Agricultural Report

Farm Production and Compost

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'Melton Mowbray'

Tasmania

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1. Prelude

The Compost Kings are proposing a composting facility on the 2.5 ha of land at the Somerton property (*i.e. Lovely Banks road, Melton Mowbray*) under the Southern Midlands council planning scheme. The plan is to produce up to 10, 000 tons of compost at the site (i.e. approximately 17, 000 cubic metres). The benefits of the composting proposal are that it would both value add to the organic waste that would otherwise be destined for landfill and the high quality product could then be utilized to improve the soil health and subsequently farm productivity of marginal farming land. Cotching (2009) states that the "Organic Matter is vital component of a healthy soil as it contributes to soil physical, `chemical and biological fertility". And Chivers (1996) identifies that "both coarse and fine organic matter are essential".

2. Summary of Agricultural Report

The following report demonstrates that incorporating a good quality compost, such as that proposed by the Compost King, could be utilised as a strategic management tool (*i.e. if cost efficient*) to improve the soil structure and fertility, and potentially lift farm productivity outcomes.

3. Introduction

Agronomically it is extremely hard to quantify an ideal soil, but there is plenty that a farmer and agronomist can do to improve the soils to increase farm productivity outcomes. The largest fraction of the soil is its mineral component (*i.e. sand, silt, and clay*). The second major component of a soil is its organic matter. This component of the soil is delicate and can be easily destroyed by cultivation. The role of the of the organic matter in the soil is that it encompasses the nutrient storage and availability, soil buffering, soil structure and water holding capacity.

The soils of the Jones Family agricultural enterprise can be described to vary from light sandy soils (i.e. CEC < 5 meq/100g), to sand-loam soils (i.e. CEC of 5 to 10 meq/100g) to Clay-loam soils (i.e. up to CEC of 15 meq/100g). The organic matter in these farm soils range from

2.1 % to 6.3% (Appendix 1, Appendix 2, and Appendix 3). Generally, it could be sated that a soil of good fertility will have organic matter levels greater than 4%.

4. Farm Compost Demonstration

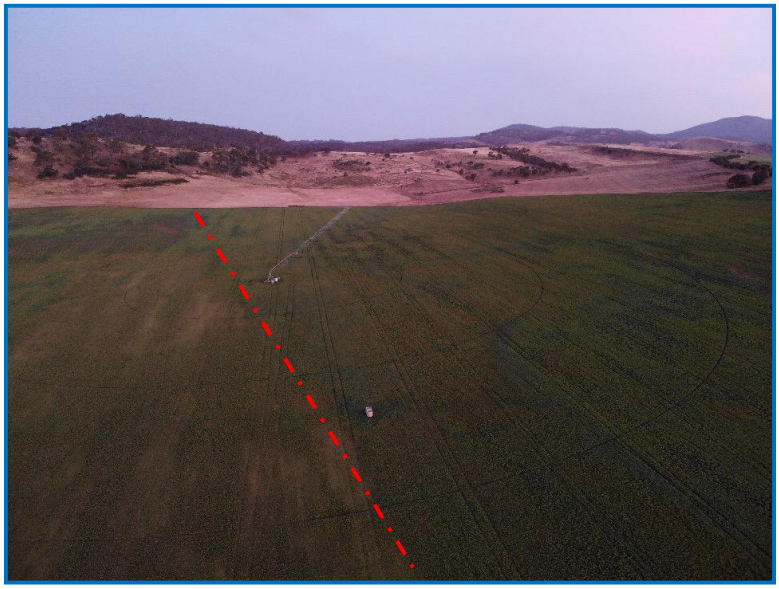
The soils of Pivot #1 can be classified as light sandy soils that have a low CEC levels and low in organic matter levels (Appendix 1). Light sandy soils can be stated to be free draining, weakly structured, the nutrients tend to leach, and the soil is susceptible to erosion. Irrigation is generally necessary to provide good yields in high value crops.

