

Eco Advance® and the importance of beneficial microbes



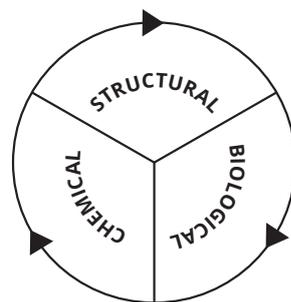
Eco Growth's granular fertilisers are impregnated with beneficial microbes - "Eco Advance® premium biology" - to stimulate microbial activity within the plant root system to maximise yield.

This microbial activity occurs around the plant root system or rhizosphere, which extends usually 1mm around healthy plant roots. The rhizosphere is more complex than it appears, not just decomposing and releasing nutrients from organic matter. In fact, it is now understood that plants and microbes have a strong communicative interaction where a plant can influence activity directly in the soil around it^{1,2}.

As a plant grows, it secretes exudates from its root growing tips. Microorganisms in the soil use these exudates to grow and proliferate, thereby increasing the biological activity in soil. It is recognised as a great benefit to the plant in encouraging microbial activity, such as formation of fungal hyphae networks and bacillus interaction.

For instance, *Arbuscular mycorrhiza* (AM) fungi release nutrients, such as phosphorus from plant unavailable forms in the soil, such as rock phosphates. AM fungi also transport moisture from deep within the soil towards the root hairs. Bacteria are similarly known to be useful, producing nitrogen, phytohormones and other useful products. Together, these form rhizosphere and bulk soil networks in agricultural soils, optimising healthy soils for sustainable food production^{1,3}.

There are three main factors that make healthy soil, which are depicted below:



- Biological components (such as microbes)
- Chemical compounds
- Structural elements

If any one of these components are in poor condition, the remaining elements of soil structure will also be diminished in effectiveness.

For instance, if soil structure is poor, such as an ill drained clay area in a paddock, water will not drain properly leading to stagnant conditions and accumulation of salts. These saline areas normally produce very limited plant activity.

It is commonly thought that conventional farming techniques such as excessive tillage, over application of soluble fertilisers⁴ (namely Nitrogen and Phosphorus), are having a devastating effect on soil health as reflected in falling carbon levels, increased disease and weed populations.

How do we turn this situation around?

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Eco Advance® and the importance of beneficial microbes

Why does Eco Growth inoculate fertiliser with “Eco Advance® premium technology”?

Eco Growth’s proprietary microbial technology is applied to its fertilisers as part of the manufacturing process to enhance the bioavailability of key nutrients, including rock phosphate. Their activity enhances phosphorus availability and promotes growth, resulting in enhancing and using natural microbial-plant interactions to increase productivity.

Evidence of this process has been witnessed during the unusually dry seasons 2017 during the Dowerin phosphorus trial. The results are a peculiarity, primarily due to decreasing yield being observed in replicated Triple Super Phosphate (TSP) application of phosphorus (P) with increased units of P applied. This was further contrasted with the exact opposite relationship with P applied in Eco Growth’s treatments, where yield continued to increase with additional units of P applied. Some light was thrown on the likely reason for this phenomenon when independent microbial testing revealed a significant increase in AM fungi colonization on Eco Growth’s trial plots when compared with conventional and zero input replicates. Interestingly, AM fungi was not introduced to this trial, however, it became apparent that conditions were suitable for colonization in the Eco Growth’s plots, which trial design had randomly been placed between conventional and zero treatments plots.



Picture: Dowerin Field Trial 31st August 2017
TSP 6 Control replicate units of P, Brix 13.5 :: Eco Growth replicate 6 units P, Brix 15

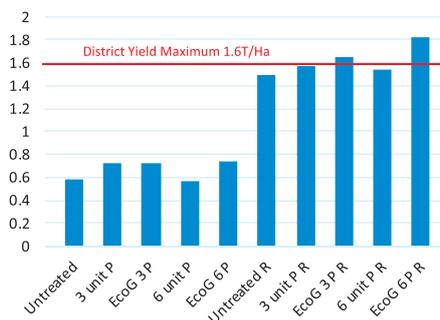


Figure: Untreated, TSP control & EcoGrowth unit P treatments non-ripped & deep ripped

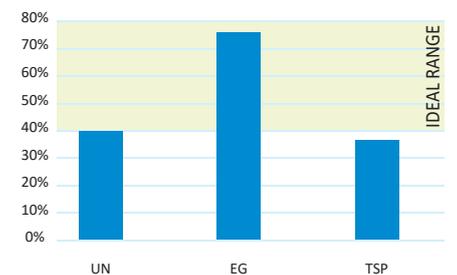


Figure: Mycorrhizal Root Score of combined Untreated, EcoGrowth & TSP control replicates Dowerin 2017

Bio-Assay Summary - Dowerin 2017

Parameter	EcoGrowth	TSP	UTC	Ideal
Total active microbial biomass (TAMB) ugC/g	12.9	7.7	6.9	10 - 20
Fungal-bacterial ratio (FBR)	1.1	0.8	0.3	>1.0
Mycorrhizal root score (MRS) %	71.4	37.5	40.0	>30
Short term mineralisation (1 month)	14.6	9.5	9	
Long term mineralisation (1 year)				
N kg/ha	30	20	17	
P kg/ha	1.65	1.20	1.00	
Skg/ha	0.66	0.50	0.30	

Trial conducted by Farmanco Management Consultants, 2017.
“Long Term Phosphorus Systems Trial, Dowerin, Western Australia”

Eco Advance® and the importance of beneficial microbes

In summary, Eco Growth's Eco Advance® impregnated granular fertilisers are inoculated to boost plant availability of fertiliser and to kick start productivity. This does not just increase plant quality and productivity, but also stimulates microbial soil building processes. Arguably, this is true fertility and the absolute mainstay of Regenerative Agriculture. The table right outlines the beneficial microbes in Eco Advance® premium biology.

Where to go next?

Quality Soil testing is an essential part of this process. In a microbial "Regen-Ag" system, it is just as essential to know when to apply something as it is to know when not to. To that end, speak with our distributors / technical staff, about how we can be further customising and enhance our fertilisers to your specific production system. Let that be the catalyst to greater things!



Eco Advance® contains the following microbes:	
Azotobacter	Produce nitrogen, vitamins and plant growth hormones. <i>Azotobacter spp.</i>
Azospirillum	Free living nitrogen fixers-converting atmospheric nitrogen to the soil.
Bacilli	Such as Lactic acid bacteria, help with soil condition structure <i>Bacillus subtilis</i> , also phosphorus solubilisation <i>Bacillus Megaterium</i> .
Cellulosic Fungi	Decomposers of organic matter (cellulose) turning stubble into organic carbon. <i>Chaetomium spp.</i>
Mycorrhiza	Nutrient converters and actively source phosphorus from the soil. <i>Vesicular Arbuscular Mycorrhiza spp</i> (Glomus intraradices).
Pseudomonas	Bacteria that populate the soil and root zone, aid with plant hormone production. <i>Pseudomonas spp.</i>
Rhizobium	Legume nitrogen fixers.
Streptomyces	Bacteria that produce metabolites that help plants grow.
Trichoderma	Plant metabolite and hormone producer. <i>Trichoderma spp.</i>

References:

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3. Kahn S.A. & Mulvaney, T.R. & Boast C.W. 2013. "The Myth of Nitrogen Fertilization for Soil Carbon Sequestration." Journal of Environmental Quality. November 2007
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