

# Effects of N fertilizer placement, formulation and rate on the agronomic performance in canola under no-tillage in an Orthic Brown Chernozem

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Increasing the efficiency of nitrogen fertilizer uptake by crops improves the agronomic, economic, and environmental value of fertilizer N. Band placement of urea below the soil surface increased recovery of N in plants in both conventional and no-tillage systems. The latter systems require all fertilizers be applied before or during the seeding operation. In order to avoid seedling damage caused by fertilizer, side banding and mid-row banding opener systems have been developed to separate the seed and fertilizer. The objective of this study was to compare the agronomic performance in canola between side banding and mid-row banding N fertilizations and estimate effects of fertilizer formulation and rate in an Orthic Brown Chernozem. This study was a part of a multi-location and multi-crop research program on effects of nitrogen placement on greenhouse gas emissions and agronomic performance. A three-year experiment (2000-2002) was conducted near Swift Current. Seventeen treatments were arranged in a randomized complete block design in four replications with plot size of 3 m × 9.2 m. A canola cultivar (InVigor 2273 in 2000 and Invigor 2663 in 2001 and 2002) was direct seeded into standing stubble using a 10 ft., 4 tank PAMI pneumatic plot seeder configured to apply AA or urea in addition to seed and P requirements. Seed row openers were located at 25 cm (10 in.) spacing using Flexi-Coil Stealth openers for the side banding treatments and Bourgault knives with Bourgault mid-row coulter banders (placed between every second set of knives) for the mid-row banding treatments. On-row packing with V shaped packers was done in all the treatments. Canola was seeded into wheat stubble in 2000, and flax stubble in 2001 and 2002. Each field plot received the same N treatment in consecutive years. The environment had a major impact on the seed yield and biomass production. The overall average yield was 1.6 t ha<sup>-1</sup> in 2000, 0.6 t ha<sup>-1</sup> in 2001 and 1.0 t ha<sup>-1</sup> in 2002. In general, the differences in agronomic performance between side-row and mid-row banding and between urea and anhydrous ammonia were small. In most cases, grain yield and biomass production were linearly and quadratically related to N rate.