Planting Method and Seeding Date Affects Winter Camelina Establishment and Yield

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Introduction

Replacing fallow with a biofuel feedstock like camelina could increase returns and profitability of wheat-fallow based systems in the central Great Plains (CGP). Growing camelina in the fallow period avoids direct competition for land use with food crops in wheat-based production systems. Recent cropping systems studies in Montana and Wyoming have shown that camelina can replace fallow in wheat-fallow systems with minimal yield reductions. Although both winter and spring camelina genotypes exist, most studies on camelina are generally focused on spring types. Planting camelina in the fall will result in early emergence and improve plant stand in the spring. Good stand establishment could suppress weeds, an added advantage because currently, there are no labeled herbicides for weed control in camelina. Besides, fall seeded camelina may be harvested early allowing for soil moisture storage for the subsequent crop. This will fit well into dryland winter wheat-based cropping systems where moisture availability is critical to prevent crop failure. Due to the small seed size, camelina is often planted at shallow depths. Seeding equipment type can alter seed placement, soil growing conditions and reduce the vulnerability of seedlings to inclement weather conditions. In addition, there is limited information on agronomic performance of winter camelina germplasm in the CGP region.

Objectives

Our objective was to evaluate seedling emergence, stand establishment and seed yield of two winter camelina cultivars as affected by planting method and seeding date.

Materials and Methods

The study was conducted at the University of Wyoming James C. Hageman Sustainable Agriculture Research and Extension Center (SAREC), near Lingle, WY in the fall of 2012. The soil at the experimental site was Haverson loam with 2.2% organic matter, pH 8.2, 17 mg kg^{-1} nitrate-N, phosphorus (P) 18 mg kg^{-1}, and potassium (K) 544 mg kg^{-1}. Experimental design was a randomized complete block with four replications in a split-split plot arrangement. Main plots were two planting methods (hoe drill and disc drill). Sub-plot treatments were two winter camelina cultivars (BSX-WG1 and Bison) planted at three seeding dates on October 2, October 16 and October 30, 2012. No fertilizer was applied to the plots. Seedling emergence was quantified in November 2012 by determining the percentage of plant that germinated in each plot. Stand establishment (plant density) were determined on April 3, 2013 by counting the number of plants in a 1-m^{-2} quadrat from three random locations in each plot, and the average plant density recorded. Camelina was harvested on July 15 for seed yield using a small plot combine. Total precipitation during the growing season (from sowing to harvest) was 203 mm. In addition, all plots received a supplemental irrigation (100 mm) during the growing season.

Fig. 1. Seedling emergence and plant stand of camelina plots planted with a disc drill.

Fig. 2. Seedling emergence and plant stand of camelina plots planted with a hoe drill.

Fig. 3. Picture showing the two winter camelina cultivars, Bison and BSX-WGI.

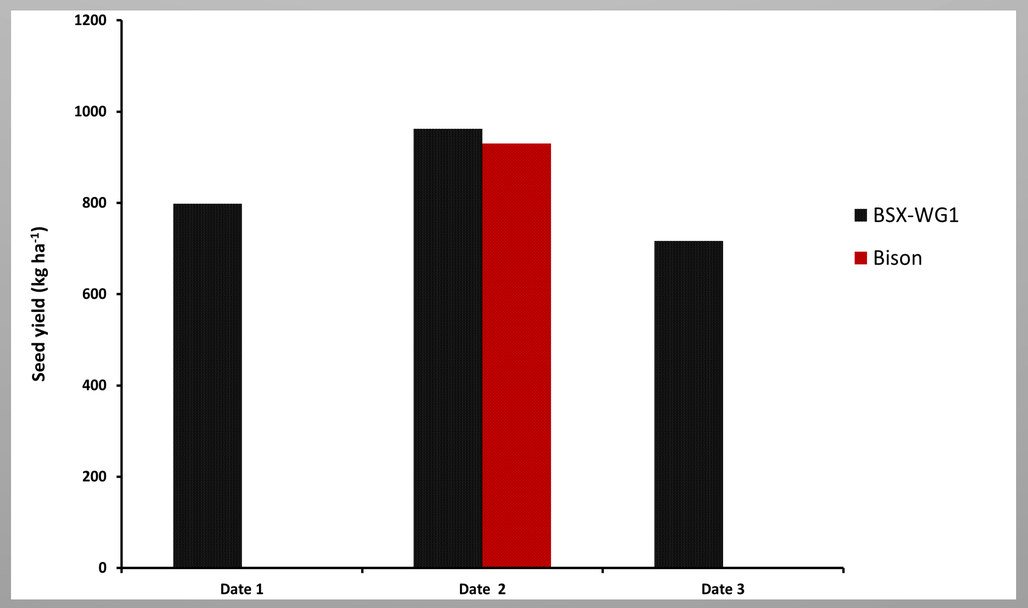

Fig. 5. Camelina seed yield response to different planting dates and cultivar during the 2013 growing season at SAREC.

Results

Preliminary results in 2013 showed that seeding date and planting method had a significant effect on camelina seedling emergence and plant stand density. Regardless of planting date, seedling emergence and stand establishment were significantly greater in the hoe drill than disc drill plots (Fig.1 & 2). Due to poor emergence in the disc drill plots, stand establishment was poor and resulted in severe weed problems, so there was no seed harvested from the disc drill plots. Among the two winter camelina varieties studied, BSX-WGI outperformed Bison with regard to seedling emergence and stand establishment (Fig.3). Seeding beyond October 16 resulted in lower seedling emergence and plant density. Seed yield of BSX-WGI ranged from 798 kg ha^{-1} for the first planting date to 962 kg ha^{-1} for the second planting date (Fig.4). Due to poor stand establishment, there were no harvests for Bison for the first and third seeding dates. However, planting Bison on October 16 (seeding date 2) resulted in good stand establishment, and seed yield similar to BSX-WG1 (Fig.4). The two camelina cultivars (Bison and BSX-WGI) showed promise for winter survival in the CGP.

Conclusions

Based on our preliminary data, the hoe drill provides a better option for seeding winter camelina. Earlier planting of winter camelina is important to ensure good stand establishment, winter survival and greater seed yield.

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