WHAT'S THE SCIENCE BEHIND THE OUTCOMES?

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Future Drought Fund

West Gippsland Catchment Management Authority

Food & Fibre Gippsland

CORANGAMITE CMA

Glenelg Hopkins CMA

NORTH EAST CATCHMENT MANAGEMENT AUTHORITY

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towongshire

Recent Work

Scaling out of successful multi-species pasture management in rainfed dairy systems of southern Australia to increase drought resilience at landscape and catchment levels (DA, DAFF) (2022-2024) (*Future Drought Fund Drought Resilient Soils and Landscapes Program*)

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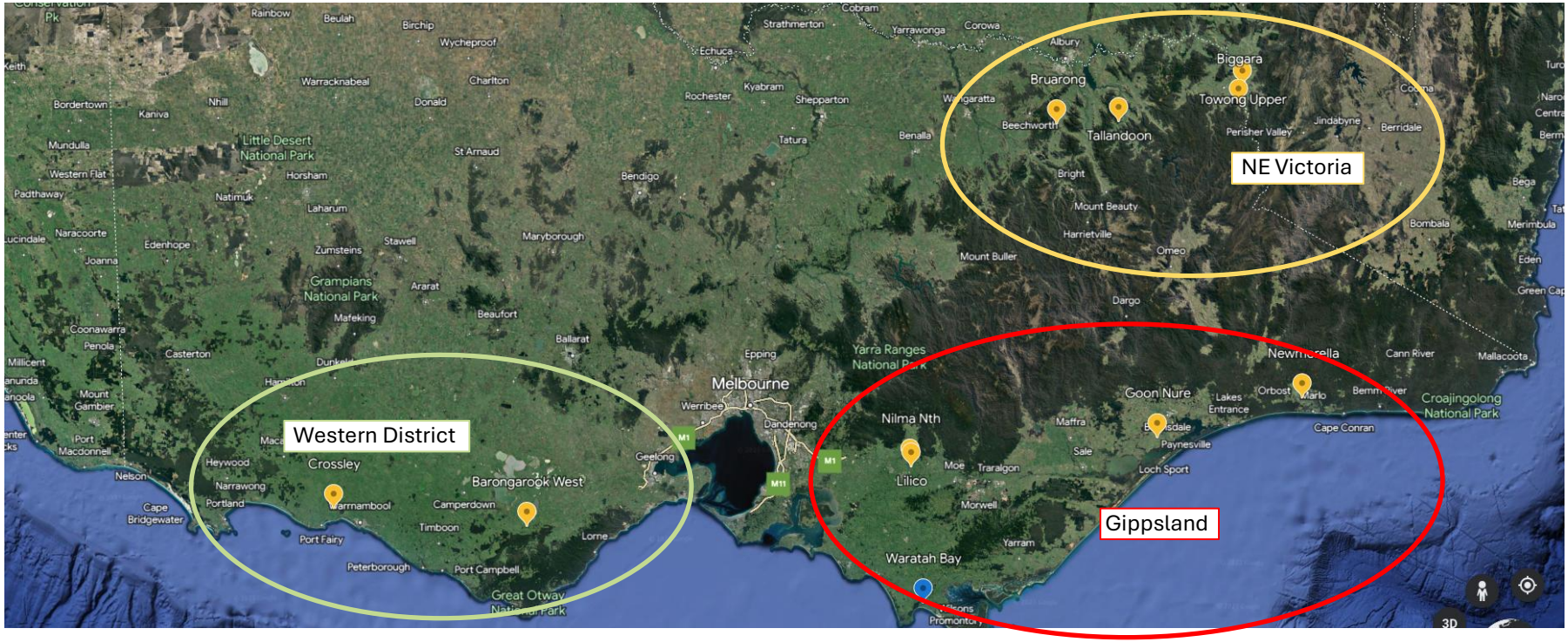
Location of trial sites: 11 farms, 3 regions



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Experimental Design

multispecies

ryegrass

Details

Commercial farms

Paired paddock approach

Farmer management

Measurements

Pasture production, quality and composition

Soil carbon and nitrogen (deep cores)

Soil microbiology (deep cores)

Soil moisture (real time, capacitance probes)

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Results

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Pasture production : Victoria

Autumn 2023 to Autumn 2024

Region	Site	Pasture production (t DM /ha/yr)		Annual rainfall (mm)	Average annual Min and Max temp (°C)
		Ryegrass	Multispecies		
Western District	Crossley	11.85	15.12	675	10, 19
	Barongarook West	15.35	18.22	714	7.5, 19
Gippsland	Nilma North	13.09	12.69	1020	8.4, 19
	Lilico	18.03	NA	1020	8.4, 19
	Newmerella	16.61	19.39	768	10, 21
	Goon Nure	7.77	8.46	645	8.4, 20
	Waratah Bay	11.08	16.55	778	10, 19
NE Victoria	Tallandoon	25.42	23.54	999	7.7, 21
	Bruarong	8.63	8.64	959	7.8, 18
	Biggara and Towong Upper	9.93	15.34	926	7.4, 21

Key Findings

- Climate a key driver of production
- Low inputs reduced production
- Other factors can influence differences seen
- No loss in annual production if inputs the same

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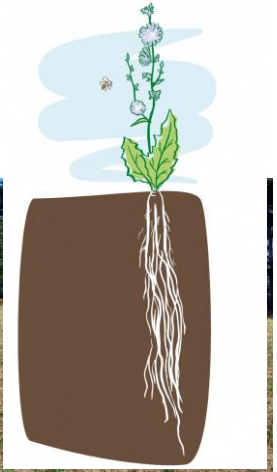
Pasture production :

