Milestone 3 – 30/3/2007

Disease severity and grain yield data from trials sown in each of two years to determine the optimum disease management strategy for Flip 94-090c, Flip 94-509c and Flip 94-508c supplied to Pulse Australia and GRDC in collated and tabulated form by Dr Brand and Mr McMurray.
The new varieties will be compared with and Howzat for at least 3 disease management strategies at 1 site each in the Wimmera and southern Mallee (not including Flip 94-508c), Victoria and Mid North, South Australia.
COMMENT – Repeated in 2006 with additional varieties (see trials conducted table)

WIMMERA (KALKEE), VICTORIA

Results

No ascochyta blight was observed this year due to extremely dry conditions. Trial not harvested due to drought, frost and heat.

Interpretation and Other Information

SOUTHERN MALLEE (BEULAH), VICTORIA

Results

No ascochyta blight was observed this year due to extremely dry conditions. Trial not harvested due to drought, frost and heat.

Interpretation and Other Information

MID NORTH (HART AND TURRETFIELD), SA

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Aims

To compare disease management strategies for minimum fungicide input and maximum grain yield and quality of new chickpea varieties.
To demonstrate the much improved levels of ascochyta blight disease resistance in new varieties of chickpeas to SA growers.

Treatments

Random complete block design experiments were conducted at two sites in South Australia in 2006 following on from similar experiments held at these sites in 2004 and 2005. Trials were conducted at Hart in the mid north on the Hart Field day site (clay loam over heavy clay, pH 8.5 in water) and at Turretfield (Kingsford property) in the lower mid north (sandy clay loam over a light clay, pH 7.4 in water). Varieties evaluated at Hart were limited to those currently available to growers while at Turretfield lines expected to be available to growers over the next few years were included.

Treatments consisted of:
Varieties - Howzat (desi, moderately susceptible to ascochyta), Almaz (large kabuli moderately resistant), Genesis 509 (desi, resistant), Genesis 090 (small kabuli, resistant) and at Turretfield only FLIP94-079C (small kabuli, resistant), Nafice (large kabuli moderately resistant), CICA 503 (desi, resistant).

5 fungicide strategies - nil (no sprays), fortnightly (sprayed every 14 days starting at 8 weeks after sowing), strategic (8 week after sowing, early flowering and early podding), podding (early podding), podding plus (early and late podding).

Treatment spray dates and frequency detailed in table 1.

Table 1: Sowing date, disease inoculation and spray treatment timing at Hart and Turretfield

Operation	Hart		Turretfield	
	Date	Treatments	Date	Treatments
Sown	4/6	all	14/6	all
Disease inoculated	13/7	all	2/8	all
Spray 1	19/7	St, Fn	11/8	St, Fn
Spray 2	31/7	Fn	28/8	Fn
Spray 3	21/8	Fn	4/9	St*f1
Spray 4	4/9	St, Fn	11/9	Fn, St*f2
Spray 5	22/9	St, Fn, Pd, Pd+	18/9	St*f3
Spray 6			27/9	Fn,St*p1,Pd*p1,Pd+*p1
Spray 7			3/10	St*p2,Pd*2,Pd+*2

St=strategic, Fn=fortnightly, Pd=podding, Pd+=podding plus, St*f1=Flip94-079C, St*f2=Genesis090, Genesis509, Howzat & CICA503, St*f3=Almaz & Nafice, St*p1, Pd*1 & Pd+*1=Flip94-079C, Genesis509, CICA503 & Howzat, St*p2, Pd*2 & Pd+*2=Almaz, Nafice & Genesis090.

All sprays were chlorothalonil (720 g/L) @ 2.0L/ha. Each trial was sown with group N inoculum with desi types at a density of 50 seeds per sq.m and the kabuli at 35 seeds per sq.m. Fertilizer used was MAP+2% Zn @ 90kg/ha at Hart and MAP +2% zinc @ 40kg/ha drilled with the seed (DAP @ 100kg/ha was pre-drilled) at Turretfield.

Both trials were inoculated with disease by spreading infected hammer milled stubble across all plots (Table 1). Trials were rated for foliar disease at various stages during the growing season however due to dry conditions and a lack of pod infection, pod disease infection at maturity was not assessed. Trials were harvested for grain yield in November and December and 100 grain seed weights were recorded.

Results

Hart

Ascochyta blight disease severity in the trial was at low levels during mid August. Plants of the susceptible variety Howzat incurred stem breakage from this outbreak however due to dry seasonal conditions no further infection occurred. Fungicide treatments had no effect on ascochyta blight infection levels or on grain yield due to these dry conditions. A varietal response for ascochyta blight infection, grain yield and grain weight did occur (Table 1). Grain yield was very low in all varieties due to these unfavourable conditions and a quick dry finish to the season. The ascochyta resistant varieties Genesis090 and Genesis509 had the lowest levels of infection while the moderately resistant variety Almaz had slightly higher levels but substantially less than Howzat.

Table 1: Ascochyta blight infection (% plot severity infection pre flowering), grain yield (t/ha) and grain weight (g/100 seeds) of chickpea varieties at Hart

	Ascochya blight	Grain yield	Grain weight
Almaz	5	0.06	39.1
Genesis090	0	0.19	27
Genesis509	1.	0.3	16.4
Howzat	27	0.27	19.7
LSD (0.05)	4.6	0.03	1.0

Turretfield

Favourable seasonal conditions during winter allowed for good levels of vegetative growth in the chickpeas. Ascochyta blight disease pressure during winter was at low to moderate levels also due

to these favourable conditions. A significant rainfall event (10mm) in early September allowed for further disease spread and a moderate level of plant death was detected in the susceptible variety Howzat. Dry spring seasonal conditions and the lack of significant rainfall after early September stopped further disease spread and many plants recovered from the early infection. There was no level of pod infection detected in any varieties.

