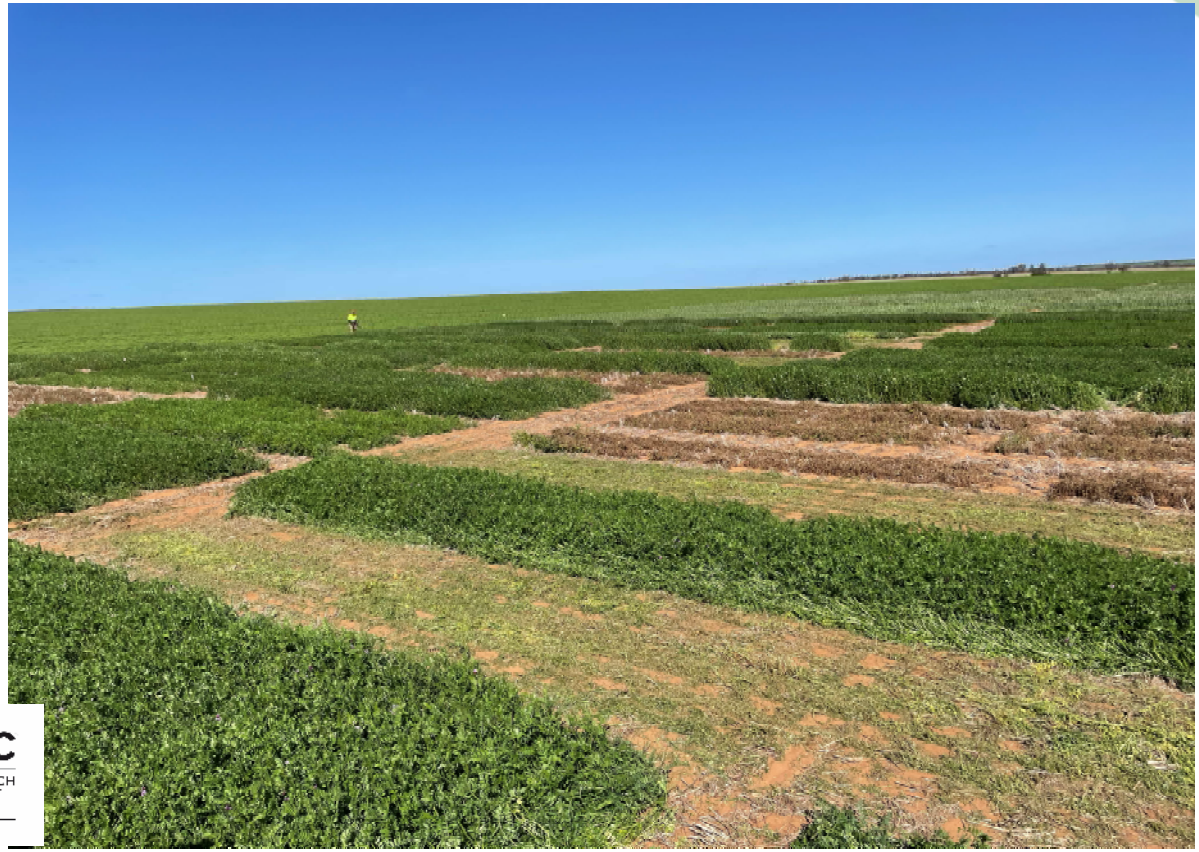
Vetch agronomy in the Victorian Mallee

Brooke Bennett, Angus Butterfield, Yolanda Plowman



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Acknowledgments

- This research was funded by the GRDC as part of the ‘National Grower Network – Vetch agronomy for the lower Vic Mallee’ project (BWD2304-001SAX).

- We thank Linc Lehmann and Scott Anderson for hosting the trials.

Photo: BCG, 29/8/24 Ouyen site

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Vetch in the Victorian Southern Mallee

- Successfully grown as a LRZ legume in the southern Mallee for many years.
- Tolerates dry periods
- Fixes high levels of N
- Utilised as a disease break, a grass weed break and has several end uses:
    - Grazing
    - Hay
    - Brown manure
    - Harvested for seed

Photo: BCG

2022 Birchip GRDC NGN Forum

- Although vetch has been included in the rotation for many years, there are several knowledge gaps to be addressed.

- Knowledge gaps:
    - How is biomass production affected by end use?
    - Do different end uses affect the N legacy effects?
    - Do different end uses affect the soil moisture left over?

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The Aim

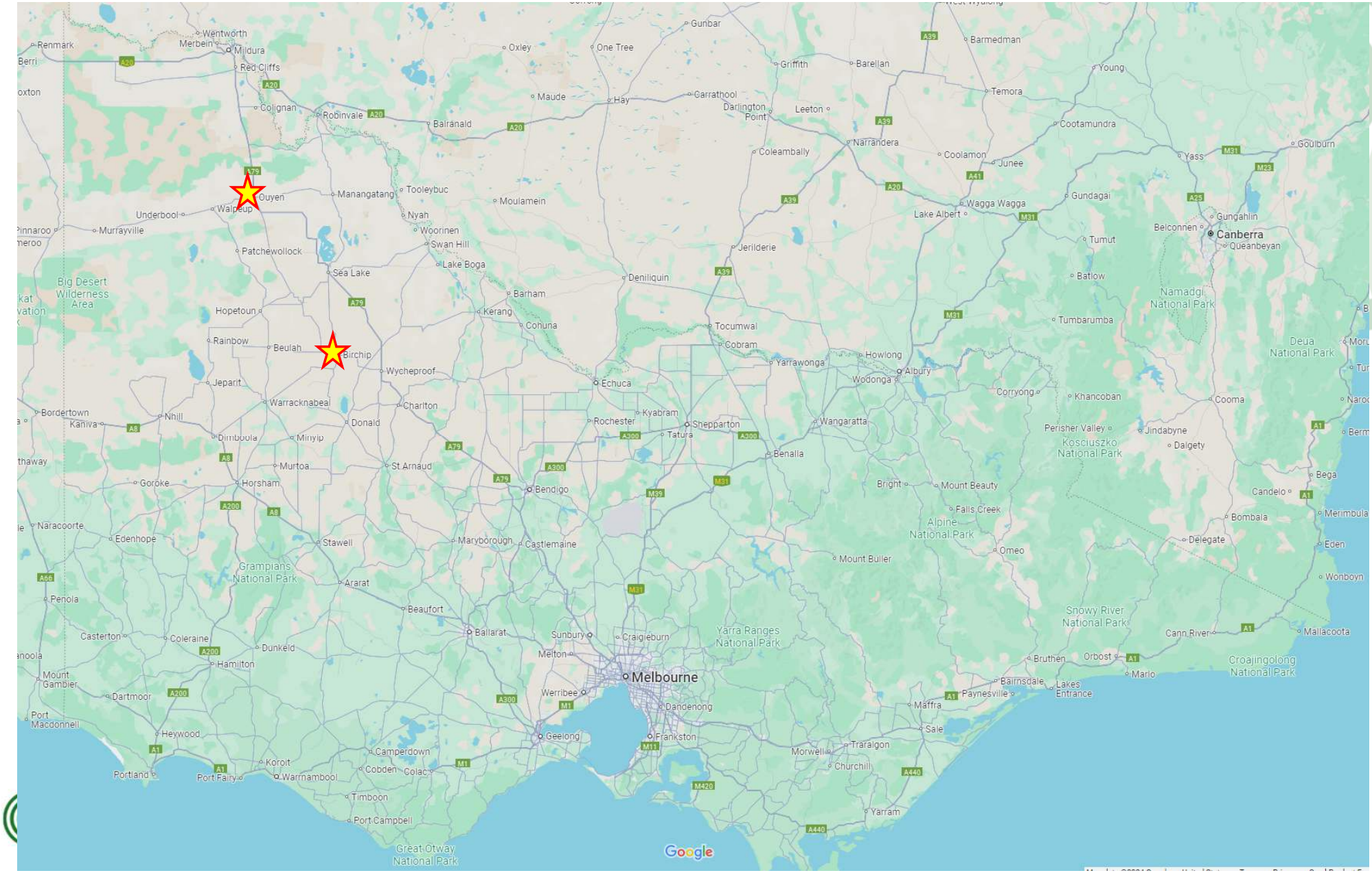
- The aim of this research is to evaluate the effect of agronomic decisions on vetch end uses and soil moisture and soil mineral nitrogen following the end use.

