

## Response of Mace wheat to potassium and nitrogen – Binnu

**AIM:** To investigate responses to potassium and nitrogen in wheat. Wheat yield and grain quality can be limited if either of these macro nutrients is in short supply.

**Grower:** Craig Simkin

**Location:** NAG Main Trial Site 2014, Simkin North

**Soil Type:** Yellow sand

**Table 1. Soil Test Results**

	<b>P</b>	<b>Ammonium</b>	<b>Nitrate</b>	<b>K</b>	<b>S</b>	<b>pH</b>	<b>Al</b>	<b>OC%</b>
0-10cm	21	3	16	28	9.6	5.6	0.50	0.45
10-20cm	17	2	2	16	3.8	4.5	3.14	0.15
20-30cm	18	1	< 1	18	3.5	4.3	4.38	0.15
30-40cm	6	1	< 1	18	4.3	4.4	2.74	0.05
40-50cm	6	2	1	40	6.1	5.0	0.40	0.06

Potassium levels are low in this soil and this site should be responsive to applied potassium. pH in the 0-10cm is reasonable, however the pH and aluminium levels below 10cm could limit root growth at this site.

### **Rainfall:**

Total rainfall at Binnu in 2014 was 281mm compared to an average of 341mm. The growing season rainfall was 262mm which was below the average of 289mm. June, July and August rainfall was well below average.

	<b>Jan</b>	<b>Feb</b>	<b>Mar</b>	<b>Apr</b>	<b>May</b>	<b>Jun</b>	<b>Jul</b>	<b>Aug</b>	<b>Sep</b>	<b>Oct</b>	<b>Nov</b>	<b>Dec</b>
<b>2014 Rainfall</b>	15.8	0	2.0	52.8	85.0	22.2	32.2	16.2	53.4	0	1.4	0
<b>Average Rainfall</b>	8.3	13.1	17.4	22.7	49.7	69.0	66.1	43.8	23.1	14.3	7.6	5.6

### **TRIAL DESIGN**

**Plot size:** Length 20m, width sown 2.05m, row spacing 22.9cm (9")

**Machinery use:** Small plot seeder, knife points and press wheels

**Replicates:** 3 (randomized blocks)

**Crop type:** Mace wheat

**Seeding rates and dates:** 75 kg/ha sown on 8<sup>th</sup> May 2014

### **FERTILIZER**

**At seeding** 75 kg/ha **MAPSZC** banded

### **PESTICIDES**

Pre-emergent

Herbicides 8<sup>th</sup> May

2L/ha. Trifluralin

Insecticides

200ml/ha Dominex & 200ml/ha Lorsban



Post emergent

Herbicides 26<sup>th</sup> May

800ml/ha Velocity & Hasten @ 1%vv

**Table 2. Potassium treatments and timing**

Treatment No.	Treatment	K banded at seeding 8 <sup>th</sup> May 2014		N at seeding 8 <sup>th</sup> May 2014		N top up rate 5 <sup>th</sup> June 2014 (AWAS)	
1	0N 0K						
2	0N 10K	MOP	20 kg/ha				
3	0N 20K	MOP	40 kg/ha				
4	0N 40K	MOP	80 kg/ha				
5	30N 0K			Urea	50 kg/ha	Urea	15 kg/ha
6	30N 10K	MOP	20 kg/ha	Urea	50 kg/ha	Urea	15 kg/ha
7	30N 20K	MOP	40 kg/ha	Urea	50 kg/ha	Urea	15 kg/ha
8	30N 40K	MOP	80 kg/ha	Urea	50 kg/ha	Urea	15 kg/ha
9	60N 0K			Urea	50 kg/ha	Urea	80 kg/ha
10	60N 10K	MOP	20 kg/ha	Urea	50 kg/ha	Urea	80 kg/ha
11	60N 20K	MOP	40 kg/ha	Urea	50 kg/ha	Urea	80 kg/ha
12	60N 40K	MOP	80 kg/ha	Urea	50 kg/ha	Urea	80 kg/ha
13	90N 0K			Urea	50 kg/ha	Urea	146
14	90N 10K	MOP	20 kg/ha	Urea	50 kg/ha	Urea	146
15	90N 20K	MOP	40 kg/ha	Urea	50 kg/ha	Urea	146
16	90N 40K	MOP	80 kg/ha	Urea	50 kg/ha	Urea	146

**Table 3. Wheat head counts, yield and gross margin returns from fertilizer treatments**

Treatment No.	Treatment	Head Counts / m <sup>2</sup> 10 <sup>th</sup> Sept 2014	Wheat Yield T/ha	Fertilizer Inputs # \$/ha	Returns ^ \$/ha
1	0N 0K	119	1.48	\$66.68	\$408.41
2	0N 10K	115	1.57	\$79.44	\$424.54
3	0N 20K	117	1.62	\$92.20	\$427.83
4	0N 40K	113	1.60	\$117.72	\$395.89
5	30N 0K	110	1.69	\$102.15	\$440.34
6	30N 10K	122	1.65	\$114.91	\$414.74
7	30N 20K	119	1.49	\$127.67	\$350.62
8	30N 40K	114	1.51	\$153.19	\$331.52
9	60N 0K	122	1.62	\$150.53	\$369.50
10	60N 10K	112	1.61	\$163.29	\$353.53
11	60N 20K	114	1.60	\$176.05	\$337.56
12	60N 40K	121	1.49	\$201.57	\$276.73
13	90N 0K	117	1.58	\$193.10	\$314.09
14	90N 10K	117	1.56	\$205.86	\$294.91
15	90N 20K	109	1.65	\$218.62	\$311.04
16	90N 40K	122	1.57	\$244.14	\$259.84

