

## **C8 Sowing Time, MRZ Mid North (Pinery), South Australia**

## **C9 Sowing Time, MRZ Yorke Peninsula (Melton), South Australia**

### **Aim**

To identify appropriate sowing times of new advanced chickpea lines alongside commonly grown commercial varieties.

**Table 1:** Chickpea commercial varieties and advanced breeding lines sown at two different sowing times at Pinery and Melton 2016.

<b>Seed type</b>	<b>Variety</b>
<b>Desi</b>	PBA Slasher
	PBA Striker
<b>Advanced breeding line (Desi)</b>	CICA1007
	CICA1442
	CICA1541
<b>Kabuli</b>	Genesis™ 079
	Genesis™ 090
	Genesis™ Kalkee
	PBA Monarch
<b>Advanced breeding line (Kabuli)</b>	CICA1156
	CICA1352
	CICA1452

**Table 2:** Site details

	<b>Trial site</b>	
	<b>Pinery</b>	<b>Melton</b>
Sowing date	Pinery 5 May (Early sowing); 31 May (Late sowing)	12 May (Early sowing); 7 June (Late sowing)
Soil type	Sandy loam/limestone clay	Sandy clay loam over light clay
<b>Similar site details</b>		
Inoculant	Group N	
Seed treatment	P-Pickel T (200 ml/100 kg seed)	
Fertiliser	MAP + Zn (2%) @ 90 kg/ha at sowing	
Fungicides	Chlorothalonil at 8 weeks, early flower and early podding	
Row spacing	22.5 cm	
Plot size	10 m by 1.75 m	
Plant density	Kabuli (35 plants/m <sup>2</sup> ) Desi (50 plants/m <sup>2</sup> )	

## **Results and interpretation**

### **Flowering**

- The date to first flower was generally reached earlier in early sown chickpeas compared with later sown chickpeas and varied between varieties sown within similar and different sowing dates across the two sites. Chickpea flowering is largely influenced by factors such as day-length and temperature where an average daily temperature of below 15°C is likely to reduce pollen viability and cause flower and pod abortion. Varietal differences in responsiveness to these two factors may have contributed to differences in commencement of flowering.
- Earlier flowering in early sown chickpeas occurred under conditions of heavy winter rainfall and low temperatures while later sown chickpeas commenced flowering under non-limiting moisture conditions in spring and more conducive warmer temperatures.

**Table 3:** Commencement of flowering date (Number of days from sowing to flowering in parenthesis) of 12 chickpea varieties/lines sown at two different sowing dates at Pinery and Melton, 2016

Seed type	Variety	Sowing dates			
		Pinery		Melton	
		5-May	31-May	12-May	7-Jun
Desi	PBA Slasher	23-Aug (111)	21-Sep (113)	2-Sep (114)	23-Sep (109)
	PBA Striker	23-Aug (111)	8-Sep (100)	25-Aug (106)	22-Sep (108)
Advanced breeding line (Desi)	CICA1007	23-Aug (111)	8-Sep (100)	2-Sep (114)	24-Sep (110)
	CICA1442	23-Aug (111)	9-Sep (101)	30-Aug (111)	22-Sep (108)
	CICA1541	10-Aug (98)	23-Aug (84)	11-Aug (92)	2-Sep (88)
Kabuli	Genesis™ 079	23-Sep (142)	16-Sep (108)	30-Aug (111)	23-Sep (109)
	Genesis™ 090	2-Sep (121)	4-Oct (126)	18-Sep (130)	3-Oct (119)
	Genesis™ Kalkee	5-Sep (124)	7-Oct (129)	24-Sep (136)	11-Oct (127)
	PBA Monarch	23-Aug (111)	17-Sep (109)	30-Aug (111)	28-Sep (114)
Advanced breeding line (Kabuli)	CICA1156	23-Aug (111)	17-Sep (109)	30-Aug (111)	29-Sep (115)
	CICA1352	28-Aug (116)	2-Oct (124)	18-Sep (130)	29-Sep (115)
	CICA1452	27-Aug (115)	9-Sep (101)	30-Aug (111)	27-Sep (113)

### Lodging

- The favourable growing season allowed early-sown crops to establish early and develop bulk canopies which were more prone to lodging and a delay in sowing improved the standing ability of most varieties (Table 4).