- The outcomes of the vetch phase are discussed here, and the trials have been sown to a cereal in 2024 to assess the effect on the subsequent crop.

Photo: BCG

Trial details

- **Location**: Kinnabulla and Ouyen, Victoria

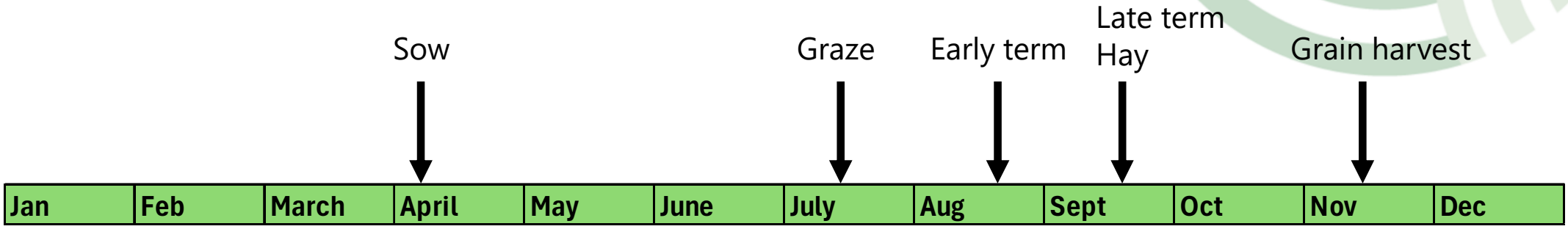

Wentworth
Merbein
Mildura
Red Cliffs
Renmark
Berri
Oxley
One Tree
Gunbar
Griffith
Barellan
Barmedman
Young
Temora
Maude
Hay
Carrathool
Darlington Point
Leeton
Colignan
Robinvale
Balranald
Coleambally
Narrandera
Cootamundra
Coolamon
Junee
Yass
Goulburn
Ouyen
Walpeup
Underbool
Murrayville
Manangatang
Tooleybuc
Nyah
Woorinen
Swan Hill
Moulamein
Lake Albert
Wagga Wagga
Gundagai
Gungahlin
Belconnen
Canberra
Queanbeyan
Tumut
Patchewollock
Sea Lake
Lake Boga
Jerilderie
Deniliquin
Batlow
Big Desert Wilderness Area
Barham
Kerang
Conuna
Hopetoun
Rainbow
Beulah
Birchip
Wycheproof
Tocumwal
Cobram
Tumbarumba
Namadgi National Park
Deua National Park
Yarrawonga
Howlong
Albury
Wodonga
Echuca
Jeparit
Warracknabeal
Charlton
Corryong
Khancoban
Cooma
Bordertown
Kaniva
Nhill
Donald
Rochester
Kyabram
Shepparton
Tatura
Wangaratta
Perisher Valley
Jindabyne
Kosciuszko National Park
Dalgety
Dimboola
Minyip
Benalla
Murtoa
St Arnaud
Goroke
Horsham
Bendigo
Bright
Mount Beauty
Falls Creek
Alpine National Park
Bega
Candelo
Bombala
Merimbula
Naracoorte
Edenhope
Stawell
Maryborough
Castlemaine
Delegate
Eden
Omeo
Mount Buller
Grampians National Park
Ararat
Wonboyn
Penola
Beaufort
Snowy River National Park
Ballarat
Sunbury
Craigieburn
Yarra Ranges National Park
Cann River
Mallacoota
Casterton
Coleraine
Dunkeld
Melton
Bruthen
Orbost
Croajingolong National Park
Hamilton
Mount Gambier
Melbourne
Marlo
Dartmoor
Werribee
Bairnsdale
Lakes Entrance
Dandenong
Paynesville
Maffra
Port Macdonnell
Heywood
Geelong
Frankston
Sale
Traralgon
Morwell
Camperdown
Churchill
Koroit
Portland
Port Fairy
Warrnambool
Cobden
Colac
Timboon
Port Campbell
Yarram
Great Otway National Park
Google

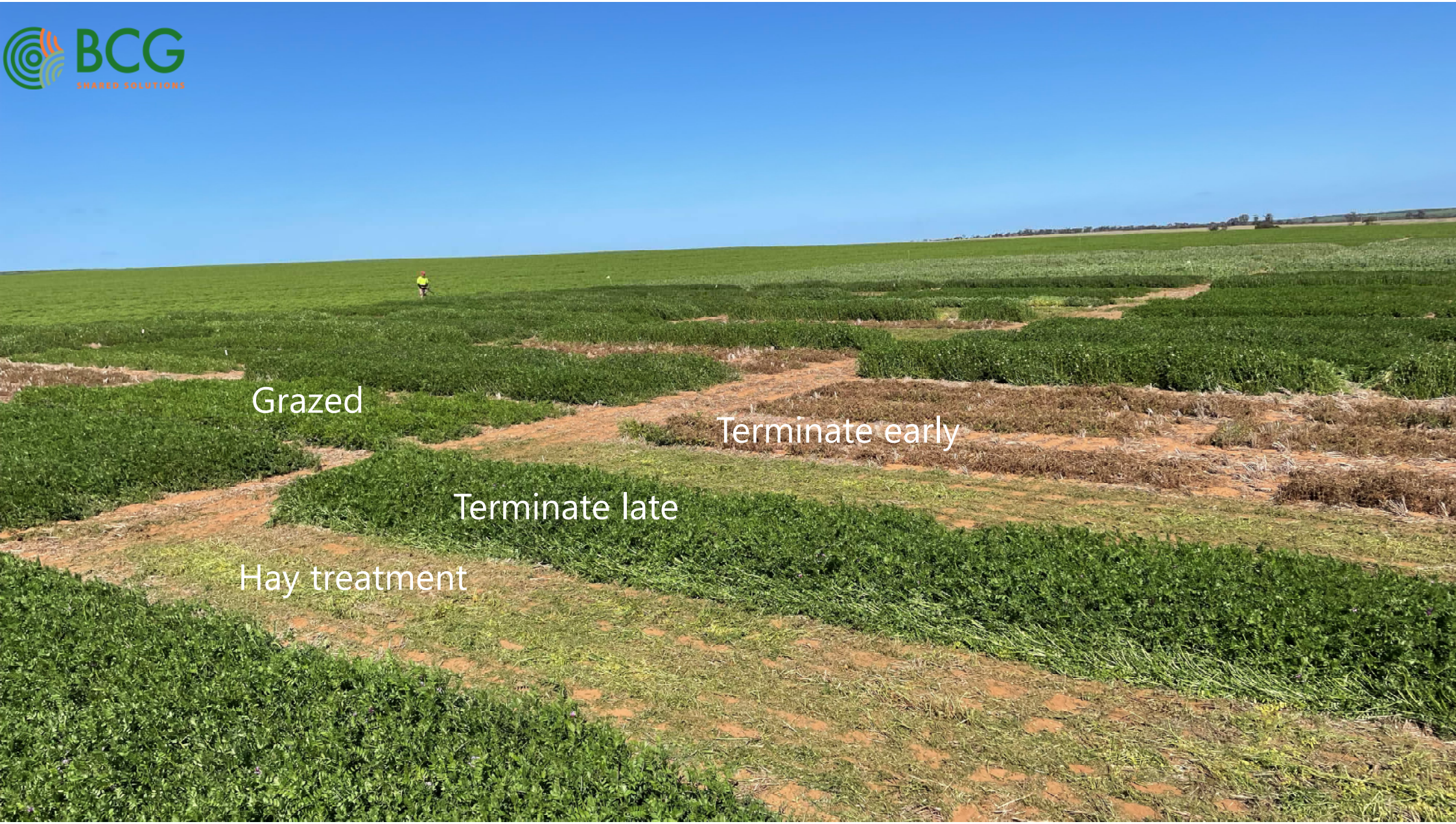
Trial details

- **2 year trial** – finishing end of 2024
- **Three varieties of common vetch (maturity):** Morava (late maturing), Volga (early), Studenica (very early)
- **Treatments:**