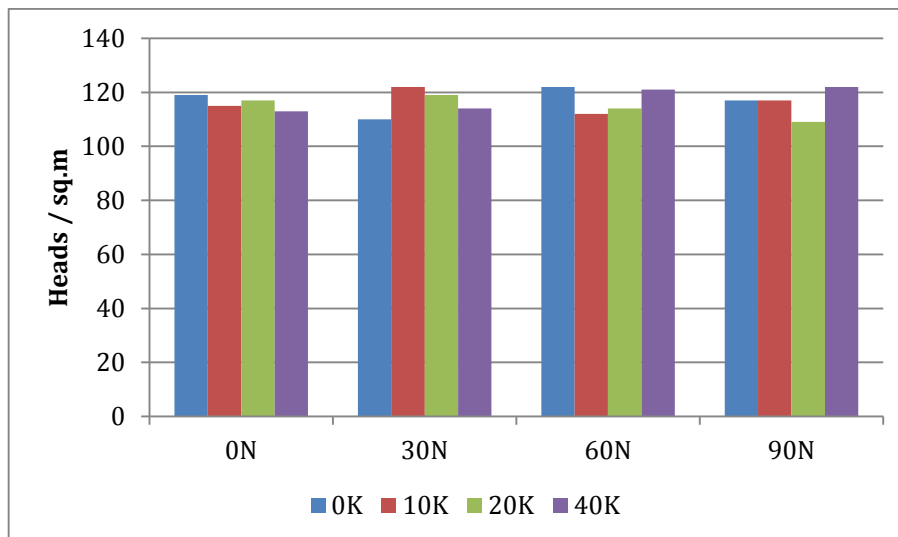
Price Notes: All prices net delivered/received Geraldton and GST Exclusive : APW1 \$321

# March 2014 retail price (per T ex Geraldton), MAPSZC \$889, Urea \$645

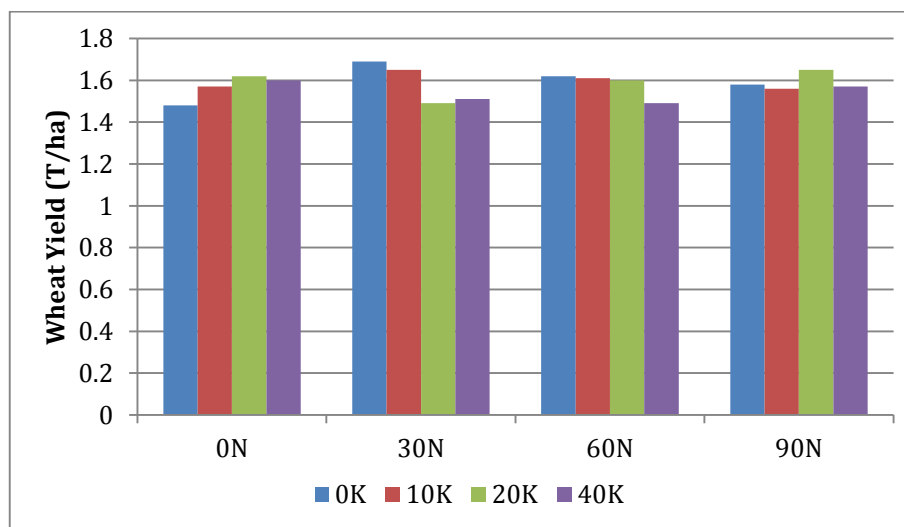
^ Gross margin calculated using grain yields and subtracting the cost of fertilizer applied

Unfortunately grain samples were not retained at harvest so grain quality cannot be reported on or used in the calculation of wheat returns. Grain protein and screenings may have increased at higher nitrogen rates. Returns have been calculated using APW1 as the delivery grade.

**Figure 1. Wheat head numbers in response to potassium and nitrogen treatments**



**Figure 2. Wheat yield in response to potassium and nitrogen treatments**



**Key Messages:**

- Potassium levels are low in this soil and this site should have been responsive to applied potassium, however due to seasonal and soil conditions there were no differences between treatments in this trial.
- The very dry June to August had a marked impact on crop growth, particularly tillering. This can be seen by the lack of differences in the head counts taken in September.
- Very hot conditions in early August also affected flowering in wheat and limited any response in grain yield with later rains.
- Soil penetrometer readings in the paddock near the trial site showed a hard pan and this in conjunction with the pH and Aluminium levels below 10cm would have restricted root growth and limited the wheat plants ability to access soil moisture at depth during the dry winter period.
- Without yield responses to applied treatments, crop return decreased as fertilizer rates increased.