How Hungry is Hemp for Fertilizers?

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Abstract

A field experiment was conducted at Melfort, SK in 2000 and 2001 to determine the effects of nitrogen and phosphorus fertilizer rates on hemp (*Cannabis sativa* L.) productivity. Increased nitrogen fertilizer rates significantly increased seed yield and biomass production of hemp. The application of seed-placed phosphorus fertilizer, on the other hand, significantly reduced emergence, seed yield and biomass production in a dry year.

Introduction

Crop diversification has become an important activity in the last few years, as agriculture scientists and producers search for new and economically viable alternatives that will allow them to increase crop rotations choices as well as create additional farming revenue opportunities. Hemp (*Cannabis sativa L.*) is one of the most recent additions to the list of new crops available to farmers, who planted in excess of one thousand hectares of this crop in western Canada in 2001.

It has been common knowledge that hemp is not a particularly 'hungry' crop, capable of putting out a good performance with relatively low fertilizer requirements (Ranalli, 1999). As the interest in new crop alternatives, and in hemp in particular, increases in the farming community of western Canada, it is important to establish agronomic recommendations, tailored to the local growing environments, for these incoming crops, as very little information is available regarding their nutrient requirements and other cultural practices (Blade, 1998).

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, which contained 27 kg N/ha in 0-30 cm depth and 17 kg P/ha in 0-15 cm depth in 2000, and 29 kg N/ha in 0-30 cm depth and 51 kg P/ha in 0-15 cm depth in 2001. The growing season (May-August) precipitation was 302 mm (135% normal) in 2000 and 90 mm (40% normal) in 2001.

The factors studied were N fertilizer rate, P fertilizer rate and cultivar. The N fertilizer treatments were 0, 40, 80 and 120 kg N/ha; the P fertilizer treatments were 0 and 20 kg P/ha; and the cultivar treatments were Fasamo and Finola. The N was applied as 34-0-0, top-dressed after emergence, and P was applied as 12-51-0, with the seed.

The plants at maturity were cut at soil level with a Suzue single row binder (Finola: 20

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 then weighed and threshed with a plot combine.

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

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 similar to that obtained in the previous year (Figure 1).

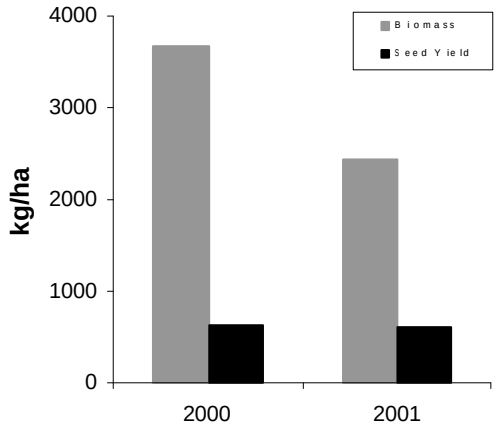

Figure 1. Year effect on seed yield and biomass production of hemp at Melfort in 2000 and 2001 average of two cultivars).

Effect of N fertilizer on seed yield and biomass

Seed yield and biomass of hemp increased as N fertilizer rate increased (Figure 2). The earlier and shorter cultivar Finola reached its maximum seed yield and biomass production at 80 kg/ha of added N fertilizer, while the cultivar Fasamo was still showing significant gains at the highest N rate applied (120 kg N/ha).

