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# Plant Population and Weed Control in Hemp Production

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**Key words:** hemp, seeding rate, row spacing, weed control

## Abstract

A field experiment was conducted at Melfort, SK in 2000 and 2001 to determine the effects of seeding rate and row spacing on oilseed hemp (*Cannabis sativa* L.) production. High seeding rates significantly reduced weed infestation, and increased seed yield and biomass production of hemp. Narrow row spacing reduced weed infestation only in 2000 (wet), and did not have any significant effect on seed yield or biomass production in either year.

## Introduction

Industrial hemp (*Cannabis sativa* L.) is grown in many countries of the world for its fibre. More recently, however, attention has given to its seed, which contains close to 30% oil, with a fatty acid composition that has sparked interest in the nutraceutical industry. Cultivars of a shorter stature and earlier maturity than the traditional fibre varieties have been developed for the specific purpose of seed production.

It has been recommended that seeding rates should be higher for fibre production than for seed production in hemp (Baxter et al., 1998; Ranalli, 1999), as fibre content and quality tend to improve with increasing plant density. These previous recommendations, however, were established for eastern Canada and Europe. Some work has been done in the last few years to address this issue in Alberta (Blade, 1998), but more extensive research was needed to establish local recommendations on plant density for hemp production in the diverse agricultural environments of western Canada.

## Material and Methods

A factorial experiment was conducted at the Melfort Research Farm, Melfort, SK during 2000 and 2001. Soil type was a Black Chernozem, and fertilization was done according to soil analysis recommendations for wheat. Growing season (May-August) precipitation was 302 mm (135% normal) in 2000 and 90 mm (40% normal) in 2001.

The factors studied were seeding rate, row spacing and cultivar. The seeding rate treatments were 20, 40 and 60 kg/ha in 2000, and 20, 40, 60 and 80 kg/ha in 2001; the row spacing treatments were 18 and 36 cm; and cultivar treatments were Fasamo and Finola.

The weed samples were pulled from 0.5 m<sup>2</sup> (2000) and 1.0 m<sup>2</sup> (2001) area of each plot, at 41 and 30 days (in 2000 and 2001, respectively) before cutting the early cultivar Finola.

The plants at maturity were cut at soil level with a Suzue single row binder (Finola: 18

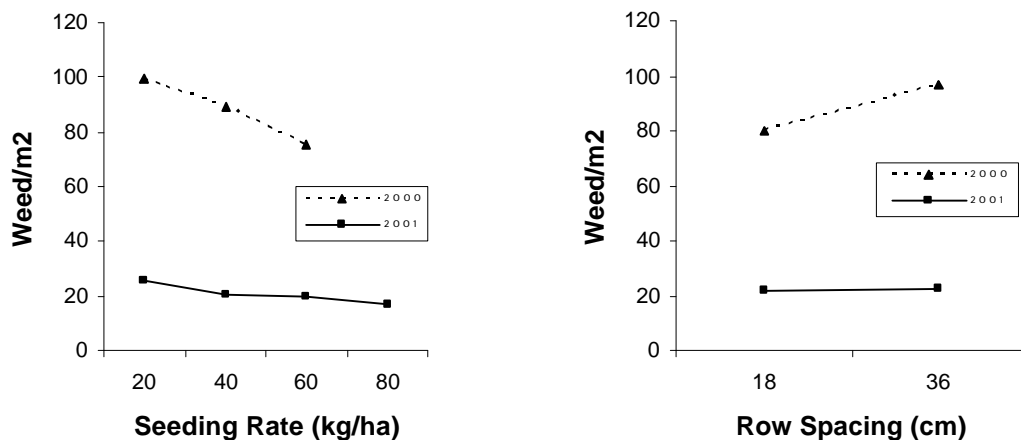
September 2000 and 30 August 2001; Fasamo: 2 October 2000 and 11 September 2001), put in cloth bags and left to dry in the field. The dried plants were weighed and threshed with a plot combine to determine seed yield.

The experimental design was a randomized complete block with 4 replications. The data were analyzed with the SAS (GLM) program, as a split plot design, with years as main plots and the factorials as subplots.

