



Potassium Strategies

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Key Messages

- There was no response to topdressed muriate of potash but a 0.3 t/ha response to K banded in K-Till Extra.
- Nitrogen (N) use efficiency was maximised with K-Till Extra.
- Potassium (K) was a more limiting nutrient than N.
- Dry conditions frequently experienced in the Wheatbelt limit the effectiveness of topdressed K.

Aim

To compare K fertiliser strategies and to investigate the effect of K supply on N.

Background

Fertiliser is one of the highest cropping input costs for farming businesses these days and so there is always pressure to increase the returns and profitability of every dollar invested. Finding the most efficient and effective way to maximise yields will help ensure the best return on the investment. The increasing frequency of dry periods during the growing season limits the effectiveness of topdressed fertilisers (and the availability of soil nutrient reserves), and increases the dependence upon banded fertiliser inputs. The development of nitrogen, phosphorous and potassium (NPK) compound fertilisers provide an option to help improve the efficiency of K supply to crops.

The trial conducted east of Carnamah compared some of the options for K application strategies and subsequent effects on N use efficiency.

Forward

The CSBP trial conducted this year at the Liebe Main Trial Site encountered issues due to site location thus seeding was delayed to three weeks later than planned. Consequently the ideal soil moisture and time of sowing was missed and dry conditions led to poor crop establishment and yields of less than 1.0 t/ha with no significant effects. However, CSBP has a widespread trial program across the state and a local trial at Carnamah produced some interesting results in relation to different K fertiliser strategies.

Trial Details

Property	Tremlett, east Carnamah
Plot size & replication	2.5m x 20m x 3 replications
Soil type	Yellow loamy sand
Soil pH (CaCl₂)	See table 1
EC (dS/m)	See table 1
Sowing date	08/05/2014
Seeding rate	64 kg/ha Mace wheat
Paddock rotation	2011: canola, 2012: wheat, 2013: wheat
Fertiliser	08/05/2014: table 2 19/06/2014: table 2
Herbicides/Fungicides	07/05/2014: 1 L/ha Roundup (Farmer) 08/05/2014: 2 L/ha Treflan, 300 mL/ha Lorsban 29/07/2014: 300 mL/ha Folicur
Growing Season Rainfall	208mm

Table 1: Soil Test Results from east Carnamah, 2014.

Depth (cm)	pH	EC	OC	Nit N	Amm N	P	PBI	K	S	Ex Ca	Ex Mg	Ex K	Ex Na	eCEC	Ex Al%	Al
0-10	6.4	0.13	1.1	10	2	37	27	35	60	4.6	0.48	0.09	0.10	1	2	<1
10-20	4.5	0.04	0.3	4	<1	11	23	16	18	0.9	0.19	0.04	0.02	1	22	2.5
20-30	4.6	0.04	0.1	4	<1	5	25	<15	31	1.0	0.26	0.03	0.02	1	11	<1
30-40	5.5	0.03	0.1	3	<1	3	40	<15	31	1.1	0.36	0.04	0.03	2	10	<1
40-50	5.4	0.03	0.1	2	<1	2	49	<15	34	1.2	0.41	0.02	0.05	2	10	<1

Table 2: Treatments and Results at east Carnamah, 2014.

Trt	IBS (kg/ha)	Banded (L/ha)	Banded (kg/ha)	Z23 (L/ha)	N	P	K	Yield (t/ha)	Protein (%)	NUE*
1	-	-	-	-	0	0	0	1.36	10.3	-
2	-	-	89 Big Phos	-	0	12	0	1.48	10.9	-
3	-	50 Flexi-N	85 Agstar Extra	65 Flexi-N	60	12	0	1.64	11.1	13
4	-	54 Flexi-N	100 K-Till Extra	65 Flexi-N	60	12	11	1.97	11.1	28
5	-	54 Flexi-N	100 K-Till Extra + 18 MoP	65 Flexi-N	60	12	20	1.80	11.2	20
6	40 MoP	50 Flexi-N	85 Agstar Extra	65 Flexi-N	60	12	20	1.61	11.6	18
7	80 MoP	-	89 Big Phos	-	0	12	40	1.41	9.8	-
8	80 MoP	50 Flexi-N	85 Agstar Extra	65 Flexi-N	60	12	40	1.62	11.4	20
Prob								<0.001	0.094	
LSD								0.186	1.2	

*Nitrogen Use Efficiency

Table 3: Economic Analysis for Mace wheat grown at east Carnamah, 2014.

Trt	IBS (kg/ha)	Banded (kg/ha)	N	P	K	Harvest Yield (t/ha)	K Economics		
							Response (\$/ha)	Cost (\$/ha)	Profit (\$/ha)
3	-	85 Agstar Extra	60	12	0	1.64	-	-	-
4	-	100 K-Till Extra	60	12	11	1.97	83	19	64
5	-	100 K-Till Extra + 18 MoP	60	12	20	1.80	40	31	9
6	40 MoP	85 Agstar Extra	60	12	20	1.61	-7	28	-35
8	80 MoP	85 Agstar Extra	60	12	40	1.62	-5	56	-61
Prob						<0.001			
LSD						0.186			

*Assumes wheat \$250/t; K-Till Extra K \$1.70/kg; MoP K \$1.40/kg

Comments

This trial demonstrated the value of K banded in the NPK product K-Till Extra. There was a 0.3 t/ha response to K supplied by K-Till Extra and no response to up to 80 kg/ha MoP topdressed. The absence of a response to topdressed MoP was potentially the result of it being trapped in the inter-row after seeding, and/or post application rainfall events not being substantial enough to allow movement into the root zone.

The response to N was only 0.2 t/ha and not profitable as K was the more limiting nutrient. Despite additional N being unprofitable, N use efficiency was highest where 100 kg/ha K-Till Extra was used. This indicates that improved K uptake from K-Till Extra increased the crop's capacity to access N.

An economic analysis of the different K strategies showed that 100 kg/ha K-Till Extra was about \$100/ha more profitable than topdressing 40 kg/ha MoP.

The trial clearly highlighted that fertiliser placement can be more important than the amount applied, and that nutrients have to be available to the crop to be effective.

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