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EFFECTS OF CANOLA, WHEAT AND FABA BEAN ON YIELD AND NITROGEN USE EFFICIENCY IN POTATO PRODUCTION SYSTEMS

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- Potato is an important crop in Canada (AAFC, 2015);
- Recent expansion of potato processing plants;
- Saskatchewan has the potential to significantly expand irrigated production.

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Concerns related to potato production :

- Requires more tillage than cereal or oilseed crops;
- Produces little crop residue;
- Requires large amounts of fertilizer

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Objectives:

Evaluate the effect of wheat, canola, and faba bean residue on soil physical, chemical, and biological properties;

Assess the cumulative effects and economic benefits of the entire rotational sequence.

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2016

2017

0, 75, 150, 225 kg N ha^{-1}

2018

0 & Standard recommendation

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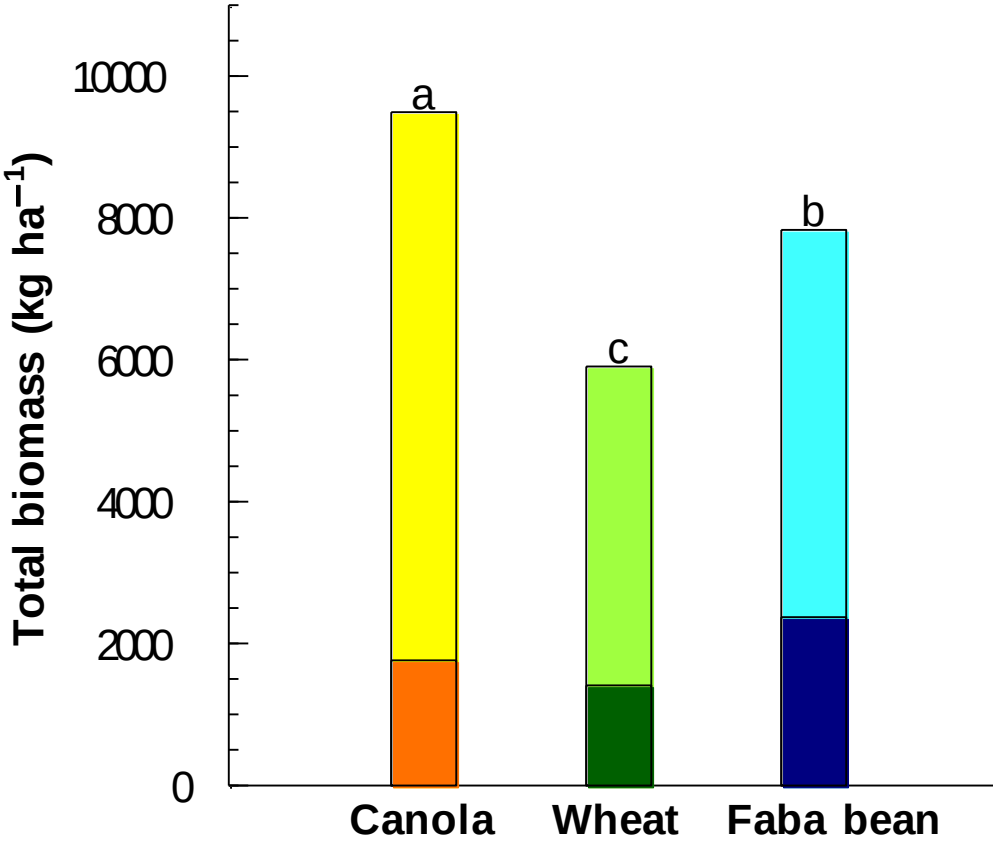
Data 2016 Field crops

- Total biomass
- N_2O emissions



Gan et al., (2009)

Significant differences at α = 0.05 Tukey procedure in total biomass(residue) production between three field crops

