

Camelina Growth and Yield Response to Planting Rate and Depth

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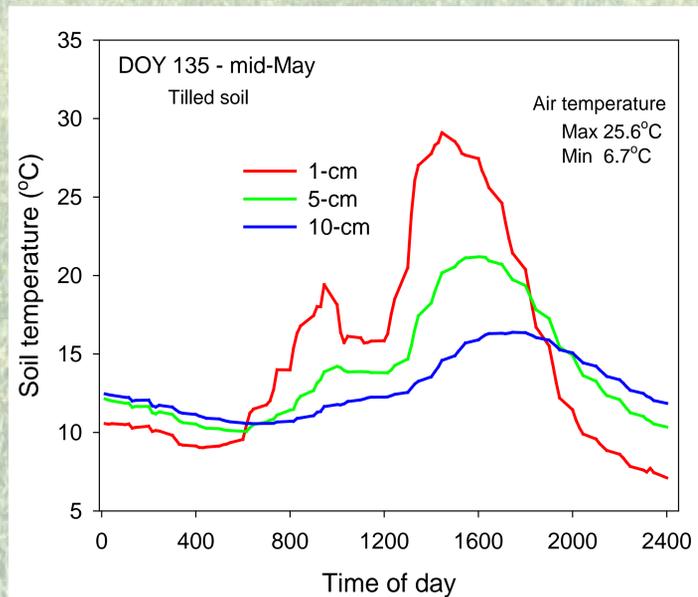
Introduction

Camelina (*Camelina sativa* L.) has shown good potential as an alternative oilseed feedstock for the northern and western U.S. However, seedling establishment has been problematic in some environments.



Example of poorly established camelina

Several “growers guides” developed by industry and academia recommend planting camelina shallow (i.e., ~ 1.2 cm deep), partly due to its small seed size. Shallow planting can diminish seed to soil contact and expose seeds to greater fluctuations in soil temperature and moisture (see graph of soil temperature below), which greatly affect germination and emergence.



Example of soil temperature fluctuation on a typical spring day in the northern Corn Belt. Note the large fluctuation in temperature at the 1-cm depth. Spring camelina is planted in late April to mid-May in this region.

Objective

The objective of the present study was to determine the effects of planting depth and rate on camelina seedling emergence, plant growth, and yield in west central Minnesota.

Methods

- Two-year field study conducted in west central Minnesota on a Barnes loam soil following spring wheat (*Triticum aestivum* L.)
- Split plot RCBD with four replications. Main plots were planting rate and subplots were planting depth
- Planting depths = 1, 2, and 4 cm; planting rates = 2, 3, and 6 kg ha⁻¹
- Spring camelina (cv. CO46) was planted in 30-cm spaced rows 18 May, 2011 and 6 June, 2012
- Data were analyzed with the Mixed Model of SAS using year as a random variable



Test plots were planted with a Wintersteiger plot drill with double-disk openers

Results



Test plots showing differences in plant emergence with planting depth.

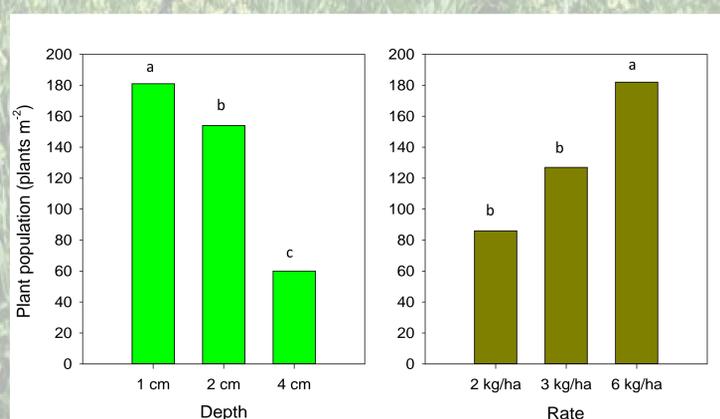


Figure 1. Effect of planting depth and rate on seedling emergence. Treatments followed by a different letter are significantly different at the $P \leq 0.05$ level.

- Plant population decreased with increased planting depth and decreased planting rate.
- Although significantly different, the difference in plant population density between the 1 and 2 cm planting depth was not large.
- The highest seeding rate did help compensate for plant loss due to seeding depth at 4 cm (data not shown).

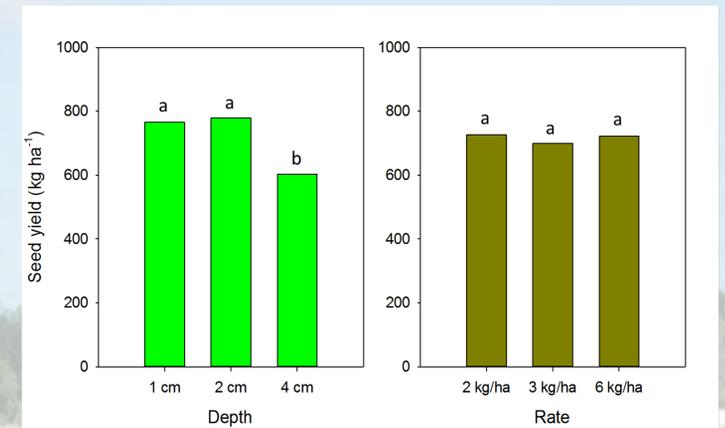


Figure 2. Effect of planting depth and rate on seed yield. Treatments followed by a different letter are significantly different at the $P \leq 0.05$ level.

- Planting at 4 cm led to a 22% decline in seed yield compared to shallower planting, but there was no difference between the 1 and 2 cm treatments.
- Seeding rate did not affect yields.

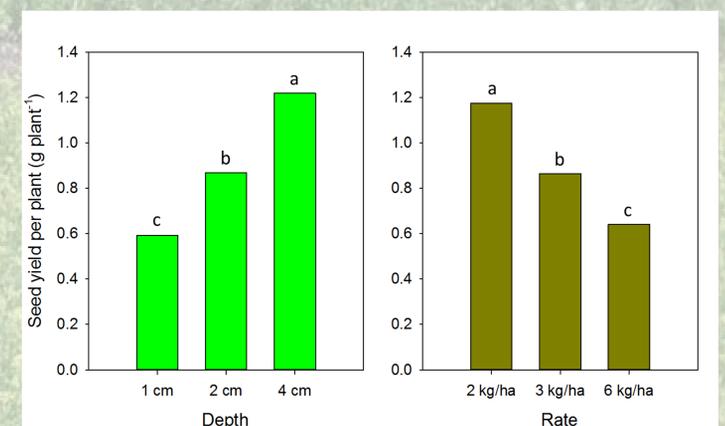


Figure 3. Effect of planting depth and rate on seed yield per plant. Treatments followed by a different letter are significantly different at the $P \leq 0.05$ level.

- Seed per plant increased with planting depth and decreased with increased planting rate.
- Planting depth and rate did not affect harvest index, which ranged from 26 to 29%, nor did they affect seed oil content, which averaged 35% (wt/wt) across treatments and years (data not shown).
- Planting at 4 cm delayed 50% flowering by 2 to 3 days on average compared to the shallower plantings (data not shown).

Summary

- Results indicate that camelina can be planted deeper than previously recommended. Planting to at least 2 cm deep did not reduce yield.
- This can help seed to soil contact and be of benefit for certain soils and environments, especially those prone to large temperature and moisture fluctuations at planting.
- Camelina shows very good yield compensation. However, good stand establishment is necessary for weed suppression.
- Therefore, planting at a rate of 3 kg ha⁻¹ or more is recommended.