Cereal Practice for Profit

Darcy Fleay, Research Agronomist, Kalyx Agriculture

Aim

To examine the profitability of increasing inputs for cereal varieties representing APW, noodle and hard wheat grades, as well as new malt and feed barley varieties, on a loam soil, with increasing acidity at depth.

Background

This trial was designed to investigate the response of a range of cereal types to increasing seeding rate, fertiliser including nitrogen manipulation, disease management and grass/broadleaf weed management strategies. Low, District and High management strategies that ranged in cost from $170-$345/ha were applied to each variety, and crop growth, weed counts, disease infection, crop head counts, yield, grain quality and gross margin were measured. Management practices are explained below;

Low input treatments are based on a farmer delivering grain to the bin at the lowest possible cost, regardless of seasonal conditions (approx. $170/ha).

District input is based on what is considered common farm practice for the area as determined by growers via Liebe R&D Committee (approx. $255/ha).

High input treatments simulate a paddock with high yield potential matched with increased inputs to maximise yields and profitability (approx. $345/ha).

Analysis in this report is based on estimated 2010 input prices and returns calculated from current cash grain prices.

Trial Details

Property	Rob Nankivell, East Maya
Plot size & replication	2.5m x 12m x 3 replications
Soil type	Loam increasing to acid at depth
Sowing date	31/5/2010
Seeding rate	As per protocol
Fertiliser (kg/ha)	As per protocol
Paddock rotation	07 Cadiz serradella, 08 Wheat, 09 Peas
Herbicides	As per protocol
Growing Season Rainfall	141mm, May-October (long term growing season average 246mm)

Treatments

Table 1. Crop Protection

No.	Date	Product	Rate		Placement
1	31/5/2010	Roundup PowerMAX®	2	L/ha	knockdown IBS
		Chlorpyrifos	1	L/ha	
2	1/9/2010	Ally®	4	g/ha	post emergent (volunteer peas)
		Lontrel	300	mL/ha	
		Hasten®	1	% v/v	

Table 2. Treatments

Input	No.	Variety	Treatment	Rate		Timing		Date
Low	1	Wyalkatchem wheat	Trifuralin	1.2	L/ha	IBS	A	31/5/2010
	4	Calingiri wheat	MAP	20	kg/ha	IBS	A	31/5/2010
	7	Tammarin Rock wheat	Seed rate	40	kg/ha	seeding	B	31/5/2010
	10	Hindmarsh barley	MCPA LVE	300	mL/ha	Z13-Z14	C	29/6/2010
	13	Buloke barley	Diuron	350	mL/ha	Z13-Z14	C	29/6/2010
			Flexi N®	30	L/ha	Z15-16	D	15/7/2010
Active	2	Wyalkatchem wheat	Trifluralin	1.5	L/ha	IBS	A	31/5/2010
	5	Calingiri wheat	Avadex	1.6	L/ha	IBS	A	31/5/2010
	8	Tammarin Rock wheat	Agstar®	80	kg/ha	IBS	A	31/5/2010
	11	Hindmarsh barley	Seed rate	60	kg/ha	seeding	B	31/5/2010
	14	Buloke barley	Paragon®	250	ml/ha	Z13	C	29/6/2010
			Flexi N®	40	L/ha	Z15-16	D	15/7/2010
			Tilt	250	mL/ha	Z30	E	31/8/2010
			Flexi N®	30	L/ha	Z37	F	31/8/2010
High	3	Wyalkatchem wheat	Boxer Gold®	2.5	L/ha	IBS	A	31/5/2010
	6	Calingiri wheat	Agstar®	120	kg/ha	IBS	A	31/5/2010
	9	Tammarin Rock wheat	Flexi N®	60	L/ha	IBS	A	31/5/2010
	12	Hindmarsh barley	Seed rate	90	Kg/ha	seeding	B	31/5/2010
	15	Buloke barley	Jockey	3	L/tonne	with seed	B	31/5/2010
			Axial®	150	ml/ha	Z12-13	C	29/6/2010
			Adigor	0.5	% v/v	Z12-13	C	29/6/2010
			Flexi N®	30	L/ha	Z15-16	D	15/7/2010
			Paragon®	400	mL/ha	Z16	D	15/7/2010
			Bromicide MA	600	ml/ha	Z16	D	15/7/2010
			Flexi N®	30	L/ha	Z37	F	31/8/2010
			Tilt	250	mL/ha	Z39	G	31/8/2010