Treatment	In season treatment	End use
Hay	Nil	Hay
Terminate - early	Nil	Brown manure
Terminate - late	Nil	Brown manure
Hay - Grazing	Grazing	Hay
Grain	Nil	Grain

Trial details




Grazed
Terminate early
Terminate late
Hay treatment

Trial details

Photo: 29/8/24 Ouyen site

Photo: 19/7/23 Kinnabulla site

Trial details

Assessments

- Grazing potential through biomass yield
- Hay and grain yield
- Hay quality
- Soil moisture and nitrogen post-harvest and pre-sowing of subsequent crop

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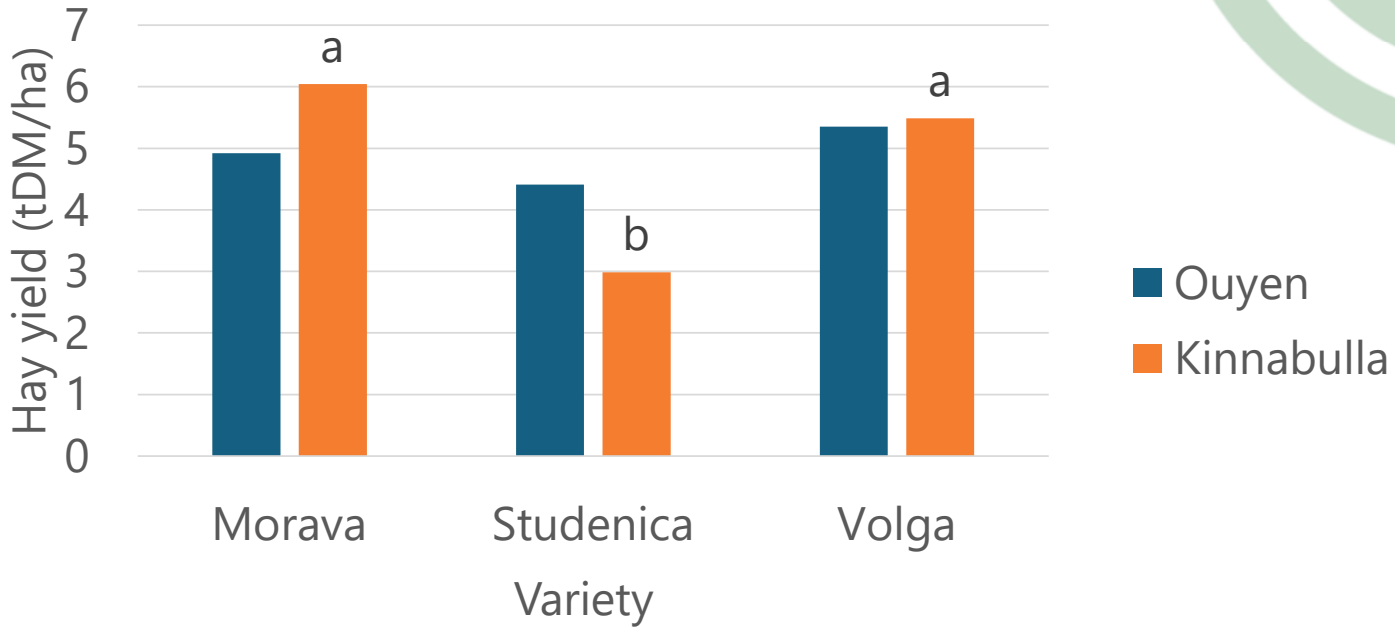
Results

Hay yield



Ouyen = NS, Kinnabulla P<0.001, Lsd 1.86t DM/ha, CV 26.7%.

Results

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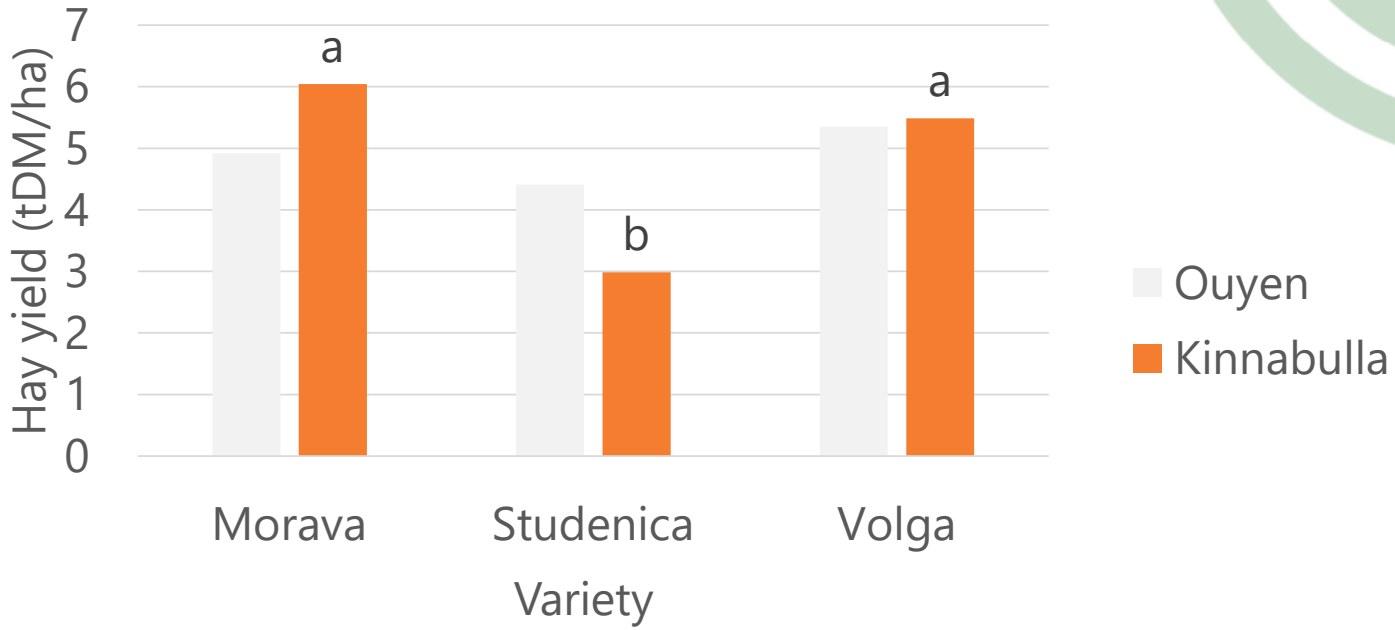