Chicory



Ryegrass , Gippsland February

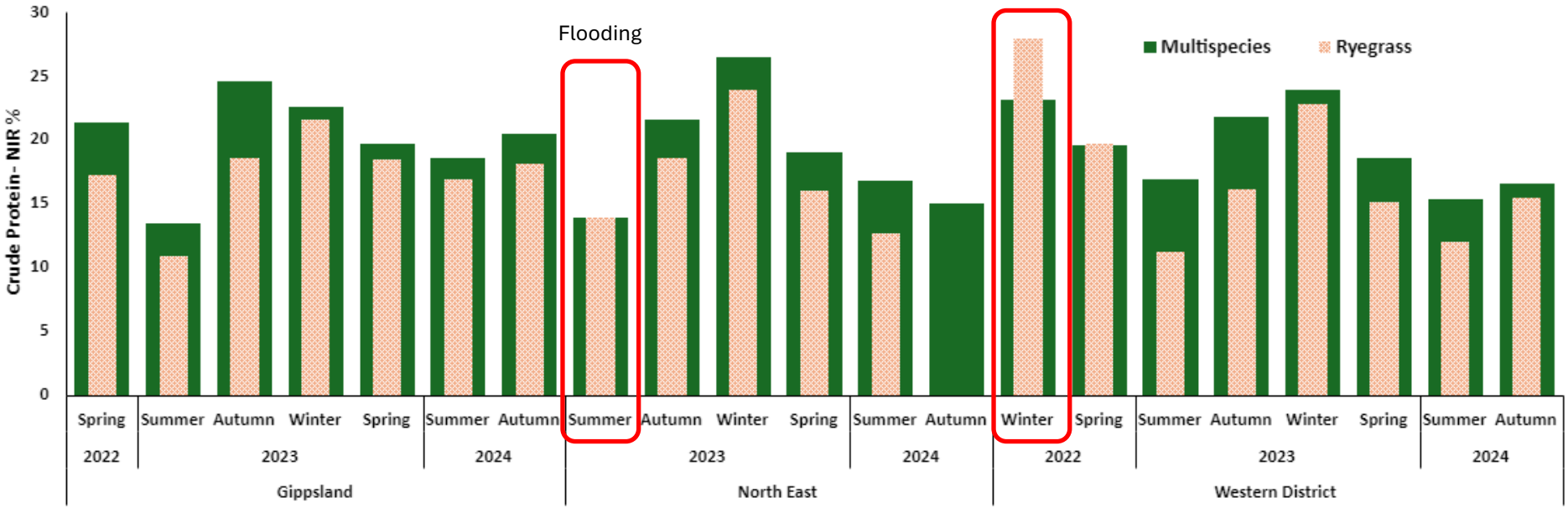
Multispecies, Gippsland February

Ryegrass, Western District
February

Multispecies, Western District
February

Image: Cotswold seeds

Pasture quality : crude protein (Victoria)



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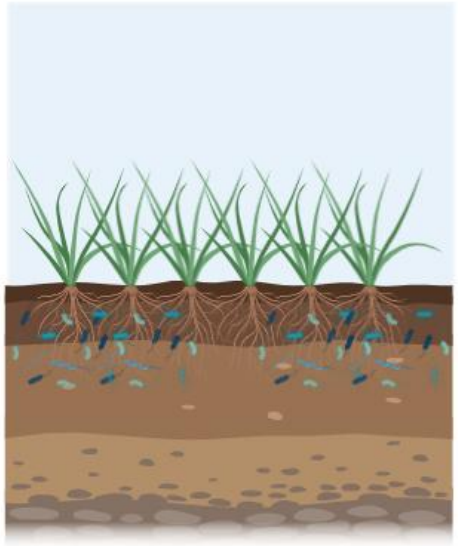
Pasture composition : maintaining diversity



Ryegrass monoculture

Multispecies

- Above and below ground competition

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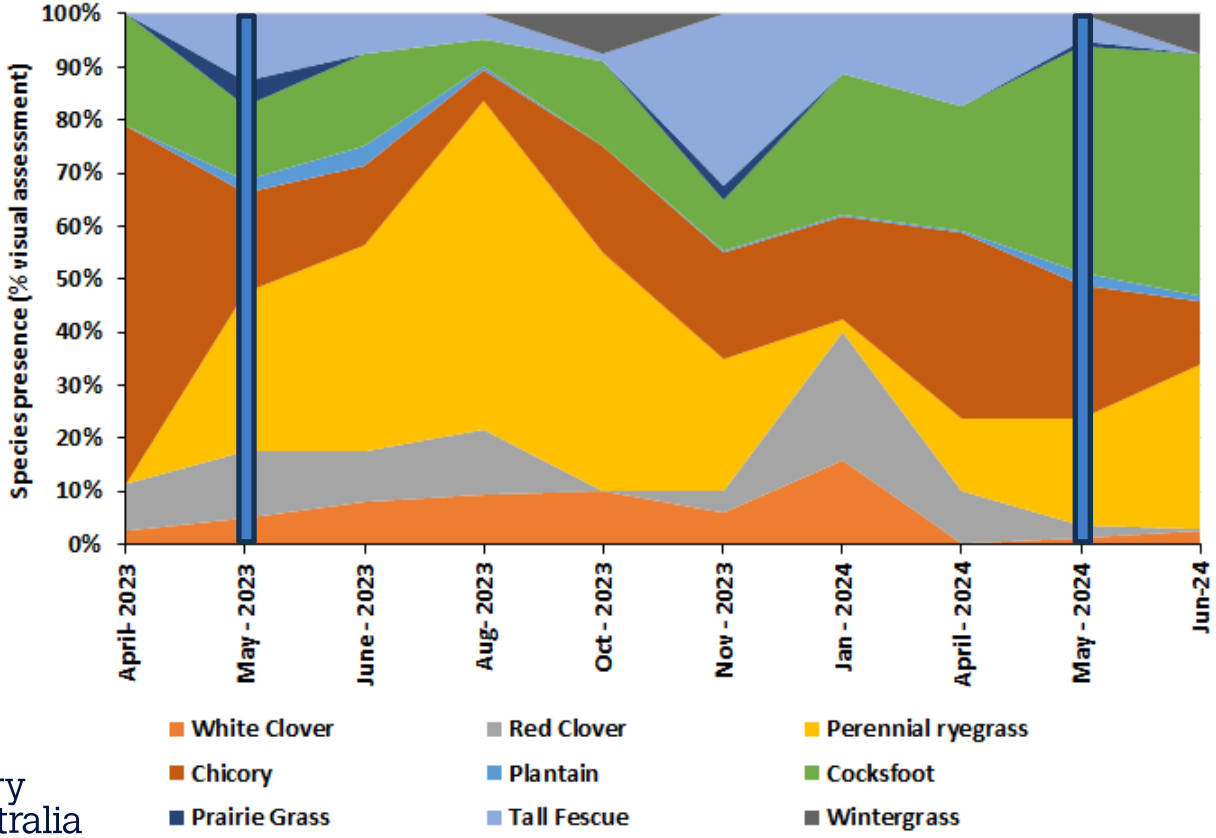
Pasture composition : Barongarook West



