Pulse Evaluation and Agronomy on Upper Eyre Peninsula in 2003

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Key Points

- Peas are the most robust pulse option in low rainfall environments, but erosion risks must be well managed.
- Early sowing is essential for maximising pulse yields.
- Kaspa is an option for low rainfall regions, but has generally performed best in the more favourable years.
- No significant yield difference occurred in Kaspa by increasing plant density from 45 to 55 plants/m^2 in 2003.
- Beans and chickpeas are opportunity crops only in low rainfall environments and suited to better years and more favourable conditions.

Why do the trial?

Pulses are a valuable break crop option in rotations in many low rainfall areas, although they do not currently fit all areas, situations and seasonal conditions. Breeding lines of pulse crops are evaluated at Minnipa alongside current varieties, with the aim of producing varieties better adapted to low rainfall environments.

Agronomic testing of lines with potential in low rainfall areas (to verify that recommendations for maximum production in other pulse growing regions of SA are applicable under low rainfall conditions) is limited. Kaspa generally outyields Parafield in most areas of SA. It flowers about a week later than Parafield and has a condensed pod filling/flowering window making it a slightly riskier option in low rainfall areas. Seeding rate trials in the Mid North and Yorke Peninsula indicate Kaspa is more responsive to higher seeding rates (50-55 plants/m^2) than Parafield (40-45 plants/m^2). A trial was run at Minnipa in 2003 to verify this recommendation in a low rainfall situation.

What Happened?

Seasonal conditions at Minnipa in 2003 were not favourable for pulse production. The late and fragmented break to the season resulted in pulse trials being sown 10-14 days later than ideal. In years where growing season rainfall is average or below, the delay in sowing results in significant reduction in yields. Early plant growth was slow due to the late start, especially in vetch and chickpeas. Vegetative growth was low at the onset of flowering and continued dry conditions through spring led to low final levels of vegetative production. High temperatures (33°C) on September 20-21 abruptly finished flowering and caused high levels of flower and pod abortion in all pulses. Rain in late September allowed some yield compensation in later varieties but generally yields of all pulses were poor due to the combination of low levels of vegetative growth and dry conditions. Weeds were also at high levels in most trials as the dry conditions made timely and effective herbicide control difficult.

The capacity of peas to tolerate low rainfall conditions better than all other pulses was again evident in 2003. Pea yields averaged 0.9 t/ha in the seeding rate trial compared with grain yields of 0.3-0.4 t/ha in the bean variety trials and less than 0.2 t/ha in the vetch and chickpea variety trials. Peas continue to be the most reliable pulse option in low rainfall areas, providing erosion risks are managed well.

Peas

A replicated trial of the varieties Parafield and Kaspa at a range of seeding rates from 20 to 120 plants/m^2 was sown on June 8, with 70 kg/ha of 18:20:0 fertiliser. The trial was harvested on November 10. Similar trials were also sown in other regions of the State.

Parafield was 9% higher yielding than Kaspa at standard seeding rates in 2003. This is similar to previous results at Minnipa in below average growing season rainfall years (<240 mm), when Parafield has outyielded Kaspa (Table 1). In years of above average growing season rainfall, Kaspa has yielded similarly or slightly above Parafield. This result supports previous findings that although Kaspa is still an option for low rainfall areas of South Australia it is more suited to medium to high rainfall areas with milder finishes.

Over the last five years high grain yields in peas at Minnipa have occurred in years when growing season rainfall has been well above the average (2000 and 2001), even when sown later than the accepted cut-off date of May 20. In years of below average rainfall it is critical to sow early to maximise yield, as shown in Table 1.

***Table 1: Parafield and Kaspa pea trial** yields compared **with rainfall and** sowing date at Minnipa, 1999-2003*

	1999		**2000**		**2001**		**2002**		**2003**	
	Para-field	**Kaspa**	**Para-field**	**Kaspa**	**Para-field**	**Kaspa**	**Para-field**	**Kaspa**	**Para-field**	**Kaspa**
Yield (t/ha)	**0.90**	0.81	2.20	2.24	**2.46**	**2.56**	**1.40**	**1.40**	**0.87**	**0.79**
GSR (mm)	**210**		299		**267**		**219**		**204**	
Annual Rainfall	**268**		389		**354**		277		**263**	
Seeding Date	**May 31**		June 2		**May 29**		**May 27**		**June 8**	

Results from the seeding rate trial indicate that grain yield of both Parafield and Kaspa increases with targeted plant density (Table 2). However, only the very low (20 plants/m^2) and the very high (120 plants/m^2) seeding rates produced grain yields significantly different from the recommended seeding rates (45 plants/m^2 for Parafield and 55 for Kaspa). Plant establishment was variable due to the dry start and plant emergence counts showed no significant difference in establishment between the targeted rates of 45, 55 and 65 plants/m^2 (Table 2), although visual differences were observed. This lack of measurable difference in plant establishment is most probably responsible for the lack of grain yield differences between treatments.

Table 2; Effect of plant density on grain yield of Kaspa and Parafield peas at Minnipa, 2003

Plants/ m^2 targeted	Grain yield (t/ha)		As % of Parafield @ 45 plants/m^2		Plants/m^2 estab ished	
	Kaspa	**Parafield**	**Kaspa**	**Parafield**	**Kaspa**	**Parafield**
20	0.46	0.61	**53**	70	18	19
45	**0.74**	0.87	**85**	100	**54**	**65**
55	0.79	1.02	91	118	37	67
65	0.87	**0.99**	100	114	66	**65**
75	0.90	**0.98**	103	113	**85**	82
120	**0.97**	1.13	111	131	118	142
Site Mean	**0.86**				67	
LSD (0.05)	0.18				**35**	
CV%	9.7				**25.2**	

This result supports findings from elsewhere in SA where a minimum plant population of 40-45 plants/m^2 is required to maximise yields. The higher targeted plant density of 55 plants/m^2 in Kaspa did not increase yields significantly in 2003. The significantly higher yield achieved with the very high seeding rate at Minnipa is not an uncommon finding in dry years and also occurred in Parafield at Willamulka (a medium to low rainfall sandy clay loam site on Yorke Peninsula) (Table 3). Such high rates however are unlikely to be economic and definitely not logistically possible. They are also unlikely to hold true in years of above average rainfall or where early vegetative growth is more prolific.

