Alternative crops trial

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Key Points

- The best yielding crops were undersown barley, at l t/ha, and wheat, at 0.8 t/ha.
- Excel field peas were the only alternative crop to yield similar to wheat, but like all other alternative crops, its yield was statistically different from undersown barley.
- Wheat and undersown barley were the only trial entries to have positive gross margins.
- Kaspa field peas had the lowest gross margin in the alternative crops because of high seed costs.

Why do the trial?

The Tottenham regional site committee, in assoication with the TOP Woodlands Ag Bureau, in 2004 conducted a trial to look at alternative crops to wheat and barley. This trial is an extension of a pulse trial, which was conducted in 2003, that only looked at field peas, lupins, vetch and undersown barley. In 2004 the group wanted to look further into alternative crops therefore chickpeas, canola and wheat were included in the trial. All crops were assessed on yield and gross margin.

How was it done?

The trial was designed as a randomized replicated block. There were three replicates with each alternative crop present in each replicate, with the plots 30 m long and 6 m wide. The trial was located on a local fanner's property just on the western edge of Tottenham. It was managed by the Tottenham Regional Site group and CWFS staff.

The trial was sown using a cone seeder on the 14th June. All varieties, seeding rates, fertiliser rates and sowing times for this trial are given in Table 1. For each species grown at least one variety that was suited to the Tottenham district was selected. A description for each variety is also provided. The rainfall for the Tottenham trial site is shown in Figure 1.

Variety Descriptions

Wheat

Janz is prime hard quality with moderate seedling vigour. It has medium to strong straw strength with good lodging and shattering resistance. Janz has good milling quality. Sunbri is also a prime hard wheat. It doesn't have the seeding vigour of some varieties, however it has strong straw.

Barley/Lucerne

Schooner barley is the main central and southern malting variety. It was undersown in this trial with L69 and Hunterfield lucerne. L69 is highly winter active and is highly resistant to both spotted alfalfa and blue-green aphids. It is resistant to phytophthora root rot, highly resistant to anthracnose and has low resistance to stem nematode. Hunterfield has moderate growth in winter, with vigorous seedling growth and rapid regrowth after cutting or grazing. It is suitable for hay production and has a quick response to summer/autumn rains.

Fieldpeas

Kaspa is a dun pea which has vigorous growth, medium height and shatter resistant pods, however, they can lodge at maturity. Excel is a blue pea which has

excellent standing ability at harvest, is high yielding and semi-leafless with medium height.

Lupins
Jindalee is a narrow-leaf lupin with good shatter resistance and lodging resistance. It can be used in early sowing and has high resistance to stem blight, however it can cause lupinosis in sheep. Merrit is also a narrow-leaf lupin with good shatter resistance, resistance to root rot and moderate resistance with Phomopsis stem infection.

Vetch
Popany vetch is a purple vetch which has a late maturity, a high potential for hay production, is hard seeded and is susceptible to pod shattering. It is resistant to rust and susceptible to ascochyta blight. Haymaker vetch is a common vetch which has a middle maturity, a high potential for hay production and hard seeded to some degree. It is also resistant to rust.

Canola
ATR Beacon is triazine tolerant variety with medium maturity, moderate yield and oil, high protein and a blackleg ratine of 6.

Chickpeas
Amethyst is a Desi type pea with a medium height, moderate lodging resistance and medium maturity.

Table 1. Alternative crop species, varieties, seeding rates, fertiliser rates and sowing time.