Key Findings

- Variation in composition of mix over time
- Across Victoria similar patterns

Note: May 2024 production < May 2023

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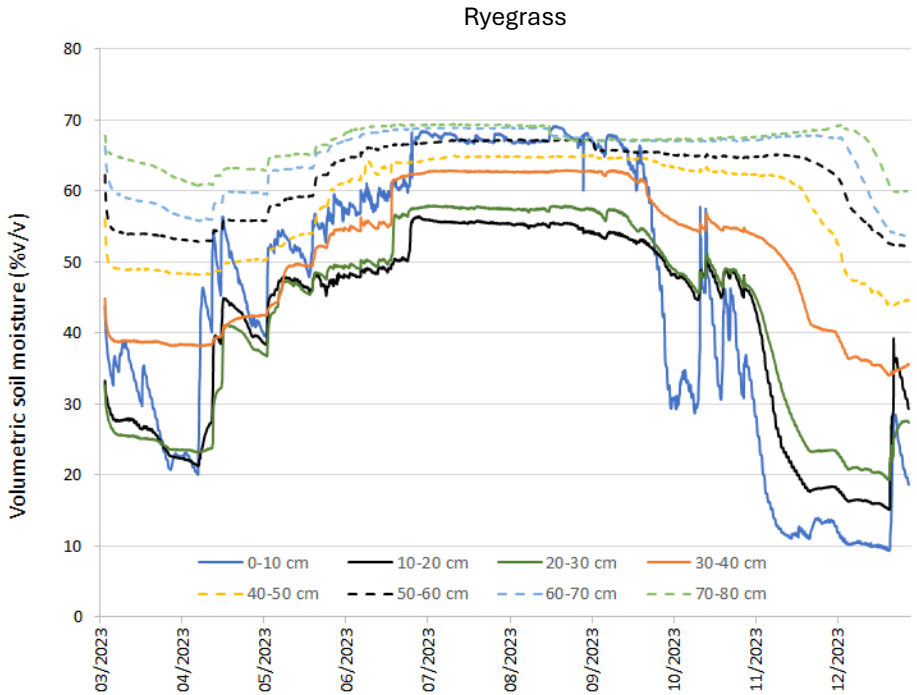
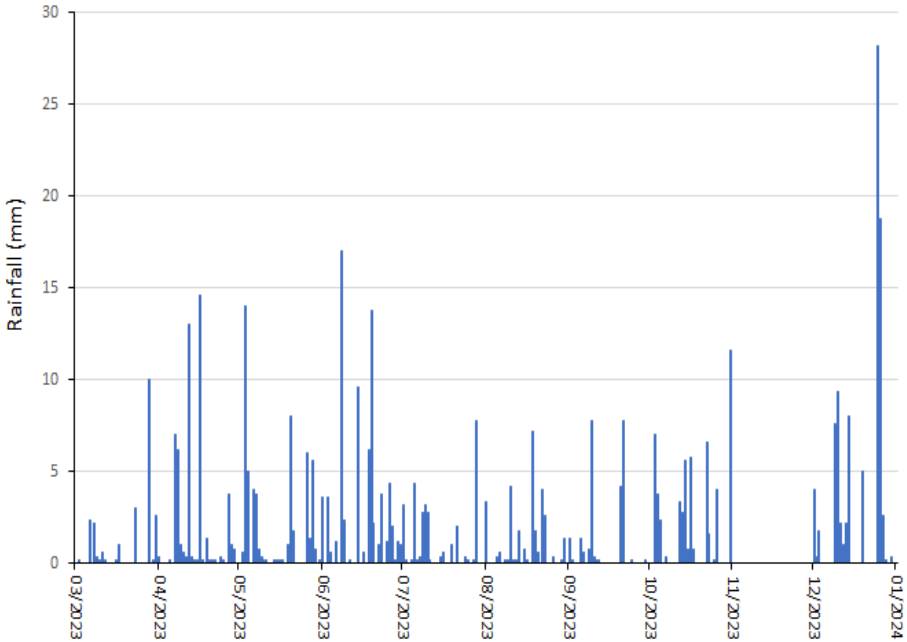
Soil moisture : Barongarook West