Table 3: Effect of plant density on grain yield(t/ha) of Kaspa and Parafield peas at Minnipa, Willamulka and a predicted mean across 7 sites in SA in 2003

Targeted Plants/m^2	Minnipa		Willamulka		State Mean (7 sites)	
	Kaspa	**Parafield**	**Kaspa**	**Parafield**	**Kaspa**	**Parafield**
20	0.46	0.61	1.92	1.72	2.82	2.50
45	0.74	0.87	2.27	**2.15**	3.40	2.92
55	0.79	1.02	2.32	**2.48**	3.33	2.98
65	0.87	0.99	2.42	2.32	**3.30**	**2.95**
75	0.90	0.98	2.30	**2.33**	**3.26**	2.79
120	**0.97**	1.13	2.30	**2.52**	3.20	**2.95**
Site Mean	0.86		2.26		**3.03**	
LSD (0.05)	0.18		0.26			
CV%	**9.7**		**4.9**			

General pea performance in 2003

Kaspa continues to perform well in SA and is broadly adapted. Its best performances in variety trials have been in medium to high rainfall areas where finishing conditions are generally more favourable. Kaspa's maturity timing is well suited to crop topping of rye grass, although effective herbicide-weed contact

may often be difficult to achieve due to its bulky, erect growth habit. Windrowing of Kaspa may be an option to achieve more effective control of rye grass.

Frost was a major yield limiting factor in many areas in 2003. While peas are tolerant to frosts in the vegetative stage, flowers and developing seeds can be very sensitive. There is no difference in frost tolerance at the reproductive stage between current pea varieties. Frost avoidance due to differences in variety flowering/podding time or perhaps due to differences in canopy architecture are the likely reasons for observed differences in yield losses between varieties.

Kaspa's susceptibility to blackspot is similar to Parafield's and growers are urged to implement blackspot management strategies to minimise yield loss. Bacterial blight was not a widespread problem in SA pea crops in 2003, as it was in NSW and Victoria, but growers are reminded of the importance of obtaining clean disease free seed (especially if sourcing seed from NSW or Victoria) and implementing farm hygiene protocols to reduce the risks of the disease becoming a problem.

Performance of other pulses at Minnipa in 2003

Other pulse crops evaluated at Minnipa in 2003 were disappointing. Yields were very low (less than 0.4 t/ha) and variability in the trials was high making discrimination between varieties on grain yield difficult. The poor performance was a direct result of the dry seasonal conditions but also highlighted the importance of early sowing for these crops in low rainfall environments.

Beans

Visually, beans handled the dry conditions and weed competition better than chickpeas and vetch in 2003, and yields were slightly better. Height to the bottom pods was very low due to reduced levels of vegetative growth making harvest difficult and yield losses comparatively high. Fiesta was the highest yielding variety (see the SAFCE Bean Variety Evaluation Results' although yield differences were no-significant. Fiesta sets its pods further off the ground than other varieties which often makes harvest easier and grain losses less.

Beans yielded exceptionally well at Lock in 2003, with very favourable condition for growth (300 mm. GSR) and earlier seeding allowing good cro establishment. Fiord was the highes yielding variety (2.9 t/ha), with Farah an Fiesta performing similarly (2.5 t/ha Fiord set a prolific amount of early pod which enabled it to yield higher tha Fiesta at numerous sites across the State Bean yields at Lock in 2003 show tha they can be a profitable crop in medium to low rainfall areas in better season: particularly when sown early.

The major interest for faba bean growe in SA is the release of the new variety Farah, as a replacement for Fiesta VI Seed should be available through PlantTech for commercial sowings i 2004. Farah is a direct selection from Fiesta VF. It is identical to Fiesta VF most attributes, but with the advantage < reduced susceptibility to ascochyt Growers can therefore expect ascochy seed staining to be less of a problem wi Farah than with Fiesta VF, and it m also allow fewer fungicide sprays f adequate ascochyta control. Farah unlikely to expand bean production low rainfall areas but will provide a low disease risk option for areas current successfully producing beans.

Chickpeas and Vetch

Chickpea and vetch results from Minni in 2003 are not presented as yields we

less than 0.2 t/ha and had very high variability due to the dry seasonal conditions and weed competition.

The anticipated release of the desi chickpea line FLIP94-508C with improved resistance to ascochyta will provide some growers with a low disease risk option in 2004. Due to its lower yields than Howzat, poor adaptation to dry conditions and inherently small dark seed (making it less preferred by marketers than Howzat) it will not be suited to low or medium to low rainfall areas.

No new vetch varieties have been released for 2004. Several promising advanced lines are continuing to be widely evaluated, including lines derived from complex crosses between Morava and Cummins and Morava and Languedoc, with the aim of producing early maturing, rust resistant grain and forage types with beige coloured cotyledons.

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Category
Try yourself
Location:
Minnipa Agricultural Centre
Paddock -South 3 S
Rainfall:
Av. annual : 326 mm
Av. G.S.R.: 241 mm
2003 total: 263 mm
2003 G.S,R.:204 mm
Paddock History
2003: Pulse trials
2002: Chemical fallow
2001: Yitpi wheat
2000: Pasture
Soil Type
Sandy loam, pH 8.9