Species	Number	Variety	Seeding Rate (kg/ha)	Fertiliser	Sowing Time*
Field peas	**1**	*Kaspa*	**122**	60 kg/ha Trifos	Late
	2	*Excel*	122	60 kg/ha Trifos	Late
Lupins	**3**	*Jindalee*	**65**	60 kg/ha Trifos	Late
	4	*Merrit*	**67**	60 kg/ha Trifos	Late
Vetch	**5**	*Popanv*	**32**	60 kg/ha Trifos	Late
	6	*Haymaker*	**32**	60 kg/ha Trifos	Late
Undersown barley with lucerne	**7**	*L69*	**2**	80 kg/ha MAP	Optimum
	8	*Hunterfieki*	**2**	80 kg/ha MAP	Optimum
		Schooner Barley	**24**		Optimum
Wheat	**9**	*Jan:*	**35**	80 kg/ha DAP	Late
	10	*Sanbri*	**35**	80 kg/ha DAP	Late
Canola	**11**	*A TR Beacon*	**3**	80 kg/ha DAP	Late
Chickpeas	**12**	*Amethyst*	**46**	60 kg/ha Trifos	Late

* Sowing time - Optimum: preferred sowing time. Late: later then recommended, yield reductions expected.

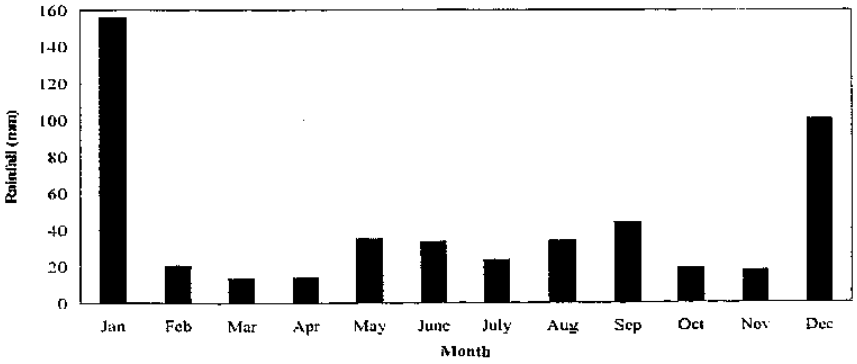

Figure 1. Rainfall at the Tottenham regional site alternative crop trial 2004

What happened?

The yield results for each crop variety can be seen in Figure 2. This figure shows a significant difference ($P<0.05$) in yield between crops. The highest yielding crop, which was sown in the optimum sowing window, was Schooner barley undersown with either L69 or Hunterfield lucerne. The lowest yielding crops, which were sown later than recommended, were Haymaker vetch, Popany vetch and Amethyst chickpeas. In the pulse crops the highest yielding variety was Excel field peas, followed by Kaspa field peas and Merrit lupins. The field peas and lupins were also sown later than recommended.

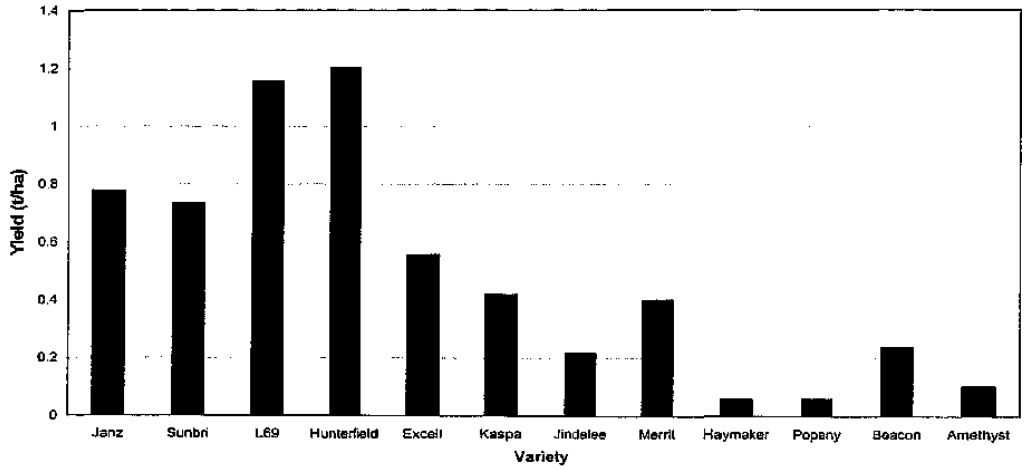

Figure 2. Grain yield (t/ha) for the Tottenham regional site alternative crop trial