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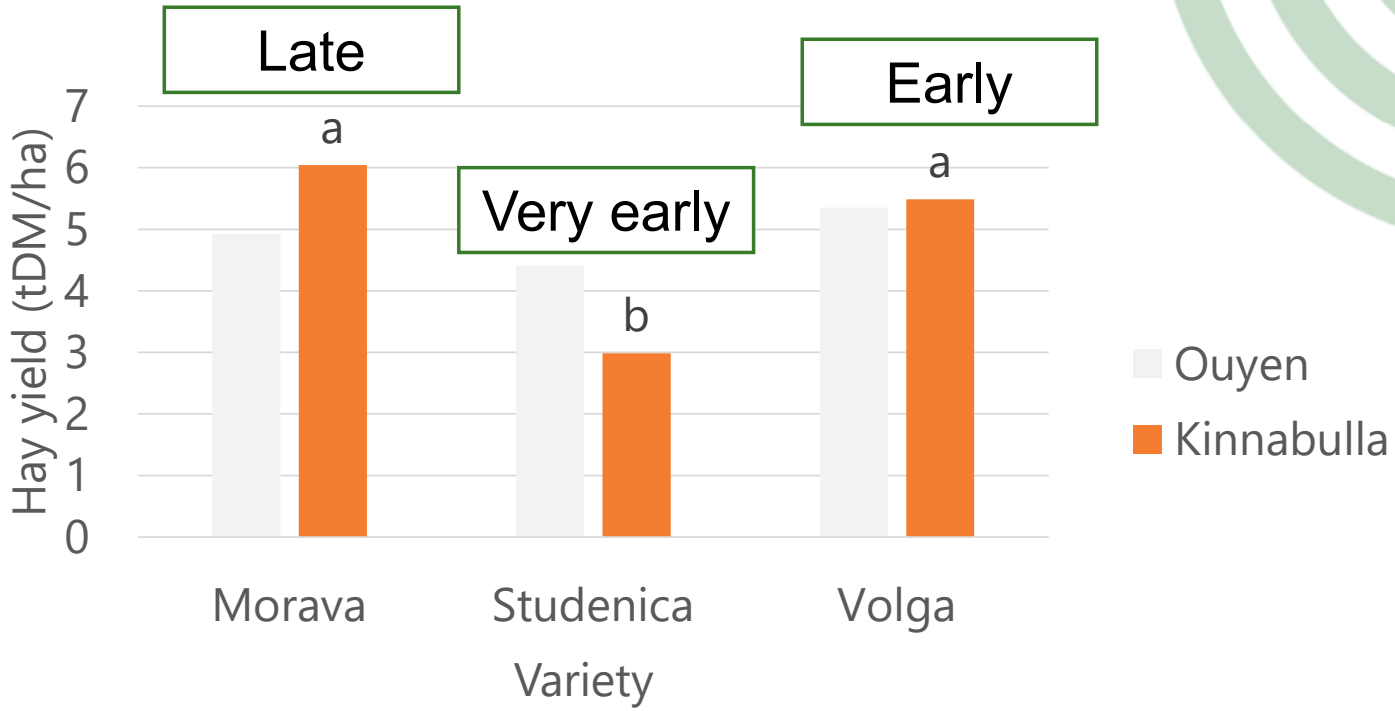

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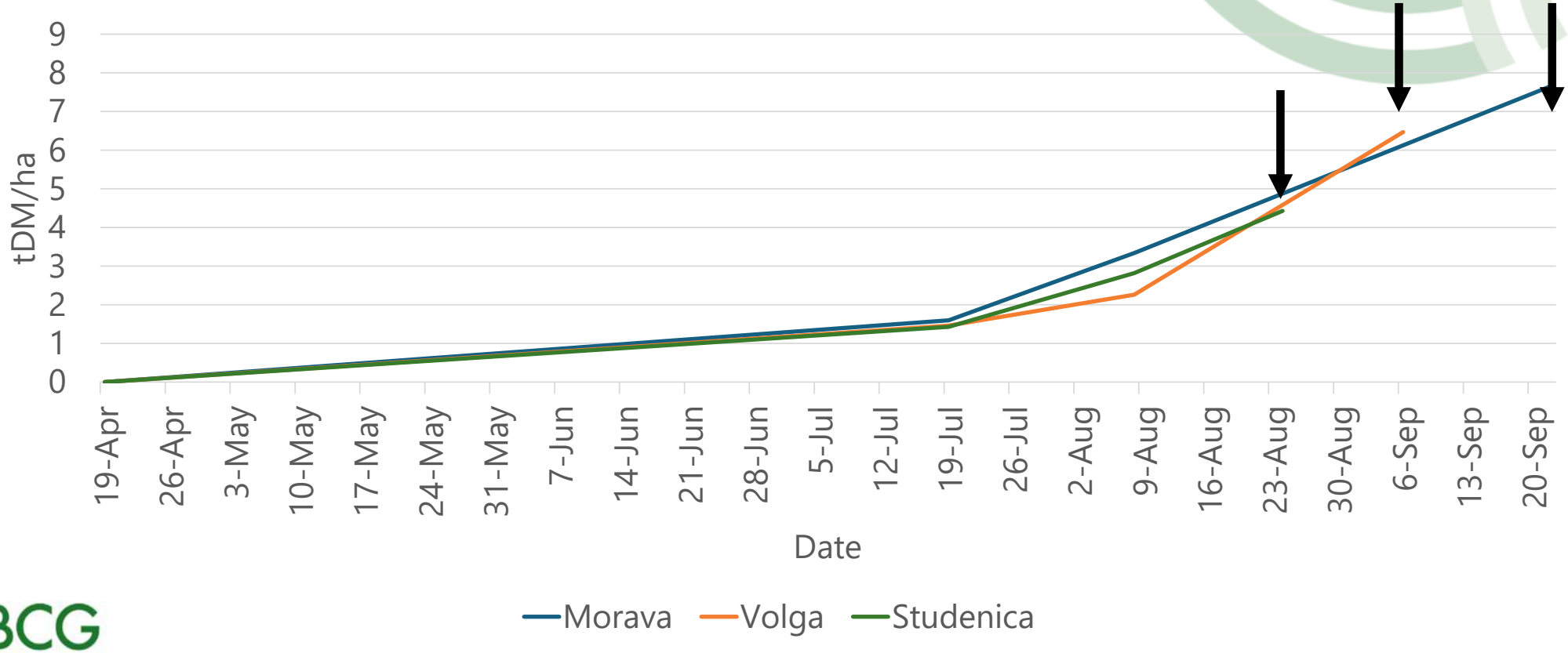

Results

Soil mineral N (kg N/ha) (0-100cm) and Plant Available Water (PAW) (mm) (0-100cm)

- Variety selection had no effect on PAW or soil mineral N levels at the end of the season

- End use did have an effect on PAW and soil mineral N but not to the extent expected

Results

Plant Available Water (PAW) (mm) (0-100cm)

End use	Kinnabulla		Ouyen	
	Post harvest	Pre sow	Post harvest	Pre sow
Early termination	184[a]	210	87[a]	113
Hay	165[bc]	209	78[ab]	121
Late termination	151[c]	212	53[cd]	118
Grain	151[c]	193	37[d]	109
P value	0.001	0.206	<0.001	0.234
LSD (P=0.05)	16.01	NS	17.96	NS
CV%	13.7		32.7	

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Decile 7 rainfall harvest to sow

