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Crop Rotation Options for Canola Production in Algoma District

INTRODUCTION:

Canola production in the Algoma District has been relatively limited due to a combination of socio-economic and environmental limitations. However, there are benefits of including canola in northern Ontario crop rotations, including:

- Shorter growing season than soybeans and a preference for cool weather conditions;
- The timing of canola harvest allows growers to seed winter wheat before the harvest of other crops such as soybeans; and
- Existence of herbicide-tolerant canola varieties (e.g. LibertyLink with Invigor or Roundup Ready) that enable more effective weed control.

OBJECTIVES:

- Identify the best crops to grow in Algoma together with Canola;
- Determine the best rotation sequences in a greenhouse mimicking Algoma soil and climatic conditions.

METHODS:

Greenhouse experiments for the selected crops included::

- Alfalfa (*Medicago sativa*)
- Canola (*Brassica napus* – InVigor L150, Bayer)
- Fodder Corn *(Zea mays* – Pioneer 39B90, Roundup Ready)
- Soybean (*Glycine max* – 900Y81, Roundup Ready)
- Spring Wheat *(Triticum sp*)

Plants were grown in pots containing the most commonly farmed soil in northern Ontario in a greenhouse mimicking Algoma climate conditions.

- All possible combinations for two crops sequences were tested: 5 crops x 5 sequences = 25 possibilities
- The best and worst preceding crop(s) were identified by comparing the yield of the target crop grown in a rotation with that of the same crop grown in a monoculture

RESULTS:

Results are summarized in Table 1, below.

- Suitable 4-year rotations based on these experiments were: Canola → Fodder Corn → Soybean → Alfalfa; and Canola → Alfalfa → Fodder Corn → Alfalfa

Table 1: Best and worst crops to grow before target crop, based on greenhouse experiments.

	Alfalfa	Canola	Fodder Corn	Soybean	Spring Wheat
Alfalfa		+20% *	+26%	-16%	+10%
Canola	-32%		+6%	-8%	-19%
Fodder Corn	+30%	+14%		+26%	-19%
Soybean	+27%	+19%	+6%		-9%
Spring Wheat	+16%	+8%	-8%	+18%	

* That is, canola grew 20% more after alfalfa than after canola.

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Canola Production Costs

Canola can be grown successfully in "clean-till" and "no-till" cropping systems. Depending on the available equipment and the growers' preferred management system, both methods will produce acceptable yields. The costs outlined below are for GMO canola (Roundup Ready). Recommended seeding rates range from 3.5 to 5 pounds per acre resulting in approx¬¬imately 300,000 – 450,000 plants per acre (7.5" rows). It is important not to plant seeds too deep, ½" to 1", with soil temperatures near 10 degrees Celsius for fast emergence. Nitrogen demand is very high for canola with recommended application rates between 70 and 120 lbs/acre. Weed control should begin early, targeting weeds that emerge with the crop instead of waiting until later in the growing season. Most growers will only treat once for weeds. White mould, flea beetles and swede midge are some of the pests associated with canola. In severe cases, a grower must be prepared to apply pesticides to reduce crop losses. Canola can be direct combined or swathed and combined with the later providing quicker drying time. The cost of these activities from planting to harvesting can vary depending on equipment, management style and scale of operations.

Table 2: Summary of input costs[1]

Activity	Cost ($/acre)	Comment
Seed	61.85	5 lb/acre –hybrid, treated
Tillage	43.90	Clean till system
Planting	19.05	Conventional seed drill
Fertilizer	96.15	Urea + ammonium sulphate
Herbicide	10.20	Glyphosate
Pesticide	11.50	-
Harvesting	50.40	Direct harvesting
Trucking	15.00	Estimated double than southern Ontario
Other	24.20	Interest, labour, insurance, overhead
Total	**332.25**	

[1] Based on OMAFRA spring canola crop budget sheets

Growing Conditions and Yield

Most soil textures can be suitable for a productive canola crop given appropriate drainage, fertility and acidity. Canola growth is best when fields are well-drained and soils do not become water logged. Canola can tolerate pH levels between 5.5 and 8.3 before yield reductions become serious. The addition of lime can have a positive effect on acidic soils. Nitrogen is the most common limiting nutrient for canola production and should be properly managed for maximum economic returns. Reported yields in northern Ontario are documented annually in variety performance trials and are shown in Table 2. These yields are grown and reported under optimal conditions.

Table 3. Cross section of yields at New Liskeard and Verner crop research stations (lbs/acre)

Rank	Sponsor	Variety	New Liskeard	Verner
Check	Pioneer	45H28	2198	2295
Check	Monsanto	72-55 RR	2332	1818
1	Bayer	5440	2210	2310
6	Canterra	1990	2046	2398
11	La Coop Federee	6060 RR	1860	1759
16	Dow Agro Science	2014 CL	1610	1470

Canola Growers Association

Risk Management

There are a number of variables in any production scenario that can make or break positive economic returns for the grower. Three important factors are identified as input costs, yield and market value. Crop yield can be affected by a number of factors including establishment success, pest and disease losses, soil fertility, weather, weed competition and variety selection. Having a well thought out management system that includes all of these factors is the key to successfully meeting crop yield targets. The price received for your crop will be dependent on fewer variables and include current commodity price, seed quality and end product markets. Generally, canola oilseeds will only be accepted at the market if less than 10% moisture. Buying prices in western Canada currently range from $565 - $580 per tonne ($0.26 /lb). Assuming an average Algoma farmer can yield 1600 lbs/acre, this equates to $416/acre delivered price providing a net margin to the farmer of approximately $86/acre.

The following table describes the sensitivity of net margins for the farmer with changes in yield, purchase price and input costs. When assessing changes in economic variables, the average price/yield/costs are used as noted in the table.

Table 4. Sensitivity of yield, input costs, and purchase price on canola net margins

Risk Factor	Value	Net Margin
Average Yield (lbs/acre)	1600	$86
Increased Yield (+25%)	2000	$190
Decreased Yield (-25%)	1200	$-18
Average Input Cost ($/acre)	$330	$86
Increased Input Cost (+25%)	$412	$4
Decreased Input Cost (-25%)	$248	$168
Average Purchase Price ($/tonne)	$570	$86
Increased Purchase Price (+15%)	$659	$150
Decreased Purchase Price (-15%)	$487	$24

RAIN calculations based on OMAFRA and Canola Growers Association data.