**Table 4:** Lodging scores of 12 chickpea varieties/lines averaged across two sites, SA 2016.

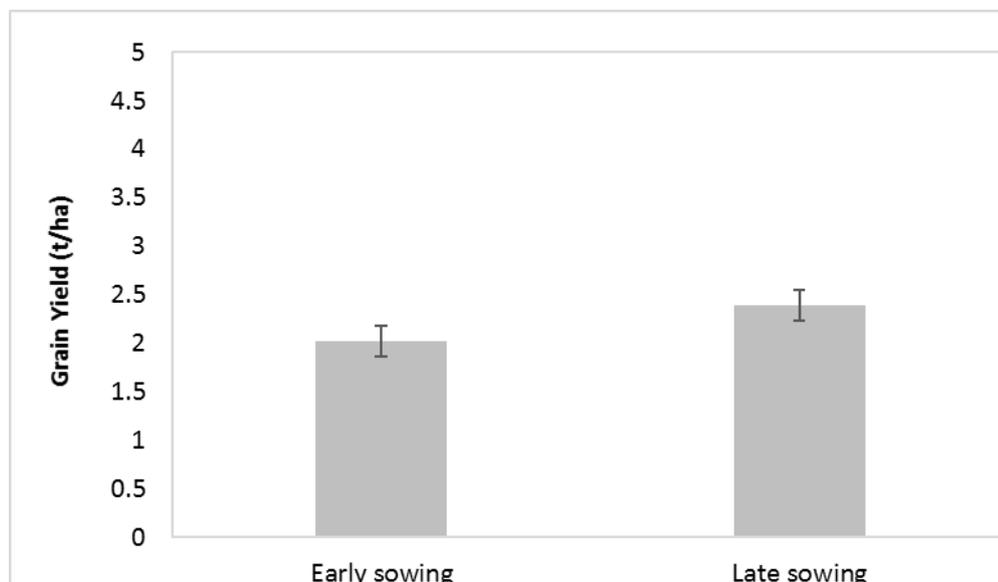
Variety	Early sowing (*)	Late sowing (*)
CICA1007	4	4
CICA1452	4	6
Genesis™ Kalkee	4	7
PBA Slasher	4	4
CICA1156	3	5
CICA1352	3	4
CICA1442	3	5
CICA1541	3	5
Genesis™ 090	3	6
PBA Monarch	3	3
Genesis™ 079	2	3
PBA Striker	2	4
<b>LSD (P&lt;0.05)</b>	<b>1.39</b>	<b>1.4</b>

\*Early sowing = 5<sup>th</sup> May (Pinery); 12<sup>th</sup> May (Melton); Late sowing = 31<sup>st</sup> May (Pinery); 7<sup>th</sup> June (Melton).