Decile 8 rainfall harvest to sow

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End use	Kinnabulla		Ouyen	
	Post harvest	Pre sow	Post harvest	Pre sow
Early termination	87[a]	156[bc]	190[a]	272
Hay	72[b]	153[bc]	145[bc]	243
Late termination	65[b]	170[a]	135[c]	287
Grain	46[c]	114[c]	104[d]	258
P value	<0.001	<0.001	<0.001	0.29
LSD (P=0.05)	7.88	20.43	9.78	NS
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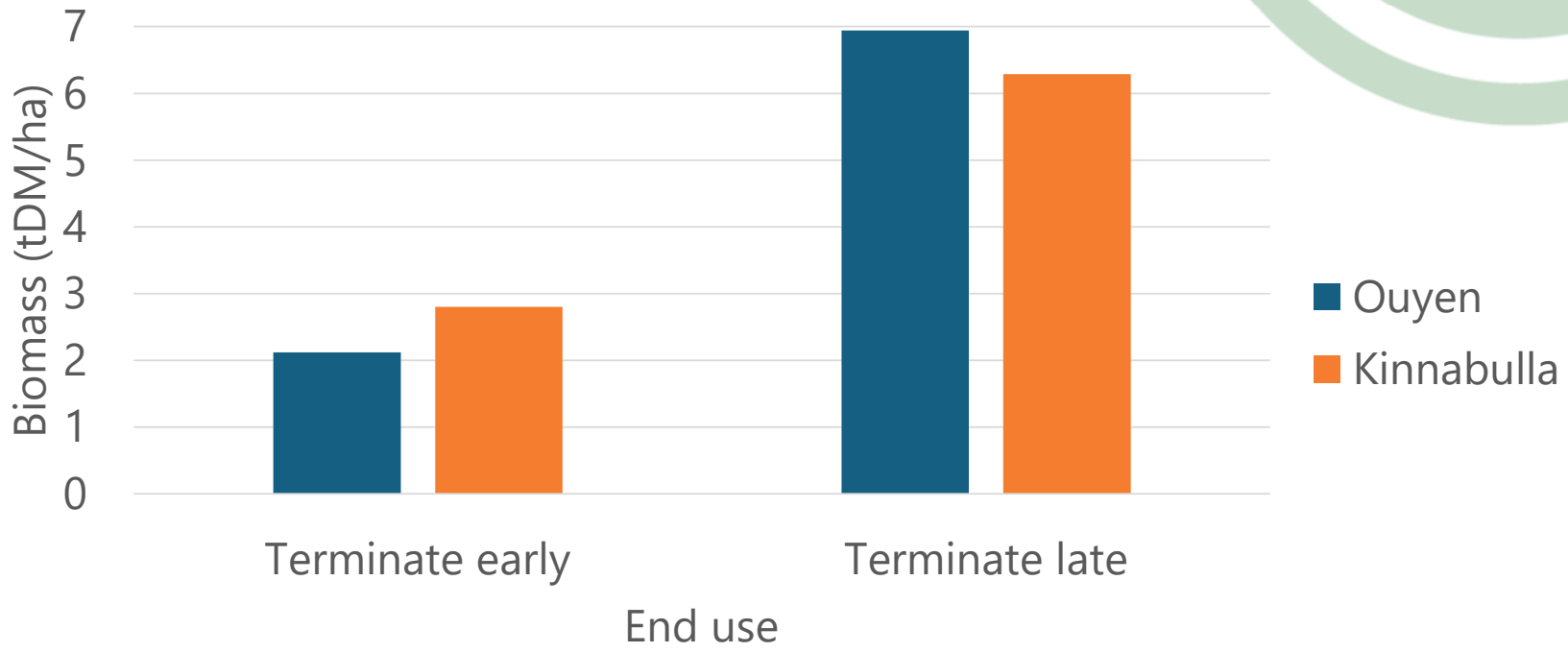
Results

Termination timing biomass



Results

Late termination post-harvest year 1 (L), post sow year 2 (R)

Where to in 2024

- Both trials have been sown to wheat in 2024
- Assessments will include NDVI, biomass, grain yield and quality
- Trials will be soil sampled post-harvest in 2024 to see what soil moisture and nitrogen effects will affect the 2025 crop

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Take home messages

- In Kinnabulla, Morava and Volga produced the highest hay yield
- There are differences in PAW and soil mineral N levels between vetch end uses but not between vetch varieties
- Vetch biomass matter most likely takes more than a summer to break down and become measurable soil mineral N
- The conservation of soil moisture is of little value in a decile 7/8 summer rainfall period

Thank you

Brooke Bennett
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Site details

Site	Sowing date	GSR	Soil type	Starting soil N (kg/ha)	Soil pH (H2O)
Ouyen	19 April	196 mm	Sandy loam	0-40 cm = 72	0-10 cm – pH 8.4 10-40 cm – pH 9.2 40-70 cm – pH 9.8 70-100 cm – pH 10.1
Kinnabulla	20 April	187 mm	Sandy clay loam	0-40 cm = 37	0-10 cm – pH 9.2 10-40 cm – pH 8.2 40-70 cm – pH 9.6 70-100 cm – pH 9.7

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Trial timeline

Activity	Timeframe	Treatments
Site establishment	Mid-April	All
Biomass cut Grazing	Mid-July (before canopy closure)	Treatment 4
Biomass cut Termination - early	7 August (set at 4 months after sowing)	Treatment 2
Biomass cut Termination – late Hay cut	Studenica – early September Volga – early-mid September Morava – mid September	Treatment 1, 3, 4
Harvest	Mid November	Treatment 5
Soil sampled	19 November	All

