Department of Primary Industries
Department of Regional NSW

NSW research results

RESEARCH & DEVELOPMENT – INDEPENDENT RESEARCH FOR INDUSTRY

The following paper is from an edition of the Northern or Southern New South Wales research results book.

Published annually since 2012, these books contain a collection of papers that provide an insight into selected research and development activities undertaken by NSW DPI in northern and southern NSW.

Not all papers will be accessible to readers with limited vision.
For help, please contact: Carey Martin at carey.martin@dpi.nsw.gov.au

©State of NSW through the Department of Regional New South Wales, 2023

Published by NSW Department of Primary Industries,
a part of the Department of Regional New South Wales.

You may copy, distribute, display, download and otherwise freely deal with this publication for any purpose, provided that you attribute the Department of Regional New South Wales as the owner. However, you must obtain permission if you wish to charge others for access to the publication (other than at cost); include the publication advertising or a product for sale; modify the publication; or republish the publication on a website. You may freely link to the publication on a departmental website.

Disclaimer
The information contained in this publication is based on knowledge and understanding at the time of writing. However, because of advances in knowledge, users are reminded of the need to ensure that the information upon which they rely is up to date and to check the currency of the information with the appropriate officer of the Department of Regional New South Wales or the user's independent adviser.

Any product trade names are supplied on the understanding that no preference between equivalent products is intended and that the inclusion of a product name does not imply endorsement by the department over any equivalent product from another manufacturer.

Effect of sowing date, seeding rate and irrigation pre-sowing on grain yield of two canola varieties – Condobolin 2015

Ian Menz and **Daryl Reardon** NSW DPI, Condobolin; **Rohan Brill** NSW DPI, Wagga Wagga

Key findings

- The combination of extra stored water (20 mm) and early sowing (17 April) resulted in the highest grain yield in this experiment.
- Early sowing without extra stored water gave a higher yield than late sowing (4 May), regardless of the irrigation treatment at the later sowing date.
- The extra grain yield from early sowing and irrigation was due to increased biomass accumulation and improved harvest index.
- Oil concentration was low overall, but was higher from the early sowing (33.6%) than the later sowing (30.5%).

Introduction

Water stored in the fallow phase can contribute significantly to the grain yield of all crops. This experiment was designed to determine which management factors for canola improved the efficiency of using stored water.

Site details

Location	Condobolin Agricultural Research and Advisory Station
Soil type	Red chromosol
Previous crop	Lucerne pasture (2012–2014), fallowed August 2014
Fertiliser	70 kg/ha MAP + flutriafol 250 g/L @ 400 mL/ha
Available nitrogen (N) at sowing	278 kg/ha (0–180 cm)
Plant available water at sowing	30 mm (non-irrigated treatment)
In-crop rainfall (April–October)	198 mm
Harvest date	According to maturity (hand harvest)

Treatments

The experiments were sown as a full factorial combination of variety, sowing date, irrigation (plus and minus) and plant density.

Variety	Hyola 575CL Pioneer 45Y88 (CL)
Sowing date	17 Apr 4 May
Irrigation	Plus Minus
Plant density	15 plants/m^2 45 plants/m^2

Irrigation of 64 mm was applied with a small lateral irrigator in March. The soil was cored prior to sowing and the extra water stored by this irrigation was 20 mm, giving plant available water in the irrigated treatment of 50 mm compared with 30 mm in the non-irrigated treatment.

Results

Grain yield

The irrigation treatment and sowing date interaction significantly affected grain yield (P = 0.006). There was a 0.7 t/ha grain yield benefit from the irrigated treatment compared with the non-irrigated treatment when sown early (17 April), but no benefit from the irrigated treatment when sown on 4 May (Figure 1). The non-irrigated treatment sown on 17 April yielded more than the irrigated treatment sown on 4 May.

Variety had a significant effect on grain yield (P = 0.031). Pioneer® 45Y88 (CL) was higher yielding when averaged across all treatments than Hyola® 575CL (1.2 v 1.0 t/ha). Seeding density had no effect on grain yield.

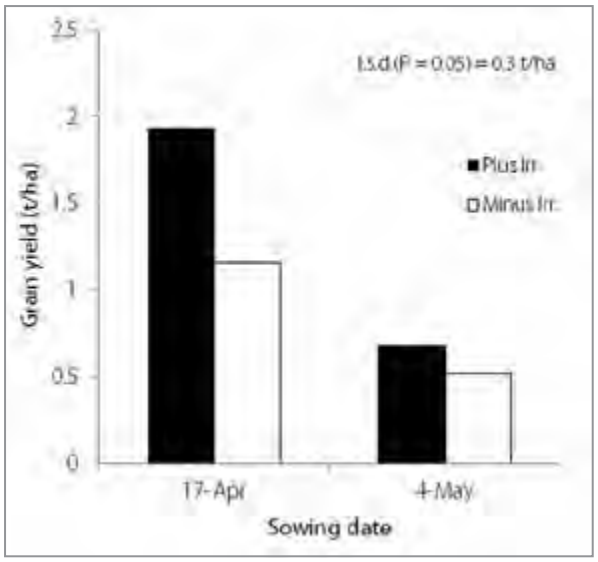

Figure 1. The effect of sowing date and irrigation treatment on grain yield of canola, averaged across two target plant densities, Condobolin 2015.