Light color is **above-ground residue**
Dark color is **below-ground residue**

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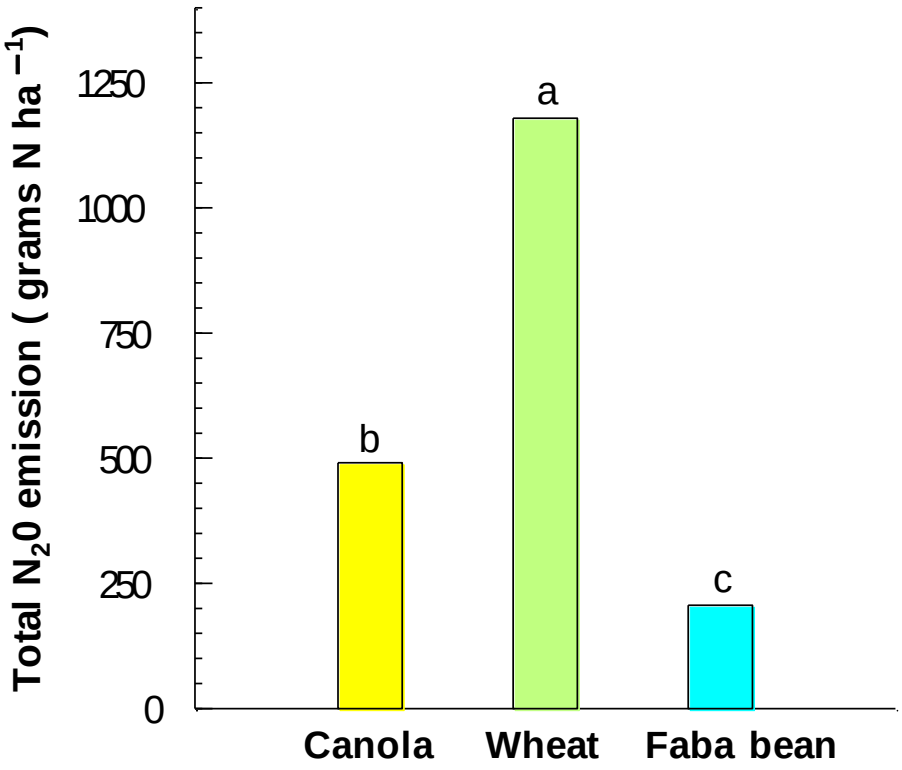
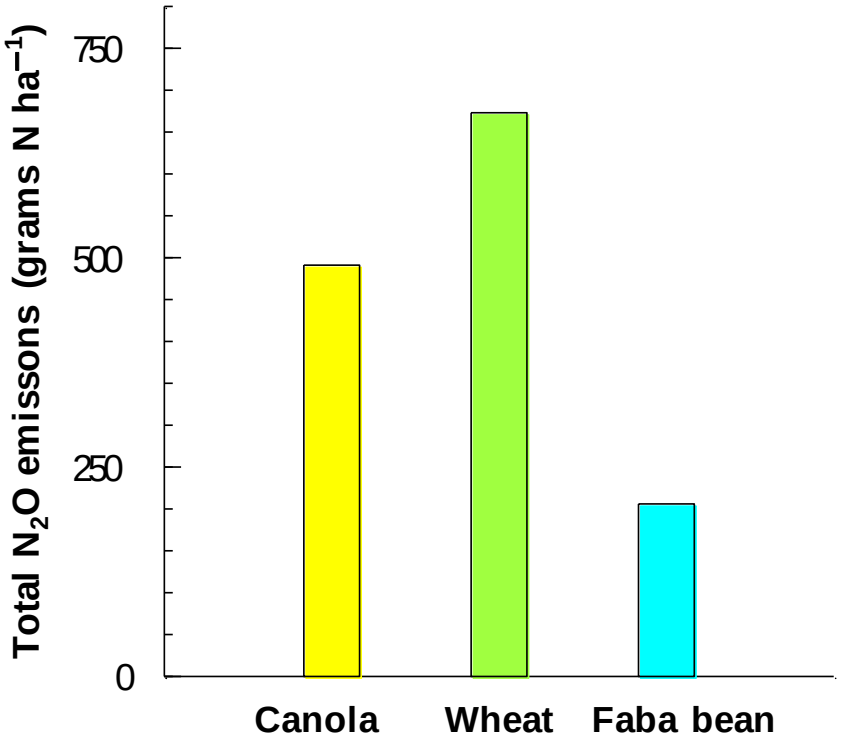
Data 2016 Field crops