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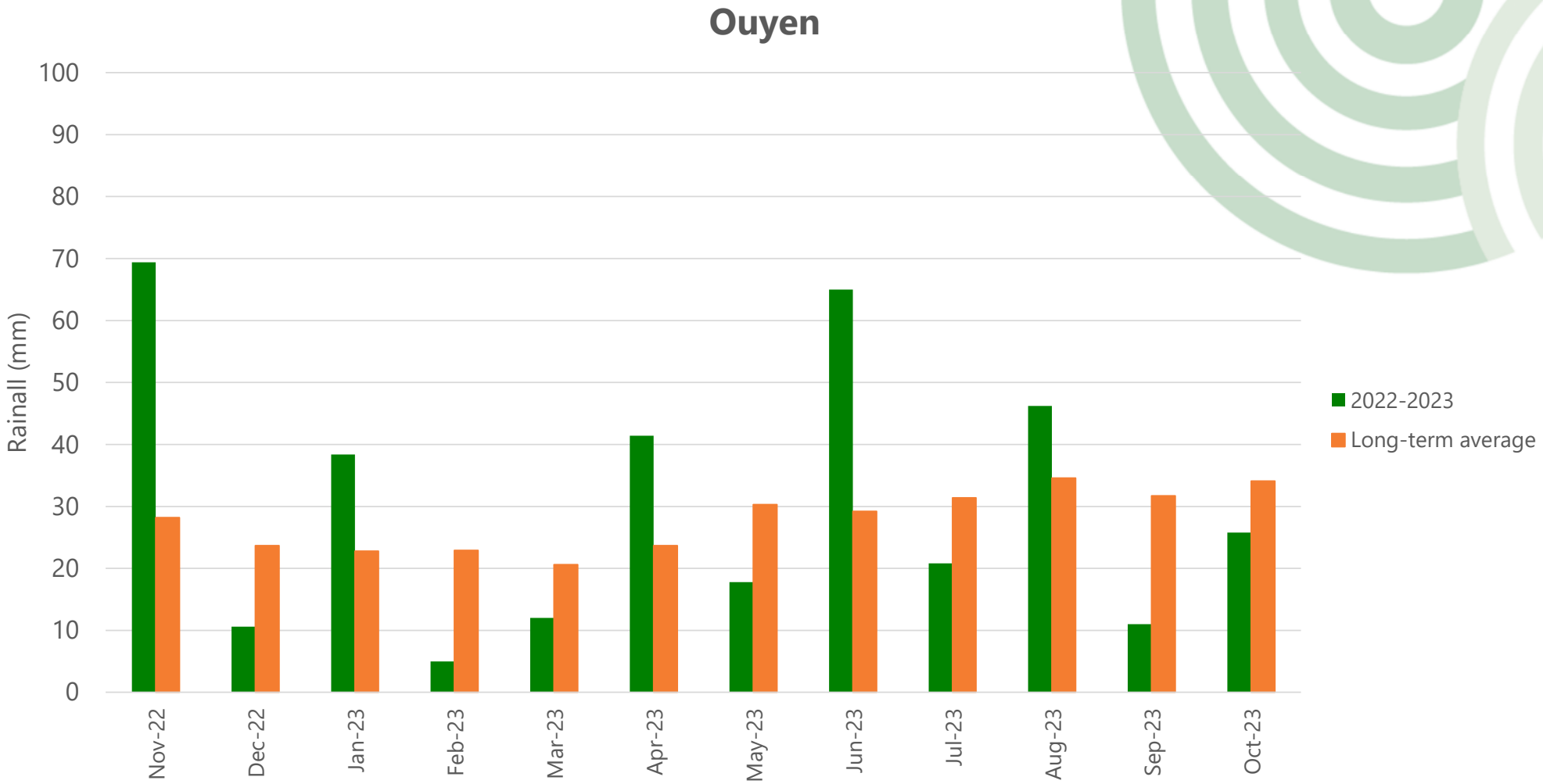
