Testing New Products/13WMG16

Bill Bowden, WMG Cropping R&D Ambassador Dave Gartner, R&D Coordinator

Purpose: To independently compare a range of agricultural foliar products on wheat at Badgingarra in a replicated trial.

Location: Badgingarra Research Station, White Dam paddock

Soil Type: Grey sandy gravel

Soil Test Results: 0-10 cm depth :- mineral N 36 mg/kg, P 16 mg/kg, K 72 mg/kg, S 18 mg/kg, OC 1.57%, conductivity 0.142 ds/M, pH(CaCl2) 5.3, pH (water) 5.9, exchangeable cations

(meq/100gm):- Al 0.048, ex Ca 3.09, ex Mg 0.38, ex K 0.18, ex Na 0.08

BACKGROUND SUMMARY

Product salesmen and growers often wish to test new products for use in WA farming systems. While local testing is essential before a product can be shown to be generally useful, any one trial necessarily gives site, season and management specific results. This trial attempts to test several foliar application products and illustrates the complexities of doing a scientific comparison that can incorporate sometimes specialized requirements stipulated by product sellers in a commercial situation.

Named products were applied in line with information that accompanied the product.
A couple of products were withdrawn from the trial by the sellers because we could not manage the trial in accordance with their requirements for cultivation and herbicide management
As some products (even nutritional ones) are recommended for use regardless of the nutritional status of the site, we chose to test the products at low and high levels of crop nutrition.

TRIAL DESIGN

This trial grew out of a desire to test new products but was constrained by our ability and resources, to sow products according to their promoters' wishes. We decided to make it a test of post seeding foliar application products at two levels of general nutrient availability. This precluded a couple of potential test products. If the promoters demand strict conditions for the use of their products, then these conditions should be clearly stated as part of their sales pitch so that growers know whether the product will or will not have a chance of working under their own conditions.

The trial is a split plot design two main treatments (high and low fertility) sub-plotted for the test and control treatments.

Plot size: sub plot dimensions are 24 metres by 3 metres on 4 metre centres

Machinery use: 2 by 55 metre runs with a 12 metre bar seeder were used to sow the main plots with plus and minus fertilizer. Sub plots were applied via a quad bike spray unit, or were hand top-dressed

Repetitions: 3

Crop type and varieties used: Calingiri wheat sown at 80 kg/ha

Seeding rates and dates: Sown on 23 May 2013 after the application of 1.5L/ha "attack" and 118gm/ha Sakura. Further sprayed on 19th for radish control with 600 ml/ha of MCPA LVE + 700 ml/ha of Jaguar +125 ml/ha of alpha cypermethrin + 250 ml/ha of Tilt plus

Treatment rates and dates: The two main treatments were sown without and with Summit Spud at 130 kg/ha. The plus fertiliser treatments were drilled with the seed and provided the following nutrients: 10.4 kg N/ha, 16.6 kg P/ha, 14.6 kg K/ha, 10.3 kg S/ha, 2.9 kg Ca/ha, 1.2kg Mg/ha , 180 gm Cu/ha, 170 gm Zn/ha, 200 gm Mn/ha and 10 gm Mo/ha

The plus nutrient plots were given subsequent additional 100 litres/ha of UAN (42 kg N/ha) on June 17 (3.5 leaf stage)
On June 17 (3.5 leaf stage), cross treatments (13) were applied. Those treatments with repeat applications received them again on 24th July (6.5 leaf stage)

Table 1. Treatment details for the sub plots.

#	product	rates	methods	timing 1	timing 2	application
1	Ipusagro	3 kg/ha	twice	3.5WAS	9 WAS	400L water/ha
2	Grazers	250 ml/ha	twice	3.5WAS	9 WAS	in 250Lwater/ha
3	Summit	83 L/ha Maxamflo	once only!	3.5WAS		spray
4	CSBP	120 kg/ha NS51	tissue test	3.5WAS		topdressed
5	CaCl2	10 L/ha	twice	3.5WAS	9 WAS	with 30 L water
6	Calsap	6 L Calsap	twice	3.5WAS	9 WAS	with 30 L water
7	Calsap	6 L Calsap	twice	3.5WAS	9 WAS	with 30L UAN
8	control (nil)	nil				
9	12 kg N/ha 5 was	25 kg urea/ha		3.5WAS		topdressed
10	23kg N/ha 5 was	50 kg urea/ha		3.5WAS		topdressed
11	46 kg N/ha 5 was	100 kg urea/ha		3.5WAS		topdressed
12	92 kg N/ha 5 was	200 kg urea/ha		3.5WAS		topdressed
13	12 kg N/ha	30 L UAN	twice	3.5WAS	9 WAS	spray

