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## SOIL HEALTH—PHOTOSYNTHESIS FOR BIOLOGY

### Balala Station - Autumn 2020

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After what can be described as one of the worst droughts, the land really needed something. Once the rains started arriving in January 2020 the marvel of nature took control and the turn around in 5 weeks was quite astounding. It was at this time that I decided to start planting some areas of the farm to a multi species cover crop to try and feed the biology in the soil. Some of the paddocks were bare, one had been a 1 ha containment paddock (House Paddock) and the others had an element of ground cover though there is licence in how much.

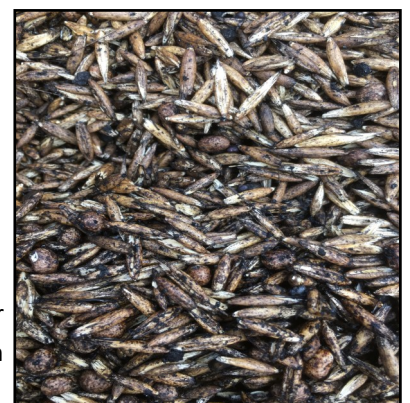
Working around the learning trails of a new seeder - calibration, different seed sizes, being coated and sprayed - the consistency uniform seeding wasn't up there with precise even tidy nature of some paddock sowings but that didn't faze me at all.



**Seed Species and Treatment**—the mix of species tried to cover the five families, Grasses; Cereals; Legumes; Brassica's; Chenopods. Another aspect with species mix is identifying some limiting resources one is trying to overcome like compaction, organic matter, nitrogen fixing, pollinators etc. Biodiversity is key.

The seeds were treated with Seed Start; Bio N; Platform; Granulated Humates (all products from Nutri Tech) and a furrow application of Bio Cast Worm Juice with Fish Hydrolysate at sowing time.

**Sowing**—House Paddock has had no soil amendments to it, no soil balancing etc. The other paddock in the attached plant tissue result, Cow Crossing, has had a lot of soil balancing in the style of William Albrecht, with lime, chicken manure, MAP, Sulphur Bentonite, trace minerals - zinc, copper, potassium, molybdenum, boron but at sowing time nothing additional was put out apart from what's mentioned in the seed treatment and furrow application.



The results from the multispecies was incredible to the extent that I had a phone call from Natural Resources Access Regulator (NRAR) asking to visit the property because a complaint had been lodged that I was irrigating and was removing water from the Roumalla Creek illegally. This was a huge 'feather' in the results in my view! No irrigation has been done, only an increase of organic matter in the soil increasing by over 2% over the last couple of years.





With the House Paddock I decided to graze it out and then sow it to oats and legumes in late April for winter green leaf area. The stock density was 1100 dse/ha for 1 day, the sheep made short work of everything in the paddock. I then sowed oats and clovers directly into the paddock with the same treatment and liquid injection as done with the multi species in April.



There was moisture and all litter was left in situ, evaporation was nil and the results certainly show. Like before the evenness of sowing still needs some working around but I'm not stressed by this as the Air Seeder gets there in a manner.

In Cow Crossing paddock (which didn't have a multi species sowed into it in January) was sown with the oats and legume mix directly into the native grasses in late April. The paddock wasn't sprayed out with Roundup and there was no fertiliser at sowing apart from the same treatment and liquid injection as done with the multi species in April.



I then decided to take some plant tissue tests of the oats from three paddocks. House Paddock, Cow Crossing and a paddock nearby that was sprayed out, and the oats sown with a Crop Lift fertiliser.

The results led to a lot of questions and I think it is more healthier biology in the soil and the relationships between microbes as to why the results are so different.

Another point being the results from a soil test and then a plant tissue test highlight that though some results are adequate in the soil, they may be deficient in the plant tissue result.

Nothing scientific but these results were really interesting to me.

WRITTEN BY RICHARD DAUGHERTY 22/05/2020

PLANT TISSUE ANALYSIS REPORT

3 samples supplied by Balala Station on 12/05/2020. Lab Job No.J3517

Analysis requested by Richard Daugherty. Your Job: Oats

49 Balala Road BALALA NSW 2358

Parameter	Method reference	Sample 1	Sample 2	Sample 3	Ave Grass	Sufficiency Range	
		House	Cow Crossing	ABC		OATS	
		Oats	Oats	Oats		Head emerges from boot	
		Balala Station	Balala Station	Balala Station		25 Whole Shoots	
		J3517/1	J3517/2	J3517/3		Lower	Upper
Nitrogen (%)	LECO Trumac Analyser - Inhouse S4a	5.16	3.71	2.91	3.6 - 4.4	2.00	3.00
Phosphorus (%)	Nitric Acid digest - APHA 3125 ICPMS	0.65	0.49	0.30	0.25 - 0.50	0.20	0.50
Potassium (%)	Nitric Acid digest - APHA 3125 ICPMS	6.15	5.55	2.82	42430	1.50	3.00
Sulfur (%)	LECO Trumac Analyser - Inhouse S4a	0.45	0.38	0.60	0.32 - 0.35	0.15	0.40
Carbon (%)	LECO Trumac Analyser - Inhouse S4a	43.3	43.0	44.8		..	..
Calcium (%)	Nitric Acid digest - APHA 3125 ICPMS	0.33	0.30	0.37	1.2 - 2	0.20	0.50
Magnesium (%)	Nitric Acid digest - APHA 3125 ICPMS	0.27	0.18	0.25	0.30 - 0.50	0.15	0.50
Sodium (%)	Nitric Acid digest - APHA 3125 ICPMS	0.03	0.03	0.11	0.2 - 0.5	..	..
Copper (mg/kg)	Nitric Acid digest - APHA 3125 ICPMS	5.7	6.5	5.1	15	5.00	25.00
Zinc (mg/kg)	Nitric Acid digest - APHA 3125 ICPMS	59	23	18	45	15	70
Manganese (mg/kg)	Nitric Acid digest - APHA 3125 ICPMS	58	80	136	55	25	100
Iron (mg/kg)	Nitric Acid digest - APHA 3125 ICPMS	131	85	63	<100	40	150
Boron (mg/kg)	Nitric Acid digest - APHA 3125 ICPMS	7.1	9.0	5.4	10+	2	4
Molybdenum (mg/kg)	Nitric Acid digest - APHA 3125 ICPMS	1.3	0.92	0.77	1 - 1.6	0.20	0.30
Cobalt (mg/kg)	Nitric Acid digest - APHA 3125 ICPMS	<0.10	<0.10	<0.10	0.13	..	..
Silicon (mg/kg)	Nitric Acid digest - APHA 3125 ICPMS	512	804	562		..	..
Nitrogen : Sulfur Ratio		11.4	9.7	4.8		..	..
Nitrogen : Phosphorus Ratio	Calculations	8.0	7.6	9.7		..	..
Nitrogen : Potassium Ratio		0.8	0.7	1.0		..	..
Carbon : Nitrogen Ratio		8.4	11.6	15.4		..	..
Crude Protein (%)	Calculation: Total Nitrogen x 6.25	32.3	23.2	18.2		..	..