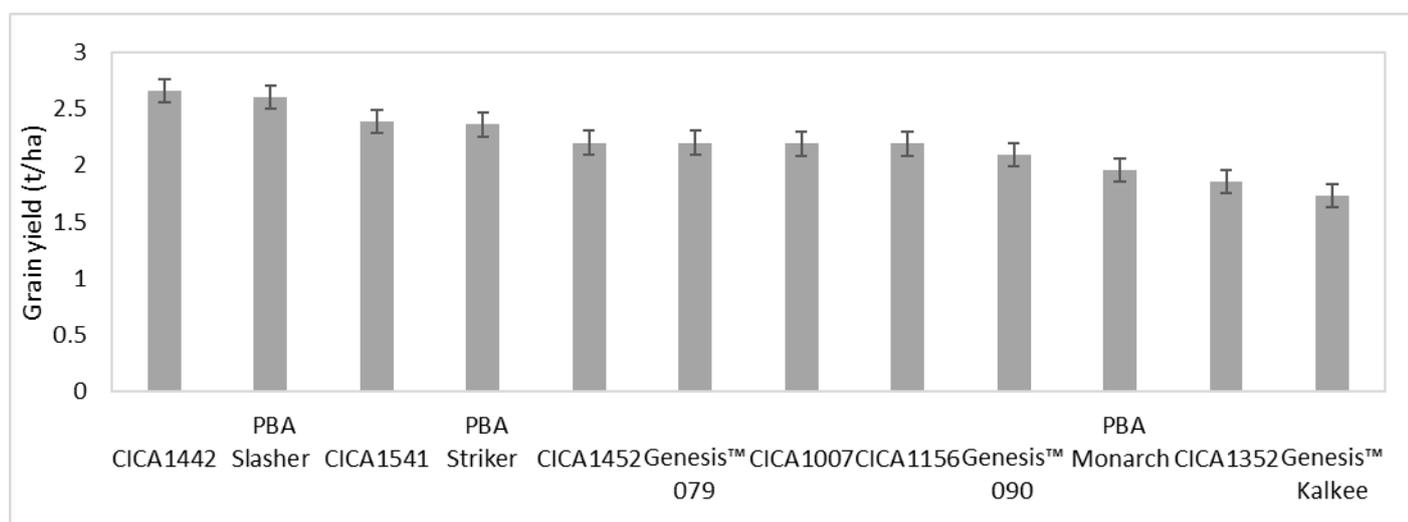
### Grain yield

- Grain yield of chickpeas is largely influenced by environmental conditions, mainly temperature, during flowering and duration of reproductive period (grain filling period) which is largely determined by availability of moisture.
- A significant sowing date response was found for grain yield where averaged across varieties and sites, a three week delay in sowing yielded 18 % more than early sown chickpeas (Figure 1).
- Despite earlier flowering, a yield loss was incurred in early sown chickpeas mainly due to a combination of various factors including flowering under non-conductive wet conditions which promoted foliar disease infection (Ascochyta Blight and Botrytis Grey Mould) and low temperatures which may have led to flower and pod abortion. Early sown crops produced large canopies which were more prone to lodging. Occurrence of hail and frost may have also exacerbated damage in early sown chickpeas leading to yield losses.

- In later sown chickpeas, flowering commenced in warmer temperature conditions, more conducive for podding. Soil moisture was also non-limiting leading to a longer duration of grain filling which suited the long maturity profile of chickpeas.
- Averaged across sowing times and sites, significant variety differences were found for grain yield. The advanced breeding Desi line CICA1442 and commercial Desi variety, PBA Slasher yielded similar (2.6 t/ha) and were top yielding varieties. PBA Slasher is rated MS for AB and is high yielding in all chickpea growing areas in SA.
- Genesis™ Kalkee, was the lowest yielding variety, equal to the advanced breeding Kabuli line CICA1352. The yield of Genesis™ Kalkee has generally been previously reported as being inferior to other small Kabuli types and PBA Monarch (Figure 2).



**Figure 1:** Grain yield (t/ha) averaged across 12 chickpea varieties/lines sown at two different sowing times at Melton and Pinery, SA, 2016. \* Early sowing = 5<sup>th</sup> May (Pinery); 12<sup>th</sup> May (Melton); \* Late sowing = 31<sup>st</sup> May (Pinery); 7<sup>th</sup> June (Melton);



**Figure 2:** Grain yield (t/ha) of 12 chickpea varieties/lines averaged across two sowing dates and sites in SA, 2016.

### Conclusion

- Compared to most pulses, chickpeas have a higher sensitivity to cold temperatures during reproductive growth stages of flowering and podding and also require cool long finishing conditions for grain filling due to the long maturity profiles.
- Sowing time influenced the yield of chickpeas in 2016 where earlier sown crops were: a) more susceptible to AB foliar disease as a result of bulk canopies, b) flowered and podded under non-conductive conditions of low temperatures and heavy rainfall and c) incurred yield loss compared with later sown crops.

- On the other hand, later sown chickpeas commenced flowering under favourable conditions of warmer temperatures and non-limiting moisture conditions leading to higher yields.
- Chickpea production is currently receiving a lot of interest in South Australia, however, growers need to take into consideration the recent change in the AB pathogen virulence and develop effective strategies for disease management including less susceptible varieties and application of strategic fungicides.