Responsive farming for soil type at Wharminda

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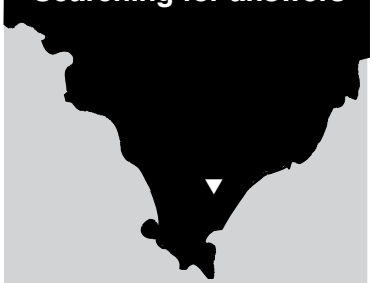
RESEARCH

Searching for answers



Location: Wharminda
Ed Hunt
Wharminda/Arno Bay Ag Bureau

Rainfall
Av. Annual: 322 mm
Av. GSR: 222 mm
2009 Total: 348 mm
2009 GSR: 189 mm

Yield
Potential: 4.9 t DM/ha (at maturity)
Actual: 1.7 t DM/ha (at flowering)

Paddock History
2010: Barley
2009: Wheat
2008: Pasture

Yield Limiting Factors
Low medic plant numbers
P deficiency

Key messages

- **Annual medic plant establishment density limited by 2008 drought, mice and possibly a false break.**
- **Pasture production restricted by low plant numbers but increased by 2010 P applications.**

Why do the trial?

It is important that our low rainfall farming systems are low risk, flexible and responsive. Paddock inputs need to balance the best agronomic and economic advice with the need to ensure reliable outcomes at low cost.

At Wharminda a paddock, one of three focus paddocks in the current farming systems project, was chosen as representative of eastern Eyre Peninsula soils varying from deep sand to shallow clay loam. The emphasis in 2009 and 2010 was on managing risk through tailoring inputs to the different production zones potential by using variable rate technology. In 2011 the Wharminda focus paddock was in the pasture phase of a pasture-wheat-barley-pasture rotation with the response in pasture production from the variable fertiliser rates applied on the 3 zones in 2010 to be assessed.

How was it done?

A paddock at Wharminda was selected and zoned according to soil type - deep sand over clay (poor) representing 20% of the paddock, shallow sand over clay (medium) representing 50% of the paddock and loam (good) representing 30% of the paddock.

In 2010 the paddock was sown with Fleet barley with three fertiliser treatments of low 0, standard 8 and high 16 kg P/ha applied to the paddock in alternating strips across the paddock.

In 2011 the paddock was in the annual medic phase of the rotation. This was a self regenerating pasture, established from the soil seed reserve, with no applied fertiliser. Soil samples were taken at 4 permanent sample points for chemical analysis (Table 1) on 27 April from the standard input treatments. The measurements taken during the growing season were plant establishment and dry matter at flowering, both measured on 5 July from within sheep exclusion cages. Quadrants of 0.1m^2 were counted at each of these 12 permanent sample points from the low, standard and high 2010 fertiliser treatments.

What happened?

All zones had Colwell P levels at or below levels considered adequate to meet plant growth requirements.

The was no difference across the zones or inputs in terms of plant establishment (Table 2), however the dry matter production was higher in the good and medium zones in response to the 2010 standard and high P applications.

Table 1 April Colwell P levels (mg P/kg) at Wharminda in 2009, 2010 and 2011

Zone	Colwell P 0-10cm (mg/kg)		
	2009	2010	2011
Good	24	32	21
Medium	22	23	24
Poor	34	26	15

Table 2 Annual medic plant establishment (plants/m²) and dry matter production (t DM/ha), 7 July 2011

Zones	Inputs	Plant establishment (plant/m²)	Dry matter anthesis (t DM/ha)
Good	High	120	1.5
	Standard	122	1.7
	Low	110	1.1
Medium	High	116	1.4
	Standard	128	1.4
	Low	116	1.0
Poor	High	116	1.1
	Standard	116	1.1
	Low	112	1.1

What does this mean?

Similar numbers of annual medic plants established across all zones and 2010 P application treatments. However 100–120 plants/m² is lower than the required 300-400 plants/m² required to optimise early biomass production. There are several possible reasons why the annual medic seed resource did not support a higher density;

- 2011 rainfall of 338 mm included more than 100 mm in February and early March, early germinating medic may have died over the late March, April dry period,
- the previous medic phase in the rotation was during the very dry 2008, limiting seed production and,
- mice reduced seed reserves.

The measured biomass in July reflected the P application in 2010 coupled with soil type. It could be assumed that the heavier clay based soils retained more available P from 2010 applications along with stored soil water from the February/March rainfall events. The result of this was an increased biomass in response to previous P applications on the heavier soils, but no benefit on the deep sands.

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