THE UNIVERSITY OF SYDNEY

AUSTRALIAN AGRONOMY CONFERENCE
Adaptive agronomy for a resilient future
21-24 October 2024 | Albany, Western Australia
agronomyconference.com

21st CONFERENCE AGRONOMY AUSTRALIA

Variation in yield and grain protein components of two wheat genotypes grown under diverse environments

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1 Introduction

Overview:

Impact of high temperatures on wheat yield and protein quality.

Importance of heat-tolerant varieties in diverse environmental conditions.

Objective:

Identify how sowing date and location affect yield and protein quality in two wheat genotypes

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2 Research Hypothesis

Hypothesis:

The late sowing date will impact the yield, protein content, and components of Sokoll more than Berkut, particularly in the hotter location of Merredin.

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3 Study Locations and Experimental Design

Locations:

Horsham (VIC), Narrabri (NSW), and Merredin (WA)

Sowing Dates (Time of Sowing, TOS):

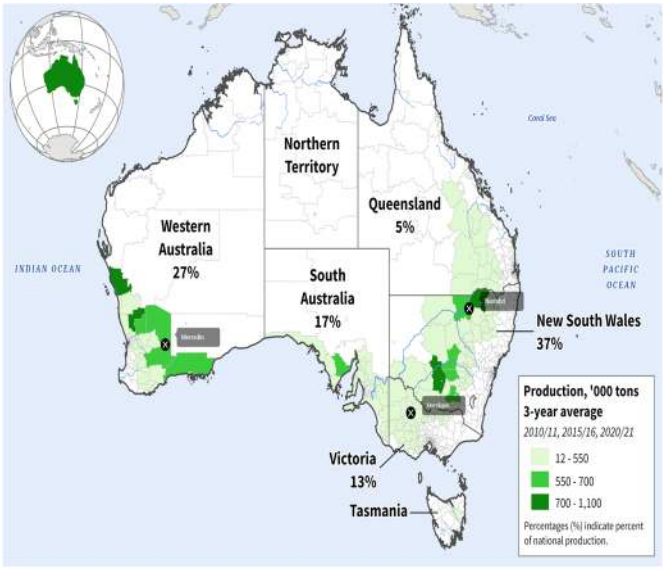
TOS1: May

TOS2: July

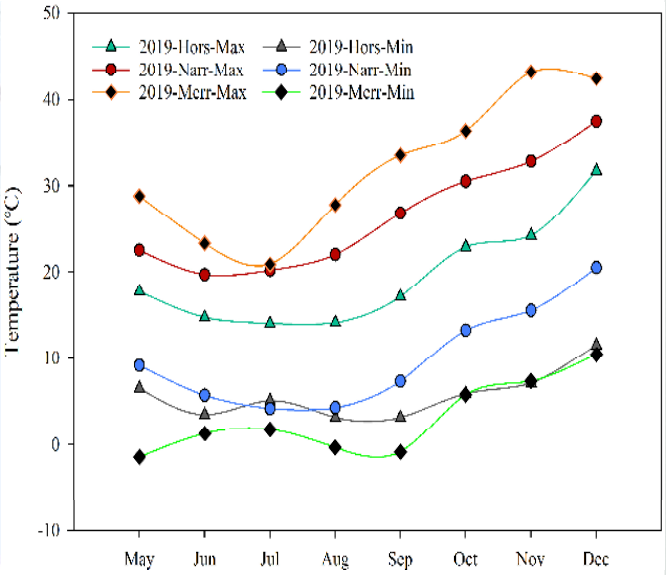
Wheat Genotypes:

Berkut (highly heat-tolerant)

Sokoll (moderately heat-tolerant)



Field locations for three sowing experiments



Temperatures and sowing times for Narrabri, Horsham and Merredin in 2019

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4 Methods

Experimental Setup:

Irrigation, soil management, and plant density.

Sampling dates for TOS1 and TOS2.

Protein Analysis:

Vario MACRO cube for crude protein.

BCA protein assay for protein fractions.

Statistical Analysis:

ANOVA and Tukey’ s HSD

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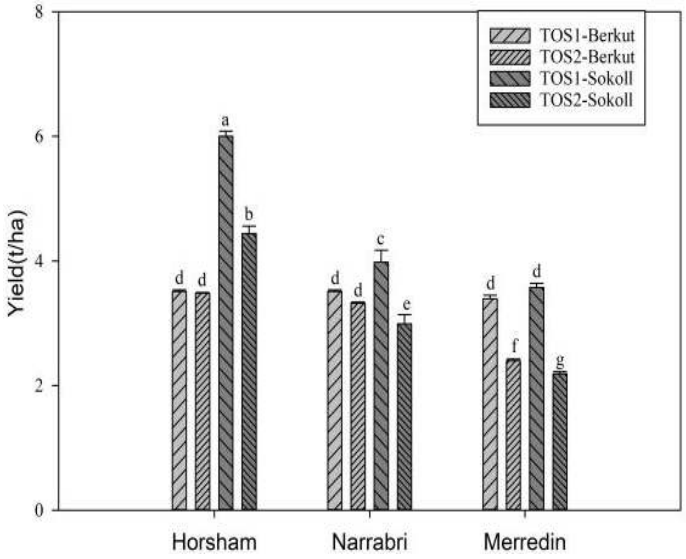
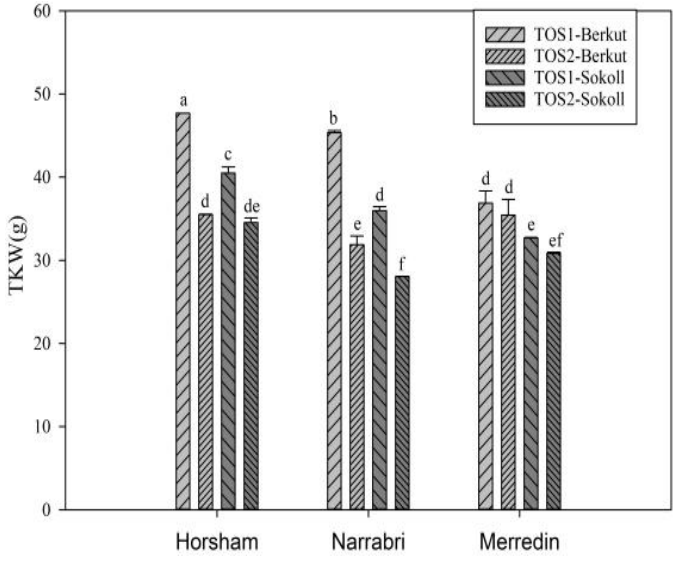
5 Results – Yield and Thousand Kernel Weight (TKW)

