# Precision Farming Project

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***Canola yields are affected by year to year variations in growing season conditions, but also by many biotic actors on a field scale basis. A three-year Precision Farming study was conducted in Indian Head, Saskatchewan from 2000 to 2002 to look at the effects of nitrogen fertility, management zones, crop plant population, weeds and diseases on canola yields using a field scale approach. The results from the study demonstrated that yield variability was greatest due to different environmental conditions encountered each year, management zones, diseases and weed pressures. The study highlighted the importance of variable rate fertilization programs and crop monitoring to maximize field profitability.***

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The objective of the project was to collect information on the spatial variability of crop plant populations, weeds and plant diseases during the 2000, 2001 and 2002 growing seasons in order to determine the effect of these biotic factors on the final grain yield of canola as part of a variable rate nitrogen program on the IHARF Precision Farm. The farm had been divided into 8 – 38.5 acre fields using a crop rotation of spring wheat – canola – spring wheat – field pea.

Seeding was done with a 33 foot Flexicoil 5000 series air drill equipped with double shoot stealth openers on 12 inch spacing. A variable rate fertility program for nitrogen was implemented for the wheat and canola fields based on a checker board grid pattern that allowed replication of seven N rates of liquid urea-ammonium nitrate (28-0-0) in each of the management zones: 60, 75, 90, 105, 120, 135 and 150 lbs N/acre. Weeds, plant counts and disease ratings were collected. Fields were harvested with a New Holland TR99 combine equipped with a yield monitor and GPS antenna to create spatial yield maps.

The results from the study demonstrated that yield variability was greatest due to different environmental conditions encountered each year. Differences in yearly precipitation affected the canola yield the most. The second most important variable impacting yield was the effects of the management zones. The study highlighted the importance of variable rate fertilization programs and crop monitoring to maximize field

profitability. Diseases and weed pressures also played an important role in yield variability. The study showed that careful crop monitoring should be done to reduce the negative effects of these two variables.

In 2000, yields were mostly affected by differences in field conditions (43%), nitrogen rates (14%) and weeds (0.1%). The data for years 2001 and 2002 was combined, and showed that 87% of the yield variability in both years could be explained by 11 variables, with year to year differences the most significant, followed by the difference in management zones and sclerotinia disease impacts.

Overall, yields in 2000 were the highest averaging 55 bushels/acre, however 2001 and 2002 were considerably less due to the lack of moisture during the growing season. In 2002, swaths also suffered severe wind damage resulting in dramatic grain loss. Although the most yield improvement from N fertilizer was in 2000, overall the study showed a significant yield difference between each management zone, and was accurate for a gently undulating glacio-lacustrine type of landscape. The study confirmed that the method developed for assigning management units to a field was accurate, robust and consistent from year to year. This method provides an important tool for producers to learn more about the uniformity of their fields and help them be more strategic about field management in identified zones. It could assist them in their soil sampling.

**Scientific Publications**

Basnyat, P., McConkey, B., Lafond, G.P., Moulin, A. and Pelcat, Y. 2004. Optimal time for remote sensing to relate to crop grain yield on the Canadian Prairies. Can. J. Plant Sci. 84:97-103.