Case Study 6 – West Midlands Group, Evolving Soils Project.
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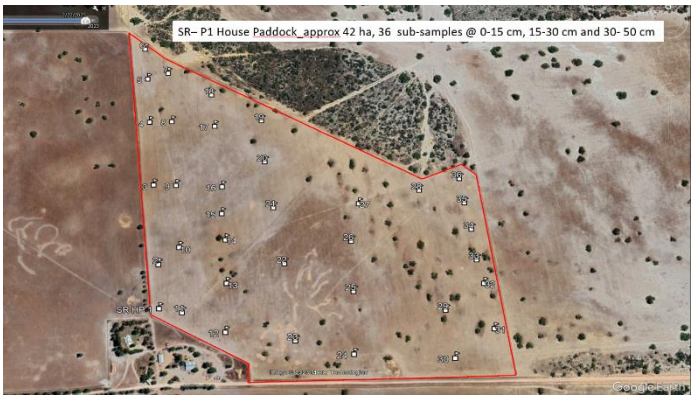
Interpretation of lab data and graphical results for two paddocks for comparison (P1and P2).



P1 had 36 subsamples taken at three depths 0 – 15, 15 – 30 and 30 – 50 cm. P1 is a cropping paddock: recently growing cereals.

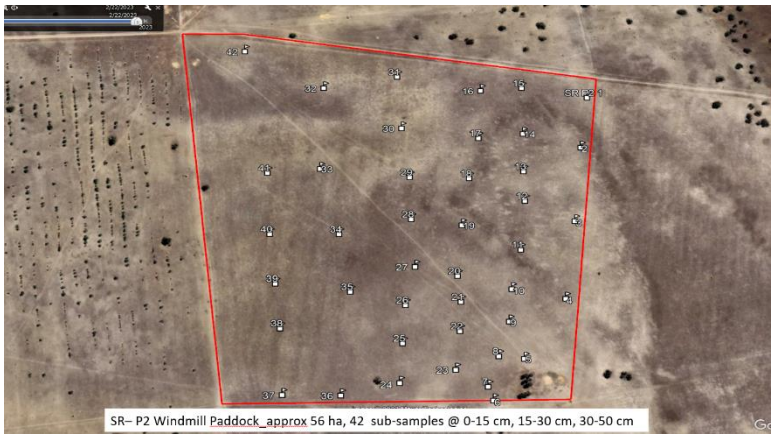
Each paddock data set was graphed to compare the three depths and then the topsoil from both paddocks also graphed for comparison.

Figure 1 P1 Graphical Results 0-15, and 15 – 30 and 30 – 50 cm

P1 Interpretation

- pH levels are fine in top two depths (0 – 15 and 15 – 30 cm) but low at 30 – 50 cm.
- CEC levels across the depths are all low consistent with sandy loam to sand (1.68, 1.57 and 0.84).
- P levels are all low.
- Most parameters are reduced as the depth increases except for Sodium which increases at 15 – 30 cm then decreases again. Iron increases over depth.
- PBI is all low but slightly increases over depth (higher PBI soil binds P).
- Total P indicates some P is available via microbial activity to plant also.

- Potassium is low to very low at depth. at depth.
- Low Magnesium decreases further with depth.
- Calcium is also low to very low at depth. The Ca:Mg ratio is in balance however with both parameters being low to very low.
- Sodium also very low at all depths.
- Trace elements (Copper, Iron and Manganese) are all low except for zinc which is sufficient at 0 – 30 cm and deficient at depth.
- Boron is low across all (0.13, 0.11 and <0.1).
- Nitrate Nitrogen is low to very low decreasing at depth.
- The C:N ratio is low improving at depth, low ratio generally indicates sufficient N in the system if high organic matter is existing. All soils in the wheatbelt have a typically low OM content so keep an eye on N levels.
- The balance of Nitrate to Ammonium Nitrogen is quite good (5.8:3.4, 5.6:2.8 and 2:1.2) indicating good mineralisation is occurring.
- Total Nitrogen levels are ok showing some N in the system and the fact that mineralisation is occurring is positive.
- Sulphur levels are also low across the profile.



Paddock 2 (P2) had 34 sub samples taken for each depth, 0 – 15, 15 – 30 and 30 – 50 cm. Paddock use is pasture/grazing.

Figure 2 P2 Graphical Results 0-15, 15 – 30 and 30 – 50 cm

P2 Interpretation

- pH levels are fine in all 3 depths.
- CEC levels are low and decreasing consistent with sandy loam to sand at depth.
- P levels are low to very low through the depths.
- Most parameters are reduced as the depth increases except for iron which decreases then increases.
- PBI is on the very low end of the scale indicating plant available P if applied (higher PBI soil binds P).
- Total P indicates some P is available via microbial activity to plant also.
- Potassium is very low in all depths to 50 cm.
- Low to very low Magnesium across all depths.
- Calcium is also low in all depths.
- The Ca:Mg ratio is in balance but both parameters are too low.
- Sodium also very low at all depths.
- Trace elements (Copper, Iron and Manganese) are all very low with Zinc being sufficient in the top 15 cm and low below.
- Boron is low at 0.12, <0.1 and <0.1.
- Nitrate Nitrogen is very low.
- The low C:N ratio indicates sufficient N in the system if high organic matter is existing. All soils in the wheatbelt have a typically low OM content so keep an eye on N levels as organic matter is low.
- The balance of Nitrate to Ammonium Nitrogen is not good (2.4:2.5, 1.6:1.8

and 1.7:1.7) indicating little mineralisation is occurring.

- Total Nitrogen levels do indicate some N is in the system.

The topsoil across both paddocks was also further investigated and graphed for comparisons.

