Wheat inputs experiment

WRITTEN BY

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Location: Balldale, NSW

Growing season rainfall:
Annual: 355mm (average 504mm)
GSR: 281mm (average 319mm)
Stored moisture: 72mm

Soil:
Type: Red chromosol
pH ($CaCl_2$): 5.2
Colwell P: 46mg/kg
Deep soil nitrogen: 110kg/ha

Sowing information:
Sowing date: 23 May 2009
Variety: Ventura, wheat

Row spacing: 18cm

Paddock history:
2008 — canola (hay)
2007 — pasture

Plot size: 1.5 x 16m

Replicates: 3

KEY POINTS

- **Trials reveal that 70 plants per square metre (about 35kg/ha seed) and 5–10 kilograms per hectare of phosphorus represent the optimal target plant density and phosphorous input level for wheat.**
- **Similar yield results can be obtained using a number of combinations of seed and fertiliser.**
- **Low tiller numbers can be recovered by using light amounts of nitrogen.**

Aim

The aim of this trial was to assess the effect of varying the seed rates and fertiliser inputs on wheat yields.

Method

A replicated experiment was established to test the effect of varying seed and phosphorus and nitrogen fertiliser inputs.

Results

See Table 1 for results.

Observations and comments

- The minimum number of plants required to produce average yields for wheat in this trial was 70 plants per square metre (about 35 kilograms per hectare of seed).
- The optimum phosphorus rate is 5–10kg/ha at sowing (depending on original phosphorus soil test levels).
- The optimum tiller numbers were between 250–350 tillers/m^2 (t/m^2).
- A rate of 35kg/ha of seed and 5kg/ha of phosphorus can produce 500t/m^2 by using early nitrogen fertiliser to boost tiller numbers. Early nitrogen in this treatment boosted tiller numbers to nearly the same level as that produced by the 70kg/ha of seed and 5kg/ha of phosphorus treatment. The experiments show that tillers can be boosted by either using more seed or extra nitrogen applied early (prior to Z31).
- This trial (2009) shows that 500 tillers/m^2 may not be necessary to produce a 4t/ha crop. Further efforts are required to see what occurs at higher yield targets.
- There may be opportunities to split the phosphorus use by using lower phosphorus inputs at sowing and applying phosphorus in crop.
- Using lower inputs produces the optimal result due to the lower cost of production and higher gross margin in about average growing season rainfall (GSR) years. This strategy also lowers risk and increases yield in low-rainfall years.
- Using lower inputs may increase the quality of wheat at similar yields.

Sponsors

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TABLE 1 2009 Results for the wheat inputs experiment

Treatment description	Plant count (plants/m²)	Tillers (Z15 t/m²)	Tillers (Z30 t/m²)	Yield (t/ha)	GM ($/ha)
70S 0P 0N	156	308	346	1.9	243
70S 5P 0N	163	423	403	2.4	297
70S 10P 0N	141	414	442	2.9*	361
70S 20P 0N	154	541	550	3.2*	383
70S 20P 20N	141	549	485	2.8	287
35S 0P 0N	70	152	166	1.9	244
35S 5P 0N	70	178	235	2.6	341
35S 10P 0N	74	213	242	3.0*	406
35S 20P 0N	74	259	298	3.2*	403
35S 5P 20N+20N[1]	71	190	401	2.6	289
35S 5P 20N	78	178	190	2.7	310
35S 10P 20N+20N[1]	64	224	449	3.4*	414
35S 10P 40N	68	219	247	3.0	332
35S 20P 20N+20N[1]	66	242	497	3.5*	391
35S 20P 40N	70	239	283	3.6*	410
35S 5P+15P[2] 20N+20N[1]	70	213	523	3.5*	389
35S 5P+15P[2] 40N	67	224	262	3.5*	387
150S 20P 0N	258	708	953	1.4	27
15S 20P 20+20N[1]	35	150	391	2.4	202
70S 0P 20N at sowing[3]	140	463	490	2.3	267
70S 10P as SS[4] 20N	143	506	487	2.5	270
LSD (preliminary analysis) (0.05)	48	139	154	0.4	
CV				16.9%	

S = Sowing rate of Ventura (kg/ha), P = rate of phosphorus (kg/ha) applied at sowing as triple super unless otherwise stated, N = rate of nitrogen applied as urea at Z31 unless otherwise stated.

1 — Nitrogen applied as a split application of urea at Z15 and Z31 (first and second nitrogen figures refers to rate applied at Z15 and at Z31 respectively. 2 — Phosphorus applied as triple super split application at sowing and at Z15. 3 — Nitrogen as urea applied at sowing. 4 — SS – Single Super instead of triple to supply sulphur as well as phosphorus. * — These treatments were not significantly different in yield to the 70S 20P 0N treatment. The 70S 20P 0N treatment was the most commonly recommended sowing treatment for the region prior to 2005.