- Total biomass
- N_2O emissions



2016 N_20 emission for field crops were significantly different at the α = 0.05 level (Tukey procedure).


Total N_2O emissons (grams N ha^{-1})
750
500
250
0
Canola
Wheat
Faba bean

Crop	Amount fertilized (kg N ha^{-1})	Emission factor (%)	Standard deviation
Canola	160	0.18	0.08
Wheat	165	0.61	0.10
Faba bean	0	nd	- - -

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0, 75, 150, 225 kg N ha^{-1}

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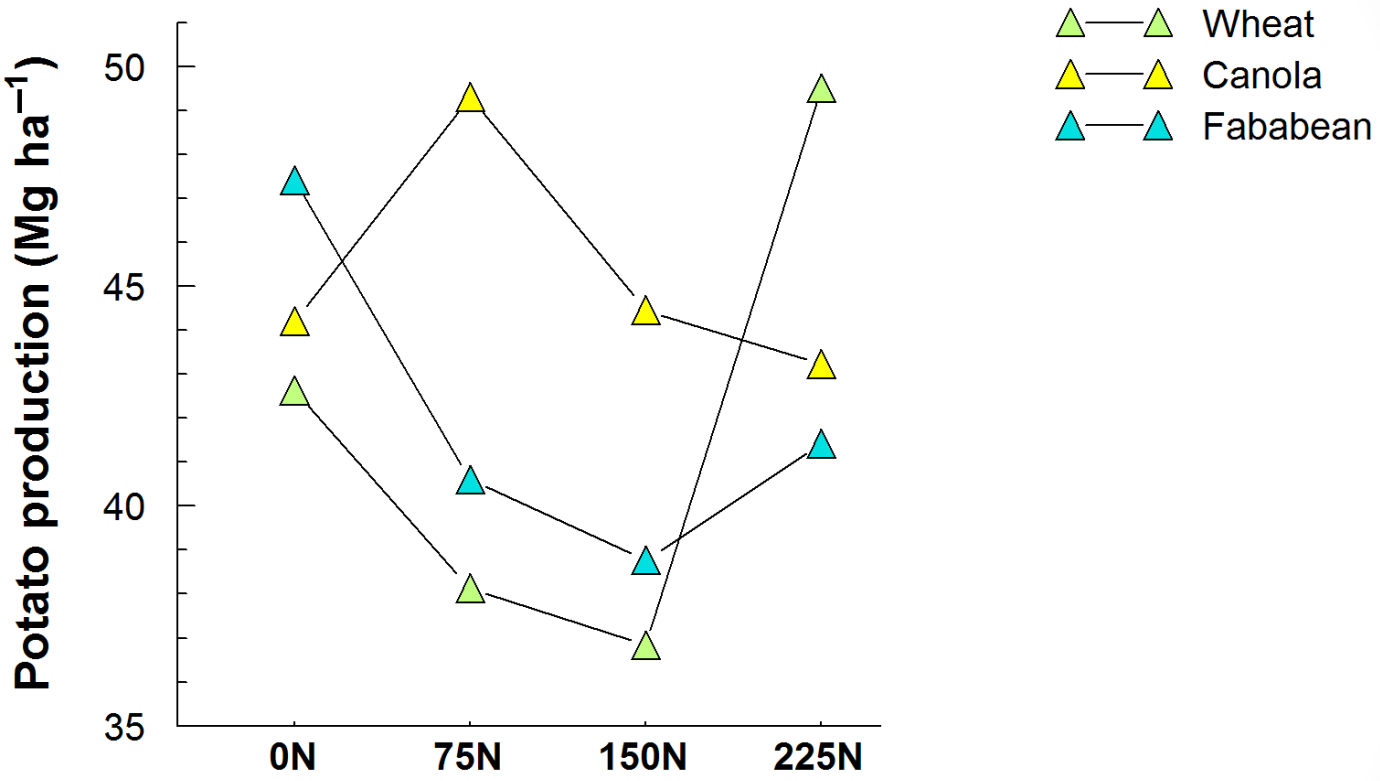
Total Potato yield



Effect of nitrogen fertilizer and previous crop on total potato yield was not significant (P = 0.xxxx).

