Camelina (*Camelina sativa* Crantz) response to different harvest stages

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Introduction

Camelina (Camelina sativa L.) is an oilseed crop with promise for dryland crop production in the Great Plains because it is well adapted to water-limited environments. One of the production issues has been uneven maturity of camelina, which results in yield losses due to pod shattering. Hence, there is a need to determine the best harvest time for camelina that will increase seed yield without significant effects on the quality

Objectives

To determine the effects of different harvest times on camelina yield, water use efficiency, and oil content.

Materials and Methods

Experiment: The study was nested on an established wheat-camelina rotation trial at Wyarno, near Sheridan, WY (Fig. 1). The rotation trial entailed six cropping systems replicated five times. For this study, plots of spring (Blaine Creek) and winter (BX WG1) camelina cultivars were harvested at three maturity stages (when 50%-early; 75%-mid and >90%-late of the silicles were brown in color).

Fig. 1. Wheat-camelina rotation trial at Wyarno, near Sheridan, WY showing both camelina and wheat in rotation.

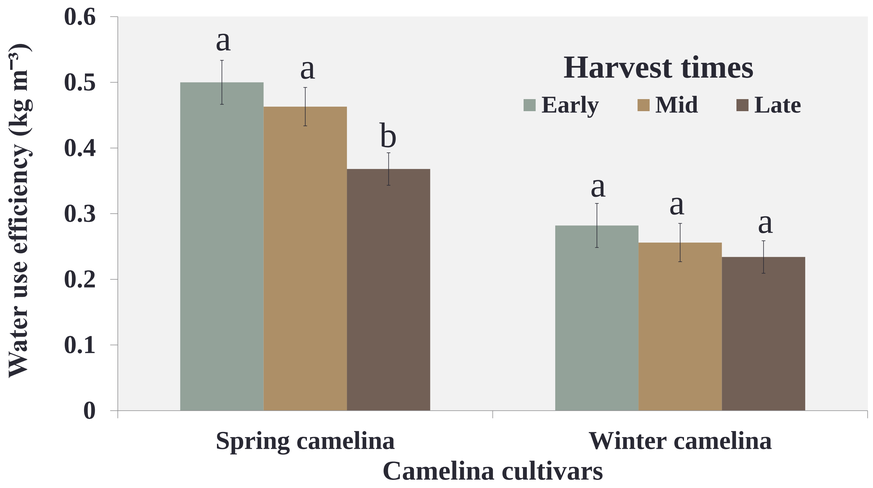

Fig. 2. Water use efficiency of camelina as affected by cultivar and harvest time. Within cultivar, means followed by the same letter are different at $P > 0.05$.

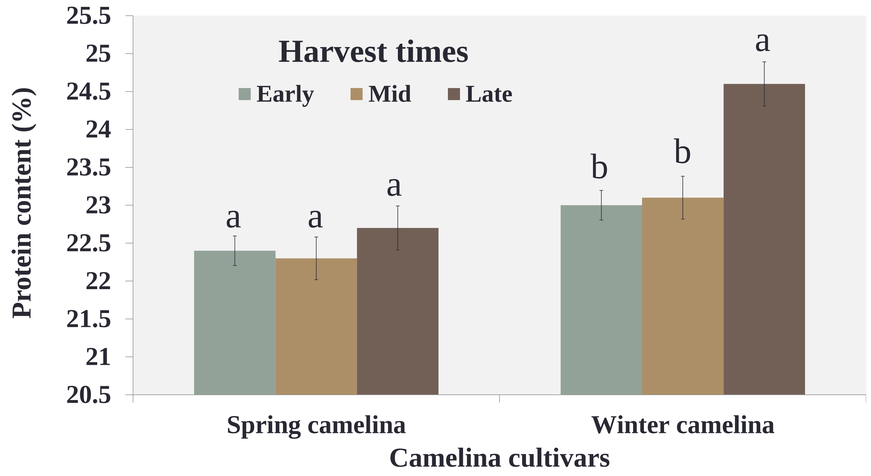

Fig. 3. Camelina protein content as affected by cultivar and harvest time. Within cultivar, means followed by the same letter are different at $P > 0.05$.

Table 1. Harvest time effects on camelina seed yield, harvest index, oil content, biodiesel, SFA, MUFA, and PUFA.

Harvest stage	Seed yield (kg ha^{-1})	Harvest index	Oil content (%)	Biodiesel (L)	Total SFA (%)	Total MUFA (%)	Total PUFA (%)
Early	1051a	0.264a	33.6b	155a	7.93ab	37.6b	49.1a
Mid	975b	0.266a	34.7a	148a	8.02a	37.4b	49.3a
Late	831c	0.243b	33.3b	121b	7.79b	39.3a	47.8b

Least squares means (LSMEANS) and adjusted Tukey multiple comparison procedure ($P > 0.05$) was used for mean separation. Within columns, means followed by the same letter are not different.

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Soil moisture: A neutron probe was calibrated and used to record soil moisture content in 20 cm depth increments to 80 cm total soil depth. This was used to estimate water use and subsequent water use efficiency (WUE) of camelina.

Results

Harvesting at mid and late stages significantly reduced camelina seed yield compared to early harvest (Table 1). However, harvesting at mid maturity stage resulted in highest oil content, and as such, there was no difference in biodiesel production between early and mid harvests. Delaying camelina harvest increased total monounsaturated fatty acid (MUFA), but decreased the total polyunsaturated fatty acid (PUFA) and harvest index. Total saturated fatty acid (SFA) was more in mid harvest stage than late harvest, with early harvest being intermediate (Table 1).

There was significant cultivar × harvest time interaction effects on camelina protein content and water use efficiency. Early harvest increased water use efficiency of spring camelina, but it had no effect on the winter camelina cultivar (Fig. 2). On the contrary, delaying harvest increased camelina protein content in the winter cultivar, but had no effect on the spring cultivar (Fig. 3).

Conclusions

The results showed that delaying harvest affected camelina seed yield, suggesting the need to harvest early by swathing in order to minimize pod shattering.

Acknowledgement

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