



## Higher canola yields when seeded into tall stubble

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Canola yielded 24% higher when seeded into tall stubble, compared to stubble that had been cultivated in the fall. Additionally, canola seeded into tall stubble yielded 16% higher than if seeded into stubble that was left standing until spring, and then cultivated.

On the semi-arid Prairies, low water availability is a significant constraint to canola production. Direct seeding into standing stubble has been commonly adopted by many Prairie farmers, with a key benefit of preserving soil moisture. The objective of this research was to determine the effects of standing wheat stubble of various heights on the in-crop microclimate, and growth and yield of canola. While conducted from 1999 to 2002, the results are still important for today's canola growers.

The field trials were conducted at the Agriculture and Agri-Food Canada, Semiarid Prairie Agricultural Research Centre, Swift Current, Saskatchewan. Wheat stubble was harvested with a header, leaving stubble taller than 12 inches (30 cm). The six stubble management treatments were:

- (1) stubble cut at 12 inches tall in fall and direct seeded in spring;
- (2) stubble cut at 6 inches (15 cm) in fall and direct seeded in spring;
- (3) stubble cut at 12 inches, then cultivated in fall, and seeded in spring;
- (4) stubble cut at 12 inches in fall and direct seeded in spring, but fertilized with an additional 30 lbs N/ac (34 kg/ha)

- (5) stubble cut at 12 inches in fall and cut at 6 inches in spring, and direct seeded;
- (6) stubble cut at 12 inches in fall then cultivated in spring, and seeded.

A tandem disc was used to cultivate the plots, with about one-half of the residue left lying on the soil surface.

Canola was seeded with an air seeder on 9 inch (23 cm) row spacing at 8.5 lbs/ac (9.5 kg/ha). Recommended fertilizer rates were applied.

Soil temperature, wind velocity, solar radiation, and soil water were measured. Grain yield and water use efficiency (WUE) was calculated.

### **More favourable microclimate in taller stubble**

The microclimate in shorter stubble was intermediate between tall and cultivated stubble, so comparisons were only reported between tall and cultivated stubble.

Overall, tall stubble changed the microclimate near the soil surface by reducing wind speed, solar radiation, and soil temperatures throughout the life cycle of canola. Wind speed was highest in cultivated stubble before flowering. Tall stubble reduced wind speeds before flowering by about 77% when measured at 6 inches (15 cm), and 14% at 40 inches (100 cm).

The average daily soil temperature at the 2 inch (5 cm) depth was greater for the cultivated stubble than tall stubble, when measured before and after canola flowering.

For tall stubble, average daily total incoming solar radiation at 3 inches (7.5 cm) above the soil surface was 21% lower before flowering and 38% lower after flowering compared to cultivated stubble.

### **Higher yield with tall stubble**

The highest biomass, grain yield and WUE occurred for canola growing in tall stubble with extra fertilizer. Tall stubble with extra fertilizer increased canola dry matter, grain yield and WUE by about 15% compared to tall stubble without extra N. Tall stubble with extra fertilizer yielded 30 bu/ac (1680 kg/ha) compared to tall stubble at 26 bu/ac (1445 kg/ha). This suggests that to achieve maximum yields in the semiarid prairie, canola seeded into tall standing stubble should be fertilized with rates higher than typically recommended.

For treatments grown without the additional N fertilizer, tall stubble yielded 26 bu/ac , an increase of 16% compared to spring cultivated stubble (22 bu/ac), and also increased WUE by about 11%.

Tall stubble canola (26 bu/ac) also yielded more than canola grown in short fall stubble (21 bu/ac).

Tall stubble increased seed yield of canola by about 24% and WUE by about 19% compared with stubble cultivated in the fall. The fall cultivated treatment yielded 20 bu (1155 kg/ha).

Analysis found that stubble management did not affect crop water use, so the increase in canola grain yield was a result of higher WUE.

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Cutforth, H. W., Angadi, S. V. and McConkey, B. G. 2006. Stubble management and microclimate, yield and water use efficiency of canola grown in the semiarid Canadian prairie. *Can. J. Plant Sci.* 86: 99-107

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