



Welcome to Tarinore Farm

Composts, Preps and Soil Biology Field Day



Program

- Intro and House keeping
- James Turnell, UNE
- 12:30 – Lunch
- Lee Fieldhouse – Island Biologicals
- Discussion

What questions do you have?

What did you want to
learn/see/hear today?

Rule of Succession

A species will move into an environment when the conditions become suitable for its establishment, and will move out of that environment when the conditions become unsuitable for its reproduction

ECOSYSTEM BASICS



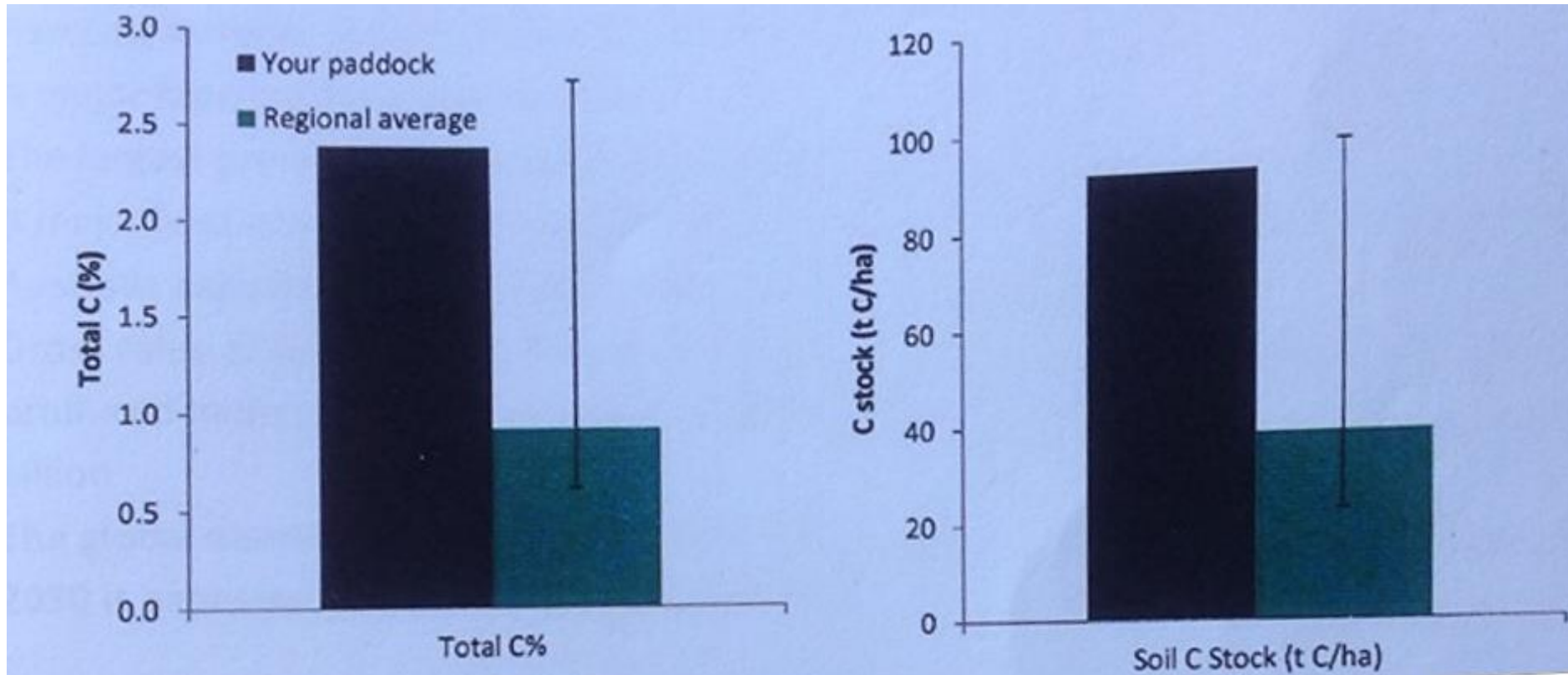
The Four Ecosystem Processes



Moredun – Richard Makim

- Long term grazing history – taken up in 1825
- History of cropped areas and pasture “improvement”
- Planned Grazing implemented across whole property
 - Areas that were just designated as grazing responded
 - Areas with cropping and ploughing history did not respond as well.