Note: columns with the same letter are not significantly different

The gross margins for all trial entries can be seen in Figure 3. The gross margin results show a significant difference ($P<0.05$). The variety that generated the highest gross margin was Schnooner barley undersown with Hunterfield, this was not significantly different from undersowing with L69. The next highest gross margins were Janz and Sunbri wheat. All the alternative crops had negative gross margins. Kaspa field peas had the lowest gross margin, however this was not significantly different from Excel field peas, Popany vetch or Haymaker vetch.

The total variable costs and approximate breakeven yields for each trial entry can be seen in Table 2 (at the end of the paper). These figures explain the low gross margins for both field peas and lupins. The main variable cost affecting the profitability of field peas and lupins is seed costs ($/ha), with prices around $128.10/t and $120.78/t and $58.50/t and $60.30/t respectively.

Conclusions

The main points in this trial were:

- In 2004 the only crop to yield over 1 t/ha was the undersown barley, with the wheat yielding just under 0.8 t/ha. Both of these crops were the only crops to have a positive gross margin.
- In the alternative crops, the only variety to have a yield similar to wheat was Excell field peas, whilst the lowest yielding alternative crops were vetch and chickpeas.
- All the alternative crops had negative gross margins, with Kaspa field peas the lowest.

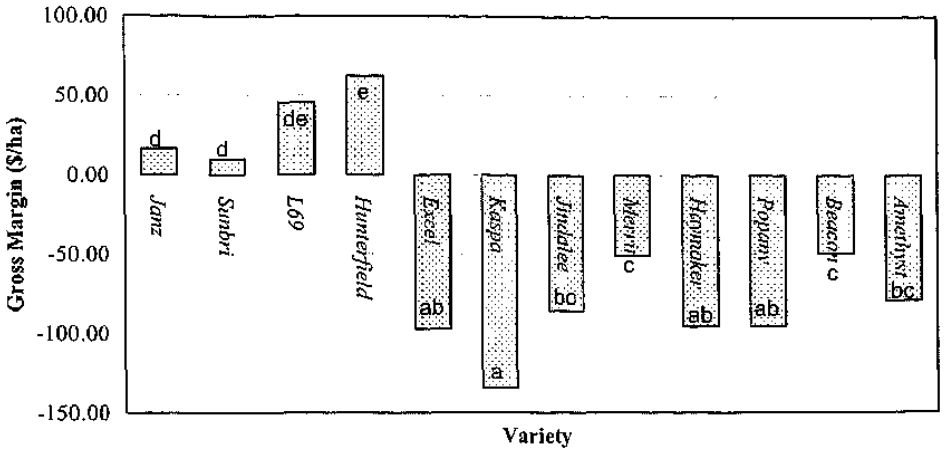

Figure 3. Gross margins ($/ha) for the Tottenham regional site alternative crop trial

Note: columns with the same letter are not significantly different

• The variable cost with the greatest impact on the profitability of field peas and lupins was the cost of seed.

These results are interesting to farmers because they show that in drought years alternative crops can be expensive to produce due to higher input costs, associated with the cost of seed and insecticide applications, and their lower yields compared to cereals.

It is recommended that farmers don't look at these trial results and conclude that alternative crops don't play a role in farming systems, because of poor gross margins in 2004. These results merely indicate that farmers need to seriously think about whether or not to sow alternative crops in drought years, when trying to limit input costs. Alternative crops can play a very important role in our cropping systems when the right crop is selected for the right paddock at the right time. They offer many benefits to the cropping rotation, such as:

- provide a disease break in cereal rotations
- better control of grasses
- rotation of herbicides, particularly for broad-leaf weeds
- extension of the cropping rotation
- improving the health and fertility of soils, mainly pulse crops

The rotational benefits of alternative crops can be seen not only in normal years, but also in dry years. It is up to you as the farmer to decide if the higher input costs are justifiable for the rotational benefits.

