Foliar disease control in lentils

The aim of this trial was to investigate fungicide types and application timings to minimise the effect of foliar disease in lentils.

Summary
The 2001 season was a low disease pressure year, Botrytis grey-mould was not detected in this trial and Ascochyta appeared late in the season at low to moderate levels. Fungicide treatments did not affect grain yield regardless of fungicide type, application timing or the number of applications made. Fungicide timing affected seed discolouration with late season fungicide treatments on Cassab and Digger having cleaner seed than those treated earlier or not treated at all.

Background
Foliar disease in lentils has the potential to cause significant yield decline as well as impacting negatively on grain quality. Botrytis grey mould and Ascochyta blight are the two main foliar diseases responsible and fungicides are an important tool in minimising their impact.

Methods
This trial was conducted using a fully replicated randomised block design. The trial was sown on June 5 with three lentil varieties – Cassab, Digger and Northfield at 48, 48 and 42kg/ha respectively. All lentils were direct drilled into mulched wheat stubble with 80kg/ha Mallee Mix 1. All weed and pest control was conducted using registered products at normal rates.

The first application timing of fungicides was immediately prior to canopy closure (September 19) and the second application was during early pod formation (October 22). During pod-fill all treatments were assessed and scored for disease incidence and severity. All treatments were harvested to ascertain grain yield.

Table 1: Treatments including product, active ingredients, timing, rate and cost.

Treatment	Active ingredient	Timing	Rate	Cost ($/ha)
Control	-	-	-	-
Mancozeb	*Mancozeb*	Before canopy closure	2 kg/ha	
Bavistan + wetter	*Carbendazim*	Before canopy closure	0.5 L/ha	
Bravo	*Chlorothalonil*	Before canopy closure	1 L/ha	
Fortress	*Procymidone*	Before canopy closure	0.5 L/ha	
Bavistan and **Mancozeb**	*Carbendazim* ***Mancozeb***	Before canopy closure **Early pod formation**	0.5 L/ha **2 kg/ha**	
Bavistan and **Bavistan**	*Carbendazim* *Carbendazim*	Before canopy closure **Early pod formation**	0.5 L/ha **0.5 L/ha**	
Bavistan and **Bravo**	*Carbendazim* ***Chlorothalonil***	Before canopy closure **Early pod formation**	0.5 L/ha **1 L/ha**	

Results

No significant difference occurred between the fungicide treatments in this trial regardless of fungicide type, application timing or the number of applications made (Table 2).

A varietal effect occurred in this trial with Northfield (1.65t/ha) and Cassab (1.57t/ha) yielding significantly higher than Digger (1.43t/ha). The yield difference between Northfield and Cassab was not significant. There was no interaction between varietal performance and fungicide regime in this trial.

No visual difference in disease presence or severity (Botrytis grey mould or Ascochyta blight) was noted between any of the treatments when inspected mid-October.

Table 2: Yield results achieved for Cassab, Digger and Northfield lentils managed under eight different fungicide regimes.

Treatment	**Timing**	**Yield (t/ha)**		
		Cassab	**Digger**	**Northfield**
Control	Before canopy closure	1.68	1.34	1.84
Mancozeb 2kg/ha	Before canopy closure	1.79	1.61	1.75
Bavistan 0.5L/ha + wetter	Before canopy closure	1.88	1.40	1.67
Bravo 1L/ha	Before canopy closure	1.45	1.17	1.62
Fortress 0.5L/ha	Before canopy closure	1.55	1.54	1.57
Bavistan 0.5L/ha and **Mancozeb 2kg/ha**	Before canopy closure **Early pod formation**	1.39	1.38	1.67
Bavistan 0.5L/ha and **Bavistan 0.5L/ha**	Before canopy closure **Early pod formation**	1.48	1.43	1.58
Bavistan 0.5L/ha and **Bravo 1L/ha**	Before canopy closure **Early pod formation**	1.31	1.56	1.46
Average		**1.57**	**1.43**	**1.65**
Significant difference Fungicide Variety	**-**	**NS P<0.01, LSD=0.16**		

Seed quality data is presented in Table 3. The percentage of discoloured seeds was determined for a composite sample of the 4 replicates for each treatment. Northfield seed had no Ascochyta staining whereas Digger and Cassab seed was discoloured regardless of fungicide treatment. There was a trend for treatments that received two fungicide applications (canopy closure and at early pod formation) to have lower levels of seed discolouration for the varieties Digger and Cassab. There were no differences between nil application and fungicides applied before canopy closure.