Summit should have been applied twice

TRIAL LAYOUT

N

northwest	minus fertiliser		plus fertiliser			minus fertiliser			plus fertiliser			plus fertiliser			minus fertiliser		
Plot	reat#.		Plot	reat#.		Plot	reat#.		Plot	reat#.		Plot	reat#.		Plot	reat#.	
1	7	Calsap in UAN	14	7	Calsap in UAN	27	1	Ipusagro	40	1	Ipusagro	53	8	control (nil)	66	8	control (nil)
2	13	12kg N/ha as U	15	13	12kg N/ha as UA	28	11	48 kg N/ha	41	11	48 kg N/ha	54	11	48 kg N/ha	67	11	48 kg N/ha
3	10	24 kg N/ha	16	10	24 kg N/ha	29	6	Calsap in water	42	6	Calsap in water	55	12	96 kg N/ha	68	12	96 kg N/ha
4	4	NS51	17	4	NS51	30	3	Maxamflow	43	3	Maxamflow	56	6	Calsap in water	69	6	Calsap in water
5	2	Grazers	18	2	Grazers	31	13	12kg N/ha as U	44	13	12kg N/ha as U	57	10	24 kg N/ha	70	10	24 kg N/ha
6	5	CaCl2	19	5	CaCl2	32	4	NS51	45	4	NS51	58	5	CaCl2	71	5	CaCl2
7	11	48 kg N/ha	20	11	48 kg N/ha	33	8	control (nil)	46	8	control (nil)	59	1	Ipusagro NS51	72	1	Ipusagro
8	9	12 kg N/ha	21	9	12 kg N/ha	34	2	Grazers	47	2	Grazers	60	4	Calsap in UAN	73	4	NS51
9	6	Calsap in water	22	6	Calsap in water	35	7	Calsap in UAN	48	7	Calsap in UAN	61	7	Grazers	74	7	Calsap in UAN
10	8	control (nil)	23	8	control (nil)	36	12	96 kg N/ha	49	12	96 kg N/ha	62	2	12 kg N/ha	75	2	Grazers
11	1	Ipusagro	24	1	Ipusagro	37	9	12 kg N/ha	50	9	12 kg N/ha	63	9	12kg N/ha as U	76	9	12 kg N/ha
12	3	Maxamflow	25	3	Maxamflow	38	5	CaCl2	51	5	CaCl2	64	13	Maxamflow	77	13	12kg N/ha as UAN
13	12	96 kg N/ha	26	12	96 kg N/ha	39	10	24 kg N/ha	52	10	24 kg N/ha	65	3		78	3	Maxamflow
																	south east

OBSERVATIONS

A very dry June and early July meant a shortage of pasture and the farmer decided to graze the crop in the trial paddock. The trial was grazed spasmodically for about 10 days (4.5 to 6 leaf stage) with light defoliation but no real damage observed. The second application of spray treatments was applied about one week after the sheep had been removed from the paddock. Weeds and diseases were not a problem.

The six dry weeks after seeding meant that there was no leaching of nitrogen on what would normally be a very leaching situation. An exceptionally wet August and September resulted in one of the best seasons for cropping ever experienced in the district. The long run of rainy days meant that there was cloud cover and overnight temperatures remained warm. This gave ideal conditions for nitrogen mineralization in the soil. There was no water stress during seed set and grain fill resulting in an exceptional season.

The plus fertilizer strips had far better early growth than the minus strips. Analyzed samples showed no marked deficiencies on either strip. Ratings for growth and colour (not shown here) of the sub plots were made on the minus fertilizer main plots at 3.5, 6 and 9 weeks after seeding. The main responses observed were to nitrogen fertilizer.

HARVEST RESULTS

The plots were harvested on the 11th November 2013. Grain weight was uniform across treatments and averaged 44.5 mgm. Complete nutrient analysis of the grain was carried out on treatments 1, 7, 8 and 13 (results not reported here)

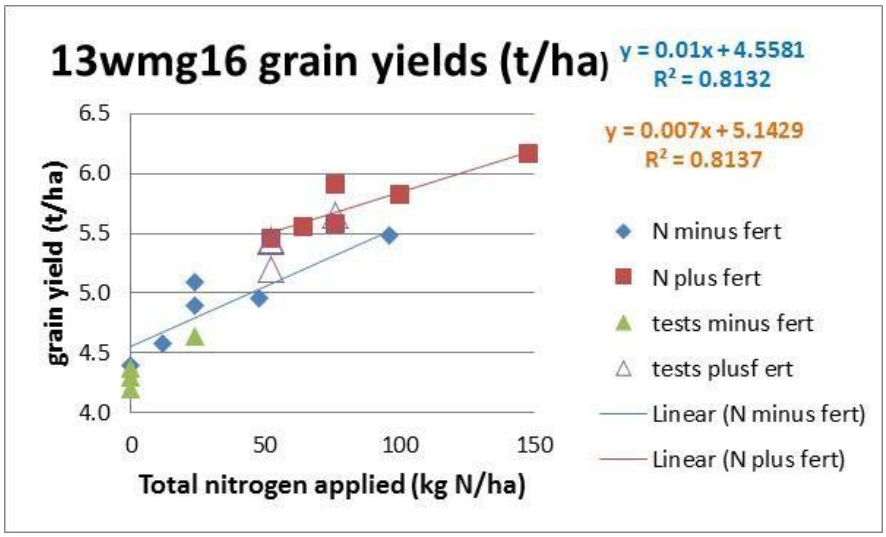
Table 3. Harvest results.

