

Managing wheat yield and quality risks through plant density and nitrogen application

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Purpose:	Determine value of agronomic management (sowing rate and nitrogen) on production of quality grain for profitable wheat systems
Location:	Northern Road
Soil Type:	Red sandy loam
Soil Test Results:	source CSBP- see below
Rotation:	2008 pasture, 2009 pasture, 2010 pasture, 2011 canola, 2012 barley
Growing Season Rainfall (April – October 2012):	332mm

Depth cm	pH	EC	OC	N(Nit)	N(Amm)	P	PBI	K	S	Ex AI	ECEC	Ex AI%	Cu	Zn	AI
0-10	4.8	0.1	1.1	40	4	14	31	128	5	0.07	3.7	2	0.9	1.1	1.1
10-20	4.5	0.05	0.4	15	2	8	17	41	3	0.18	1.7	11	1.2	0.1	2.9
20-30	4.2	0.03	0.2	7	4	4	17	47	5	0.28	1.1	25	0.7		4.6
90-100	5.1	0.02	0.1	1	1	1	51	59	12	0.05	0.9	6	0.2		0.5

BACKGROUND SUMMARY

Weed competition is one factor which can limit early sowing and increasing crop competition through increasing plant density has been demonstrated as a useful non chemical tool to reduce weed growth. The objective of this research is to evaluate the effect of plant density and nitrogen on crop yield and grain quality of new wheat varieties. The research has demonstrated that increasing plant density did not adversely affect crop yield or grain quality of crops sown in early June at Badgingarra in 2012.

In 2012, plant emergence at each seeding rates treatments 40, 80, 120, 160 was 83, 130, 162 and 196 plants/m².respectively. Nitrogen treatments (14, 30, 60 N kg/ha) were applied at seeding as Agstar Extra plus Urea. The 90 kg/ha N treatment was a split application with 60 units at seeding and 30 units post emergent on 31st July.

TRIAL DESIGN

Plot size: 1.54m*20m

Crop type and varieties used:

Repetitions: 3

Fertilizer rates and dates:

Herbicide rates and dates:

Treatment rates and dates:

Machinery use: cone seeder

Mace, Emu Rock & Cobra

Seeding date: 5/6/2012

100kg/ha Agstar Extra drilled and 25 kg/ha Muriate Potash topdressed at seeding.

2L/ha Sprayseed +1L/ha @100 L/ha Irrigator
Extend +118 g/ha Sakura + 1.5 L/ha Treflan IBS

3 varieties @ 4 targeted plant densities (75, 150, 225 & 300 plant/m²) @ 60 kg/ha N

3 varieties @ 4 N rate (14, 30, 60, 60+30 (90)) @ 150 targeted plant/m²

3 varieties @ 4 N rate (14, 30, 60, 60+30 (90)) @ 300 targeted plant/m²

RESULTS/STATISTICS

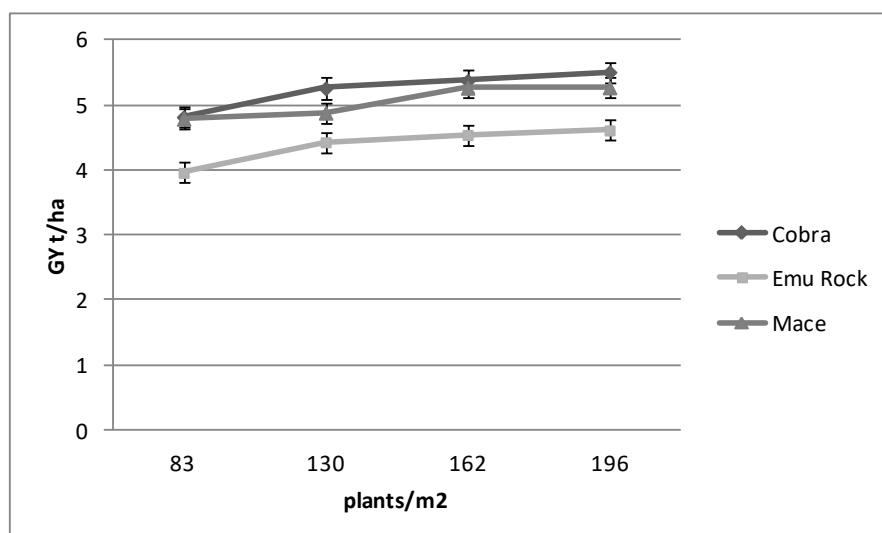


Figure 1: Grain yield response of three wheat varieties to increasing plant density at Badgingarra in 2012. (error bars = SED for each variety)

OBSERVATION/ DISCUSSION/ MEASUREMENTS

Cobra and Mace were significantly higher yielding than Emu Rock at all seeding densities ($P < 0.05$) (Figure 1). There was a yield increase for Emu Rock and Cobra when plant density increased from 83 plants/m² to 130 plants/m². Further increases in plant density did not improve or reduced grain yield of these varieties. There was a yield increase for Mace from 130 plants/m² 162 plants/m². Increasing plant density did not influence grain screenings which were less than 2% for all varieties.

At Badgingarra, nitrogen application at seeding (14, 30, 60 and 90 kg/ha) did not affect grain yield at either seeding densities (data not provided). The soil was a red sandy loam with nitrate levels in the top 20 cm of soil at 55mg/kg. Protein levels in the grain were in excess of 12.5% for all treatments and varieties. The higher split nitrogen application did significantly increase protein by 0.4% however without a yield increase the late N application was not economical. This may be a strategy to consider for high yielding varieties such as Mace. At the higher plant density, and higher yield, Mace had lower protein than Cobra and Emu Rock.

PEER REVIEW/REVIEW

Brenda Shackley, DAFWA Katanning

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