

## The Effect of Sowing Time and Variety on Yield and Oil Concentration of Canola (*Brassica napus*)

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### Key Points

- The effects of sowing time and variety on yield and oil concentration of canola (*Brassica napus*) were investigated at Condobolin in 2002 and 2003.
- Eight canola varieties and two Indian mustard varieties differing in maturity were established at four sowing times from early April to mid June.
- Early sowing increased yield and oil concentration.
- Yield and oil concentration declined with each delay in sowing time in both years.
- Variety maturity type is not as important as early sowing.

### Introduction

The central west of New South Wales is a major producer of cereal grains but the area of alternative crops (pulse/oilseed) is low. Many producers would like to grow canola due to the likely benefit to their cereal crops but are concerned that the crop is not reliable, particularly in lower rainfall areas. Condobolin is typical of the region, having an average annual rainfall of 400 - 450 mm of which approximately 200 mm falls between April and October. Early sowing and fallow moisture are the keys to a successful crop. Early sowing is important to allow grain fill before the high temperatures and evaporation rates of late spring, and fallow moisture is important to minimise water stress during crop growth. The correct combination of sowing time, variety and moisture (stored or in-crop rainfall) are vital to increasing canola production in this area. Two Indian mustard varieties were included in the 2003 trials as an alternative oilseed crop to canola.

### Material and Methods

Eight canola varieties differing in maturity (Ag-Outback, Rivette, Ag-Emblem, Rainbow, Ripper, Oscar, Hyola 60 and Dunkeld) were sown on three dates (April 22, May 17 and June 14) at Condobolin in 2002. In 2003 six canola varieties (Ag-Outback, Rainbow, Ripper, Oscar, Hyola 60 and Dunkeld) and two Indian mustard varieties (M887 and JN28) were sown on four dates (April 2, April 22, May 13 and June 6).

Due to the drought, three irrigations totalling 52 mm of water were applied to the whole trial to supplement the 86.2 mm of in-crop rainfall in 2002 and this still did not represent average rainfall (200mm) in the growing season. In 2003 three irrigations totalling 70mm were applied to the whole trial prior to sowing the April 2, April 22 and May 13 plots, to allow sowing to commence due to the lack of rainfall pre-season (132 mm between November 2002 and April 2003), however due to increased in-crop rainfall the trial received 270mm during the growing season which would be considered above average. Seed was

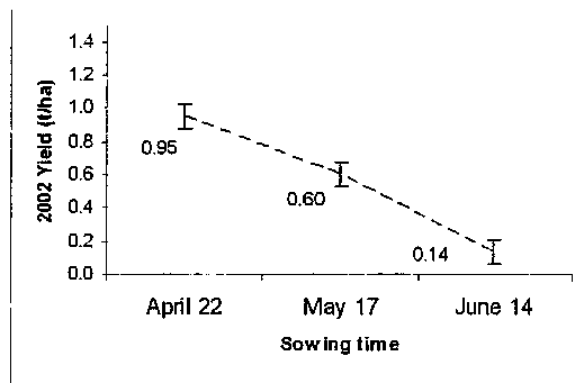
harvested and seed moisture, oil concentration, protein concentration and seed weight were analysed. **Results**

*Yield 2002*

Sowing time and variety had significant effects on yield. The effects of sowing

time are presented in Figure 1. The highest yield was recorded for April 22 sowing time (average 0.95 t/ha) after which yield declined with each delay in sowing time. The lowest yield was recorded for the June 14 (0.14 t/ha) sowing time.

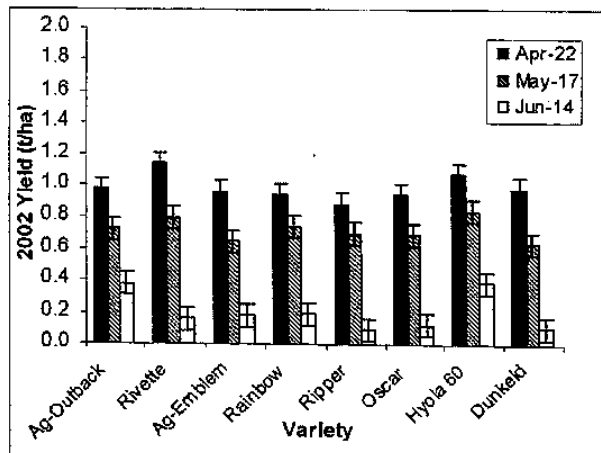
Figure 1. Yield (t/ha), averaged across eight canola varieties, of three sowing times at Condobolin in 2002.