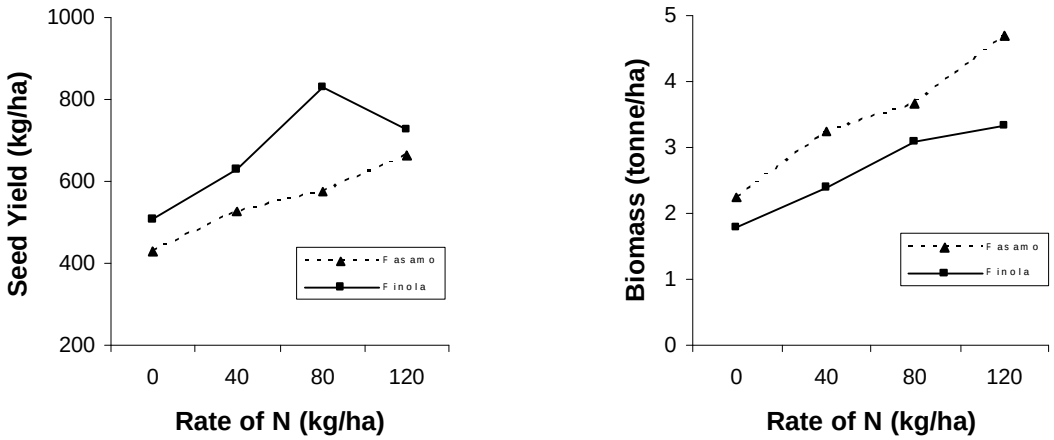

Figure 2. Effect of N fertilizer rate on seed yield and biomass production of hemp cv. Fasamo and Finola at Melfort in 2000 and 2001.

Effect of phosphorus fertilizer on seed yield and biomass

The addition of P fertilizer did not improve the performance of hemp (Figure 3). On the contrary, there was evidence that the seed-applied phosphorus may have affected emergence, as the plant population of hemp at maturity was significantly diminished at the 20 kg P/ha rate in 2001 (Figure 4). This may have been the cause for the lower seed yield and biomass production achieved at the 20 kg P/ha rate in 2001 (Figure 3).

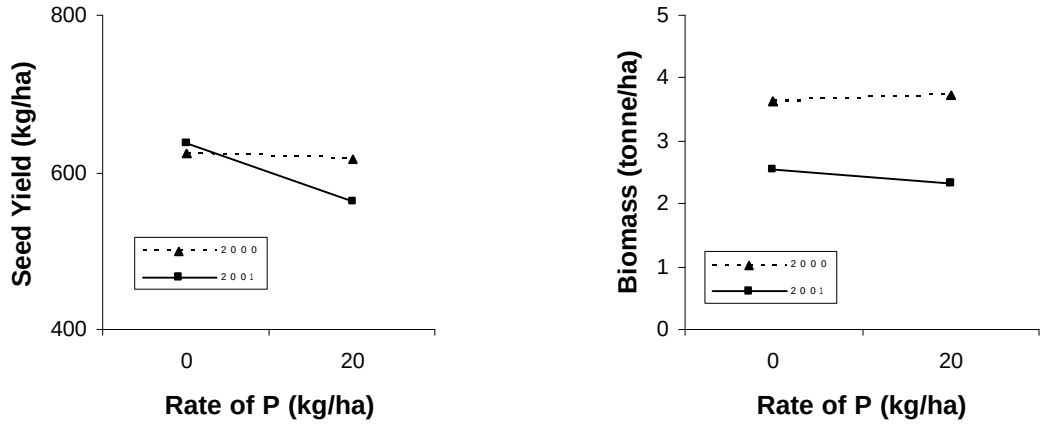

Figure 3. Effect of P fertilizer rate on seed yield and biomass production of hemp at Melfort in 2000 and 2001 (average of two cultivars).

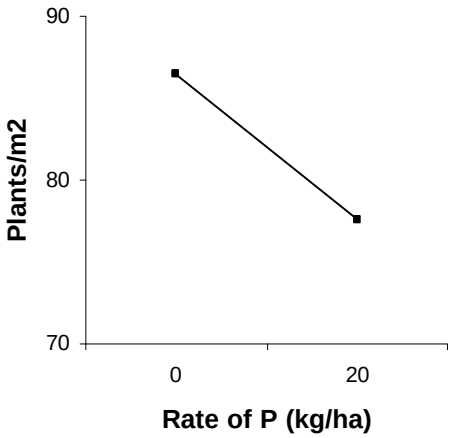

Figure 4. Effect of P fertilizer rate on the plant density of hemp at Melfort in 2001 (average of two cultivars).

Conclusion

The results indicate that hemp, grown for the purpose of seed production, could benefit from increased levels of N fertilizer. The addition of seed-applied P fertilizer, on the other hand, did not show much benefit to the development and performance of hemp, but it was rather detrimental in dry conditions.

The observed changes in biomass production also suggest that even though the cultivars used in this experiment were not of the fibre type, this information could be extended as well to hemp cultivars grown exclusively for this last purpose.

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