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Key Findings

- Soil moisture reflects rainfall and season

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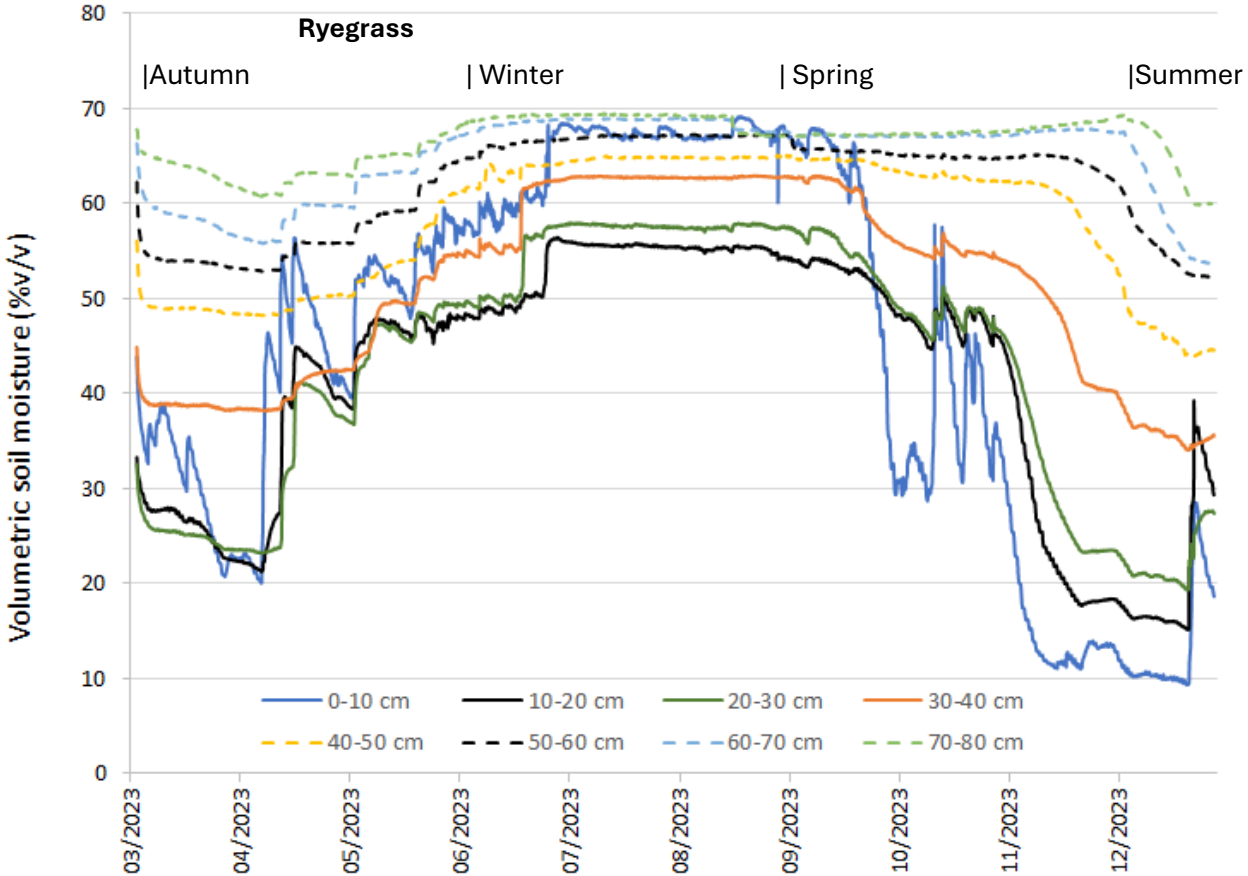
Soil moisture : Barongarook West



