

N12 soil nitrogen and grain yield

SARDI



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RESEARCH

Searching for answers

Location: Minnipa Ag Centre

Rainfall

Av. Annual: 325 mm
Av. GSR: 241 mm
2011 Total: 404 mm
2011 GSR: 252 mm

Yield

Potential: 2.8 t/ha
Actual: 2.3 to 2.8 t/ha

Paddock History

2011: CL Wheat
2010: Wheat
2009: Wheat
2008: Barley

Soil Type

Red sandy loam

Plot Size

40 m x 4 reps

whether nitrogen management options typical for upper EP would 'switch off' disease suppression. The trial is in paddock N12 of the Minnipa Agricultural Centre (MAC) which has been continuously cropped for 28 years and has developed disease suppression. The trial has now been continued as part of the National Healthy Soils Project.

How was it done?

The trial was established in 2008 with the initial treatments designed to increase soil mineral nitrogen to different levels. The treatments listed in Table 1 were imposed in 2008 and 2009. The treatments in 2008 and 2009 included nitrogen fertilisers, either urea @ 60 kg/ha or sulphate of ammonia @ 120 kg/ha with application split between sowing and tillering, peas, medic (with and without grass control or mown to simulate grazing), fallow (no carbon or N input into the system) and wheat. In 2009 two ammonium sulphate plots were accidentally spray-topped at booting giving an extra treatment.

In 2010, all treatments were sown with Hindmarsh barley @ 60 kg/ha with 60 kg DAP on 31 May. In 2011, all treatments were sown with CL Kord wheat @ 60 kg/ha with 60 kg/ha of DAP on 12 May. A pre-seeding application of 1.5 L/ha Sprayseed® with 200 ml/ha

Striker® and 300 ml/ha of Li700® was followed mid season by 750 ml/ha Intervix®. Grain yield and quality were measured at the end of the season.

What happened?

The previous rotations of 2008 and 2009 still influenced grain yield and quality this season. The medic systems had higher yields and protein (Table 1) indicating this system is being driven by soil nitrogen levels. Despite high mineral N reserves at the start of the trial, barley growth and quality in 2010 were also limited by nitrogen. Screenings were high in all treatments but this may have been due to grain filling during the dry period in late August through to the end of September.

What does this mean?

MAC N12 is a low nitrogen system and in 2010 grain yields and quality were influenced by the nitrogen levels imposed in 2008 and 2009. In 2011 some of the medic based systems had slightly higher yield and protein two seasons after the treatments were imposed.

Acknowledgements

Sprayseed – registered trademark of Syngenta, Striker – registered trademark of Nufarm, Li700 – registered trademark of Nufarm, Intervix – registered trademark of Crop Care.

Key messages

- Only medic based systems from 2008 and 2009 resulted in higher wheat yields in 2011.

Why do the trial?

This trial was originally established as part of the SAGIT funded project to investigate the impact of soil carbon and nitrogen cycling on disease suppression. The treatments were designed to test

Table 1 Soil mineral nitrogen in autumn of 2010 and grain yields and quality in 2010 and 2011

| Treatment (2008 and 2009) | Total mineral N (kg/ha) 0-60 cm | 2010 | | | 2011 | | |
|------------------------------|--|-----------------|----------------|-------------------|-----------------|----------------|-------------------|
| | | Yield (t/ha) | Protein (%) | Screenings (%) | Yield (t/ha) | Protein (%) | Screenings (%) |
| Amm Sulphate | 64 | 5.1 | 7.6 | 8.8 | 2.5 | 10.4 | 13.6 |
| Wheat Control 1 | 66 | 4.3 | 7.2 | 5.5 | 2.5 | 10.2 | 14.7 |
| Wheat Control 2 | 53 | 4.4 | 7.7 | 6.5 | 2.5 | 10.2 | 14.5 |
| Fallow | 74 | 5.6 | 9.3 | 21.0 | 2.3 | 10.7 | 13.1 |
| Fallow/Wheat | 56 | 4.5 | 7.5 | 6.7 | 2.5 | 10.1 | 13.5 |
| Medic Fallow | 83 | 5.9 | 9.1 | 19.7 | 2.4 | 10.8 | 14.9 |
| Medic Grass | 115 | 5.9 | 9.1 | 19.7 | 2.7 | 10.8 | 14.2 |
| Medic mow | 98 | 5.8 | 9.0 | 16.8 | 2.5 | 10.7 | 13.5 |
| Medic Spraytop | 118 | 5.8 | 9.7 | 23.3 | 2.9 | 10.6 | 12.1 |
| Medic/Wheat | 54 | 4.6 | 7.3 | 7.9 | 2.5 | 10.3 | 13.3 |
| Peas | 89 | 6.0 | 8.8 | 18.1 | 2.5 | 10.4 | 14.5 |
| Urea | 52 | 5.4 | 8.0 | 14.1 | 2.6 | 10.4 | 11.3 |
| Wheat spraytop booting | 96 | 6.0 | 7.7 | 6.0 | 2.5 | 10.3 | 14.1 |
| LSD (P=0.05) | 31 | 0.4 | 0.5 | 7.5 | 0.2 | 0.4 | ns |