

Acid Tolerant Barley Trial

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Key Messages

- Barley is a relatively sensitive crop to low pH soils in comparison to wheat. Barley is also particularly sensitive to aluminium which becomes more soluble as the pH decreases.
- InterGrain and Syngenta's new barley variety Litmus (WABAR2625), is adapted to acidic soils due to its aluminium tolerant gene *Alt1*.
- Litmus significantly outperformed both Hindmarsh and Wyalkatchem wheat. Litmus outperformed the Hindmarsh at this site due to the low pH (4.3), and aluminium present (10 ppm in the 10-20cm layer of subsoil) in the yellow sandy earth.

Aim

To evaluate the performance of Litmus (WABAR2625) barley in comparison to Hindmarsh and Wyalkatchem on an acidic soil.

Background

Barley is a relatively sensitive crop to low pH soils in comparison to wheat. Barley is also particularly sensitive to Aluminium which becomes more soluble in the soil solution as the pH decreases. For these reasons barley's productivity on low pH, high Al (Aluminium) soils has largely been significantly less than that of wheat. However, InterGrain and Syngenta's new Barley variety Litmus (WABAR2625), is adapted to acidic soils due to its Aluminium tolerant gene *Alt1*, and may be able to bridge the gap between wheat and barley on these acidic soils. This trial aims to discover how Litmus performs in comparison to Hindmarsh, a commonly grown barley in the area and Wyalkatchem, a commonly grown wheat in the area with acid tolerance.

Trial Details

Property	Wongan Hills Research Station			
Plot size & replication	2m x 2m x 4 replications			
Soil type	Yellow sand			
Soil pH (CaCl ₂)	0-10cm: 5.2	10-20cm: 4.3	20-30cm: 4.3	30-40cm: 4.8
Exc. Aluminium (ppm)	0-10cm: 4	10-20cm: 10	20-30cm: 3	30-40cm: 1
Paddock rotation	2010: wheat, 2011: wheat, 2012: wheat			
Sowing date	27/05/13			
Seeding rate	80 kg/ha			
Fertiliser	80 kg/ha Macropro Plus			
Herbicides	27/05/13: 2 L/ha Spray.Seed, 2 L/ha Trifluralin			
	11/06/13: 300 mL/ha Axial, 0.5% Adigor			
	28/06/13: 650 mL/ha Velocity, 1% Hasten			
Growing Season Rainfall	256mm			

Results

Table 1: Average yield and quality results comparing Litmus barley to Hindmarsh barley and Wyalkatchem wheat sown at the Wongan Hills Research Station 2013. Different letters for yield indicate a significant difference between treatments.

Treatment	Yield (t/ha)	Protein (%)	Screenings (%)	Hectolitre Weight (g/hL)	Grade
Litmus (WABAR2625)	3.06 ^a	11.1 ^a	10.24	69.36	BFED1*
Hindmarsh	2.31 ^b	10.8 ^a	13.97	70.03	BFOD1
Wyalkatchem	1.97 ^c	12.0 ^b	1.51	83.02	APW2
<i>L.S.D.</i>	<i>0.3 t/ha</i>	<i>0.3%</i>	<i>2.56%</i>	<i>1.29 g/hL</i>	

*Litmus released as feed barley, possibly commencing malt accreditation in 2015.

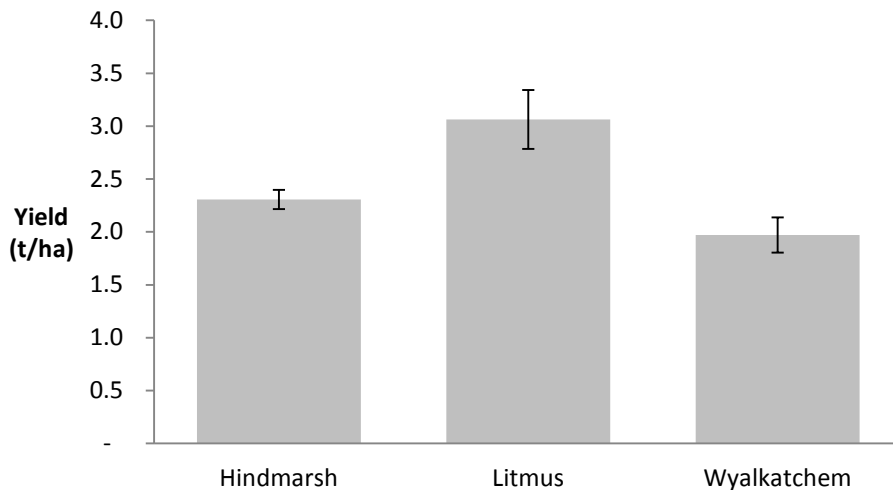


Figure 1: Average yield results of barley and wheat sown at the Wongan Hills Research Station 2013. Error bars indicate standard deviation.

Comments

Litmus significantly outperformed both the Hindmarsh and Wyalkatchem wheat. Litmus outperformed the Hindmarsh at this site due to the low pH (4.3), and Aluminium present (10 ppm in the 10-20cm layer of subsoil) in the yellow sandy earth. As a result of Litmus' *Alt1* gene, its roots excrete an increased amount of citrate which reduces the toxicity of Al in the rhizosphere (area immediately surrounding the root apex) and allows the barley's roots to increase their proliferation in the soil. This has resulted in increased water uptake and thus its yield potential on this acidic yellow sand. Extra root proliferation may have also been particularly useful during the dry June/July period whereby roots would have been searching for moisture in the toxic subsoil.

The lower Wyalkatchem yield is potentially caused by the high wheat on wheat rotation this paddock has been subjected to (previous 3 years) and it was noted that *Septoria Nodorum* was present on the Wyalkatchem at head emergence. The trial did not receive any fungicide treatments which may have resulted in a yield penalty.

Acknowledgements

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