

# New ascochyta blight resistant chickpea varieties offer profitable legume options to growers

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## Key Messages

1. New ascochyta blight resistance varieties Ambar, Neelam and PBA Striker are higher yielding than the older varieties. All have adequate resistance but Ambar and Neelam have a higher degree of resistance than PBA Striker.
2. Weed management during the chickpea phase has appeared to be a major concern of growers. A concerted effort needs to be made to extend best practices to minimise the impact that weeds may have.
3. New chickpea varieties offer profitable legume options for fine textured soils in WA

## Aims

- To demonstrate the viability of new ascochyta blight resistant chickpea varieties for profitable grain production and to promote the industry
- To receive feedback from growers during field days and field walks through direct interaction

## Methods

1. Ten demonstration trials in 2013 and 2014 involving new varieties were conducted in collaboration with various grower groups. These involved un-replicated plots sown, harvested and managed with broad acre farm machinery following district practices. Field days and field walks were held at nine of these trials.
2. Two replicated trials of the prevalent variety, new varieties and four advanced lines currently under commercial consideration were conducted at Mingenew and Merredin in six replications. Spatial row-column design with replication in two directions (along rows and columns) was applied and generated using DiGger (Coombes, 2002). Linear mixed model has been formulated using a randomization-model based approach typically used for multi-environment trials (METs). The model used for the analysis of each trial includes blocking terms to account for the randomization process and additional terms to model the extra sources of variation, such as spatial trends and extraneous variation (Stefanova *et al.*, 2009). In the MET analysis an unstructured model was used for the variance - covariance structure of the genotype by environment (G x E) interaction effect. The analyses have been conducted using ASReml-R (Butler *et al.*, 2009)
3. A survey was conducted through distributing over 150 questionnaire forms to growers and agri-business personnel.

## Results

**Demonstration trials (Demos):** While the 2013 season showed average growth in majority of the demo trials, the 2014 season had generally low rainfall and consequently depressed growth and yields. Field days and field walks were attended at all sites and over 270 growers and agri-industry people were directly addressed and shown the new ascochyta blight resistant varieties. Considerable feedback was received through interaction during these field events. The yield estimates from those demo trials are shown in Table 1. In general, new varieties Ambar, Neelam and PBA Striker were higher yielding than the older variety Genesis836.

Table 1: Yields (t/ha) in demo trials.

- Doodlakine trial (2013) was abandoned due to resistant ryegrass infestation.
- Mullewa trial (2014) was not harvested due to drought, and yields too low at around 100 kg/ha for reliable comparison

Year	Co-operator	Ambar Yield Estimate (t/ha)	Neelam* Yield Estimate (t/ha)	PBA Striker Yield Estimate (t/ha)	Genesis836 Yield Estimate (t/ha)
2013	Mingenew Irwin Group	1.614	1.504	1.665	1.306
2013	DAFWA Research Station, Merredin	1.059	0.948	1.093	1.085
2013	Corrigin Farm Improvement Group	1.108	0.821	1.016	0.834
2013	Liebe Group, Dalwallinu	0.725	0.823	1.059	0.957
2013	Mullewa Farm Improvement Group	0.223	0.341	0.343	0.356
2014	Mingenew Irwin Group	0.890	0.910	0.820	0.820
2014	Liebe Group, East Buntine	0.380	0.360	0.320	0.330
2014	Corrigin Farm Improvement Group	0.337	0.247	0.702	0.315

\*Neelam yields in 2013 are underestimates as due to damaged seed, emergence was poor with an estimated 20 % lower plant population.

**Replicated variety trials in 2014:** Due to very low rainfall at the critical flowering and podding stage both trials had low yields. Merredin's lower yield than the Mingeneu trial may be a manifestation of the comparatively lower spring temperatures that prevail at Merredin. While all new varieties yielded more than Genesis836, Ambar was particularly consistent over the two sites. Neelam's lower yield than Ambar and PBA Striker in this low rainfall season may be due to its later flowering habit. Interestingly, crossbreds under commercial consideration showed marked interaction with sites. Ranking of WACPE2199 and WACPE2234, in particular, showed sharp decline in the low yielding environment of Merredin.

Table 2: Yields (t/ha) of varieties and crossbreds under commercial consideration in replicated trials at Mingeneu and Merredin.

Variety	Mingeneu Yield	% Genesis836	Rank	Merredin Yield	% Genesis836	Rank
WACPE2196	0.746	103	5	0.434	66	8
WACPE2199	0.805	111	2	0.625	96	6
WACPE2201	0.668	92	8	0.668	102	3
WACPE2234	0.844	117	1	0.604	92	7
Ambar	0.782	108	3	0.687	105	2
Neelam	0.728	101	6	0.658	101	4
PBA Striker	0.753	104	4	0.722	110	1
Genesis836	0.724	100	7	0.654	100	5
Mean	0.756			0.631		
Standard error	0.041			0.046		
CV%	9.512			12.919		
P<	0.01			0.001		

**Chickpea industry survey:** Only 10% potential respondents returned the questionnaire reflecting the current lack of interest in chickpea. The key points emerging from the survey are as follows:

1. The current interest in chickpea is low due to recent dry seasons and also a lack of targeted extension effort.
2. Not all growers know that ascochyta blight resistant varieties are now available and there is limited knowledge about the merits of newly released varieties.
3. The two most important issues to be targeted for enhancing the chickpea industry are effective weed management and timely marketing information. Profitability can be improved by extension of robust agronomic practices and timely information on price and marketing.

## Conclusion

The chickpea industry, which in late 1990s rose rapidly from almost no chickpea to over 70,000 ha in a short time, was halted due to the devastating epidemics of ascochyta blight disease for which there was no genetic resistance in

varieties at the time. Although, the problem has been addressed and resistant varieties have become available in recent years, there has not been any marked resurgence in the area sown to chickpea in Western Australia.

This project aimed to demonstrate the new resistant varieties and in doing so, get first hand feedback from growers in order to re-kindle interest in chickpea. During the two years, almost all major field events in the potential chickpea growing regions and some other regions have been exploited through demo trials and other trials to spread the message first hand to hundreds of growers and agro-industry personnel. Both demo trials and replicated trials clearly showed that the new ascochyta resistant chickpea varieties perform better than the older variety and disease risk is now minimal. Valuable first hand feedback and survey results have provided information on the growers concerns and if targeted efforts are made to address these issues, there is every possibility that the chickpea industry will expand in WA.

### **Key words**

Chickpea, *Cicer arietinum*, variety, yield, ascochyta blight, resistance

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### **Paper reviewed by**

Dr Jonathan Clements, DAFWA

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