Foliar disease ratings for each variety were assessed at the peak of disease intensity on the 21st of September before the application of podding treatments. There was a significant interaction between variety and foliar fungicide treatment (Table 2). The susceptible variety Howzat had higher levels of foliar disease in all treatments when compared with the fortnightly treatment (no disease). Almaz and Nafice had lower levels than Howzat in all treatments however they still had higher levels of disease in the nil and podding treatments than in the fortnightly treatment. However there was no significant level of ascochyta blight infection in the strategic treatment in both these varieties. There was no increase in foliar disease levels in any treatments of the resistant varieties Genesis 509 and 090 and the two new lines (FLIP94-079C & CICA503) over the fortnightly treatments.

Table 2: Ascochyta blight scores (% plot severity of infection plot 0 – no symptoms, 100 – complete death) recorded 21st September 2006 on the foliage of chickpeas grown at Turretfield with various fungicide management regimes under low disease pressure.

Treatment	Almaz	CICA503	Flip94-079C	Genesis090	Genesis509	Howzat	Nafice
Fortnightly	0.6 cd	0 d	0 d	0.6 cd	0 d	0 d	0 d
Strategically	2.2 c	0 d	0 d	0.6 cd	0 d	2.2 c	0 d
Podding	14.2 b	1.2 cd	0 d	0.6 cd	0 d	45.8 a	10.4 b
Podding plus	16.3 b	0 d	0.1 cd	0.6 cd	0 d	34.8 a	12.4 b
Nil	10.8 b	0 d	0 d	0.6 cd	0.1 cd	45.8 a	8.9 b
LSD (0.05)	Back transformed data, interaction significant, letters indicate treatments with significant differences						

Grain yields were below average due to dry seasonal conditions but very respectable given the absence of spring rainfall. There was a significant effect of treatment on variety for grain yield (Table 3) but not for grain weight. Howzat incurred a grain yield loss in the nil and podding treatments when compared with the strategic and fortnightly treatments, which yielded the same. There was no grain yield loss in any treatments of Genesis 090 & 509, FLIP94-079C, CICA503 and Nafice when compared to the fortnightly treatment. Grain yields of all fungicide treatments of Almaz were reduced compared to the fortnightly treatment however the nil treatment was not significantly lower yielding.

Table 3: Grain yield (t/ha) and grain weight (g/100 seeds) of chickpeas grown at Turretfield with several fungicide management regimes under low disease pressure.

Regime	Almaz	CICA503	Flip94-079C	Genesis090	Genesis509	Howzat	Nafice
Fortnightly	1.67	1.99	1.45	1.45	1.92	1.97	1.38
Strategically	1.41	2.14	1.54	1.41	1.71	2.18	1.43
Podding	1.29	1.91	1.87	1.65	1.85	1.58	1.22
Podding plus	1.42	2	1.66	1.58	1.78	1.61	1.27
Nil	1.46	1.9	1.53	1.66	1.8	1.4	1.24
LSD (0.05)	0.24						
Grain weight LSD(0.05) = 0.3	43.8	20.6	25.6	33.2	17.8	23.2	46.3

Fungicide treatments had no effect on grain weight. Over all treatments very high grain weights were achieved in the large seeded kabuli types Nafice and Almaz (Table 3).

Comments

Dry seasonal conditions reduced grain yield and did not favour disease build up and spread in 2006 limiting the conclusions that could be drawn particularly in relation to the podding strategies required in the resistant types. Low to moderate disease levels pre flowering led to a low level of plant death in the susceptible variety Howzat where early disease infection was not controlled. The effect of this infection level was carried through to grain yield at Turretfield where there was a reduction in yield of these treatments compared to those where foliar disease was controlled. Almaz was the only other variety to incur grain yield loss at Turretfield in treatments where disease was not controlled. However this yield loss was less than that in Howzat and complicated by the effects of spring drought on this late maturing variety.

Foliar disease scores from Turretfield in 2006 again showed that lines with intermediate resistance like Almaz and Nafice will require early season fungicdes to prevent disease build up and grain yield loss even in dry years. The two new lines (CICA503 and FLIP94-079C) to be released in the next few years performed similarly to the resistant lines Genesis090 and 509 under the low disease levels and did not require fungicides to control disease pre the podding stage. This finding potentially indicates that a similar disease management strategy to that used in Genesis090 and 509, of only requirement for podding sprays, will be required to successfully grow these new varieties.

Key Findings:

- Dry seasonal conditions did not favour chickpea production in 2006 and grain yields were below average
- Ascochyta blight infection levels were only low in the trials however the ascochyta blight resistant varieties still had lower infection levels than Howzat, Almaz and Nafice
- Susceptible and moderately resistant varieties incurred grain yield loss in nil treatments compared to fortnightly sprayed treatments at Turretfield. This did not occur in varieties rated resistant including the two new lines to be released (FLIP94-079C and CICA503)
- Previous trials show ascochyta blight resistant varieties Genesis090 and Genesis509 can be successfully grown under high disease pressure with only the need for foliar fungicide sprays during podding
- No information was obtained on podding strategies required to reduce grain yield loss in resistant varieties due to a lack of pod infection from the dry spring conditions. Further work is required in this area.
- Varieties with intermediate resistance require foliar fungicides early in the season to control ascochyta blight and prevent yield loss even in dryer years.

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