Moredun – Straight grazing result 2004-2011



This 1.5% increase means the top 30cm of soil now can hold an additional 22mm of rainfall.

BUT – researchers discarded this result as an “outlier”

Native Grass species recovering after 5-6 years of grazing management



“But some paddocks we couldn’t move the country with the holistic rotation [grazing] alone... there were too many sins related to toxins, irrigation, hard pans, pH and lack of plant growth and density to kick start the carbon and mulch etc.” Richard

This was where the compost application in small amounts across a large area moved this from near the district average of 1% carbon to 5.5% carbon

+63mm additional rainfall storage



However, there are limitations

- Capital intensive
- Time involved
- Water required considerable even in temperate climate of the New England
- Access to suitable material – tomato farm waste in this case



SOUTHERN BLUE
REGENERATIVE EDUCATION



Johnson-Su BEAM

- Process to create fungal-dominated compost
- Over the 4.5 year trial he observed a **25-times increase in active soil fungal biomass** and an **annual average capture and storage of 10.27 metric tons soil C ha⁻¹ year**
- Increase nutrient availability
- And significant Increase crop establishment and yields

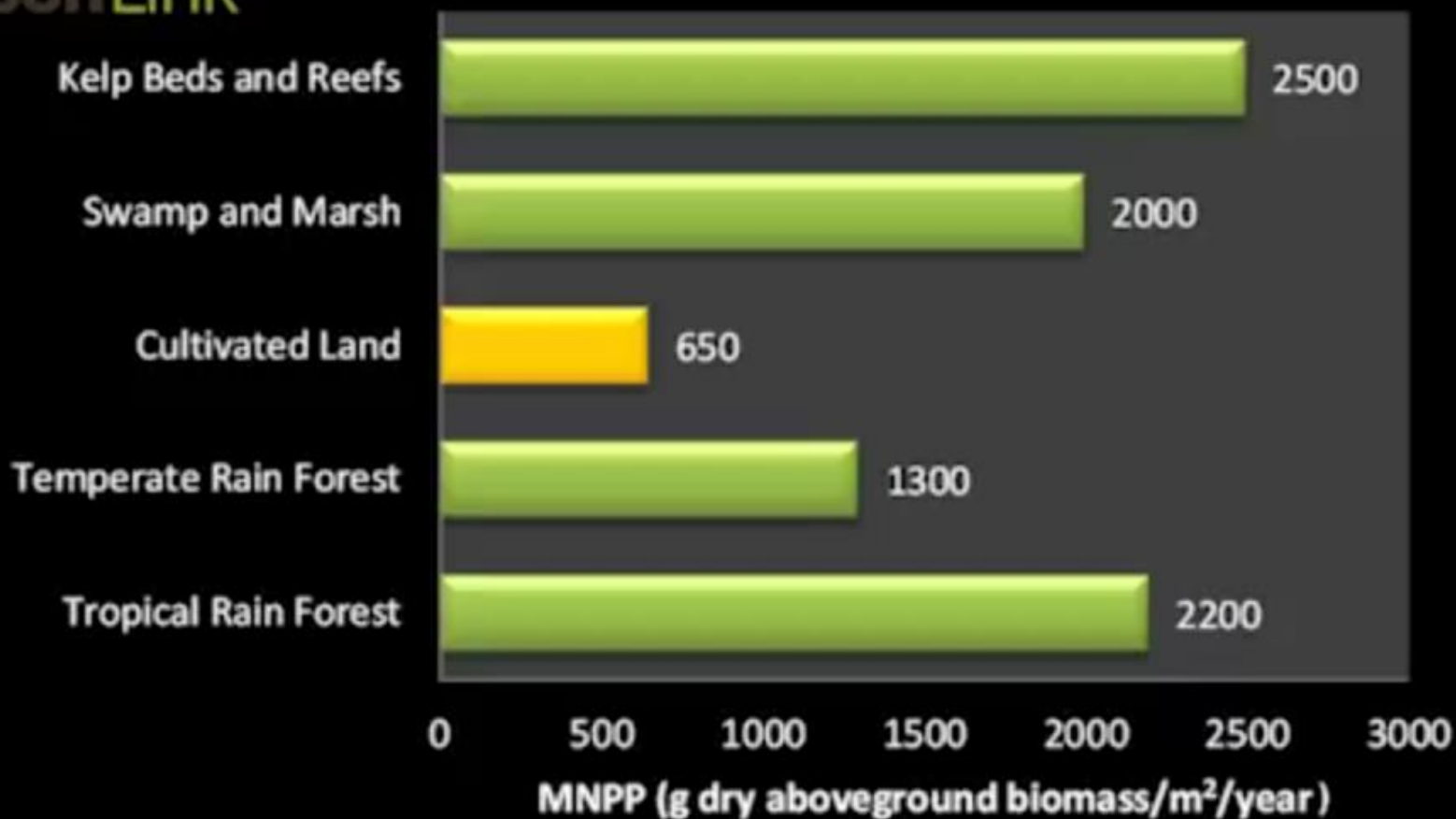
Months	0	6	8	15	19	Percent Increase	R ²	Regression
Manganese (mg/kg)	3.25	1.86	1.65	14.31	40.14	1135%	R ² = 0.969	2nd Order
Iron (mg/kg)	4.89	4.12	2.66	27.01	59.19	1110%	R ² = 0.9892	2nd Order
NO ₃ -N (mg/kg)	1.5	1.55	2.00	2.35	3.1	107%	R ² = 0.9847	Linear
SOM (%)	0.75	1.25	1.22	1.49	1.41	88%	R ² = 0.7854	Linear
Magnesium (mg/kg)	1.09	0.075	0.81	1.67	1.99	83%	R ² = 0.7954	2nd Order
Calcium (meq/L)	4.09	2.82	3.00	6.07	7.19	76%	R ² = 0.6367	Linear
Kjeldahl N (mg/kg)	633	719	739.00	752	1041	64%	R ² = 0.8244	2nd Order
Phosphorus (mg/kg)	6.9	12.2	10.00	15.3	11.3	64%	R ² = 0.4624	Linear
Zinc (mg/kg)	0.5	0.63	0.48	0.93	0.81	62%	R ² = 0.6652	Linear
Copper (mg/kg)	1.17	1.1	1.04	1.74	1.64	40%	R ² = 0.6591	Linear
Potassium (mg/kg)	30	33	32.00	42	41	37%	R ² = 0.8712	Linear