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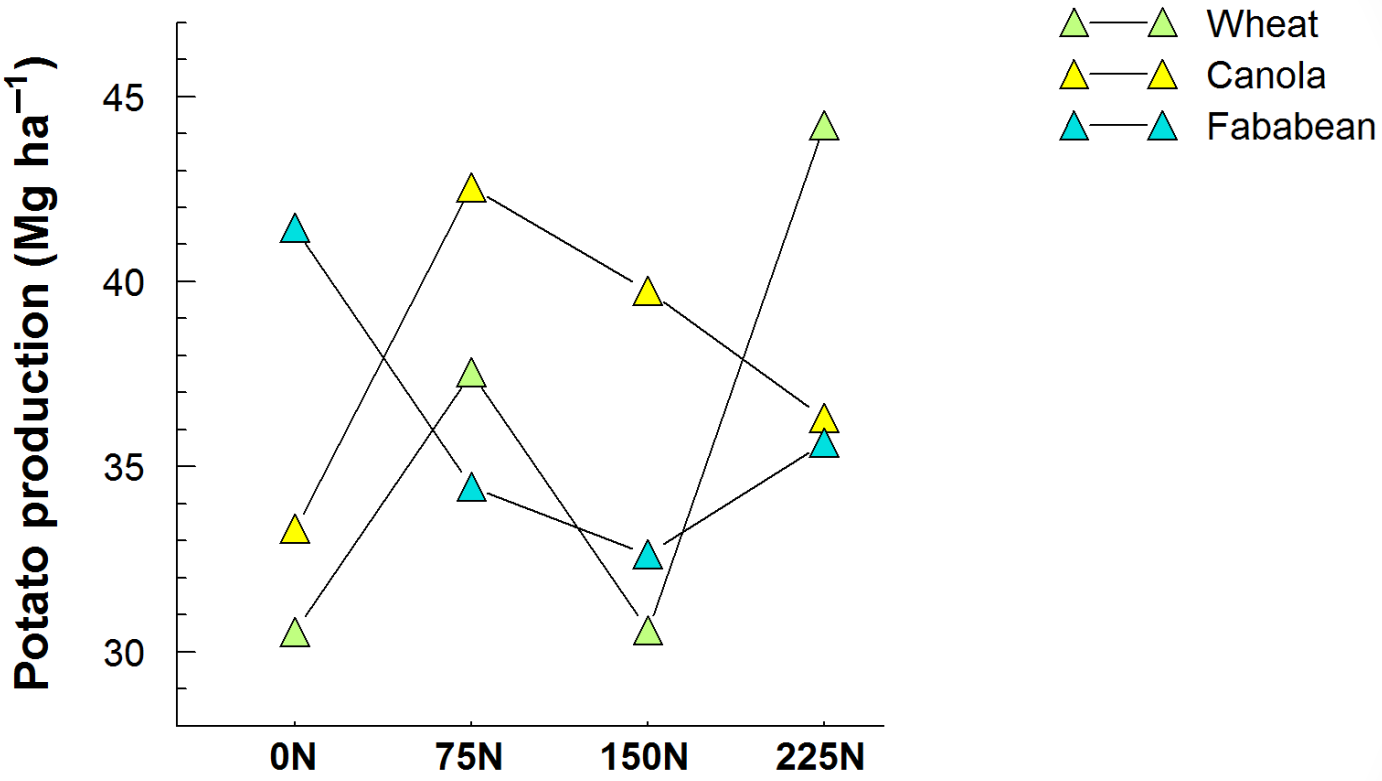
Marketable potato yield



Interaction effect of nitrogen and field crops on marketable (48 – 88 mm) potato yield (*P* = 0.0218).