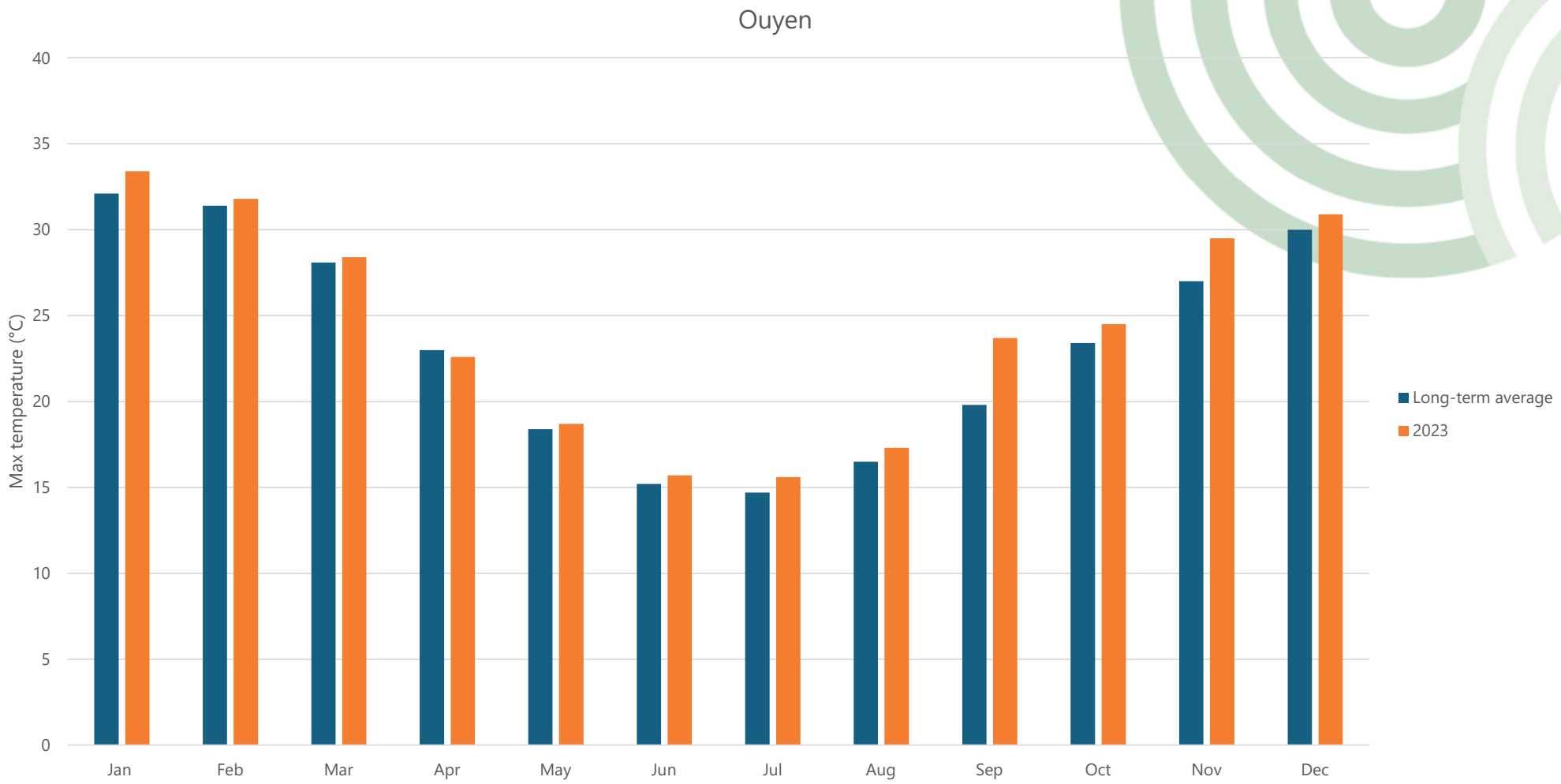
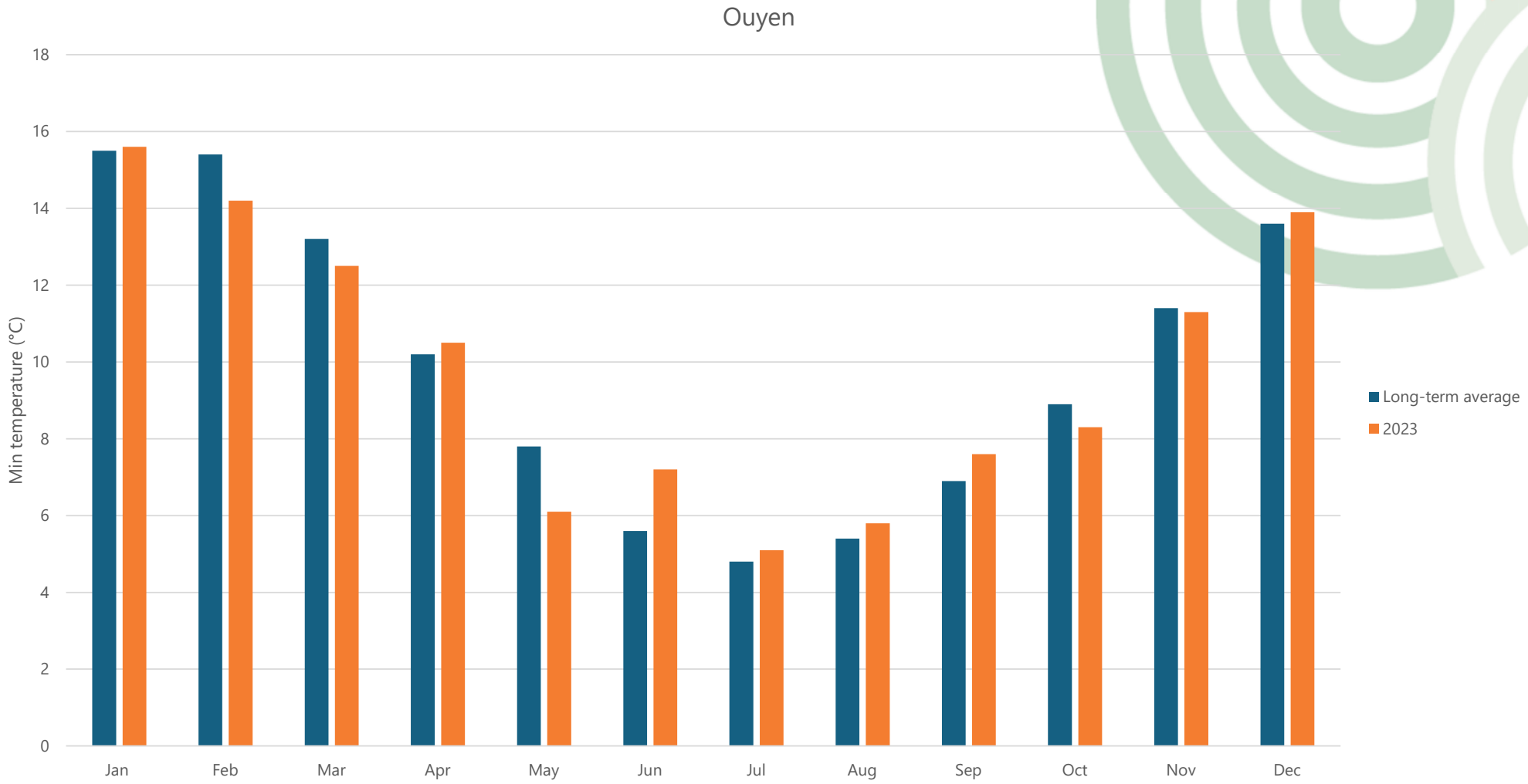
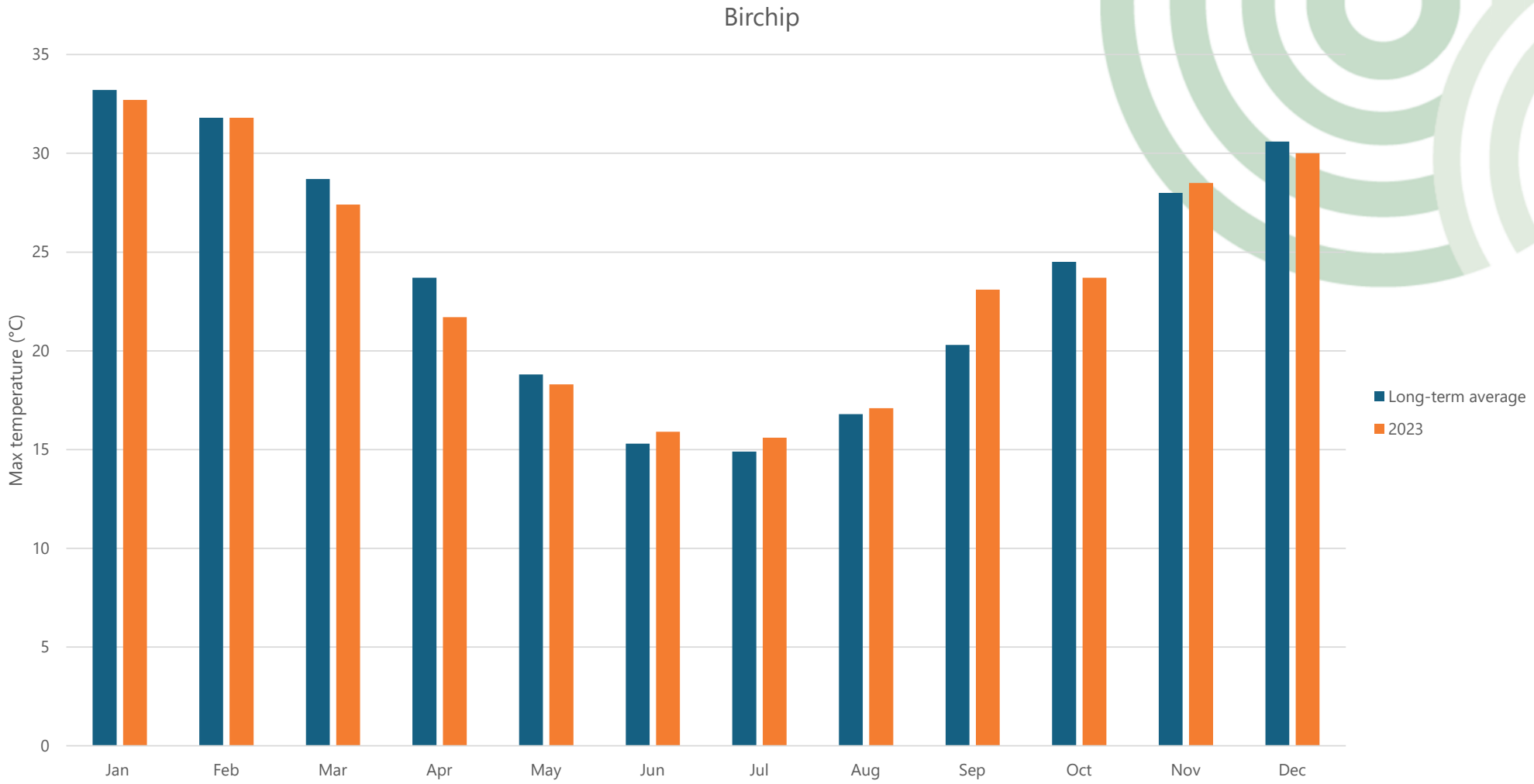