Results

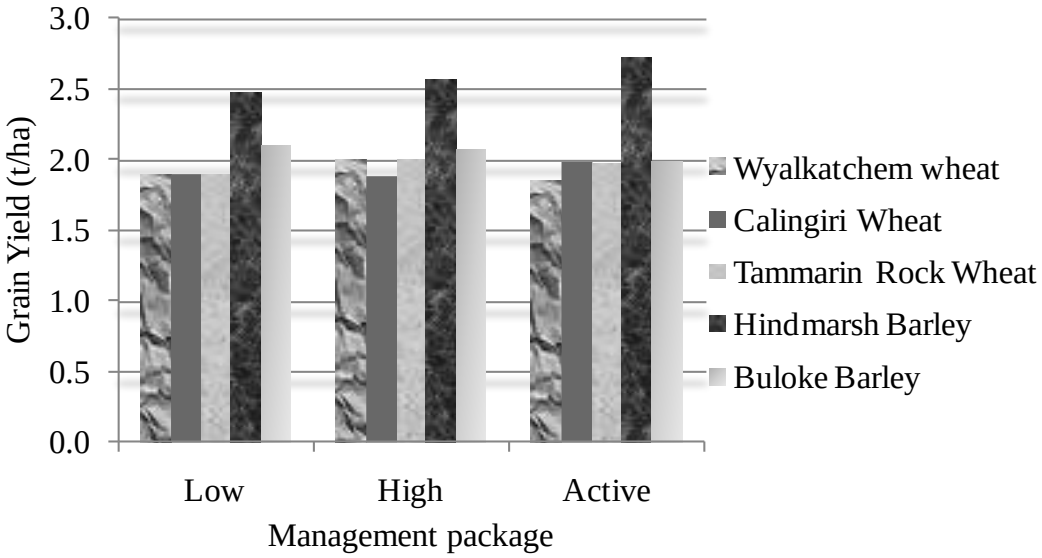

Figure 1. Yield (t/ha) for each cereal variety relative to management practice at 166 DAS (LSD =0.33 t/ha).

Table 1. Crop density (29 DA-S), Vigour (92 DA-S), Weed Counts (92 DA-S), Crop Head Number (152 DA-S), Grain Yield (166 DA-S), Quality and Gross Margin for each Crop Variety and Management Treatment.

No	Variety	Input	Crop counts #/m^2	Crop vigour 0-100	Vol. Pea counts /m^2	Crop heads #/m^2	Grain yield t/ha	Screen-ings %	Protein %	Gross Margin * $/ha
1	Wyalkatchem	Low	84 c-f	70 bcd	1.0 a	165 e	1.9 b	11.2 c	11.7 efg	156
4	Calingiri		101 bcd	67 cd	1.3 a	155 e	1.9 b	9.8 c	11.3 fg	297
7	Tammarin Rock		59 ef	60 e	1.7 a	155 e	1.9 b	15.6 c	12.5 c-f	156
10	Hindmarsh		73 def	65 de	0.7 a	325 c	2.5 a	36.4 b	10.9 g	303
13	Buloke		53 f	72 abc	1.5 a	263 d	2.1 b	61.5 a	11.8 d-g	229
2	Wyalkatchem	Active	111 a-d	72 abc	2.0 a	177 e	1.9 b	10.6 c	12.9 a-e	70
5	Calingiri		100 bcd	72 abc	2.0 a	166 e	2.0 b	10.1 c	13.1 ab c	235
8	Tammarin Rock		94 b-e	65 de	0.6 a	166 e	2.0 b	12.1 c	13.0 a-d	87
11	Hindmarsh		107 bcd	77 a	0.5 a	495 a	2.7 a	32.7 b	12.7 b-e	254
14	Buloke		92 b-e	75 ab	1.3 a	376 bc	2.0 b	66.8 a	12.8 a-e	124
3	Wyalkatchem	High	113 abc	77 a	0.7 a	204 e	2.0 b	11.9 c	13.9 ab	- 23
6	Calingiri		130 ab	75 ab	0.5 a	190 e	1.9 b	13.6 c	14.0 a	- 43
9	Tammarin Rock		99 bcd	73 ab	0.5 a	192 e	2.0 b	11.7 c	13.8 ab	- 23
12	Hindmarsh		148 a	77 a	0.8 a	480 a	2.6 a	39.2 b	13.6 ab c	146
15	Buloke		122 ab	73 ab	0.4 a	413 b	2.1 b	70.6 a	13.5 ab c	53
LSD (P=.05)			**38.1**	**6.3**	**1.2**	**54.1**	**0.325**	**9.4**	**1.3**	
CV			**23.0**	**5.3**	**72.1**	**12.4**	**9.320**	**20.5**	**5.9**	
Treatment F			**3.717**	**5.260**	**1.676**	**43.633**	**5.804**	**47.3**	**5.0**	
Treatment Prob (F)			**0.002**	**0.000**	**0.119**	**0.000**	**0.000**	**0.000**	**0.000**	