Yield for each variety over the three sowing times is presented in Figure -2. Hyola 60 yielded well across all three sowing times recording the highest yield for the May 17 and June 14 sowing times. Rivette yielded highly for April 22 (1.14 t/ha) and May 17 (0.80 t/ha) sowing

times, out-yielding Hyola 60 in the April 22 sowing time. Ag-Outback yielded highly only in the June 14 (0.38 t/ha) sowing time. The lowest yield was recorded for Ripper sown on June 14 (0.09 t/ha).

Figure 2. Yield (t/ha) for eight canola varieties sown at three different times, at Condobolin in 2002.

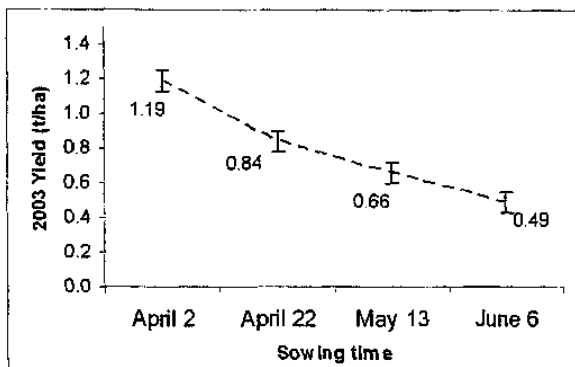


**Yield 2003**

Sowing time and variety had significant effects on yield. The effects of sowing time are presented in Figure 3. The

highest yield was recorded for the April 2 sowing time with an average of 1.19 t/ha. All yields declined with delay in sowing time beyond April 2.

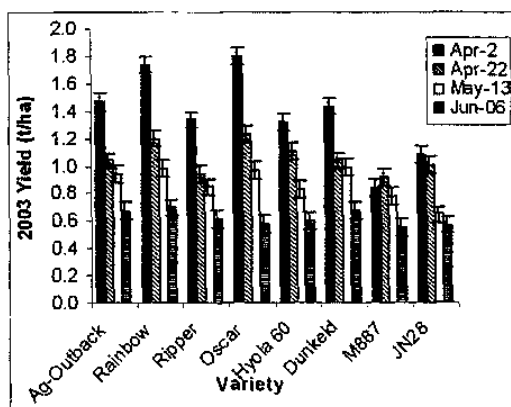
**Figure 3.** Yield (t/ha), averaged across six canola varieties and two Indian mustard varieties, of four sowing times at Condobolin in 2003.



The yield for each variety across the four different sowing times is presented in Figure 4. For the canola varieties, Oscar yielded the highest for the April 2 (1.80t/ha) and April 22 (1.23t/ha) sowing times but lowest for the June 6 sowing time (0.58t/ha). Hyola 60 yielded well for the April 22 sowing time but was the lowest yielder for the April 2 (1.32t/ha)

and May 13 (0.83t/ha) sowing times, while Ripper was the lowest yielder for the April 22 (0.95t/ha) sowing time. The April 2 sowing time yielded the highest across all varieties (except for M887) and this declined with a delay in sowing time. Both Indian mustard varieties performed poorly across all sowing times yielding less than all the canola varieties.

