Effect of sowing date on phenology and grain yield of six canola varieties – Condobolin 2015

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Key findings

» Grain yield was highest from the early sowing date (17 April).
» Pioneer® 44Y89 (CL) was the highest yielding variety.
» The early sowing treatments grew more total biomass and had a higher harvest index than the two later sowing dates.
» Pioneer® 44Y89 (CL) had a better harvest index than all other varieties in this experiment.

Introduction

The experiment was conducted to determine the grain yield and phenology response of six canola varieties sown at three different dates in a low rainfall environment.

Site details

Location	Condobolin Agricultural Research and Advisory Station
Soil type	Red chromosol
Previous crop	Lucerne pasture (2012–14), fallowed August 2014
Fertiliser	70 kg/ha monoammonium phosphate (MAP) + flutriafol (250 g/L) @ 400 mL/ha
Available nitrogen at sowing	250 kg/ha (0–180 cm)
Plant available water at sowing	30 mm
In-crop rainfall (April–October)	198 mm
Harvest date	Various according to maturity (hand harvest)

Treatments

Canola varieties	Pioneer® 43C80 (CL) Pioneer® 45Y86 (CL) Pioneer® 45Y88 (CL) Pioneerr 44Y89 (CL) Hyola® 575CL Hyola® 577CL
Sowing dates	TOS 1: 17 April TOS 2: 4 May TOS 3: 19 May

Seasonal conditions

Rainfall for the growing season was just below average, with Condobolin Agricultural Research and Advisory Station (CARAS) recording 198 mm. The long-term average growing season rainfall is 209 mm. An irrigation event of 13 mm was applied to the experiment on 29 April to optimise establishment.

The first sowing date was 17 April. There was adequate moisture but rainfall soon after sowing reduced emergence (average 20 plants/m^2) compared with the 4 May (average 45 plants/m^2) and 19 May (average 40 plants/m^2) sowing dates.

Results

Flowering

Hyola® 575CL was the fastest variety to flower from the 17 April sowing date (Table 1). The difference between Hyola® 575CL flowering and the slowest varieties (Pioneer® 45Y88 (CL), Pioneer® 45Y86 (CL) and Hyola® 577CL) was 14 days.

From the 19 May sowing date, the difference between the fastest variety Pioneer® 43C80 (CL) and the slowest variety Hyola® 577CL was only five days.

Table 1. Date of flowering (50% of plants with one open flower) of six canola varieties sown at three sowing dates, Condobolin 2015.

Variety	Date 50% flower		
	17 Apr	4 May	19 May
Pioneer 43C80 (CL)	1 Aug	17 Aug	30 Aug
Pioneer 44Y89 (CL)	26 Jul	20 Aug	1 Sep
Pioneer 45Y88 (CL)	3 Aug	26 Aug	3 Sep
Pioneer 45Y86 (CL)	3 Aug	26 Aug	2 Sep
Hyola 575CL	22 Jul	20 Aug	1 Sep
Hyola 577CL	3 Aug	26 Aug	4 Sep

Grain yield

The 17 April sowing date (average 1.2 t/ha) was significantly (P <0.001) higher yielding than the two later sowing dates (4 May average 0.3 t/ha, 19 May average 0.2 t/ha) (Figure 1). Pioneer® 44Y89 (CL) was the highest yielding variety in the experiment (average 0.8 t/ha across three sowing dates), with an overall grain yield benefit (across sowing dates) of 0.2 t/ha over the next best varieties: Pioneer® 43C80 (CL) and Pioneer® 45Y88 (CL). The interaction between variety and sowing date was not significant (P = 0.11).

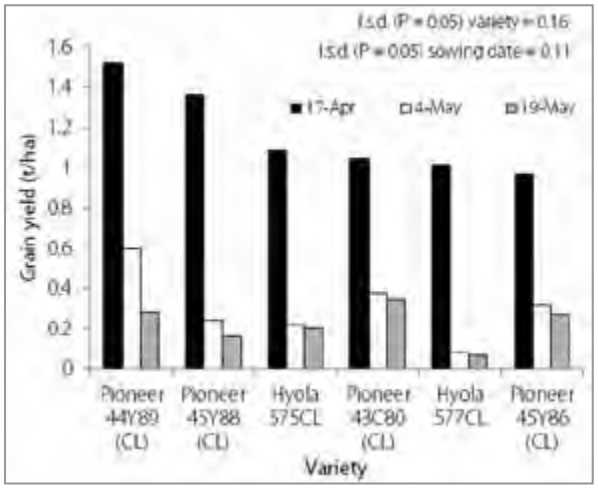

Figure 1. Grain yield (t/ha) of six canola varieties sown at three dates at Condobolin 2015.

There was a positive correlation (R^2 = 0.79) between biomass at maturity and grain yield (Figure 2), with higher biomass at maturity (from the 17 April sown treatments) resulting in higher grain yield.

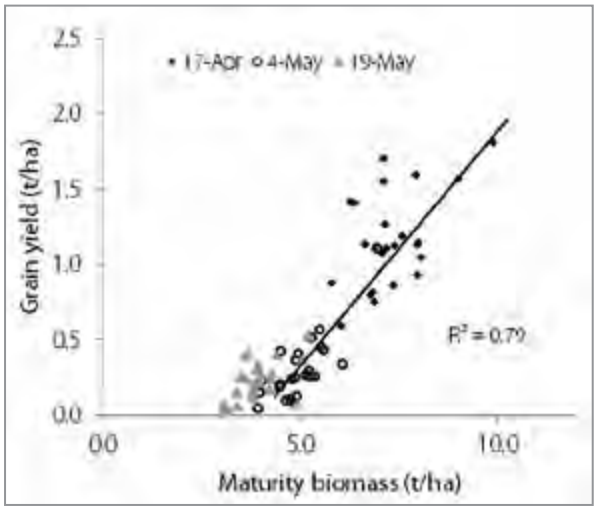

Figure 2. Relationship between maturity biomass (t/ha) and grain yield (t/ha) of six canola varieties sown on three dates at Condobolin 2015.

Sowing date and variety also affected the Harvest index (HI). Harvest index from the 17 April, 4 May and 19 May sowing dates was 0.16, 0.06 and 0.06 respectively. Averaged across the three sowing dates, Pioneer® 44Y89 (CL) had a significantly higher HI than all other varieties, being 0.13 compared with the next highest variety, Pioneer® 43C80 (CL) with 0.11.

Summary

The 17 April sowing date resulted in the highest yield across all varieties in this experiment. Pioneer® 44Y89 (CL) was the highest yielding variety when averaged across the three sowing dates.

This experiment shows that profitable canola production is possible in a low rainfall environment such as Condobolin, provided the sowing date is optimised and the most appropriate variety is selected. The water use efficiency (WUE) achieved from selecting the best variety and sowing early was 12 kg/ha/mm. The average WUE of all varieties from the 19 May sowing date was only 1.5 kg/ha/mm. Further research in this environment will quantify the benefits of stored water for canola and the interactions between stored water and agronomy decisions such as sowing date, variety choice and nitrogen application.

Acknowledgements

This experiment was jointly funded by GRDC and NSW DPI as part of the collaborative project 'Optimising canola profitability', CSP10087; 2014–19, a partnership also including CSIRO and SARDI.

Thanks to Daryl Reardon and Linda Brangwin at CARAS for technical assistance throughout this experiment.