Ouyen
Rainall (mm)
100
90
80
70
60
50
40
30
20
10
0
Nov-22
Dec-22
Jan-23
Feb-23
Mar-23
Apr-23
May-23
Jun-23
Jul-23
Aug-23
Sep-23
Oct-23
2022-2023
Long-term average


Ouyen
Max temperature (°C)
40
35
30
25
20
15
10
5
0
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Long-term average
2023


Ouyen
Min temperature (°C)
18
16
14
12
10
8
6
4
2
0
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Long-term average
2023


Birchip
Max temperature (°C)
35
30
25
20
15
10
5
0
Jan
Feb
Mar
Apr
May
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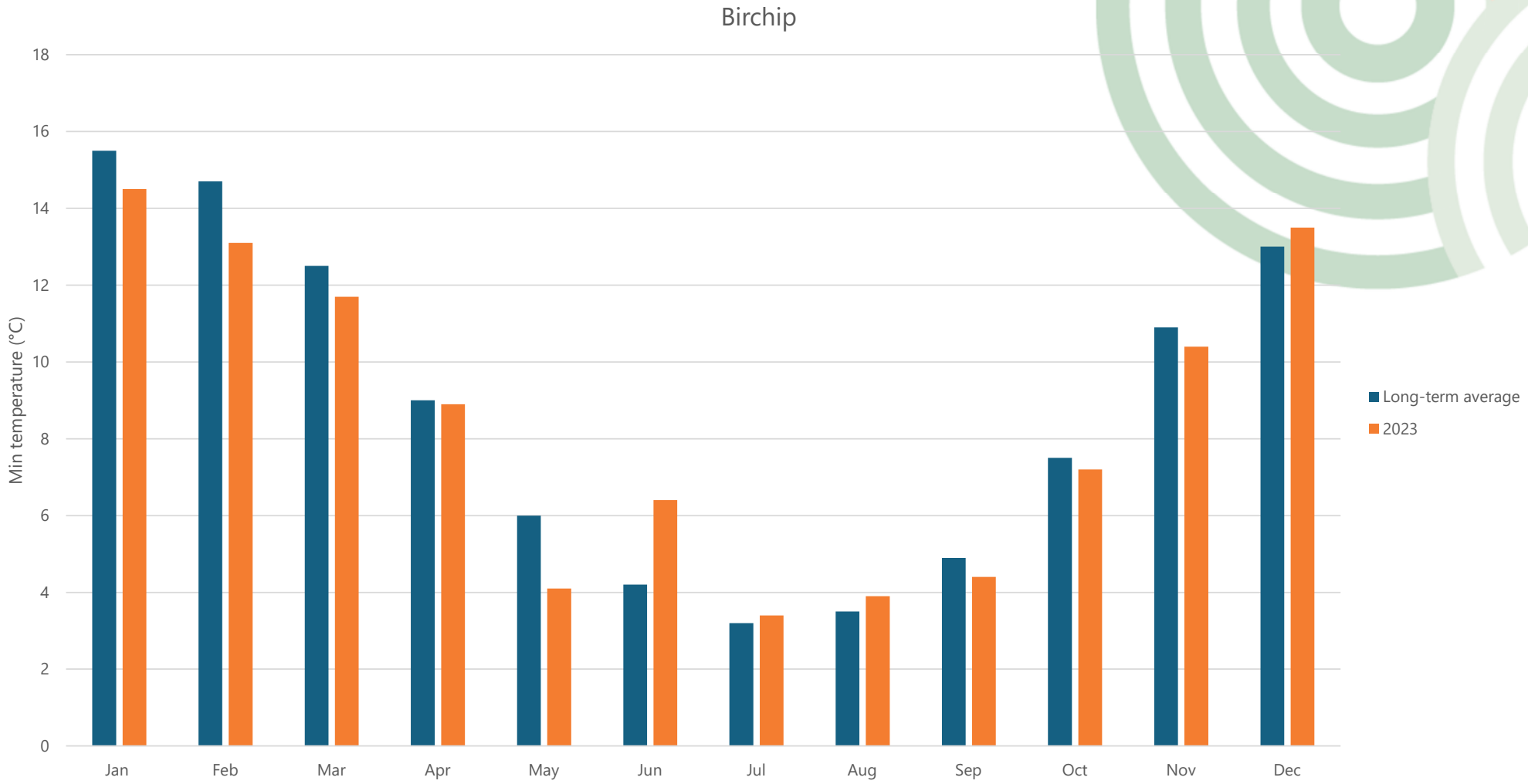
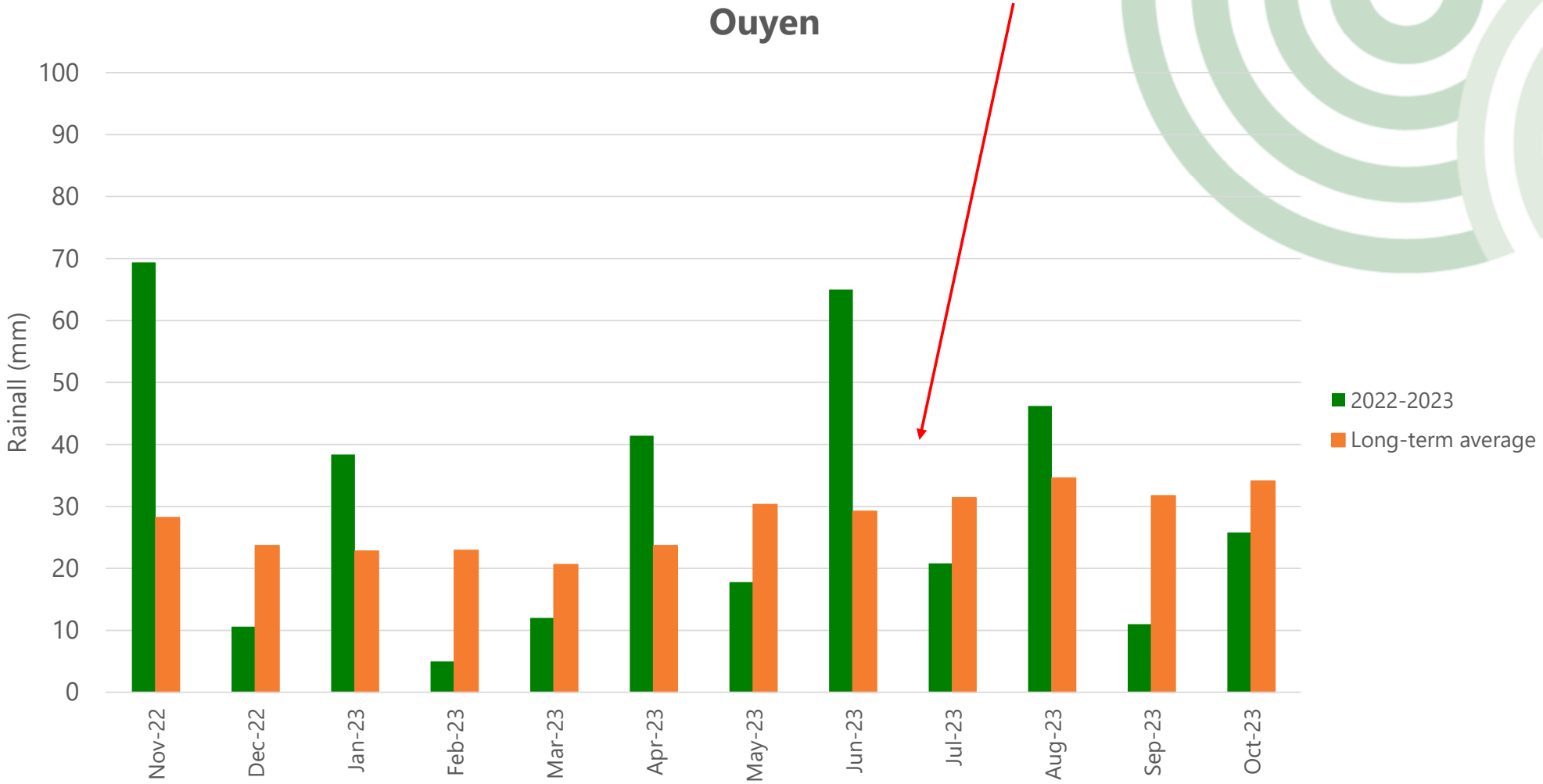
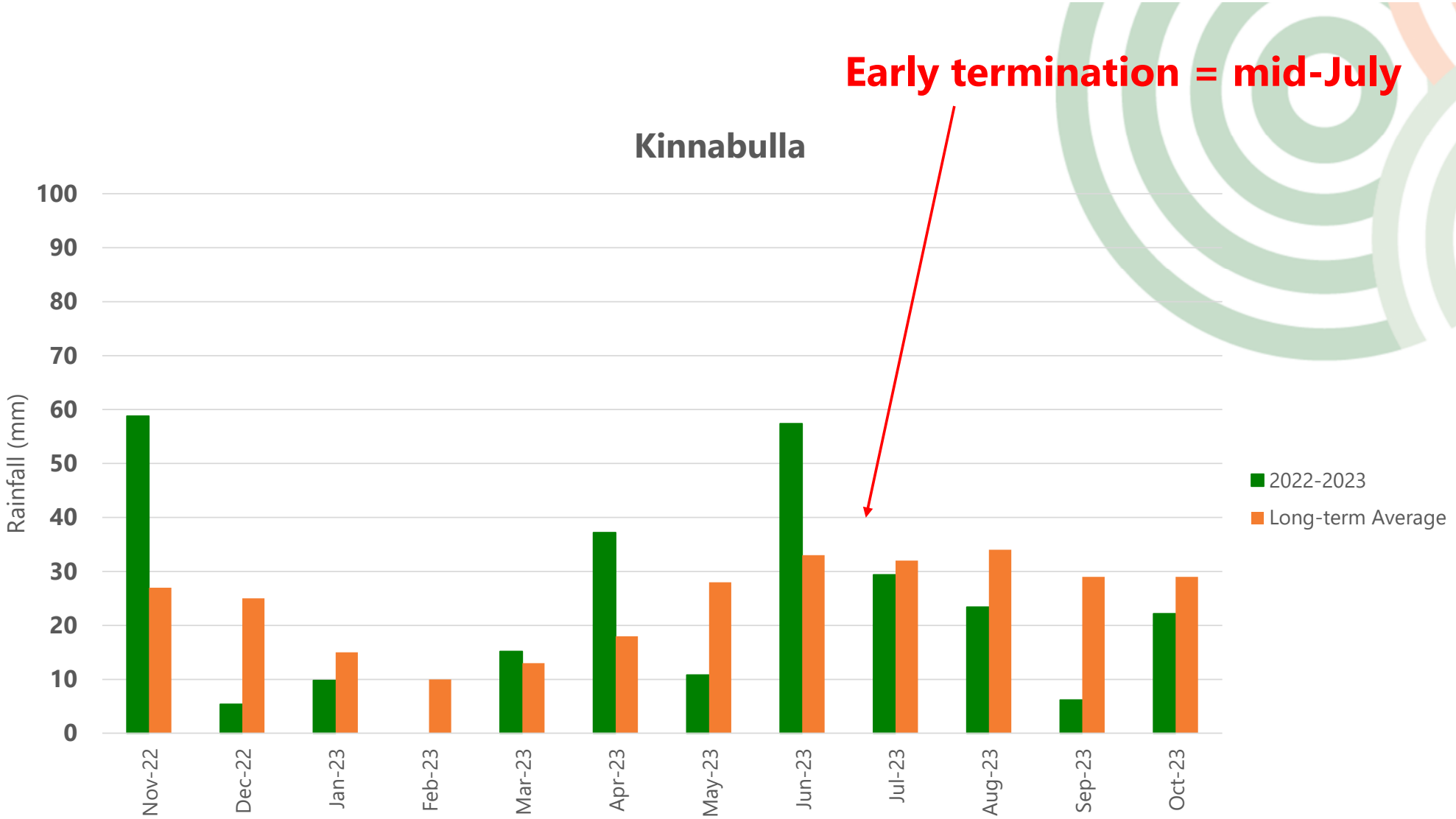
Jul
Aug
Sep
Oct
Nov
Dec
Long-term average
2023


Birchip
Min temperature (°C)
18
16
14
12
10
8
6
4
2
0
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Long-term average
2023

Early termination = mid-July

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Kinnabulla
Rainfall (mm)
100
90
80
70
60
50
40
30
20
10
0
Nov-22
Dec-22
Jan-23
Feb-23
Mar-23
Apr-23
May-23
Jun-23
Jul-23
Aug-23
Sep-23
Oct-23
2022-2023
Long-term Average