes) and Conventional Pasture Programs**
    - 2012 (Pingelly) - DAFWA.
    - 2009 (Glasshouse) - UWA.
    - 2008 (Tincurrin) – FertiTech and FACEY group.
    - 2007 (Gairdner - barley) - FertiTech.
    - 2006 (Mt Madden/Lake King - wheat) - MEAG Soil Consultancy.

Treatments: **AMF NPK Crop Plus + seed dressing microbes** VS **Conventional (DAP/MAP) pasture products.**
Findings: Mineral + Microbe programs has **significantly increased the Root: Shoot ratios** and also **boosted their dry weights** compared to conventional DAP/MAP programs.

5. **Comparative evaluation Grow Safe® (AMF Minerals + Microbes) VS Conventional Pasture Programs**
    - 2014 (Mt Barker) – WICC, Living Farm Ag Research.
    - 2012 (Pingelly) - DAFWA.
    - 2007 (Dongara tropical perennial grasses) - DAFWA.
    - 2007 (Pindar – Clover bioassays) - UWA.
    - 2004 (Capel) - Ascension Soil Co and Iluka Mines.

Treatments: **AMF Mineral Fertilisers + Seed Dressing Microbes** VS **Conventional Pasture products (DAP /MAP).**
Findings: There was **increased dry matter** in pasture, **improved production** (based on dry weight) and **better pasture species composition** (and **less weeds**) with AMF Mineral Fertilisers and Microbes compared to counterparts under conventional (DAP/MAP) programs.

6. **Evaluating Grow Safe® (AMF Minerals + Microbes) vs Bio-Char**
    - 2014 (Tenterden - wheat) - Living Farm Ag Research.
    - 2009 (Bruce Rock), 2009 (Katanning) - Living Farm Ag Research

- 2009 (Glasshouse) - UWA.
- 2005 (Pindar), 2006 (South Pindar), 2007 (Dongara tropical perennial grasses) - DAFWA.
- 2007 (Pindar – Clover bioassays) - UWA.

Treatments: **AMF mineral fertilisers + seed dressing microbes** +/- **BioChar & MAP.**

Findings: The Mycorrhizal colonisation in **AMF Grow Safe® treated** clovers was **204% more than** their **MAP treated** counter-parts**; Higher NUE** of **P** with **AMF Grow Safe® Program;** Tropical perennial grasses grew better on combined **Bio-char and AMF programs**, compared to on **conventional DAP/MAP programs;** and **Bio-char** was very effective at **encouraging mycorrhizal fungal colonisation** of wheat roots in sandy soils with low **P** status.

7. Effects of Ag-Chemicals on Soil Biology and Crop Yield

- 2010-12 (Pingelly -Knockdown + Pre-emergents trial) – Living Farm Ag Research & DAFWA.
- 2012 (Dowerin- Post-emergent + Fungicide trial) – Living Farm Ag Research & DAFWA.

Treatments: **AMF programs** with **standard knockdowns** with commonly used **Pre-emergent and Post-emergent herbicides** at **different rates** and without herbicides (**control)** and similarly with few fungicides.

Findings: Results indicated **positive** and / or **negative impacts** of various herbicides, their combinations and application rates on microbial biomass, mycorrhizal status and soil microbe composition and their impact on both Soil Carbon and Crop Yield (wheat: **2.645 - 5.092** t/ha) and also on the productivity of pasture (2012).

8. Additional Trials & Projects

- 2014 - 2017 ARC Linkage Grant – University of Western Australia, DAFWA & AMF
- 2014 Darkan (Pre-emergents on wheat & canola - AMF vs Conventional) –Icon Agriculture.
- 2015 Dowerin (P Response Curve trial) – Living Farm Ag Research & Farmanco.
- 2014 - 2016 (Kojonup and Wagin)- Bugs & Biology and DAFWA
- 2014 - 2015 (Darkan - wheat + canola) – through P-South.
- 2014 (Darkan- Pasture) - through Craig Lubcke
- 2014 (Cranbrook - Gillamii - non-wetting soils) - DAFWA, Living Farm Ag Research.
- 2014 (Dowerin - on Root Diseases) - Living Farm Ag Research & Farmanco.
- 2016 – 2018 ARC Linkage Grant – UWA, Kings Park, AMF (Mine-site rehabilitation through novel plant and microbial interactions).
- 2018 Response of Wheat to a Multiple Species Microbial Inoculant Compared to Fertiliser Application – UWA, Richgro & AMF
- 2014 - 2020 – Linkage Project – Characterisations of Soil Microbial interactions for increased efficacy of herbicides using novel fertiliser management practices – UWA, DIPRD & AMF.

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