Table 3: Percentage poor colour for Cassab, Digger and Northfield lentil.

Treatment	Timing	% Poor colour		
		Cassab	**Digger**	**Northfield**
Control	Before canopy closure	1.5	2.2	0
Mancozeb 2kg/ha	Before canopy closure	1.7	0.8	0
Bavistan 0.5L/ha + wetter	Before canopy closure	1.5	1.8	0
Bravo 1L/ha	Before canopy closure	1.1	1.6	0
Fortress 0.5L/ha	Before canopy closure	1.7	2.1	0
Bavistan 0.5L/ha and **Mancozeb 2kg/ha**	Before canopy closure **Early pod formation**	1	0.9	0.1
Bavistan 0.5L/ha and **Bavistan 0.5L/ha**	Before canopy closure **Early pod formation**	0.9	1.0	0
Bavistan 0.5L/ha and **Bravo 1L/ha**	Before canopy closure **Early pod formation**	0.5	0.9	0
Average		**1.2**	**1.4**	**0**

Interpretation

There were low levels of disease in lentil at this site. Botrytis was not evident at all and Ascochyta was present at moderate levels in the upper canopy late in the season. Yield was not affected by disease and subsequently fungicide management regimes had no effect on yield.

Seed quality varied between varieties. Northfield, which is resistant to Ascochyta seed staining, had very clean seed regardless of fungicide management. Digger and Cassab are moderately susceptible to Ascochyta seed staining and this was reflected in the seed quality results. Seed discolouration levels of 1-3% are down graded to No 2 Grade lentils with a discount of about $50/t. In this trial, only one early fungicide treatment (Mancozeb on Digger) would have made the No 1 grade. Conversely, the three late fungicide applications resulted in No1 grade lentils for Digger and Cassab.

Procymidone (Fortress, also marketed as Sumisclex) has also been found to be very beneficial for Botrytis control in trial work undertaken in SA in 2000 and 2001. This product is not registered for use in lentils.

Commercial Practice

The appropriate fungicide strategy for any lentil crop will depend on the likelihood of disease incidence – this will be determined by the variety, paddock history, location and seasonal conditions. Current best practice suggest that for cost effective Botrytis control a fungicide application must be made before canopy closure, whilst the critical time for Ascochyta is at early pod-fill. Tables 4 and 5 outline a suggested fungicide program for the Wimmera and Southern Mallee. Seasonal conditions and disease pressures must always be taken into account when making a fungicide decision.

Table 4. Fungicide disease management for three lentil varieties and season type for the Wimmera (B/M = Bravo or Mancozeb, C = Carbendazim, X = not required)

Variety	Timing	May sown		June sown		July sown	
		wet	dry	wet	dry	wet	dry
Northfield	8 weeks	B/M	B/M	B/M	X	X	X
	Pre canopy	C	C	C	C	C	C
	1st pod	C	C	C	C	C	X
Digger	8 weeks	B/M	B/M	B/M	X	X	X
	Pre canopy	C	C	C	C	C	B/M
	1st pod	C + B/M	B/M	C + B/M	B/M	B/M	B/M
Cassab	8 weeks	B/M	B/M	B/M	X	X	X
	Pre canopy	C	C	C	C	C	X
	1st pod	B/M	B/M	B/M	B/M	B/M	B/M

Table 5. Fungicide disease management for three lentil varieties and season type for the southern Mallee (B/M = Bravo or Mancozeb, C = Carbendazim, X = not required)

Variety	Timing	May sown		June sown		July sown	
		wet	dry	wet	dry	wet	dry
Northfield	8 weeks	B/M	X	X	X	X	X
	Pre canopy	C	C	C	C	C	X
	1st pod	C	C	C	X	C	X
Nugget	8 weeks	B/M	X	X	X	X	X
	Pre canopy	C	C	C	X	C	X
	1st pod	C + B/M	B/M	C + B/M	B/M	B/M	B/M
Digger	8 weeks	B/M	X	X	X	X	X
	Pre canopy	C	C	C	X	X	X
	1st pod	B/M	B/M	B/M	B/M	B/M	B/M

Acknowledgments
The BCG would like to acknowledge Kate McCormick, John Stutchbery and Assoc, for providing valued technical support to this trial. The Lentil Company conducted quality analyses.