Chickpea variety development

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The aim of this trial was to investigate the effects of soil type and climate on the yield of commercial varieties and advanced breeding lines in Victoria and thereby assist in the selection of superior varieties for farmers in this state.

Summary

The first ascochyta blight resistant desi chickpea variety, Genesis 508™, is available to growers this year. A small-medium seeded kabuli variety, Genesis 090™, will be commercially available in 2006. Both varieties have been commercialised through Australian Agricultural Commodities (AAC). These varieties require fewer fungicide applications to manage ascochyta blight and much reduced risk. Each must be considered separately based on regional yield and quality.

Background

The immediate goal of the south eastern chickpea program is to develop and release ascochyta blight resistant varieties that will restore the chickpea industry in south east Australia. Ascochyta blight resistant varieties will become available to growers in 2005 and 2006. These varieties will be a major component of an ascochyta blight management package that will ensure the economically viable production of chickpeas in Victoria.

Methods

All sites were managed in a way to reflect the best local practice. The Birchip and Gooroc trials were not harvested due to low yields as a result of drought. Although harvested, the yield results from Quambatook and Rupanyup (kabuli) have been omitted due to the high variability caused by drought and Kaniva (desi) due to residual herbicide damage.

Interpretation

Poor growth over winter and a very dry spring, particularly October, resulted in chickpea crops with low biomass. Ascochyta blight, via natural infection, was detected in low levels at trial sites at Laen, Rupanyup and Tarranyurk. At Horsham and Beulah, ascochyta blight had reached moderate levels by late September, but dry conditions during October allowed susceptible varieties to recover, particularly under the strategic fungicide spray management regime. Hot temperatures in early October followed by a number of frosts caused floral abortion and delayed podding at several locations, particularly the early sown trial at Horsham. The yield of Genesis 090™ increased from 0.5 t/ha in the earlier sown desi trial at Horsham to 0.9 t/ha in the later sown kabuli trial. Some medium and late flowering varieties were able to respond to late spring rains in early November, but this also caused ascochyta blight pod infection at the sites where ascochyta blight was prevalent.

Howzat yielded well in most trials in 2004 (Table 1). This is possibly because the later stages of the 2004 season were similar to the sub-tropical environments of northern NSW where Howzat was developed. There chickpeas are more dependent on using subsoil moisture over the drier winter and spring period and rains often occur

later in the season during podding. The new ascochyta blight resistant desi variety Genesis 508™ had variable yields in 2004 as in 2003. With only low to moderate levels of ascochyta blight there was little yield benefits associated with ascochyta blight resistance in 2004. The two ascochyta blight resistant breeding lines FLIP94-509C and FLIP94-510C, had consistent yields across the state and appear to have wider adaptation than Genesis 508™. The kabuli variety Genesis 090™ performed relatively well in the desi trials and was clearly the highest yielding entry in the kabuli trials (Table 2). The breeding line FLIP97-114C had the highest yield among the medium seeded (seed size similar to Kaniva) kabuli lines tested.

New desi varieties

Genesis 508™ (FLIP94-508C) is available to farmers in 2005. It has good ascochyta blight resistance and is likely to require only one fungicide application during podding. It has brown seed that is larger than seed of Tyson but smaller and darker than Howzat seed. Genesis 508™ can be much lower yielding than Howzat in short season areas such as the Mallee and when the season ends relatively early. Therefore it is only suited to areas with greater than 380mm annual rainfall on heavier soils (eg Wimmera grey clays) and on good sandy loam soils in the northern Wimmera and southern Mallee. Sister lines to Genesis 508™, FLIP94-509C and/or FLIP94-510C, are likely be available to growers in 2007. They have similar ascochyta resistance and quality to Genesis 508 but much higher and more stable yields. All are available from AAC through ABB.

The high yielding, ascochyta blight resistant kabuli variety Genesis 090™ is likely to be a better alternative to current desi chickpea varieties and Genesis 508 in traditional desi growing areas, especially if the price of its grain is similar or higher. See comments in kabuli section below.

