

When to sow chickpea in south-western Australia

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Abstract

The optimum time of sowing of several desi chickpea varieties varying in phenology over a range of dryland Mediterranean-type environments in south-western Australia was examined in this study. Chickpea showed good adaptation, particularly in the northern grain belt where growing conditions are warmer than southern areas. Seed yields were not clearly increased by altering sowing time to match the phenology of the current varieties to the growing season rainfall and temperatures, except at the early sowing times (April and early May). Generally, the greatest seed yields were produced by sowing between mid to late June at southern sites, and early May at central and northern sites.

Key Words

Chickpea, development, growth, seed yield

Introduction

Time of sowing has been identified as a major factor affecting chickpea yield and disease incidence (Knights and Siddique, 2002). In cereal crops, yield advantages have been gained through matching the phenology of the variety to the growing season rainfall (Kerr *et al.* 1992). In chickpea grown in the Mediterranean regions of Australia early phenology is associated with higher seed yield because it facilitates escape from terminal drought. However, flowering too early exposes chickpea to temperatures that are too low to support podset (Berger *et al.* 2004). Unlike cereal crops, chickpea has an indeterminate growth habit and is able to continue flowering and podding if environmental conditions are favourable, hence varietal responses to time of sowing may differ. This study examined the optimum time of sowing for several desi chickpea varieties varying in phenology over a range of dryland Mediterranean-type environments in south-western Australia.

Methods

Several desi chickpea varieties were sown at three or four times between early-April and mid-July at 19 sites between 1994 and 1998, corresponding to southern, central and northern production zones in south-western Australia. The lines/varieties used represented a range of phenology and seed sizes currently available for chickpea in Australia (Table 1). Entire plots (34- 36 m²) were machine harvested to determine seed yield. Seed yields were analysed across sites and seasons using a linear mixed model to determine interactions between variety, time of sowing and region. For this analysis, regions were specified as north, central or south and sowing time was grouped into early, mid or late periods of each month.

Table 1. Characteristics of chickpea lines/varieties

Line/variety	Maturity ^A	Seeds	Plant height
T1587	Early (FLW ^B 5 – 15 days before Tyson)	Medium (15-18 g/100 seeds)	Medium to tall

Sona	Early (FLW 9 – 15 before Tyson)	Large (17-22 g/100 seeds)	Medium to tall
Tyson	Medium	Small (11 – 15 g/100 seeds)	Short to medium
Dooen	Medium-late (FLW up to 7 days after Tyson)	Medium (15 – 19 g/100 seeds)	Medium

^A Estimated at Mullewa, Merredin and Nyabing ^B 50% flower

Results

Seed yield ranged from 169 kg/ha up to 2612 kg/ha for any individual variety and sowing time. When seed yields were grouped by production zone and analysed across sites and seasons using a linear mixed model, the response to time of sowing was similar for varieties (Fig. 1). In general, the greatest seed yields were achieved from earlier sowings (early May) at the northern and central sites, and from later sowings (mid to late June) at southern sites (Figs. 1, 2). However, Tyson outperformed other varieties in April and early-May sowing times across all zones (Fig. 1). This is unlikely to be due to Tyson's relatively late phenology, because Dooen, which is even later than Tyson, was not significantly higher yielding than the remainder when sown in April or early May (Fig. 1). Indeed, with the exception of Tyson, sowing very early in April resulted in lower yields than early May in central and northern regions (Fig. 1).

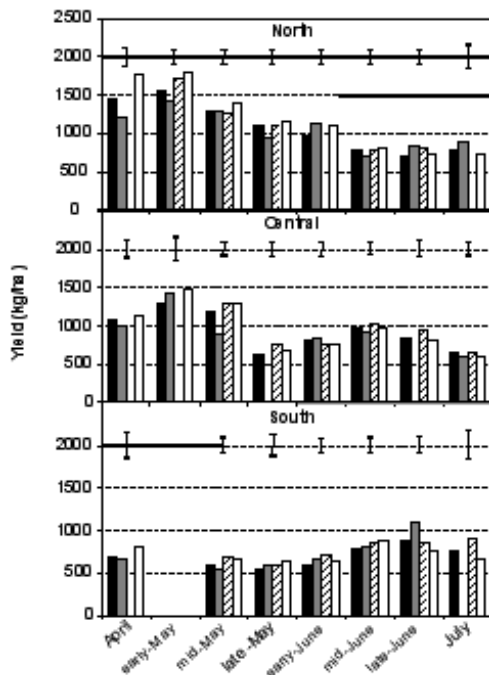


Figure 1. Yield response of Dooen (■), Sona (■), T1587 (▨) and Tyson (□) chickpea varieties to time of sowing in north, central and southern regions of south-western Australia between 1994 and 1998. (Bars

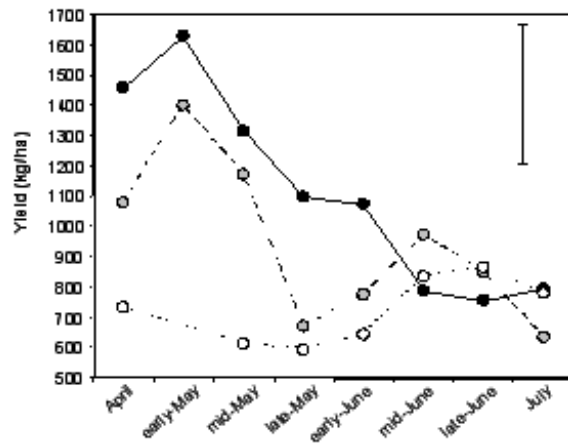


Figure 2. Yield response of chickpea yield to time of sowing in north (●), central (●) and southern (○) regions in experiments across south-western Australia between 1994 and 1998. (Bar denotes

denote average standard errors for each time of sowing x region). average 5% lsd for comparing sowing times).

Conclusions

Chickpea showed good adaptation to the dryland environments of south-western Australia, particularly in the northern and central agricultural regions where growing conditions are warmer than southern areas. This may be a consequence of the lack of chilling tolerance in chickpea. The optimal time of sowing for chickpea was from mid to late June at southern sites, and early May at central and northern sites. Seed yield of chickpea was not clearly increased by matching sowing time of current varieties with varied phenology in this study.

Acknowledgement

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References

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