

Maximising grain yield of field peas

Funded by the GRDC and conducted as part of the Southern Pulse Agronomy program.
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Key findings

- Average grain yield was higher at Hart in 2011 (2.9t/ha) compared to 2010 (2.5t/ha) and 2009 (2.4t/ha).
- Similarly to previous favourable seasons, no sowing time response was observed in 2011.
- Blackspot severity was low in 2011 because spore release was high prior to sowing and emergence.
- A 4% yield increase was achieved through fungicide applications but this was not economical in 2011.
- Recently released PBA varieties Gunyah, Twilight, Oura and Percy all performed similarly to Kaspera.
- Potential releases OZP0819 and OZP0903 both yielded 8% higher than Kaspera, while Alma was the lowest yielding variety, 7% below Kaspera.

Why do the trials?

To identify optimum sowing times and fungicide strategies in new field pea varieties and to improve recommendations from the 'Blackspot Manager' disease risk prediction model in different regions.

How was it done?

Plot size	1.5m x 10m	Fertiliser rate	MAP @ 75kg/ha with seed
Sowing date	TOS 1: 20 th May 2011 TOS 2: 14 th June 2011	Inoculant	-
Varieties (seed rate)	Alma & PBA Percy (45 pl./m ²) Kaspera, PBA Gunyah, PBA Twilight, PBA Oura, OZP0819 & OZP0903 (55 pl./m ²)	Row Spacing	22.5 cm
Fungicide Tmts	Nil Mancozeb (2kg/ha) @ 9 node + early flower		
Trial design	Split plot with 3 reps, blocked by rep then sowing date.		

Results

Foliar disease

The severity of blackspot in 2011 was a lower than in previous years. This was due to the early release of spores from pea stubble, facilitated by high summer rainfall, so that most spores were dispersed prior to field pea emergence. The blackspot infection levels were rated at the end of August as the number of nodes girdled with disease. There was significantly more disease in the first time of sowing (average of 5.6 diseased nodes) compared to the second time of sowing (average of 0.2 diseased nodes). There were also significant differences between varieties (Table 1) with most blackspot recorded in Alma and least recorded in PBA Gunyah, PBA Percy and OZP0903.

There was no significant interaction for blackspot severity between varieties and time of sowing. Scores showed no significant difference in disease severity between fungicide treated and untreated plots, however a small yield response was noted, as outlined below.

Table 1: Blackspot severity of field pea cultivars (averaged across fungicide treatments and sowing dates), rated August 27th, and grain yield at Hart, 2011.

Variety	Blackspot (# nodes infected)	Grain yield (t/ha)
Alma	3.6 ^c	2.57 ^a
Kaspa	3.1 ^{bc}	2.76 ^b
PBA Gunyah	2.5 ^a	2.91 ^{bc}
PBA Twilight	3.1 ^{bc}	2.89 ^{bc}
PBA Oura	2.7 ^{ab}	2.9 ^{bc}
PBA Percy	2.6 ^{ab}	2.91 ^{bc}
OZP0819	2.8 ^{ab}	2.98 ^c
OZP0903	2.5 ^{ab}	2.99 ^c
LSD (P<0.05)	0.5	0.18

Grain yield

Grain yield of field peas averaged 2.9t/ha at Hart in 2011, slightly higher than in the previous favourable seasons of 2009 (2.4t/ha) and 2010 (2.5t/ha). Grain yield showed no response to sowing time in 2011 due to generally low blackspot severity (less than 6 infected nodes does not generally cause yield loss) and a favourable season finish, so that neither sowing date was favoured.

All varieties performed similarly to the site mean except Alma, which was the lowest performing variety (Table 1) at 7% lower than Kaspa. Recent releases PBA Gunyah, PBA Twilight, PBA Oura and PBA Percy all performed similarly to Kaspa, while potential releases OZP0819 (erect, white pea) and OZP0903 (high yield potential) yielded 8% greater than Kaspa. At present prices of ~\$270/tonne this represents a gross increase of ~\$60/ha. OZP0903 was also the highest yielding line in the 2010 trial, although OZP0819 was not included.

A grain yield response of 0.12t/ha was observed from the application of fungicides. Neither interactions of fungicide with sowing date or variety were significant, meaning that the treatment response was similar at both sowing dates and across all varieties.

Treatment with Mancozeb (2kg/ha) at 9 node and early flower resulted in a 4% increase in yield across all varieties (Table 2). This corresponded to an average 120kg/ha increase in yield, or \$33/ha, which means this practice was not economic in 2011 as it has been in previous years under higher disease pressures.

Treatment	Yield (t/ha)
Nil	2.80 ^a
Fungicide	2.92 ^b
LSD (P<0.05)	0.09

Table 2: Grain yield of field peas untreated or treated with fungicide, Hart 2011.

Blackspot Manager Model validation

Field pea stubble infested with blackspot was collected from the Hart Field Day site after the harvest of the 2010 field pea fungicide by variety trial from cv. Kasper. The stubble was placed into nylon mesh pouches and placed on the ground at Hart in early January 2011. Pouches were sampled fortnightly beginning 14th January until 29th June and sent to DAFWA Pulse Pathology Lab at Northam WA for ascospore counts of the blackspot fungus, *Didymella pinodes*. Ascospores were observed in the first pouch sampled in January; this early release was due to significant rainfall events in summer that allowed pseudothecia to mature. Ascospore numbers peaked earlier than in other years, on 9th March and were last observed on 27th May (Figure 1). This data has been used to validate Blackspot Manager in South Australia. Model predictions of ascospore release for blackspot in 10 regions of South Australia were made available on the DAFWA website prior to sowing.