Key Findings

- Greatest fluctuation in top 30 cm

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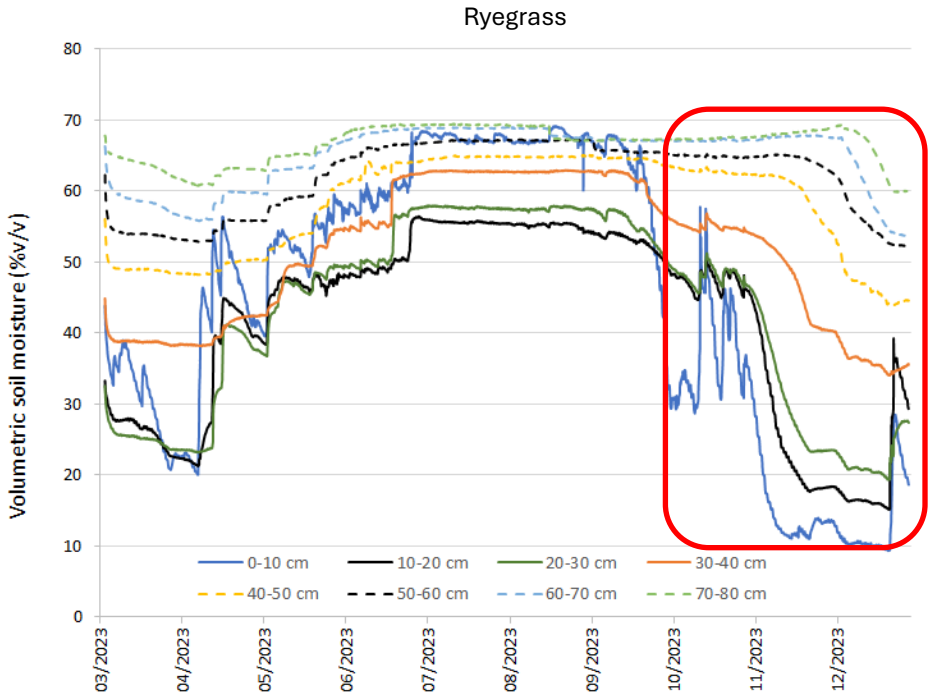
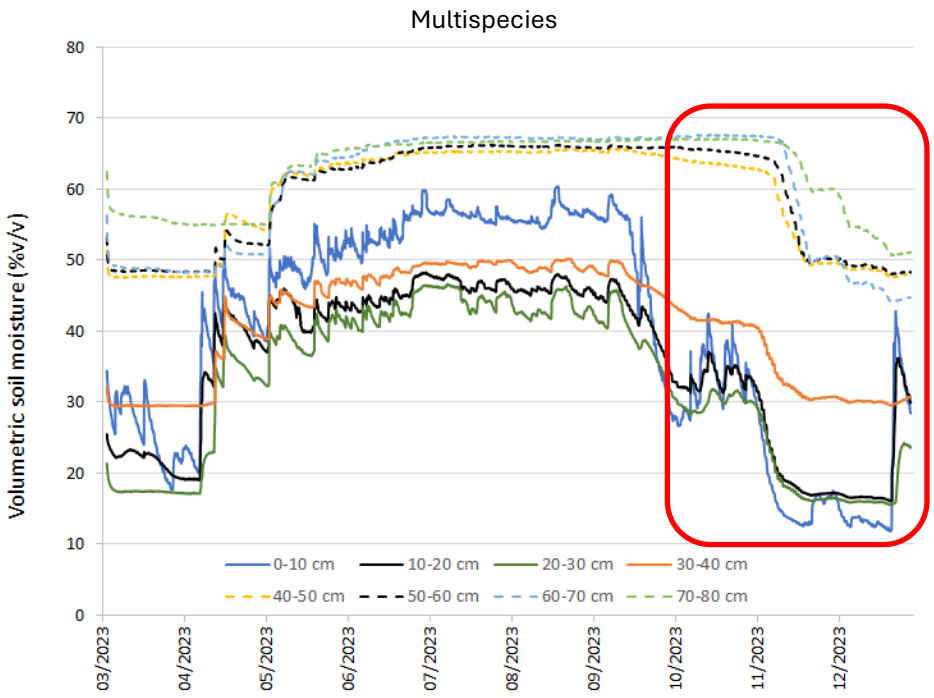
Soil moisture : Barongarook West





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Key Findings

- Greater soil moisture taken from multispecies pasture soil at depth in late-autumn

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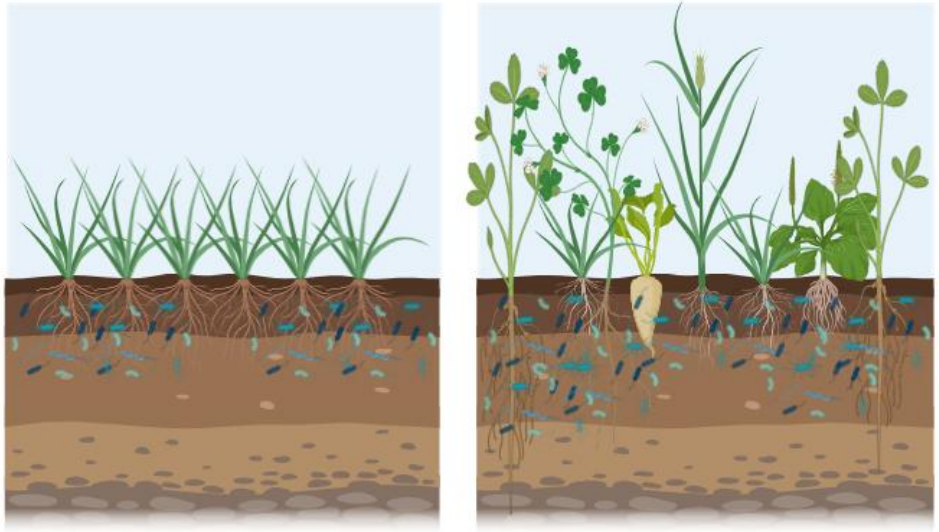
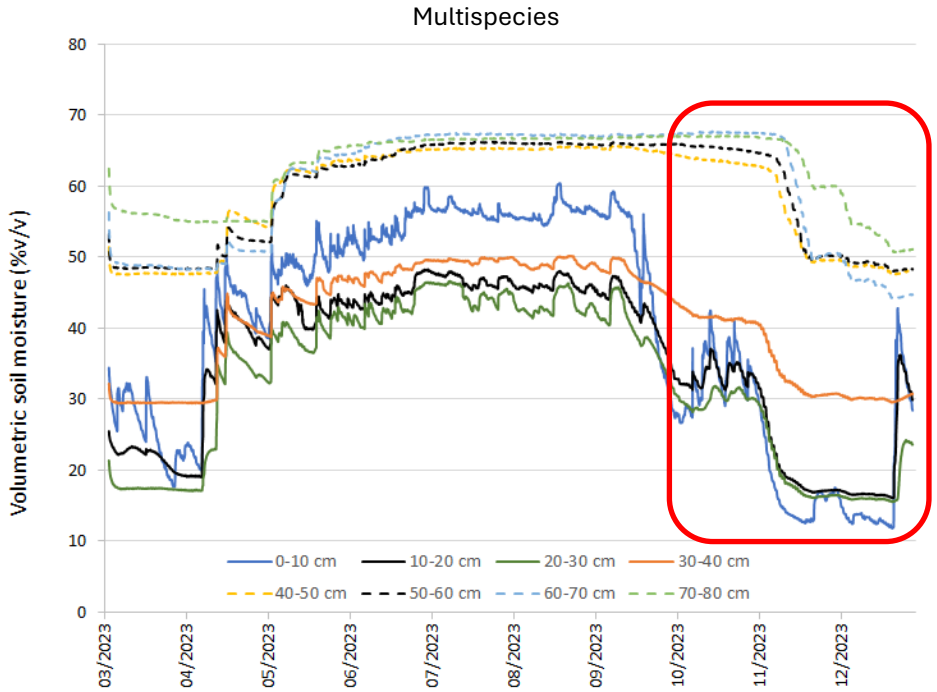
Soil moisture : Barongarook West