**Figure 4.** Yield (t/ha) for six canola varieties sown at four different times, at Condobolin in 2003.

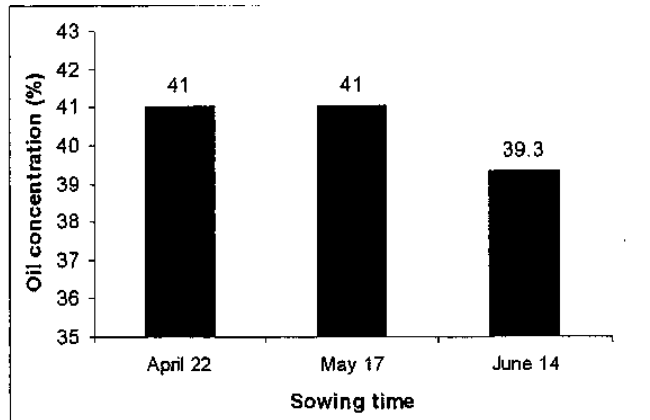


**Oil concentration 2002**

Oil concentration for the three sowing times averaged across variety are presented in Figure 5. The April 22 (41.0%) and May 13 (41.0%) sowing

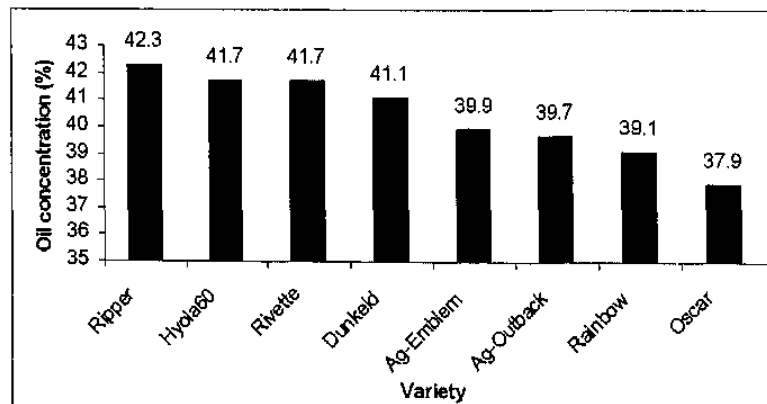
times had similar oil concentrations, however the June 14 (39.3%) sowing time had a significantly lower oil concentration.

**Figure 5.** Oil concentration (%) for three sowing times, averaged across eight canola varieties, at Condobolin in 2002.



Variety and sowing time had significant effects on oil concentration. The effect of variety on oil concentration is presented in Figure 6. Ripper (42.3%), Hyola 60 (41.7%) and Rivette (41.7%) had

significantly higher oil concentrations than the mean (40.5%) for all canola varieties. Rainbow (39.1%) and Oscar (37.9%) had significantly lower oil concentrations than the mean.



**Figure 6.** Oil concentration (%) for eight canola varieties, averaged across three sowing times, at Condobolin in 2002.

**Oil concentration 2003**

Sowing time and variety had significant effects on oil concentration. Figure 7 presents the oil concentration for four

different sowing times. Oil concentration declined with each delay in sowing time. The April 2 (40.33%) sowing time had a significantly higher oil concentration than

the other three sowing times. The June 6 concentration. (36.1%) sowing time had the lowest oil

**Figure 7.** Oil concentration (%) for four sowing times, averaged across six canola varieties and two Indian mustard varieties, at Condobolin in 2003.

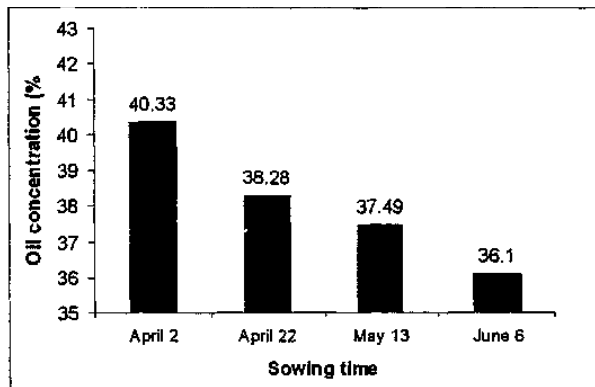
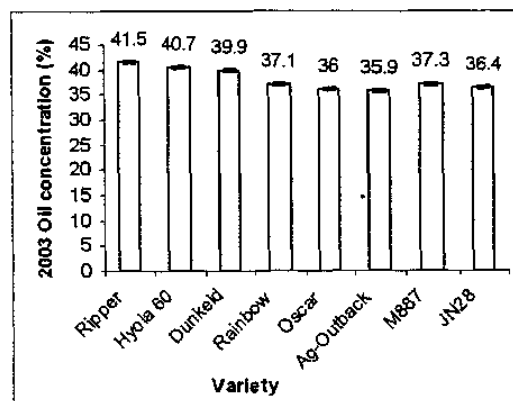