## Results and Discussion

### Weeds

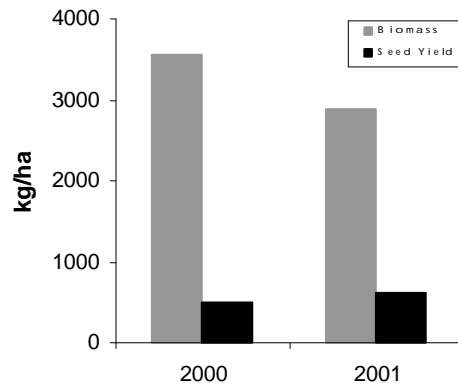
The infestation of weeds was much higher during the wet year (2000), with an average of 88 weeds/m<sup>2</sup>, as compared to the dry year (2001), with an average of 22 weeds/m<sup>2</sup>. High seeding rate (in both years) and narrow row spacing (only in 2000) significantly reduced weed infestation in hemp (Figure 1). This could be an important factor for a crop like hemp, as there is no registered herbicide yet available for weed control in this crop, and the fact that organically produced hemp seed receives a premium price.



**Figure 1.** Effect of seeding rate and row spacing on weed infestation in hemp at Melfort in 2000 and 2001 (average of two cultivars).

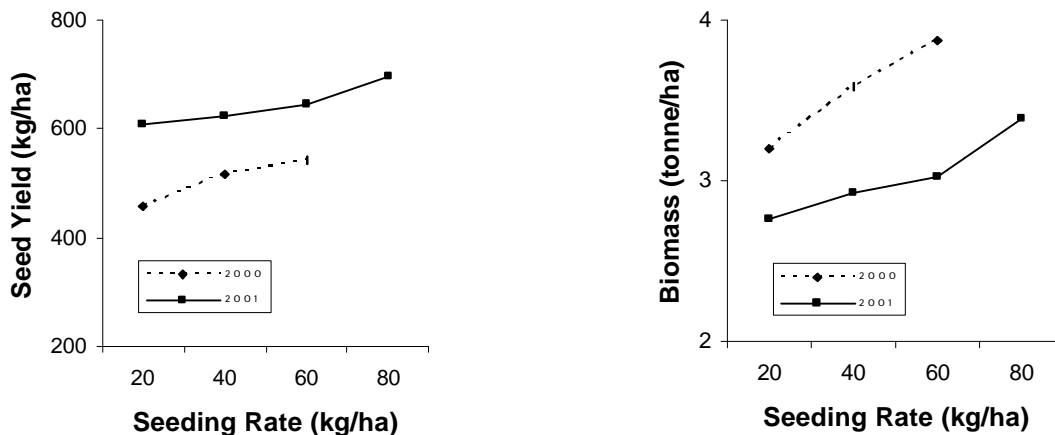
### Seed Yield and Biomass

It was noticed that the wet and cooler environment of 2000 favored biomass over seed production as compared to the much drier and warmer weather of 2001, where biomass production was diminished but seed yield was significantly higher than that obtained in the previous year (Figure 2).



**Figure 2.** Year effect on seed yield and biomass production of hemp at Melfort in 2000 and 2001 (average of two cultivars).

The seed yield and biomass of hemp increased as seeding rate increased (Figure 3), indicating that hemp, grown for the purpose of seed and possibly fibre production in western Canada, could be more productive when using higher seeding rates than those traditionally recommended for the province of Ontario or in Europe. Row spacing, on the other hand, did not have any significant effect on seed yield or biomass production in either year or cultivar.



**Figure 3.** Effect of seeding rate on seed yield and biomass production of hemp at Melfort in 2000 and 2001 (average of two cultivars).

## Conclusion

The results of this study indicate that the seeding rate for hemp grown for seed in the Parkland region of the Prairies should be increased to at least the levels recommended for fibre production in eastern Canada (40-50 kg/ha). The findings also suggest that, for organic production, it may be economical to use even higher seeding rates (60-80 kg/ha) and narrow row spacing (18 cm) in order to take better advantage of the enhanced weed control achieved at the higher plant population levels.

## **References**

Baxter, W.J., Scheifele, G. and Dragla, P. 1998. Hemp Production. Infosheet (9 pages).

Blade, S.F. 1998. Industrial hemp in Alberta. Pages 2-20 *in* S.F. Blade (ed.), Alberta Hemp Symposium Proceedings, Alberta Agriculture, Food and Rural Development, Edmonton, Alberta.

Ranalli P. 1999. Agronomical and physiological advances in hemp crops. Pages 61-84 *in* P. Ranalli, (ed.), Advances in Hemp Research. Food Products Press, An Imprint of The Haworth Press, Inc. Binghamton, NY.

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