Manganese response in barley at Wharminda

RESEARCH

Cathy Paterson, Wade Shepperd and Ian Richter
SARDI, Minnipa Agricultural Centre

Location: Wharminda
Ed Hunt
Rainfall
Av. Annual: 322 mm
Av. GSR: 222 mm
2012 Total: 241 mm
2012 GSR: 209 mm
Yield
Potential: 2.5 t/ha (B)
Actual: 2.7-2.9 t/ha
Paddock History
2011: Pasture
2010: Barley
2009: Wheat
Disease
Nil
Yield Limiting Factors
Dry spring

Key message

- **In 2012 applying N at GS31 increased yields but no response to manganese was measured.**

Why do the trial?

During the 2010 growing season the Wharminda Ag Bureau questioned the value of applying manganese (Mn) with nitrogen (N) as this is a common practice for some farmers in the area. As a result in 2010 an unreplicated treatment strip of foliar Mn was applied to barley in a small area in the EP Farming Systems 3 Wharminda Focus Paddock, where there was a yield increase possibly in response to added Mn in combination with N in a decile 9 season.

In 2011 a trial was established to investigate Mn response in barley (EPFS Summary 2011 pp 133-134). This trial was repeated in 2012.

How it was done?

The trial was sown with Scope barley @ 55 kg/ha at Wharminda on 29 May with 9 treatments applied (Table 1). All treatments received DAP @ 50 kg/ha except treatment 9 which received triple super @ 48 kg/ha (equal to 10 kg P/ha). These treatments were established to investigate the benefit in applying Mn at different rates, different timings of application and method of application, as well as the interaction between N and Mn.

Due to a lack of spring rain in 2012 the late stage applications of Mn and N in treatments 6 and 7 were not applied.

Soil chemical analysis performed before sowing indicated that the Colwell P level (0-10 cm) was 18 mg/kg, mineral N (0-60 cm) was 34 kg/ha and DTPA Mn (0-10 cm) was 1.9 mg/kg. Measurements taken during the year included plant establishment (not reported), dry matter at early tillering and anthesis, grain yield and grain quality.

What happened?

There was no dry matter response to Mn or N at any stage during the growing season (Table 2), however there was a grain yield response to N when it was applied at GS 31, while the application of Mn did not result in a higher yield. In terms of grain quality all treatments were in the Barley Feed 1 parameters and there was no grain quality response to applied nutrients.

What does this mean?

Given that there was a grain yield increase only when N was applied at GS 31 it is doubtful that there is an agronomic advantage in applying these two nutrients together in the absence of severe Mn deficiency. The response at this site was most likely due to the lower mineral N status rather than Mn, as 1.9 mg/kg Mn is considered borderline for deficiency (The Wheat Book - Principles and Practice).

This trial needs to be repeated in different seasonal conditions and background soil nutrition levels to further explore any interaction between Mn and N.

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Table 1 Mn treatments applied to Scope barley, Wharminda 2012

Treatment 1	Control
Treatment 2	Nil Mn + 12 units N @ GS 31
Treatment 3	1.1 kg/ha Mn sulphate banded with seed (fluid)
Treatment 4	0.55 kg/ha Mn sulphate 2-3 leaf stage + GS 31 1.1 kg/ha Mn sulphate + 12 units N
Treatment 5	0.55 kg/ha Mn sulphate 2-3 leaf stage + GS 31 1.1 kg/ha Mn sulphate
Treatment 6	0.55 kg/ha Mn sulphate 2-3 leaf stage + GS 31 1.1 kg/ha Mn sulphate + 12 units N + Late stage Mn application + N (Not applied)
Treatment 7	0.55 kg/ha Mn sulphate 2-3 leaf stage + GS 31 1.1 kg/ha Mn sulphate + 12 units N + Late stage Mn application – N (Not applied)
Treatment 8	Mn Seed dressing 6 L/t Seed
Treatment 9	Control minus N

GS = growth stage

Table 2 Barley dry matter, yield and grain quality response to Mn, Wharminda 2012

Treatment	Early DM (t/ha)	Harvest DM (t/ha)	Yield (t/ha)	Test Wt (kg/hL)	Protein (%)	Screenings (%)
Treatment 1	2.2	5.8	2.7	73.9	9.5	3.7
Treatment 2	2.2	6.4	2.8	73.4	9.8	4.7
Treatment 3	2.0	5.8	2.6	73.8	9.5	4.4
Treatment 4	2.3	5.9	2.9	73.9	9.4	3.5
Treatment 5	2.1	5.7	2.7	74.1	9.2	3.5
Treatment 6	2.1	5.5	2.9	74.0	9.3	5.6
Treatment 7	2.1	6.0	2.8	73.7	9.2	4.0
Treatment 8	2.0	5.8	2.7	73.8	9.4	4.6
Treatment 9	2.0	5.6	2.7	73.6	9.8	3.9
LSD (P=0.05)	*ns*	*ns*	*0.17*	*ns*	*ns*	*ns*