Ryegrass monoculture

Multispecies



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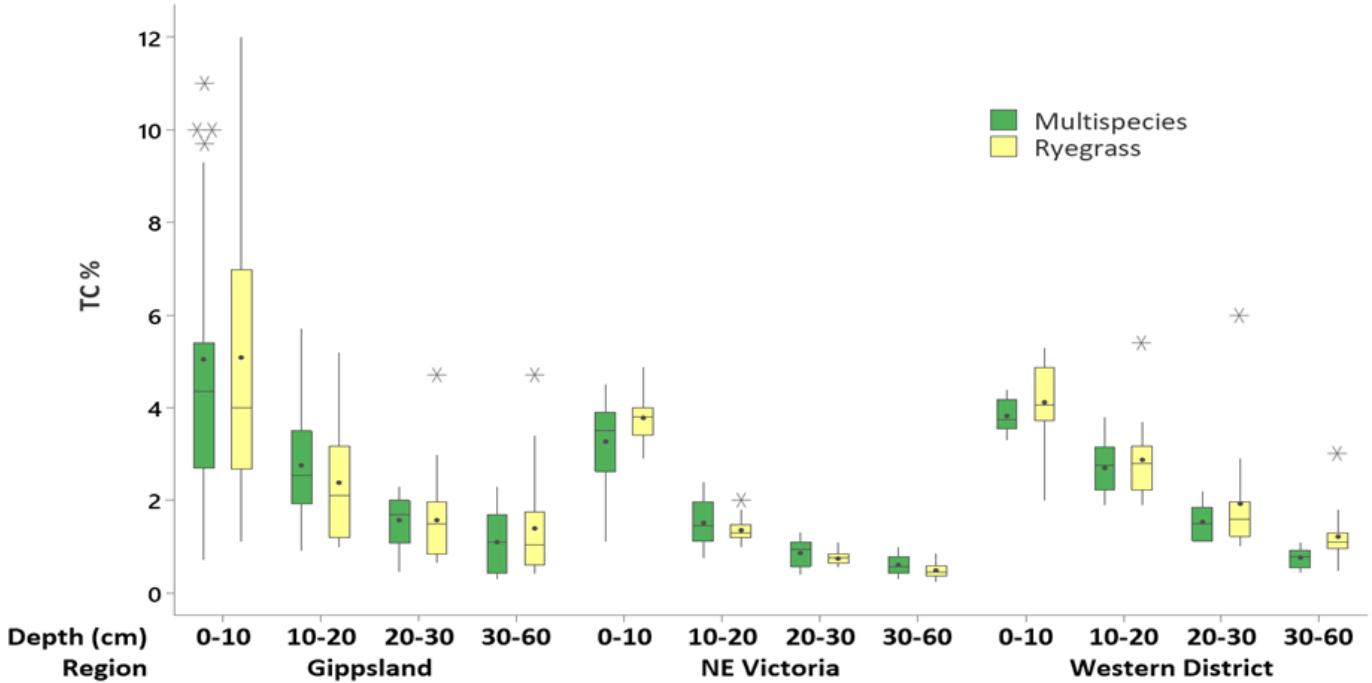
Soil carbon : Victoria



Key Findings

- Carbon decreases with depth
- Affected by climate
- No difference between pasture types
- Pattern for nitrogen the same