Maturity biomass and harvest index

Grain yield is a function of total crop biomass and harvest index i.e. the proportion of the biomass that is grain.

Sowing early (17 April) with irrigation resulted in the highest biomass at maturity and highest harvest index (HI) (Figure 2). Late sowing (regardless of irrigation) had low biomass and low HI.

Oil concentration

Oil concentration (reported at 6% moisture content) was significantly (P <0.001) higher for Hyola® 575CL (33.1%) than for Pioneer® 45Y88 (CL) (31.0%). Oil was also significantly (P <0.001) higher from the 17 April sowing date (33.6%) than the 4 May sowing date (30.5%).

Grain protein concentration was high for all treatments, averaging 29.6%.

Summary

The irrigation treatment in this experiment only stored an extra 20 mm of water in the soil; however this moisture resulted in a 0.7 t/ha grain yield increase when canola was sown early. This equates to marginal water use efficiency (extra grain yield generated per extra millimetre of water stored) of 35 kg/ha/mm. Assuming a grain price of $500/tonne with no change in oil concentration, the average return of each extra millimetre of water stored was $17.50/ha. This highlights the importance of timely fallow weed control to maximise water storage for the crop to use during the critical reproductive stages.

The extra grain yield from the early sowing with irrigation resulted from increased biomass as well as an improved HI. Research into the factors that affect biomass, and then the conversion of that biomass into grain, will form a major part of future research in the 'Optimising canola profitability' project. Factors to be investigated include sowing date, nitrogen management and variety.

The low oil levels observed in this experiment were consistent with past research (Brill et al. 2015) that has shown that increasing N has a negative effect on oil concentration. The starting N level of 278 kg/ha ensured that N was non-limiting and that grain yield was most likely to be limited by water.

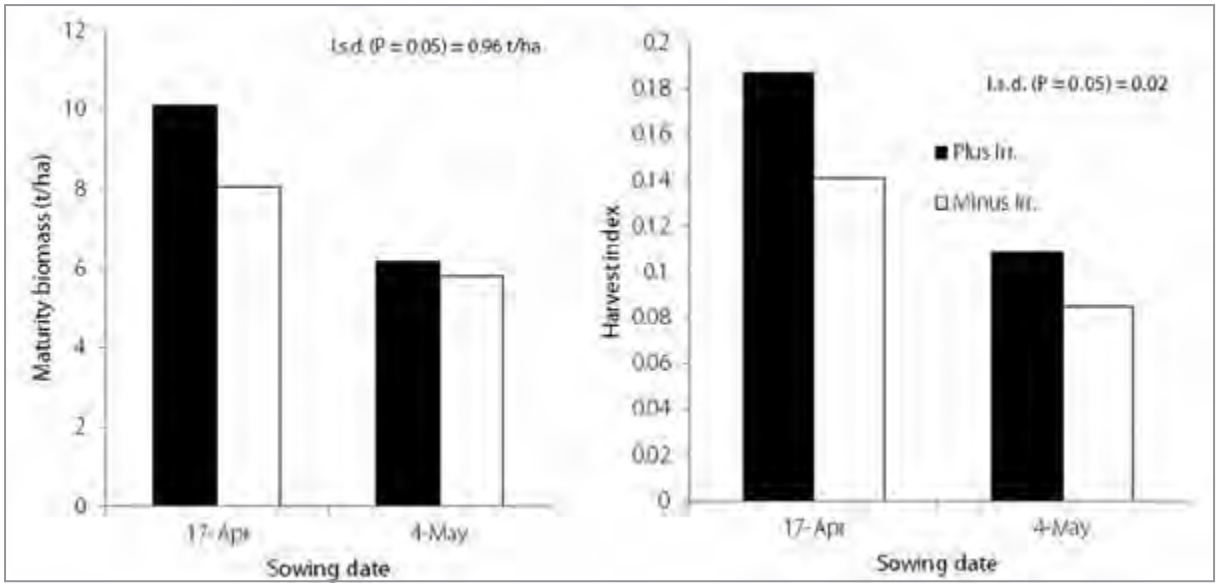

Figure 2. The effect of sowing date and irrigation treatment on biomass at maturity and harvest index of canola, averaged across two target plant densities, Condobolin 2015.

Reference

Brill, R, Street, M & Jenkins, L 2015, 'Improving WUE of canola in central NSW'. 17th Australian Agronomy Conference. Hobart 2015. Full paper at: http://www.agronomy2015.com.au/1303

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.