20 month Study, 5 Sampling Periods



CarbonLink

Most Productive Ecosystems



Whittaker, (1978)

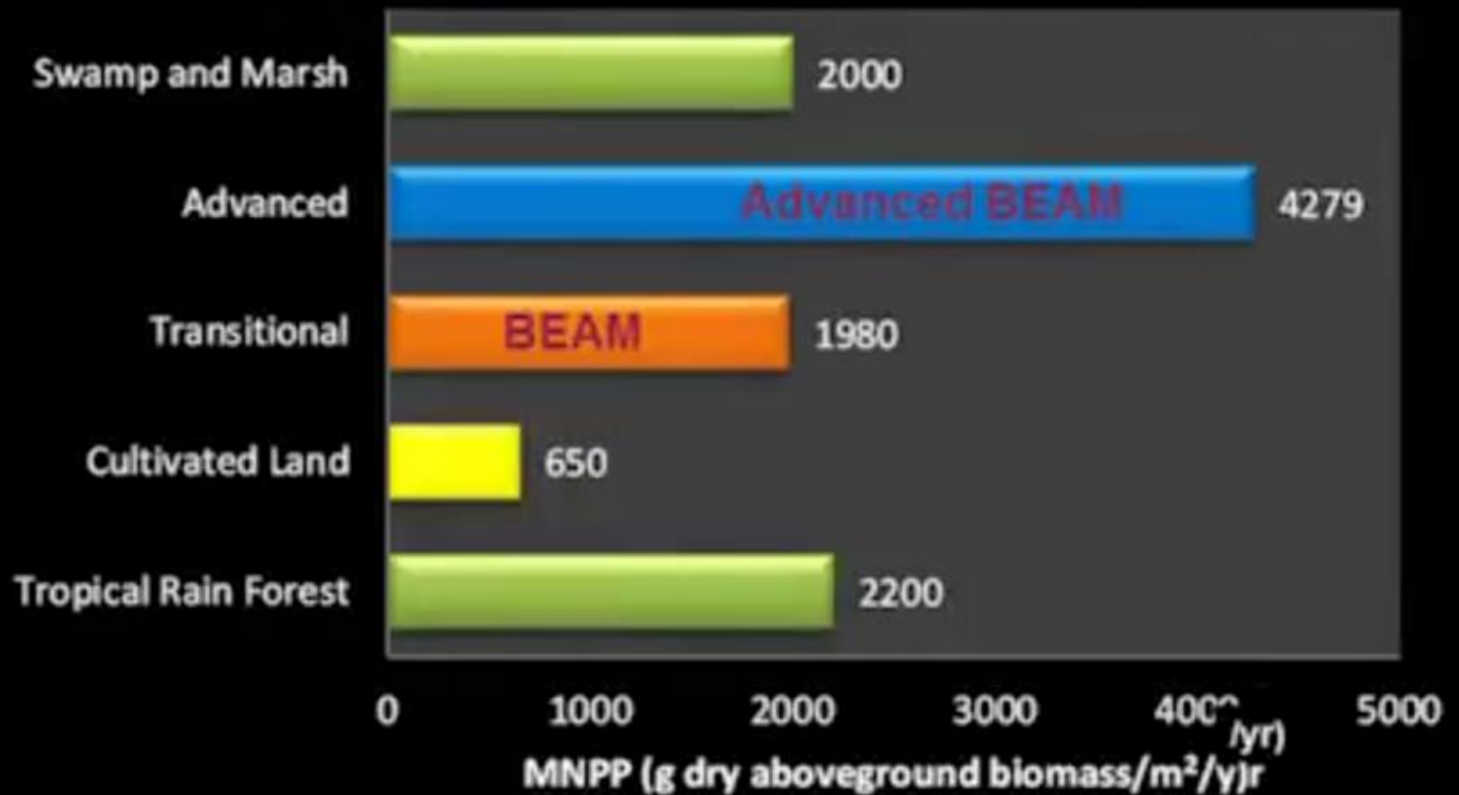


SOUTHERN BLUE
REGENERATIVE EDUCATION



CarbonLink

How Does a Biologically Enhanced Agricultural Management (BEAM) System Perform?



SOUTHERN BLUE
REGENERATIVE EDUCATION



Figure 2. A Johnson-Su Composting Bioreactor





Figure 8. *Irrigation System for a Johnson-Su Composting Bioreactor*





- Material

- Woodchips, Leaves, any material to hand

 Key is to maintain aerobic conditions in the static pile

- Vermicomposting

- Add worms in once initial compost temp has fallen below 26°C
 - Tube air holes will fill in and the worms maintain the aerobic conditions in the pile

- Age – min 9-12 months to allow for fungal maturity



Use and Application

- Extract the microbes from the compost material and apply with water spray at
1 kg of compost/hectare
- Use as an inoculant for seed being sown – pasture, cover crops, forage or pasture crops

- Create a batter slurry
 - ½ cup of a milk/molasses mixture (8 parts milk to 1 part molasses)
 - a litre of compost
 - Water (amount varies - add the water while stirring until the compost slurry has a viscosity similar to pancake batter)
- **1 litre of the resultant slurry used per 25kg of seed** in a cement mixer then air dried before planting (wet planting can be done with larger seeds)

<https://www.csuchico.edu/regenerativeagriculture/bioreactor>

Johnson-Su Composting Facebook Group

<https://www.facebook.com/groups/233254887357239/>

Wilmot – Stuart Austin

- Setup in July 2017 and had three bio reactors
 - 25% Green waste - lawn clippings & leaves
 - 25% Fine wood shavings
 - 25% Coarse wood shavings
 - 25% Sorghum straw/mulch