Means followed by same letter do not significantly differ (P=.05, LSD)

* *Hectolitre weight was not measured and grain was not graded so assumptions of feed grade(screenings > 10%) and GP grade (screenings between 5-10%) were made for calculation of Gross Margin in wheat and barley was assumed to be feed.*

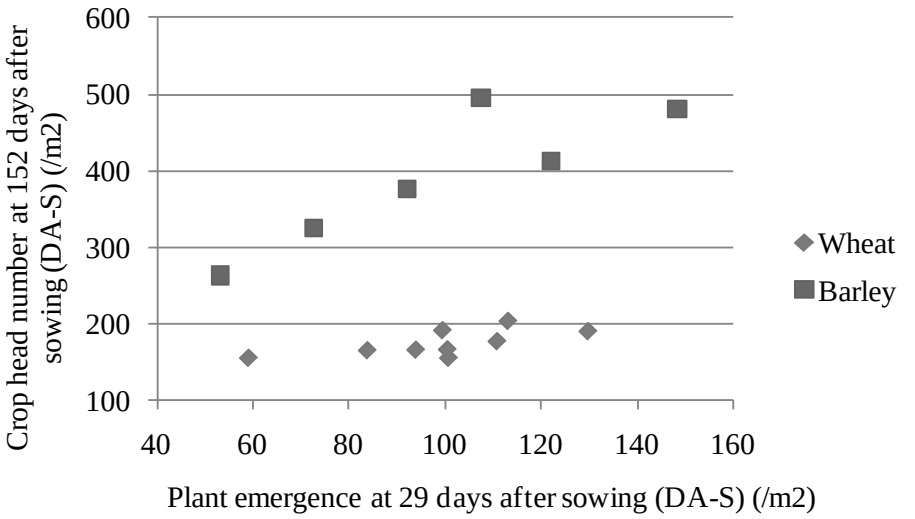

Figure 2. Relationship between head number and plant emergence.

Table 2: Factorial analysis for Crop density (29 DA-S), Vigour (92 DA-S), Weed Counts (92 DA-S), Crop Head Number (152 DA-S), Grain Yield (166 DA-S) and Grain Quality

No.	Variety	Crop counts #/m²	Crop vigour 0-100	Vol. Pea counts /m²	Crop heads #/m²	Crop yield t/ha	Screen-ings %	Protein %
TABLE OF A MEANS								
1	Wyalkatchem	102	73 a	1.2	182 c	1.9 b	11.2 c	12.8
2	Calingiri	110	71 a	1.2	171 c	1.9 b	11.2 c	12.8
3	Tammarin Rock	84	66 b	0.9	171 c	2.0 b	13.2 c	13.1
4	Hindmarsh	109	73 a	0.6	433 a	2.6 a	36.1 b	12.4
5	Buloke	89	73 a	1.1	351 b	2.1 b	66.3 a	12.7
LSD (P=.05)		**NSD**	**3.7**	**NSD**	**31.2**	**0.188**	**5.5**	**NSD**
TABLE OF B MEANS								
1	Low	74 c	67 c	1.2 a	213 b	2.1	26.9	11.6 c
2	Active	101 b	72 b	1.3 a	276 a	2.1	26.5	12.9 b
3	High	122 a	75 a	0.6 b	296 a	2.1	29.4	13.7 a
LSD (P=.05)		**17.0**	**2.8**	**0.6**	**24.2**	**NSD**	**NSD**	**0.6**