		applied nitrogen		GY t/ha		protein%	
		kg N/ha	kg N/ha	main plot fertilising		main plot fertilising	
Trt #	subplot treatments	minus	plus	minus	plus	minus	plus
1	Ipusagro twice	0	52	4.29	5.43	11.2	11.9
2	Grazers twice	0	52	4.20	5.20		
3	Summit Maxamflow	19	71	4.70	5.70	12.2	11.8
4	CSBP	44	96	5.08	5.99	12.2	12.9
5	CaCl2 twice	0	52	4.34	5.26		
6	Calsap in water twice	0	52	4.37	5.45		
7	Calsap in UAN	24	76	4.64	5.65	12.2	13.0
8	control (nil)	0	52	4.40	5.45	12.0	11.9
9	12 kg N/ha 5 was	12	64	4.58	5.55		
10	24 kg N/ha 5 was	24	76	4.89	5.58	11.9	12.3
11	48 kg N/ha 5 was	48	100	4.96	5.82	12.2	12.9
12	96 kg N/ha 5 was	96	148	5.48	6.16	12.7	14.0
13	12kg N/ha as UAN twice	24	76	5.09	5.90	12.3	12.6
	mean	22	74	4.69	5.63	12.1	12.6

5% L.S.D. for grain yield was 0.39 t/ha. Figures in bold are significantly greater than the control

Figure 1. below shows that the site was very responsive to N fertilizer. The relatively smooth response line to N shows that this was the determining factor in crop yield, regardless of whether other treatments (Calsap, IPUSagro, Grazers) were added. If these products did increase yield one would see their yield being above the response line ; if anything, they are below– this did not happen.

Figure 1. Grain yields (t/ha) in response to total nitrogen applied.



It is interesting to note the low response to P at the yields achieved. The difference in yield where the data from the plus/minus fertilizer treatments overlap indicates a modest response (300kg/ha) to nutrients apart from N.

The main response was to the level of total nitrogen applied , regardless of source or timing (see figure below). Beyond this there was no significant response to Ipusagro, Grazers or Calsap.

The slopes of the fitted lines give responses of 10 and 7 kg grain per kg N for the minus and plus fertilizer treatments at seeding respectively. At $0.3 /kg for wheat and $1.30 /kg for N it would pay to use N on both sown fertilizer treatments with greater returns at high inputs.

CONCLUSIONS

In this trial we observed no response to the non-nitrogen test products, either on the low or high fertilizer at seeding treatments. However we cannot say that they will not work under other site, season and management conditions. Unfortunately the promoters can rightly say that we did not give their product the best opportunity to perform and so it was an invalid test.

Such a reply has implications for the promoters rather than the testers. The promoters have an obligation to state under what conditions they expect their product to work and those conditions have to be readily recognized by potential local users. It is not good enough to list a range of processes which the product “improves” or even to quote circumstances from elsewhere where the product has worked. Any new product (and agronomic practice for that matter) has to be extensively tested under local conditions so that the promoters can say what the chances of success are if used by local growers.

We, the testers are able to state that the product did not work under our conditions and in the Popper sense of “falsification” have disproved any statement about how generally useful the product might be. That is, 100% of our observations say it does not work, but that is hardly useful. We could have had a drought year and nothing would have worked. We could have been wiped out by frost or we may have chosen a site with the wrong levels of fertility. We did not test across a full range of conditions and so have too limited information for invalidating the all claims made for the products. This problem is equally true for validation by the product developers.

Products MUST be tested across a wide range of local conditions before it can be promoted with confidence to the broader agricultural community.

In short, any new product (or agronomic practice) requires a major investment in validation trials which are ranged across the full set of management, site and season conditions experienced in the new environment. Otherwise, general promotion of those products should not be believed until such work has been done.

PEER REVIEW

Thanks to Doug Sawkins for his corrections and suggestions.

ACKNOWLEDGEMENTS/ THANKS

Thanks to Andrew Kenny the pre-seeding spray, to Graham and Don White for providing the site and management, to Summit Fertilizers for the seeding 'plus fertilizer' treatment, to Deb Jackson for assistance, the participating players for their products. DAFWA did the harvesting and both CSBP and Summit funded the grain analyses. Last but not least to Joel Andrew who helped with his mechanical skills at both sub-treatment application days.