Key Microbe Groups

Group	Biomass (mg/kg)	
	Yours	Guide
Total microorganisms	819.5	50.0
Total bacteria	90.8	15.0
Total fungi	712.7	33.8
Bacteria		
Pseudomonas	18.764	1.000
Actinomycetes	9.862	1.000
Gram positive	43.038	4.000
Gram negative	47.788	11.000
Methane oxidisers	0.649	0.500
Sulphur reducers	0.000	< 0.005
True anaerobes	2.214	< 0.005
Eukaryotes		
Protozoa	16.009	1.300
Mycorrhizal fungi (including VAM)	74.817	10.000

Comments

Useful indicators	Concentration (mg/kg)	
	Yours	Guide
Microbial diversity	27.7	80.0
Fungi : Bacteria	7.8	2.3
Bacterial stress	0.3	< 0.5
Compost maturity	89.8	< 80.0
Disease suppression	100.0	< 80.0
Nutrients held in microbes	Concentration (mg/kg)	
	Yours	Guide
Nitrogen (N)	43.463	3.450
Phosphorus (P)	24.585	1.500
Potassium (K)	8.195	0.500
Sulphur (S)	8.195	0.500
Calcium (Ca)	8.195	0.250
Magnesium (Mg)	8.195	0.250
Carbon (C)	374.115	22.688

Key

Poor

Fair

Good



Key Microbe Groups

Group	Biomass (mg/kg)	
	Yours	Guide
Total microorganisms	655.9	50.0
Total bacteria	87.9	15.0
Total fungi	547.3	33.8
Bacteria		
Pseudomonas	19.164	1.000
Actinomycetes	10.186	1.000
Gram positive	40.302	4.000
Gram negative	47.631	11.000
Methane oxidisers	0.000	0.500
Sulphur reducers	0.000	< 0.005
True anaerobes	2.437	< 0.005
Eukaryotes		
Protozoa	20.636	1.300
Mycorrhizal fungi (including VAM)	63.599	10.000

Comments

Useful indicators	Concentration (mg/kg)	
	Yours	Guide
Microbial diversity	31.0	80.0
Fungi : Bacteria	6.2	2.3
Bacterial stress	0.2	< 0.5
Compost maturity	87.1	< 80.0
Disease suppression	100.0	< 80.0
Nutrients held in microbes	Concentration (mg/kg)	
	Yours	Guide
Nitrogen (N)	37.093	3.450
Phosphorus (P)	19.677	1.500
Potassium (K)	6.559	0.500
Sulphur (S)	6.559	0.500
Calcium (Ca)	6.559	0.250
Magnesium (Mg)	6.559	0.250
Carbon (C)	300.586	22.688

Poor

Fair

Good

Key



SOUTHERN BLUE
REGENERATIVE EDUCATION

Key Microbe Groups

Group	Biomass (mg/kg)	
	Yours	Guide
Total microorganisms	356.6	50.0
Total bacteria	68.9	15.0
Total fungi	270.4	33.8
Bacteria		
Pseudomonas	13.673	1.000
Actinomycetes	9.930	1.000
Gram positive	34.443	4.000
Gram negative	34.487	11.000
Methane oxidisers	0.000	0.500
Sulphur reducers	0.000	< 0.005
True anaerobes	1.670	< 0.005
Eukaryotes		
Protozoa	17.312	1.300
Mycorrhizal fungi (including VAM)	44.610	10.000

Comments

Useful indicators	Concentration (mg/kg)	
	Yours	Guide
Microbial diversity	36.7	80.0
Fungi : Bacteria	3.9	2.3
Bacterial stress	0.4	< 0.5
Compost maturity	92.9	< 80.0
Disease suppression	100.0	< 80.0
Nutrients held in microbes	Concentration (mg/kg)	
	Yours	Guide
Nitrogen (N)	22.889	3.450
Phosphorus (P)	10.698	1.500
Potassium (K)	3.566	0.500
Sulphur (S)	3.566	0.500
Calcium (Ca)	3.566	0.250
Magnesium (Mg)	3.566	0.250
Carbon (C)	164.785	22.688

Key

Poor

Fair

Good