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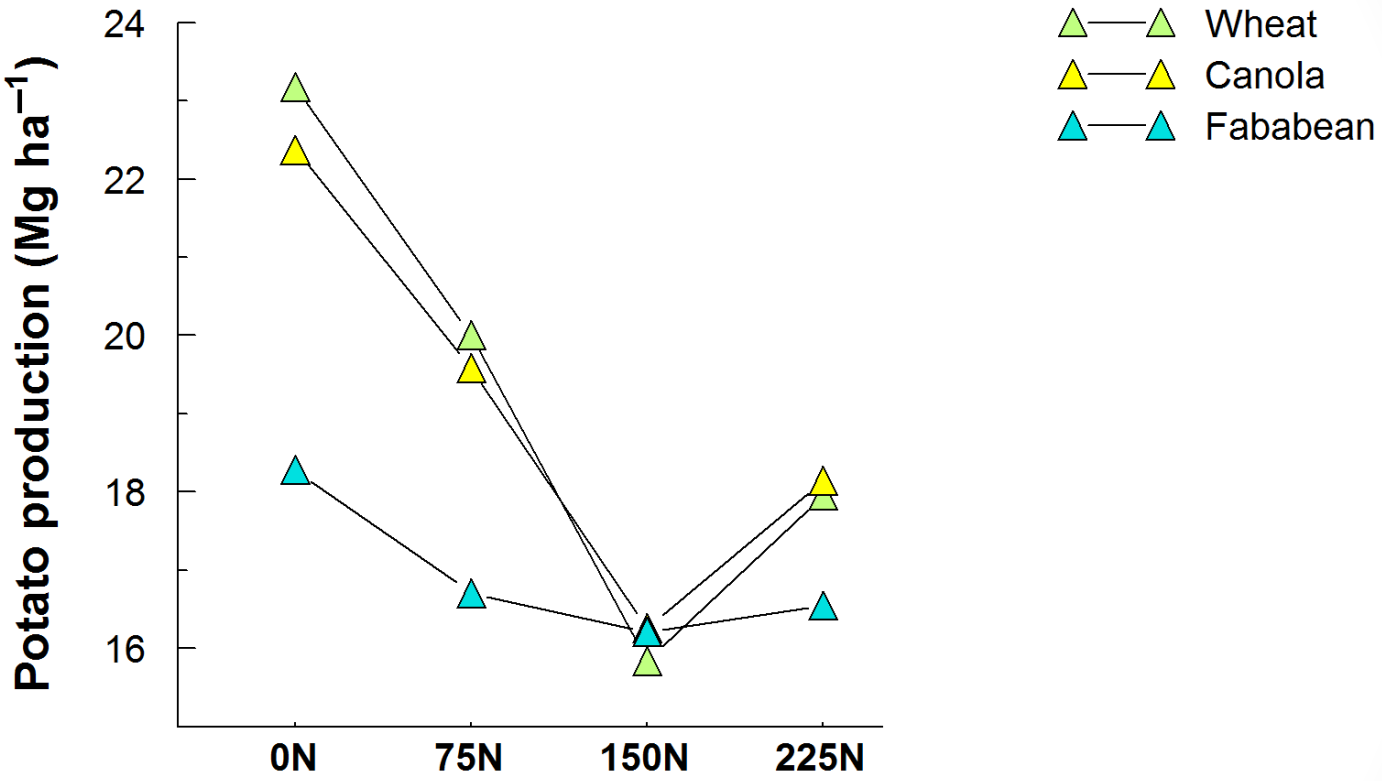
Non-marketable potato yield



Effect of nitrogen fertilizer was significant on non-marketable (<48 mm) potato yield (*P* = 0.0017).

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Conclusions:

First-year main crops

Residue production: Wheat<Faba bean< **Canola**
N20 emissions : **Faba bean**<Canola ≤ Wheat

Second-year Potato nitrogen:

Total yield production: **Fababean**=Canola=Wheat

Third-year Wheat nitrogen 2018

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Agriculture Development Fund

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Thank you !