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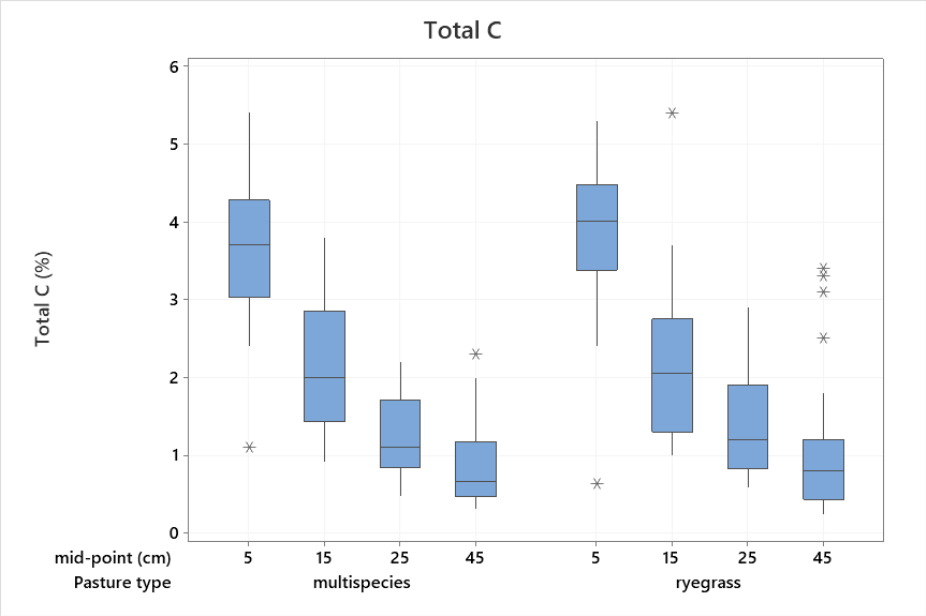
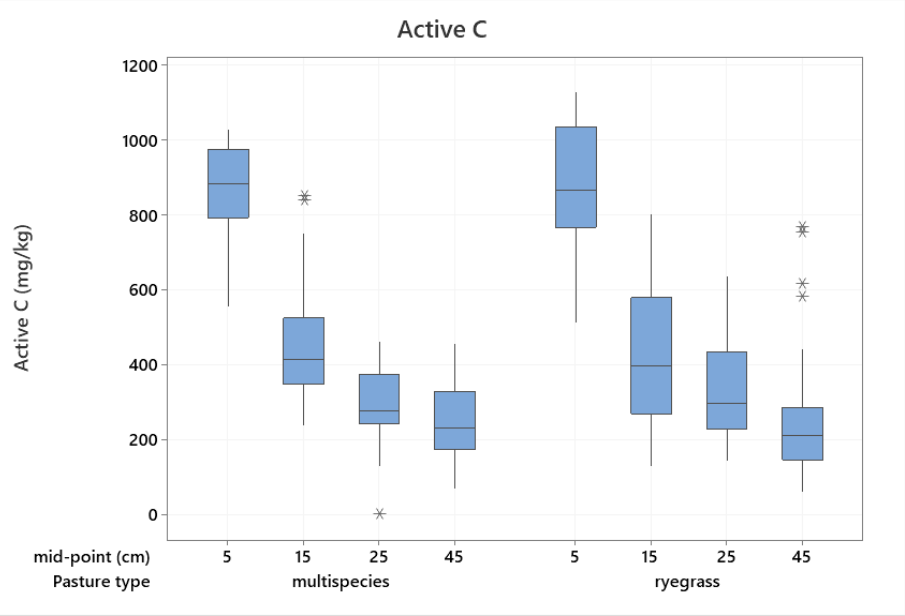
Soil carbon : Victoria





Key Findings

- No difference between pasture types

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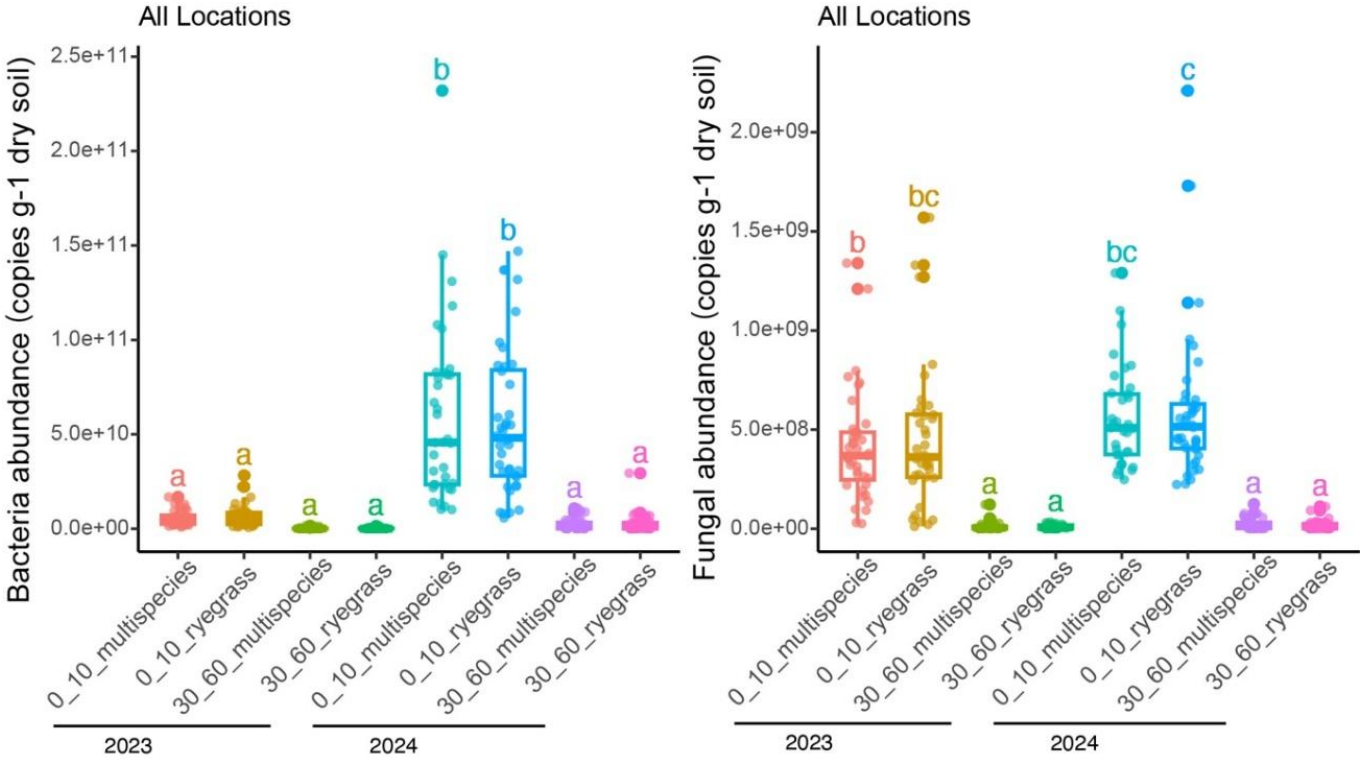
Soil health : Victoria – biological abundance