Figure 3 P1 Vs P2 0-15 cm

P1 Vs P2 Interpretation (0 – 15 cm)

- pH levels are fine in both paddocks.
- CEC levels are low and similar consistent with sand.
- P levels are low in both.
- PBI is on the very low end of the scale in both (higher PBI soil binds P).
- Total P indicates some P is available via microbial activity to plant also in both paddocks being slightly higher in-House Paddock.
- Potassium is very low in both paddocks but slightly higher also in House Paddock.
- Magnesium is low in both paddocks but slightly higher in House Paddock.
- Calcium is also low in both paddocks, incrementally higher in Windmill Paddock.

- The Ca:Mg ratio is in balance in both paddocks but both parameters are too low.
- Sodium also very low in both.
- Trace elements (Copper, Iron and Manganese) are all very low with Zinc being sufficient in the top 15 cm in both paddocks.
- Boron is low in both at 0.12 and 0.13.
- Nitrate Nitrogen is very low in both, but just slightly higher in House Paddock.
- Both paddocks are very similar with only incremental variance, with some slightly higher parameters in House Paddock.
- The biggest difference is that there seems to be more N mineralisation in House paddock also highlighted by the Nitrate and N and Ammonium N balance.
- Total Nitrogen levels in both do indicate some N is in the system with P1 again ever so slightly higher.

Soil Test Raw Data

SampleName		P1-ST-0-15-29	P1-ST-15-30-30	P1-ST-30-50-31	P2-ST-0-15-32	P2-ST-15-30-33	P2-ST-30-50-34
SampleDepth		0-15	15-30	30-50	0-15	15-30	30-50
pH 1:5 water	pH units	6.18	5.98	5.86	6.35	6.41	6.39
pH CaCl2 (following 4A1)	pH units	5.52	5.23	4.82	5.61	5.61	5.6
Organic Carbon (W&B)	% (40°C)	0.82	0.75	0.52	0.87	0.78	0.68
MIR - Aus Soil Texture		Sandy loam	Sandy loam	Sand	Sand	Sand	Sand
Nitrate - N (2M KCl)	mg/kg	5.8	5.6	2	2.4	1.6	1.7
Ammonium - N (2M KCl)	mg/kg	3.4	2.8	1.2	2.5	1.8	1.7
Colwell Phosphorus	mg/kg	10	10	6	9	5	<5
PBI + Col P		4	14	16	4	7	7
Total Phosphorus	mg/kg	62	58	23	49	39	36
Colwell Potassium	mg/kg	55	49	26	44	79	28
KCl Sulfur (S)	mg/kg	5.6	4.7	5	4.1	3.5	3.8
Calcium (Ca) - NH4Cl/BaCl2	mg/kg	250	231	105	257	184	158
Magnesium (Mg) - NH4Cl/BaCl2	mg/kg	33	31	18	31	23	21
Potassium (K) - NH4Cl/BaCl2	mg/kg	50	42	29	39	28	27
Sodium (NH4Cl/BaCl2)	mg/kg	7.1	7.6	4.9	7.2	5.5	5.5
Calcium (Ca) - NH4Cl/BaCl2	cmol/kg	1.25	1.15	0.524	1.28	0.919	0.788
Magnesium (Mg) - NH4Cl/BaCl2	cmol/kg	0.272	0.253	0.145	0.253	0.192	0.169
Potassium (K) - NH4Cl/BaCl2	cmol/kg	0.127	0.107	0.073	0.101	0.073	0.07
Sodium (NH4Cl/BaCl2)	cmol/kg	0.031	0.033	0.021	0.031	0.024	0.024
Ca:Mg ratio		4.6	4.5	3.6	5.1	4.8	4.7
K:Mg ratio		0.47	0.42	0.51	0.4	0.38	0.42
GTRI					0.07	0.07	0.07
ECR	%	9.4	9.1	12	7.9	8	8.9
Exchangeable acidity	cmol/kg	<0.02	0.03	0.08	<0.02	<0.02	<0.02
Exchangeable aluminium	cmol/kg	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Exchangeable hydrogen	cmol/kg	<0.02	0.02	0.06	<0.02	<0.02	<0.02
ECEC	cmol/kg	1.68	1.57	0.84	1.67	1.21	1.05
Calcium	%	74.3	73.3	62.2	76.9	76.1	75
Magnesium	%	16.2	16.1	17.2	15.2	15.9	16.1
Potassium	%	7.6	6.8	8.7	6	6	6.7
Sodium	%	1.8	2.1	2.5	1.9	2	2.3
Aluminium	%	0	0.3	2	0	0	0
Hydrogen	%	0	1.4	7.4	0	0	0
Salinity EC 1:5	dS/m	0.069	0.05	0.02	0.045	0.038	0.03
Ece	dS/m	0.97	0.71	0.47	1	0.88	0.7
Boron	mg/kg	0.13	0.11	<0.1	0.12	<0.1	<0.1
Iron (Fe)	mg/kg	10	17	21	5.4	4.3	5.4
Manganese (Mn)	mg/kg	4	2.6	0.7	3	1.9	1.3
Copper (Cu)	mg/kg	0.32	0.3	0.12	0.21	0.14	0.11
Zinc (Zn)	mg/kg	1.1	0.86	0.21	1.1	0.69	0.41
Dumas Total Nitrogen	% dry wt	0.082	0.073	0.036	0.073	0.07	0.062
TDS	mg/L	44	32	13	29	24	19
MIR CaCO3 equiv	%	<1	<1	<1	<1	<1	<1
MIR Tot IC	%	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12
Total Carbon	% dry wt	0.68	0.59	<0.2	0.65	0.53	0.45