Figure 8 presents the effects of variety on oil concentrations. Ripper (41.5%) and Hyola 60 (average 40.7%) achieved the highest oil concentrations. The lowest oil concentrations in canola varieties were from Oscar (average 36%) and Ag-

Outback (averaged 35.9%). The Indian mustard varieties did not achieve outstanding oil concentrations and were below the values for each sowing time (Figure 8).

**Figure 8.** Oil concentration (%) for six canola varieties and two Indian mustard varieties, averaged across four sowing times, at Condobolin in 2003.



**Discussion**  
**Yield**

Delaying sowing past April 22 in 2002 and April 2 in 2003 caused a major yield reduction in all varieties. With a loss of 0.35 t/ha when sowing was delayed until April 22, 0.53 t/ha if sowing is delayed until May 13 and 0.7 t/ha when sowing

was delayed until June 6. Current recommendations for central NSW are for sowing from late April onward, except for the drier western areas where sowing from early to late April is suggested in the NSW Agriculture Variety Guides produced every year. Our results support these recommendations.

Interestingly, early maturing varieties such as Ag-Outback and Rivette performed well from April sowings, even though they reached 50% flowering in early August, a time when frosts are common. The mid-late variety Dunkeld was almost 3 weeks later to this stage while, Hyola 60 considered a mid-maturity variety, was only days behind Rivette and Ag-Outback. These three varieties had started pod filling by mid August and continued filling for about six weeks.

By comparison, early maturing varieties sown in mid May reached 50% flowering about three weeks later than those of April sowing, but reached physiological maturity only a week later than the April sowing, giving a two week shorter pod filling period. Again, Hyola 60 performed more like an early-mid variety, flowering only a week later than Rivette although it was a little later to mature. There was a tendency for the later flowering varieties to be lower yielding for this May sowing time.

Yields for the June sowing in both 2002 and 2003 were very low for all varieties and based on these results it suggests canola should not be sown this late. Even the earliest maturing variety, Ag-Outback, did not reach 50% flowering until almost mid September and most seed growth occurred in early October, a time of rising temperatures and high evaporative demand. With this late sowing, Ag-Outback and Hyola 60 were the highest yielding varieties, while the longer season varieties were generally poor performers.

#### *Oil*

The oil concentration of seed produced from varieties sown on June 14 in 2002 was significantly less than for the earlier sowings, and this may be due to higher temperatures during seed filling which

may also have contributed to the smaller seed size observed for this sowing date. In 2003 these reduced oil concentrations were also recorded suggesting that late sowing can lead to severe reduction in oil concentration in the seed. Each weeks delay in sowing time incurred an 0.5% loss in oil concentration.

There were significant differences between varieties for oil percentage but the lack of interactions with sowing time and water confirms the strong genetic control for this character. The oil concentrations and variety rankings are in close agreement with those from NSW Agriculture variety trials. The results show that high yield and high oil are not mutually exclusive characters, as both Rivette and Hyola 60 had both high yields and high oil percentages in both years. They also highlight the problems that are likely to arise if a low oil variety is sown late.

#### Conclusion

The results from these trials confirm the need for early sowing and in particular April sowing in order to achieve high yield and oil content in this environment and suggest that the maturity grouping of the variety is less important. The trial also suggests that sowing beyond mid-May will cause unacceptable losses in yield and oil concentration. An important question that remains is the extent of yield penalty which may occur with these early sowing times from frost.

The 2003 trial demonstrated with the Indian mustard varieties used, had lower yield and oil concentrations than the canola varieties, despite the water stress canola was under, and it is not recommended that Indian mustard be chosen as an alternative to canola at this stage.