Other factors

One factor was that this area in 2004 was in their 3rd year of drought. The conditions were extremely tough for the trial, with only 184 mm of rainfall during the growing season.

The other factor is the sowing time for the trial. The trial was sown, on 14lh June, after adequate moisture was available in the soil profile. This resulted in a late sowing for all trial entries, expect the undersown barley.

Acknowledgements

I would like to thank the members of the Top Woodlands Ag Bureau and the fanners in the Tottenham district for their support and interest in this trial throughout the year. On behalf of the group I would also like to thank Allan L'Estrange, Daryl Reardon and Jimmy Presley for their technical support. I would also like to thank the Medcalf family for allowing us to have the trial on their property.

Table 2. Variable costs for the Tottenham regional site alternative crons trial.

	Wheat		Undersown Barley		Field Peas		Lupins		Vetch		Canola	Chickpeas
	Janz	**Sunbri**	L69	**Hunter field**	**Kaspa**	**Excell**	**Jindalce**	**Merrit**	**Popany**	**Haymaker**	**Beacon**	**Amethyst**
VARIABLE COSTS:												
Seed												
seed cost ($/ha)	$21.35	$21.35	$19.52	$9.00	$128.10	$120.78	$58.50	$60.30	$36.80	$36.80	$12.60	$36.80
sowing	$7.37	$7.37	$7.37	$7.37	$7.37	$7.37	$7.37	$7.37	$7.37	$7.37	$7.37	$7.37
Barley seed cost ($/ha)			$5.28	$5.28								
Fertiliser												
Triphos @ 60 kg/ha					$18.00	$18.00	$18.00	$18.00	$18.00	$18.00		$18.00
DAP @ 80 kg/ha	$43.20	$43.20									$43.20	
MAP @ 80 kg/ha			$34.40	$34.40								
Herbicide												
Pre-sowing												
Roundup Powermax @ 1.2 L/ha	$6.20	$6.20	$6.20	$6.20	$6.20	$6.20	$6.20	$6.20	$6.20	$6.20	$6.20	$6.20
Triflm- X @1.2L/ha	$10.20	$10.20	$10.20	$10.20	$10.20	$10.20	$10.20	$10.20	$10.20	$10,20	$10,20	$10.20
spray boom	$1.83	$1.83	$1.83	$1.83	$1.83	$1.83	$1.83	$1.83	$1.83	$1,83	$1.83	$1.83
Post sowing												
Verdict @ 0.075 L/ha					$18.75	$18.75	$18.75	$18.75	$18.75	$18.75	$18.75	$18.75
MCPALVE@ 1.7 L/ha	$8.25	$8.25										
Brodal@ 0.2 L/ha					$28.00	$28.00						
Buctril @ 1.4 L/lia			$18.20	$18.20								
Lontrel @ 0.3L/ha											$17.40	
spray boom	$1.83	$1.83	$1.83	$1.83	$1.83	$1.83	$1.83	$1.83	$1.83	$1.83	$1.83	$1.83
Insecticide												
Karate @ 0.02 L/ha					$4.77	$4.77	S4.77	S4.77			S4.77	S4.77
spray boom					$1.83	$1.83	S1.83	$1.83			$1.83	$1.83
Total Variable Costs ($/ha):	**$100.23**	**$100.23**	**$104.83**	**$94.31**	**S226.88**	**S219.56**	**$129.28**	**S131.08**	**$100.98**	$100.98	S125.98	**$107.58**
Approx. Breakeven Yield (t)	0.72	0.72	0.81	0.73	1.03	1.00	0.65	0.66	0.50	0.50	**0.39**	J 0.40