Effect of locations (Horsham, Narrabri and Merredin), sowing dates (TOS1 and TOS2) and varieties (Berkut and Sokoll) on yield (t/ha) and TKW (g)





Yield: Sokoll had lower yields for TOS2 in all locations. Berkut showed a significant drop only in Merredin.

TKW: Berkut consistently higher across locations except at Horsham TOS2.

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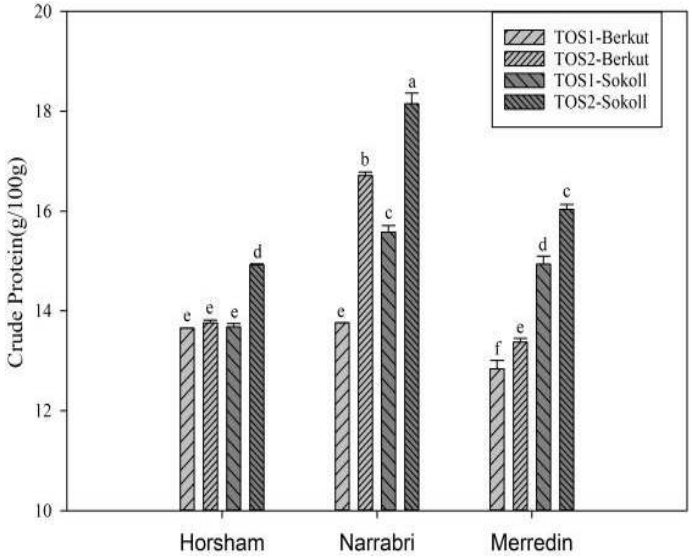
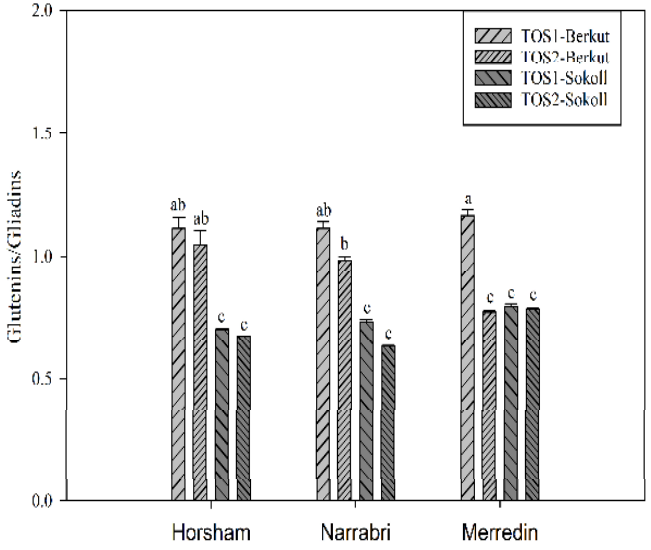
5 Results – Crude Protein and Glutenins/Gliadins

Effect of locations (Horsham, Narrabri and Merredin), sowing dates (TOS1 and TOS2) and varieties (Berkut and Sokoll) on Crude Protein and Glutenins/Gliadins





Crude Protein: TOS2 had higher protein content, except for Berkut in Horsham.
Glutenins/Gliadins: Significant differences between TOS1 and TOS2, especially for Berkut in all locations.

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5 Results – Correlations Between Yield and Protein Component

The pairwise correlations between wheat yield and protein.

	Yield		TKW		Crude protein		Glutenins/gliadins	
Yield	1							
TKW		0.6820 (0.0002)	1					
Crude protein		-0.5914 (0.0023)		-0.4001 (0.0487)	1			
Glutenins/glidadins	NS			-0.4551 (0.0255)	NS		1	

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6 Discussion and Conclusion

Discussion:

Heat tolerance of Berkut demonstrated by its stable yield in moderately warm conditions.

Late sowing reduced yield and quality, particularly for Sokoll.

Trade-offs between yield and protein quality under high temperature conditions.

Conclusion:

Berkut is more suitable for warm environments; Sokoll more affected by late sowing and high temperatures.

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Thank you

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