
Direct Seeding Dry Bean in Saskatchewan

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Abstract

Yields of direct-seeded and spring-cultivated narrow-row dry bean were comparable in two years in Saskatchewan. Either treatment appears to be an acceptable residue management practice for dry bean in this area. A dryland, narrow-row production system for dry bean (*Phaseolus vulgaris* L.) is being refined for the black soil zone of Saskatchewan. The effect of residue management on two cultivars of dry bean was studied at two locations in Saskatchewan in 1999 and 2000. Plots were spring cultivated (C), mowed (M) or left as standing stubble (S) prior to seeding. The C treatment had significantly lower plant densities than M or S in 1999 at the Rosthern location. Treatment differences for density in the 2000 season were not significant. There was no significant yield effect for residue management when differences in emergence were accounted for by covariate analysis. However, there was a significant interaction of residue treatment and cultivar in 1999 at the Rosthern location. For the 2000 season, average yields over both cultivars and locations were 941, 776, and 888 kg ha⁻¹ for C, M and S respectively and all differend significantly from each other. Spring cultivation and direct-seeding both appear to be acceptable residue management practices for dry bean. The heavier surface residue conditions of the mowed treatment seemed to be generally detrimental to yields.

Introduction

Interest in dryland, narrow-row production of bean is growing in Saskatchewan and basic agronomic research is needed to reduce production risk and improve potential yields of the crop. Direct seeding and other types of residue management may influence bean productivity in several ways. Direct seeding alters field microclimate compared to land that is cultivated before seeding, especially during early stages of crop growth. This affects the structure and productivity of the plant at harvest (Cutforth and McConkey, 1997). Seeding directly into stubble conserves moisture, often resulting in less yield loss due to drought (Enz et al 1988, Brun et al., 1986). However, plant stand can be lower in direct seeded systems (Vyn et al., 1998). The objective of this research was to identify residue management systems suited to dry bean production in Saskatchewan. Yields and plant densities were evaluated for three residue treatments and two cultivars at Rosthern and Saskatoon.

Materials and Methods

The experimental design was a split-plot with two locations; Saskatoon and Rosthern. Four and eight replicates were used in 1999 and 2000 respectively. The main plot was residue treatment and the split plot was cultivar. The pre-seeding residue management treatments were spring cultivated (C), stubble mowed and spread on surface (M) and stubble left standing (S). Two cultivars of black bean, CDC Nighthawk and CDC Espresso, were present in each residue management plot. Plant density (plants m⁻²) and yield (kg ha⁻¹) were determined for each plot.

Analysis of variance and covariance ($\alpha=0.05$) using SAS were performed on the data. Locations were considered random for all analyses. The Saskatoon data from 1999 is not used in the analysis because of excessive variability.

Results and Discussion

The C treatment had significantly lower plant density than M or S in Rosthern in 1999 (Table 1). Vyn et al (1998) reported that direct-seeding with no residue removal resulted in lower plant densities than cultivation. When variability in density was accounted for as a covariate, there were no significant overall yield differences for residue treatments in 1999 (Fig 2a). However, there was a significant interaction of residue and cultivar (Fig 2b,c).

Plant density differences were non-significant in 2000. Yields were 941, 766, and 888 kg ha⁻¹ for cultivated, mowed and stubble treatments respectively and all differences were significant (Fig 2a). The residue treatment by cultivar interaction was also significant (Fig 2b,c). The difference in yield between C and S treatments was small (5.6%) but statistically significant. The higher surface residue conditions of the M treatment seemed to be detrimental to seedling vigor and development.

Table 1. Mean plant densities for various residue treatments over cultivars at Rosthern in 1999 (LSD=8) and over both locations for 2000 (LSD=12).

Treatment	1999	2000
Cultivated	21	40
Mowed	30	42
Stubble	33	43

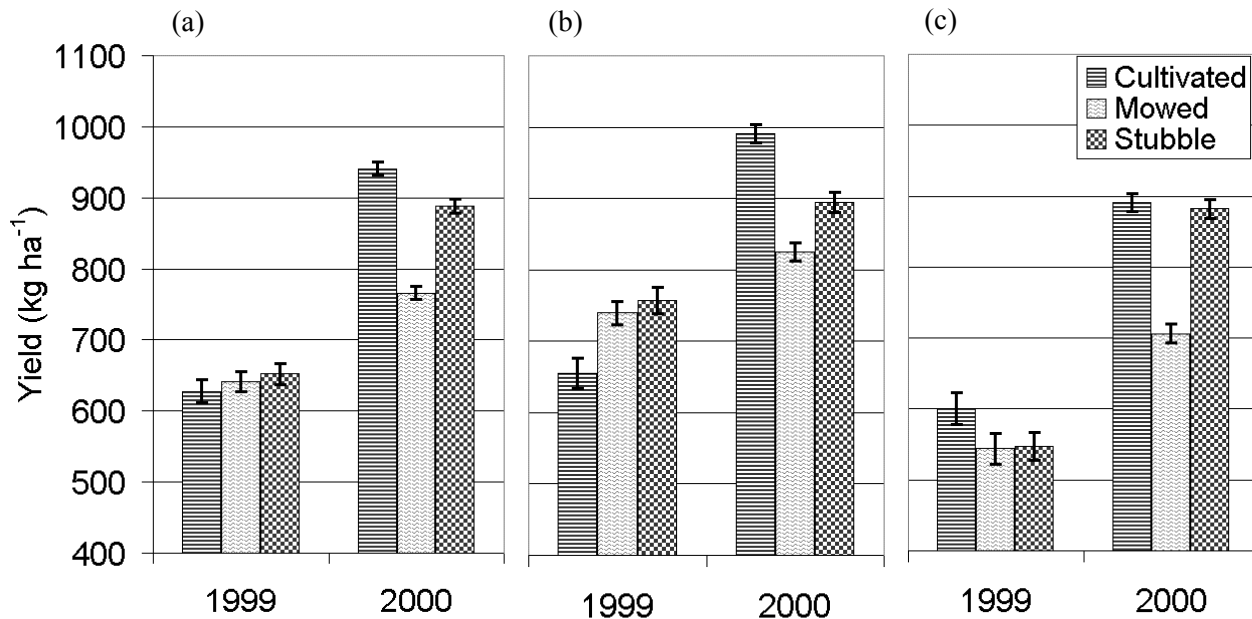


Fig. 2. Yields of dry bean from 1999 (Rosthern) and 2000 (Rosthern and Saskatoon): (a) yields averaged over locations and cultivars, (b) yields for CDC Espresso averaged over years, and (c) yield for CDC Nighthawk averaged over years. Bars are standard error of the mean.

References

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