Two cold tolerant desi varieties with moderate susceptibility to ascochyta blight have been released from WA and commercialised by AWB seeds. Named Sonali (WACPE2075) and Rupali (WACPE2095), they have yielded similar to Howzat and ascochyta blight will need to be managed as for Howzat.

New kabuli varieties

Genesis 090™ (FLIP94-090C) has good ascochyta blight resistance and has shown wide adaptation and excellent yield stability, including the drier environments. It has been higher and more reliable in yield than Kaniva and similar to the desi variety Howzat. Genesis 090™ has a small to medium sized seed that is approximately 1mm smaller than that of Kaniva. Genesis 090™ will be commercially available to farmers in 2006 and has the potential to be grown as a good alternative to desi chickpeas or as a higher yielding but lower value alternative (smaller seed) to medium seeded kabulis such as Kaniva.

Three lines from WA, FLIP97-503CLIMAS, FLIP97-530CLIMAS and FLIP97-537DCLIMAS, with good ascochyta blight resistance and yields and grain size similar to Kaniva. It is likely that one or two of these lines will be commercially available to farmers in coming years through AWB seeds.

Commercial Practice

- Returns from larger sized kabulis (eg Kaniva) can compare well to other crops in favourable areas (ie. southern Wimmera), even with high fungicide costs.

However the risk of crop loss due to ascochyta blight remains high and lower prices extenuate the risks.

- Resistant varieties such as Genesis 508™ and Genesis 090™ will reduce ascochyta blight risk to very low levels with minimal use of fungicides

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Table 1. Victorian desi chickpea yield results (% Howzat) for commercial varieties and advanced breeding lines (2004).

	Mallee					Wimmera					Ascochyta Blight resp'n
	Rainbow	Rosebery/ Beulah Strategic*	Ultima	Warne	Mean 2004	Tarranyurk	Rupanyup	Laen	Horsham Strategic*	Mean 2004	
Desi Chickpea											
Howzat t/ha	0.49	0.46	0.48	0.26	0.42	0.73	0.96	0.38	0.33	0.60	MS
Genesis 508 (FLIP94-508C)	88	94	52	99	83	45	44	65	82	59	R
Genesis 090 (FLIP94-090C)	79	144	86	122	108	99	62	97	152	103	R
Sonali (WACPE2075)	50	72	54	87	66	86	57	60	65	67	MS
Rupali (WACPE2095)	77	63	48	72	65	80	54	19	41	49	MS
FLIP94-509C	88	96	66	110	90	89	73	121	105	97	R
FLIP94-510C	103	97	73	112	96	95	76	114	119	101	R
CV(%)	11	12	12	16		12	13	22	15		
LSD(0.05)	16	20	16	24		17	17	30	23		

*Yield analysed from strategic fungicide treatments in yield loss experiments. Horsham strategic treatment received 3 fungicide sprays; 8 weeks after emergence, mid-late vegetative stage and early podding. Beulah strategic treatment received 2 fungicide sprays; 8 weeks after emergence and early podding.

Table 2. Victorian kabuli chickpea yield results (% Genesis 090) for commercial varieties and advanced breeding lines (2004).

	Mallee					Wimmera					Ascochyta blight response	Seed size
	Rainbow	Rosebery/ Beulah	Ultima	Warne	Mean 2004	Tarranyurk	Kaniva	Minyip /Laen	Horsham	Mean 2004		
Kabuli Chickpea												
Genesis 090 t/ha (FLIP94-090C)	0.51	0.53	0.41	0.31	0.44	0.89	0.62	0.65	0.86	0.76	Resistant	Small-medium
FLIP97-503CLIMAS	36	45	44	61	47	39	41	35	61	44	Resistant	Medium
FLIP97-530CLIMAS	30	48	51	63	48	46	39	38	56	45	Resistant	Medium
FLIP97-537DCLIMAS	31	33	52	76	48	35	27	43	45	38	Resistant	Medium
FLIP97-114C		60		74	67	78	95	97	83	88	Resistant	Medium
CV(%)	18	20	14	12		10	22	21	13			
LSD(0.05)	21	20	20	15		12	26	20	15			