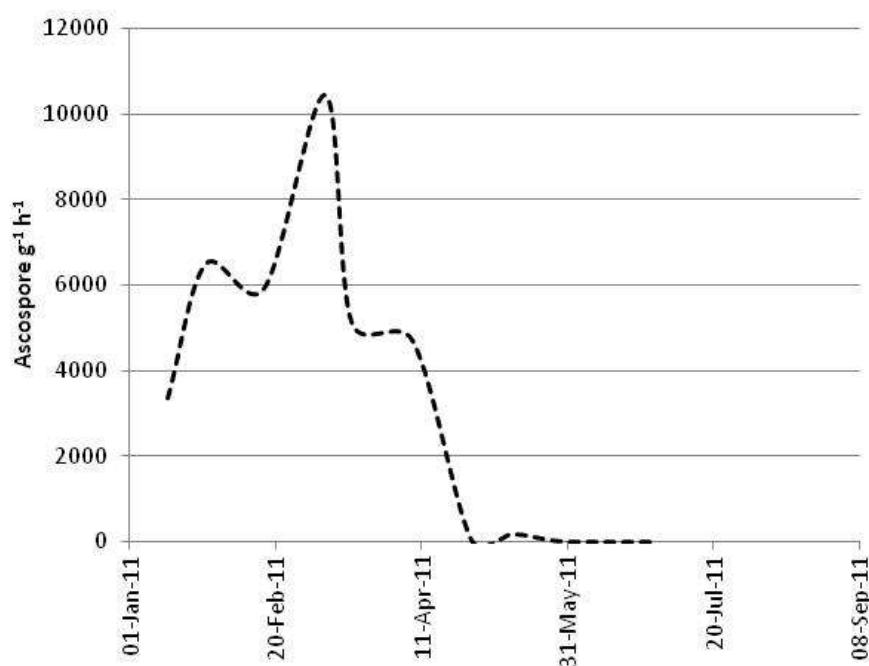


Figure 1. Blackspot spores trapped from pea stubble per fortnight from Hart incubation in 2011

Summary

Despite only average growing season rainfall, yields in 2011 (average 2.9t/ha) were improved by stored soil moisture from summer rainfall, low disease levels and generally favourable growing conditions, and performed significantly higher than the wetter seasons of 2009 (2.4t/ha) and 2010 (2.5t/ha) where growing season rainfall was higher but disease was more prevalent. These favourable growing conditions are also likely responsible for the lack of sowing date response in 2011.

The earlier flowering and maturing recent PBA releases, Gonyah, Twilight, Oura and Percy, all performed similarly to Kasper, demonstrating their flexibility in a season which generally favoured later maturing varieties. Over the recent run of favourable seasons these varieties have generally performed slightly lower than Kasper, however long term data (2005-2011) shows similar or slightly higher yield, and regional benefits generally associated with lower rainfall areas and in years when delayed sowing is required.

The bacterial blight tolerant 2011 releases PBA Oura and PBA Percy are available for 2012 sowings. PBA Oura has a semi-leafless plant type similar to Kaspas, while PBA Percy has a conventional plant type and is susceptible to lodging similar to Parafield, but neither possesses the round seed shape or pod shatter resistance traits like Kaspas, PBA Gunyah or PBA Twilight. PBA Percy has a higher bacterial resistance rating and shows less yield loss from this disease than PBA Oura and Parafield (7% compared to 12% and 15%, respectively). However PBA Oura is the highest yielding variety with improved tolerance to this disease in all districts of the state, and long term yields show a 5-11% yield advantage over Kaspas in the Mid North, South East and Murray Mallee regions, with similar yields to Kaspas elsewhere.

The potential releases OZP0819 and OZP0903 were the highest yielding lines in the trial last year. OZP0903 was also the highest yielding line in the 2010 trial, while OZP0819 was not included. These lines show a lot of promise as new varieties for their high yield potential and also their agronomic and disease resistance profiles.

Fungicides for control of blackspot in field peas are generally not economic unless the blackspot risk is severe. If field peas are sown according to recommendations of Blackspot Manager, i.e. after 50% of spores have been released, then the disease is unlikely to reach severe levels. If the peas are sown before the peak spore release e.g. the spores are released in late May or June and peas are sown mid May, then foliar fungicides are warranted for disease control. Trials in previous years have shown that potential yield needs to be at least 2.0 t/ha for foliar fungicides to be economic in field peas even when blackspot is severe. Whilst yields were high in 2011, blackspot severity was generally low, and application of fungicides was not economic in 2011.

Blackspot Manager has been successful at predicting blackspot spore releases over the last couple of seasons, and predictions for 2012 will be available from late March on the website www.agric.wa.gov.au/cropdiseases. Preliminary observations suggest that blackspot risk will be higher and spores will be released later this year as a result of lower summer rainfall.

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