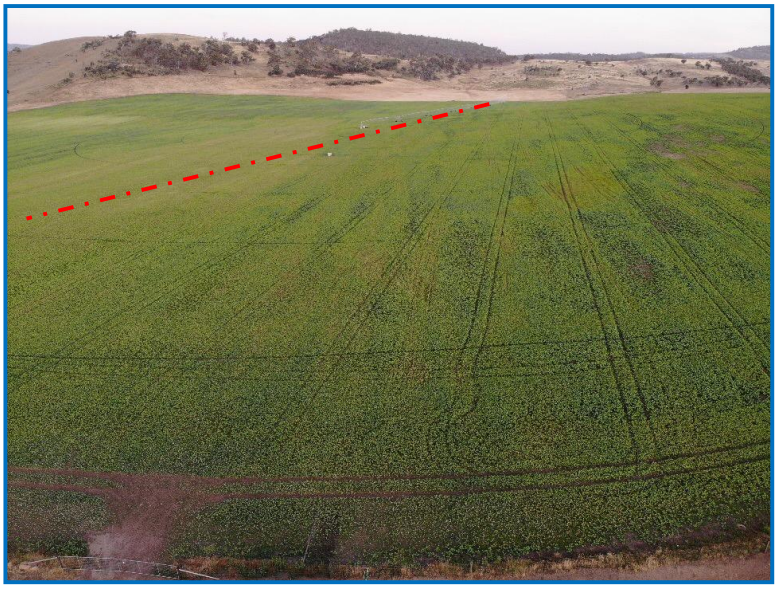
A compost demonstration was conducted on the soils of Pivot #1 (*i.e. compost spread at 3 T/ha*) and then this paddock was sown down to lucerne in October 2019. There is no definitive *(i.e. statistical*) conclusion in the Organic Matter levels in the soil data set (*i.e. six soil samples between 2015 and 2021*) but the most recent soil sample data (*i.e. Pivot #1 – House*) identifies that organic matter levels are now like those in the 2016 soil data, which is good farming outcome as cultivated sandy soils can rapidly decline in organic matter content (Appendix #1). But it should also be noted that when implementing farm management practices to build up the organic matter levels that the process may take several seasons.

The soils of Pivot #2 can be classified as light sandy soils that have low CEC levels and are low in organic matter (Appendix 2). A compost demonstration was conducted on the southern half of the soils of Pivot #2 (*i.e. compost spread at 3 T/ha*) and then this paddock was sown down to a barley cereal crop. Images early in this cereal growth stage, in late 2019, identify a visual difference in the crop where the compost had been spread and incorporated into the soil (Picture #1 and Picture #2).

Picture #1 (*top*) and Picture # 2 (*bottom*).

The right-hand side of the red dotted line (i.e. *both images*) identifies the area of the Pivot #2 soils that represents a compost demonstration. The compost was applied at 3 T/ha and soil incorporated. The barley cereal crop appears visually greener where the compost has been applied.





5. Conclusion

Farm management practices can help maintain or increase the soils organic matter levels. These include, for example, reduced or minimum tillage, retention of crop residues, the use of green manure or cover crops, reduced over grazing and the minimisation of bare earth fallows. A high standard good quality compost, that is cost effective, could provide many benefits on light sandy to sandy-loam soils by increasing farm productivity outcomes in cropping yields and animal productivity gains.

6. Reference and Bibliography

DPIWE (2021). the List (*web site*). Land Information Systems Tasmania. Department of Primary Industry and, Water and Environment, Tasmania, Australia. https://www.thelist.tas.gov.au/app/content/home

Chilvers, B. (1996). Managing Tasmania's Cropping Soils – a practical guide for farmers. Department of Primary Industry and Fisheries, Tasmania, Australia. https://dpipwe.tas.gov.au/Documents/Managing-Tasmanias-Cropping-Soils-2000.pdf

Cotching, B. (2009). Soil Health for Farming in Tasmania. Published by Bill Cotching, Tasmania, Australia https://eprints.utas.edu.au/9088/

.

Soil Wealth (2021). The 'breakdown' on composts. https://www.soilwealth.com.au/resources/fact-sheets/soil-nutrition-and-compost/the-breakdown-on-composts/

Soil Wealth (2021). Organic Soil Amendments. https://www.soilwealth.com.au/resources/global-scan-and-reviews/organic-soil-amendments/