Means followed by same letter do not significantly differ (P=.05, LSD)

Comments

Increasing seed rate led to higher crop emergence with an average 122 plants /m2 under high inputs, though the higher plant number was primarily due to higher emergence in barley varieties (reflecting lighter grain). This has set the crop up for a high yield potential, but has also increased the risk of yield loss from infrequent rainfall events and drying soil early in the season. There was also increased plant vigour under the High Input strategy, but the increase was primarily a reflection of the lower vigour in Tammarin Rock under Low and Active Input. Crop head density was also highest under High Input, reflecting the higher seeding rate and crop nutrition, and was positively correlated with seedling establishment.
The greater tillering ability of barley compared to wheat was apparent, especially as seeding rate and fertiliser rate increased.

Leaf disease was low at this site with ratings at 92 DA-S indicating damage of between 0.3 and 6%. Volunteer peas were the primary weed in this trial and, whilst easily controlled with herbicide, it is still worth noting that the increased competitive ability of the High Input strategy was effective in reducing volunteer pea weed density and at the Low and Active Input treatments Hindmarsh barley tended to compete best.

Grain yield was quite high, keeping in mind the low rainfall, with wheat and Buloke barley at about 2 t/ha. The stand out performer was Hindmarsh barley at 2.5 t/ha under Low Input. Increasing inputs resulted in only a slight increase in yield and this increase under Active and High Input was at an additional cost of about $85 and $175/ha respectively. Water Use Efficiency (8.75mm summer rain contribution + season rainfall – 60mm evaporation – 0mm at season end rainfall) was similar amongst the wheat variety and Buloke barley at 22 to 24 kg/mm/ha and was much higher in Hindmarsh barley at 29 to 31 kg/mm/ha.

As expected the grain protein increased with higher inputs, including Flexi-N®, and protein ranged 13.5 to 14% under High Inputs. The high yield of Hindmarsh did not necessarily reduce grain protein, which may reflect the pea rotation. A dry May/June of 17mm and 26mm combined with the dry finish (21mm for September) resulted in wheat screenings of 9.8 to 15.6%. Seed rate and fertiliser had little effect on wheat screenings with factorial analysis showing no significant difference between the level of input and also no significant difference between wheat varieties.

Screenings were high in general and very high in Buloke with 61% recorded under Low Inputs and increasing to 71% under high nputs. Hindmarsh had significantly lower screenings compared to Buloke and overall appeared to have the best agronomic adaptation to the prevailing season. Comments on quality measurements are constrained by the lack of Hectolitre weight.

For all wheat and barley varieties the highest return was achieved in the Low Input strategy with returns ranging from $156/ha to $303/ha and averaging $228/ha. Increasing inputs of seed, fertiliser and weed control did not lead to higher yield or better quality but did lead to a decrease in gross margin; an average $74/ha under Active Inputs and $206/ha under High Inputs. In fact wheat lost the grower $23 to $43/ha under the High Input strategy. The high yield of Hindmarsh was reflected in it achieving the highest gross margin of $303/ha, under Low Input, and this was the highest return of any variety under any of the three input strategies.

An Active Management strategy, where the aim is to establish a reasonable yield potential early and then play the season with remaining inputs, has appeared to be the most reliable strategy, producing the highest, or close to the highest, margin over several years, even in the dry season of 2007. In 2009 and 2010 the District Input turned out to be high risk with losses of $60 to $246/ha in 2009 and reduced gross margins of $49 to $105/ha compared to the Low Input strategy in 2010. On the loam soil, with slightly acidic subsoil, the Low Input Practice resulted in equivalent yields to higher input strategies, but this inputs also included the benefits of a pea rotation. Too low inputs, demonstrated in earlier years that opportunities can be missed. Seasonal conditions, risk management, weed control, weed seed set and nutrient depletion strategies must be managed across, and evaluated, season by season.

It must be remembered that the Liebe Group's membership comprises a wide and varied region. This trial was conducted in a season that recorded 56% of the average growing season rainfall and late in the season

the crop suffered from moisture stress. The data generated from this trial needs to be evaluated in light of the season, soil type, variety choice and inputs and compared with similar trials from previous years.

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Contact
Darcy Fleay
dfleay@kalyx.com.au