Key Findings

- Differences with depth
- No difference between pasture types

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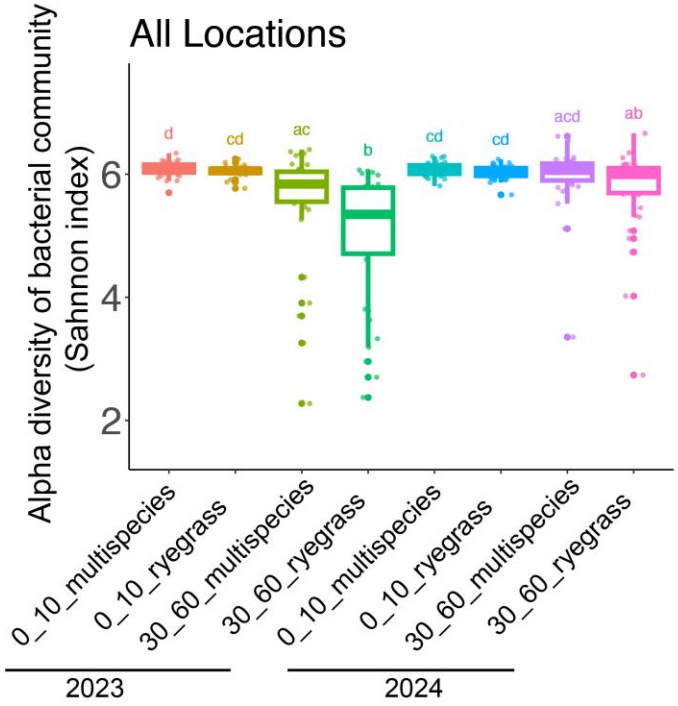
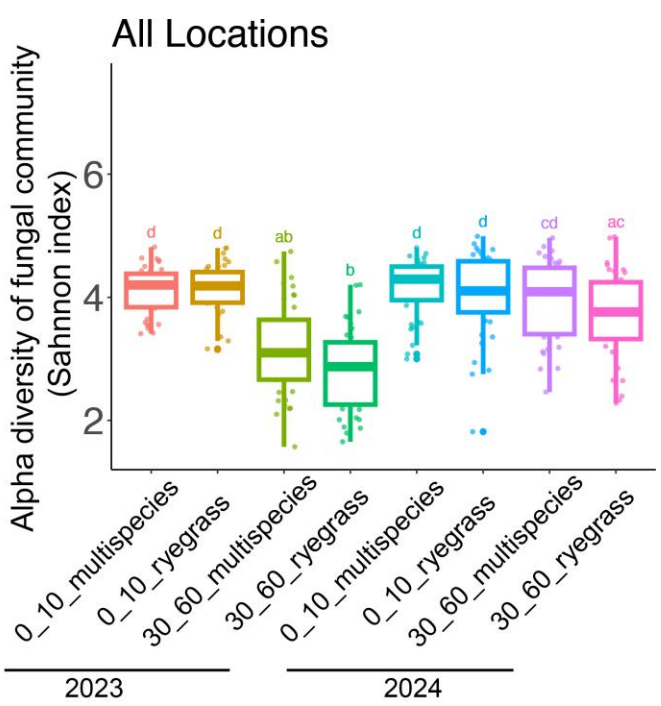
Soil health : Victoria – biological diversity





Key Findings

- Differences with depth
- No difference between pasture types

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Key insights

Q: Are there benefits of using multispecies pastures for dairy production compared to ryegrass monocultures?

1

Pasture production

Annual benefits with multispecies

Seasonally influenced

Extended season

Reduced N = reduced production

2

Pasture quality

CP often better, particularly when more valuable

3

Soil Carbon and Nitrogen

No evidence of changes – requires much longer time

Traditional systems high C (3-4%)

4

Soil health

No evidence of changes – both high organic matter systems

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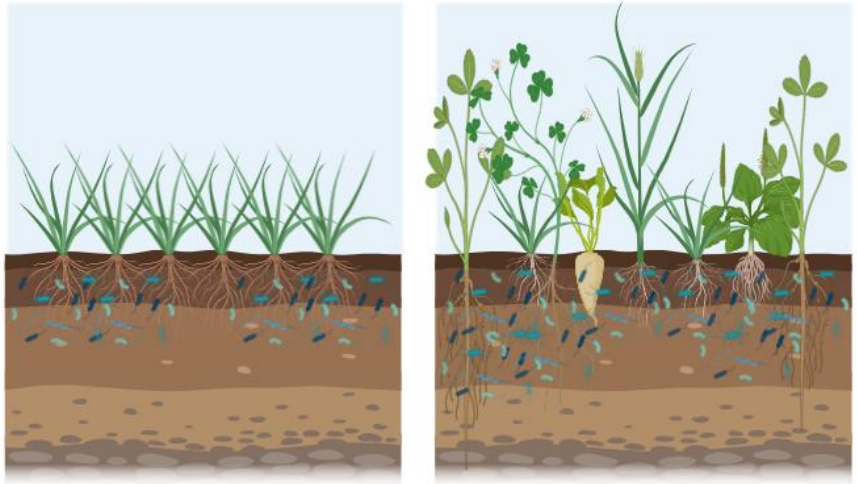
Take Home messages from research findings



Ryegrass monoculture

Multispecies

- Benefits from multispecies pastures evident (drought resilience)
- Diversity maintenance challenging – consider seed mix
- Longer-term studies required to test soil and ecosystem service outcomes

Future Drought Fund Long-term trials project *Feed 365* enables agronomic measures from three farms (led by Deakin Uni)

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Thankyou

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Image: Barenbrug seeds