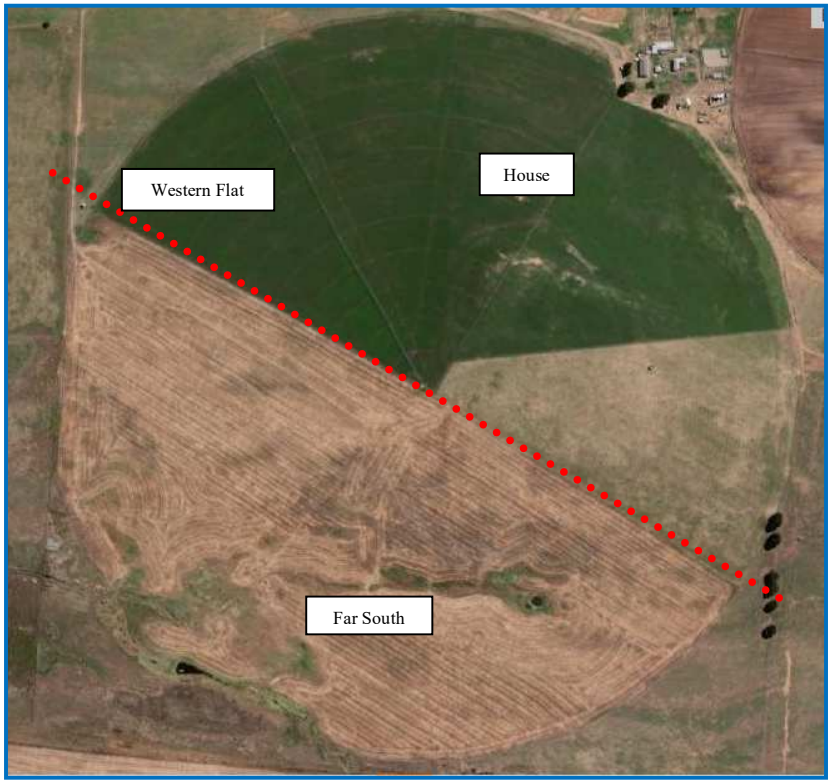
NASAA Certified Organic (2017). Certification Information – composting Guidelines. PO Box 768, Stirling, South Australia. https://www.nasaa.com.au/wp-content/uploads/2019/05/NA010_INFO-SHEET_1_REV.pdf

7. Appendices

Appendix 1. Pivot #1 soil data set.

a.) **ESRI Imagery map** (*theList web site*) identifying **"Pivot #1"** on the Follies property. The family dwelling (Justin Jones) and farm sheds can be identified in top right-hand top corner of the picture.

b.) Table of selected basic data from 6 soil analysis between 2015 to 2021 identifying sandy soil type. (*Note: this paddock has been assigned various names by different soil samplers*). The 'North Pivot*' and the 'Pivot North' soil analysis identifies soil sampling for the complete pivot area (*i.e. prior to any compost applications*). The pivot picture is split by a red dotted line. The top side of red dotted line identifies the House soil analysis after a compost demonstration (*i.e. this is a compost application at 3-ton / ha*). The bottom side of the red dotted line is Far South soil analysis (*i.e. has no compost applications*). The Western Flat Paddock is the House Paddock (*i.e. prior to any compost applications*).



	Guidelines	5.2 - 7.4	12.0 - 40.0			3.0 - 8.0	20 - 70	0.5 - 1.2	7.0 - 20.0	6.0 - 15.0	1.0 - 4.5
Pivot #1	Date	pH CaCl)	CEC	*Soil type*	OC %	OM %	P (Olsen)	K	S	Ca	Mg
North Pivot *	27/07/2015	5.4	4.1	*sand*	1.2	2.1	30 **	0.15	9	3.1	0.6
Pivot North	9/09/2016	5	4.23	*sand*	1.6	2.8	24	0.22	11	3.21	0.63
North Pivot (west Flat)	30/01/2019	4.9	3.64	*sand*	1.3	2.2	23	0.07	8	2.75	0.49
Pivot #1 Far South	17/06/2020	5.6	5.07	*sandy-loam*	1.2	2.1	14	0.3	5	3.58	0.89
Pivot #1 Far South	12/04/2021	5.2	4.27	*sand*	1.4	2.4	19	0.23	4	3.07	0.72
Pivot #1 (House)	12/04/2021	5.6	5.78	*sandy-loam*	1.6	2.7	25	0.3	7	4.48	0.71

Note: Majority of soil analysis is throught the Phosyn lab (QLD) and hence utilise their soil guidelines.

