The effect of sowing date and irrigation pre-sowing on the grain yield of canola – Ganmain 2015

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Key findings

- Early sown (9 April) Pioneer® 45Y88 (CL) yielded similarly to later sown (20 April) Pioneer® 45Y88 (CL) and Hyola® 575CL.
- The irrigation treatment that stored 20 mm plant available water did not increase grain yield or oil concentration.
- The maturity biomass was higher from the later sowing date, but the harvest index was slightly higher from the early sowing date.

Introduction

Water stored in the fallow phase can contribute significantly to grain yield of all crops. This experiment was designed to determine if early sowing of canola will improve the efficiency of use of stored water.

Site details

Location	Ganmain
Previous crop	Barley
Fertiliser applied	100 kg/ha MAP + Flutriafol SC at 200 mL/ha 400 L/ha Sulsa (27N:7S w/v) prior to sowing 100 kg/ha Urea 15-6
Available nitrogen (N) at sowing	54 kg/ha (0–180 cm)
Plant available water (at sowing):	60 mm (non-irrigated treatment)
In-crop rainfall (April–October)	320 mm

Treatments

The experiment was sown as a full factorial combination of sowing date, variety and irrigation (Table 1).

Table 1. Sowing date, variety and irrigation treatments, Ganmain 2015.

Sowing date	9 April 20 April
Variety	Pioneer® 45Y88 (CL) Hyola® 575CL
Irrigation	Plus Minus

The irrigation was applied in March 2015 using a dripper line laid into pre-drilled furrows (Figure 1). An equivalent of 38 mm rainfall was supplied to the 'plus' irrigation treatment. Of the 38 mm applied, 20 mm was stored and available when the soil was cored two weeks later.

Figure 1. Irrigating plots in March 2015. Irrigation has just been completed on rows seven and eight in this image.

Results

Flowering

From the 9 April sowing date, Hyola® 575CL was 21 days quicker to flower than Pioneer® 45Y88 (CL), but was only eight days quicker from the 20 April sowing date (Table 2).

Table 2. The effect of two sowing dates on the flowering date (date when 50% of plants had one open flower) of two varieties, Ganmain 2015.

Variety	9 April	20 April
	Date 50% flower	
Hyola 575CL	20 July	19 August
Pioneer 45Y88 (CL)	10 August	27 August

Grain yield

There was a significant interaction between variety and sowing date (P = 0.007) for grain yield. Pioneer® 45Y88 (CL) was significantly higher yielding than Hyola® 575 CL from the 9 April sowing date, but there was no difference between the two varieties from the 20 April sowing date (Table 3). The irrigation treatment had no effect on grain yield.

Table 3. The effect of variety and sowing date on grain yield of canola, Ganmain 2015.

Variety	9 April	20 April
	Grain yield (t/ha)	
Pioneer 45Y88 (CL)	3.2	3.1
Hyola 575CL	2.9	3.2
l.s.d. (P = 0.05)	0.18	

The amount of biomass grown by the time the plant matured had a large effect on grain yield (Figure 2). Biomass at maturity was 1 t/ha higher for the 20 April sowing date compared with the 9 April sowing, but the higher biomass from the later sowing date of 20 April resulted in a marginally lower harvest index (0.23) compared with the 9 April sowing (0.25).

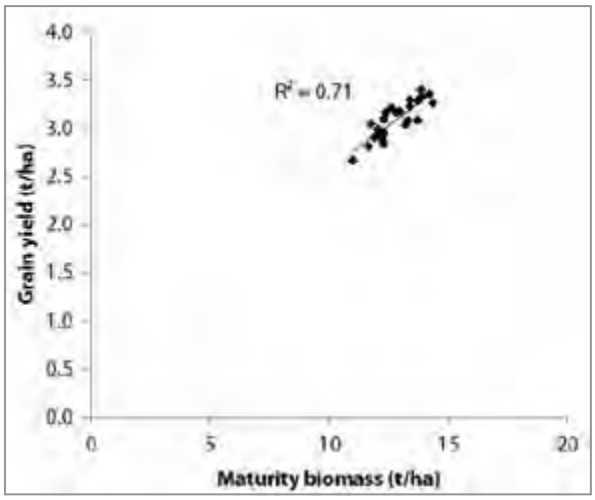

Figure 2. Relationship between biomass at maturity and grain yield of canola, Ganmain 2015.

Grain quality

Neither the sowing date nor irrigation affected oil concentration (at 6% moisture), but there was a significant effect between varieties. Hyola® 575CL had a higher oil content (42.8%) compared with Pioneer® 45Y88 (CL) (41.1%). Seed protein was unaffected by the treatments, averaging 21.6%.

Discussion and conclusion

Grain yield was strongly correlated with the amount of total biomass at maturity. The effects of the interactions between sowing date, variety choice and nitrogen management will be further investigated in subsequent experiments to determine the most effective way to optimise biomass accumulation and subsequent grain yield for different regions.

The lack of response to the extra water supplied through pre-sowing irrigation suggests that yield was limited by factors other than water. Assuming mineralisation of 40 kg/ha N through the growing season along with available N of 54 kg/ha and fertiliser N of 164 kg/ha, this experiment would have had approximately 258 kg/ha N available in the soil. The 'rule of thumb' for canola is that it requires 80 kg N/ha available in the soil to produce 1 t/ha grain. The highest yielding treatments in this experiment would have required 256 kg/ha N, which suggests that N could have limited further yield gains.

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