Note: *Denotes IPL Lab **Denotes Phosphorus Colwell. Organic Matter (OC) % = Organic Carbon (OC) % mutiplied by 1.72

Note: ppm = mg/kg (i.e. P & S). Note: meq/100g = cmol(+)/kg (i.e. K, Ca & Mg)

Appendix 2. Pivot #2 soil data set.

a.) **ESRI Imagery map** (*theList web site*) identifying **"Pivot #2"** on the Follies property. The family dwelling (Justin Jones) and farm sheds can be identified in mid left-hand side of the picture.

b.) Table of selected basic data from 6 soil analysis between 2015 to 2021 identifying generally a sandy soil type. (*Note: this paddock has been assigned various names by different soil samplers*). The Pivot #2 Northside, Pivot South, The Pivot West and Pivot East soil analysis identifies soil sampling for the pivot soils prior to any compost applications. The northern side of the Pivot would have a slightly heavier soil type.

	Guidelines	5.2 - 7.4	12.0 - 40.0			3.0 - 8.0	20 - 70	0.5 - 1.2	7.0 - 20.0	6.0 - 15.0	1.0 - 4.5
Pivot #2	Date	pH CaCl)	CEC	*Soil type*	OC %	OM %	P (Olsen)	K	S	Ca	Mg
Pivot #2 Northside (Tip Pdk)	27/07/2015	4.8	6.9	*sandy-loam*	1.9	3.3	71 **	0.51	5	4.4	1.7
Pivot South	9/09/2016	5.5	4.32	*sand*	1.4	2.4	17	0.12	11	3.3	0.72
New Pivot West	20/01/2017	4.5	3.23	*sand*	1.5	2.5	25	0.14	5	2.18	0.72
New Pivot East	20/01/2017	4.5	2.74	*sand*	1.3	2.2	22	0.14	4	1.88	0.57
PIVOT NO 2	2/10/2019	4.9	6.67	*sandy-loam*	2.1	3.6	28	0.37	23	4.76	1.32
PIVOT SOUTH	2/10/2019	5.2	5.24	*sandy-loam*	1.6	2.7	17	0.3	9	3.8	0.9

Note: Majority of soil analysis is throught the Phosyn lab (QLD) and hence utilise their soil guidelines.

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Appendix 3. Extra farm soil data set

Table of selected basic data from 69soil analysis between 2015 to 2021 across other parts of the farming enterprise (i.e. Charlton Farm and Hutton Park properties). These soils results identify some good clay-loam soil types high organic matter levels and soil nutrition levels. The sandy soils would benefit from the addition of compost to lift soil organic matter and nutrition levels.

	Guidelines	5.2 - 7.4	12.0 - 40.0			3.0 - 8.0	20 - 70	0.5 - 1.2	7.0 - 20.0	6.0 - 15.0	1.0 - 4.5
Paddock(s)	Date	pH CaCl)	CEC	*Soil type*	OC %	OM %	P (Olsen)	K	S	Ca	Mg
Boar *	27/07/2015	4.8	4.8	*sand*	2	3.4	33 **	0.26	4	2.9	1.3
Pete's	5/06/2018	4.4	4.04	*sand*	2.1	3.6	26	0.48	11	2.57	0.92
Pitt	5/06/2018	5.1	11.01	*clay-loam*	3.1	5.4	13	0.49	13	7	3.22
Pitt	12/04/2021	5.5	12.8	*clay-loam*	3.3	5.6	16	0.48	6	8.89	3.1
Airstrip	5/06/2018	5.1	12.37	*clay-loam*	3.7	6.3	6	0.79	15	7.31	3.55
Langola	5/06/2018	5.8	15.03	*clay-loam*	3.3	5.7	21	0.46	7	10.73	3.43
Langola	19/03/2021	5.6	11.19	*clay-loam*	2.7	4.6	12	0.38	9	7.92	2.59
ARTHURS	19/03/2021	5.4	5.54	*sandy-loam*	1.9	3.2	19	0.21	5	4.44	0.65

Note: Majority of soil analysis is throught the Phosyn lab (QLD) and hence utilise their soil guidelines.

Note: * Denotes IPL Lab ** Denotes Phosphorus Colwell. Organic Matter (OC) % = Organic Carbon (OC) % mutiplied by 1.72

Note: ppm = mg/kg (i.e. P & S). Note: meq/100g = cmol(+)/kg (i.e. K, Ca & Mg)