

Canadian Flax Straw: Present and Future End Use Options

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by

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Flax in Canada

Since the 1950s, all flax grown in Canada has been oilseed flax (i.e., linseed) with the exception of a few experimental fiber flax plots and fields in recent years



Flax in Canada

In the last decade the harvested area of Canadian flax has ranged from a low of 591,000 hectares (ha) to a high of 874,000 ha



Crop Year	Metric Units			English Units		
	Harvested Area (kha)	Seed Yield t/ha	Seed Production kt	Harvested Area (kac)	Seed Yield Bus/ac	Seed Production kt
97/98	737	1.40	1,029	1820	22	1134
98/99	874	1.24	1,081	2,159	20	1,192
99/00	777	1.32	1,022	1,919	21	1,127
00/01	591	1.17	693	1,460	19	764
01/02	662	1.08	715	1,635	17	788
02/03	633	1.07	670	1,564	17	739
03/04	728	1.04	754	1,798	17	831
04/05	528	0.98	517	1,304	16	570
05/06	803	1.35	1,082	1,983	22	1,193
06/07	829	1.16	959	2,048	18	1,057
10 AVE	716	1.18	852	1,769	19	940

Canada: Flaxseed Area, Yield and Production of Seed

SOURCE:

Statistics Canada, Cereals and Oilseeds Review Series, Cat. No. 22-007

In addition to its own internal funding, Biolin Research Inc. has been grateful for funding received from entities like:

- Saskatchewan Flax Development Commission
- Agriculture and Agri-Food Canada
- Saskatchewan Ministry of Agriculture
- Environment Canada

and/or departments within these entities

This funding has allowed a wide range of research to be carried out to find ways to add more value to flax straw

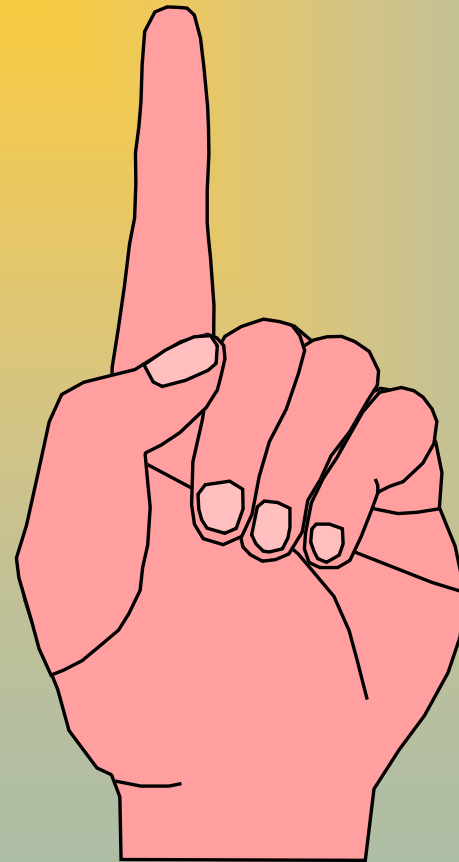


Some Lessons Learned.....

- Different types of straw are presently produced and/or could be produced in the future **IF non-traditional harvest and collection methods and better agronomic practices were applied in Canada**

Some Lessons Learned.....

Fiber
production
could be
increased
significantly
from what
presently exists
even with the
same land base!



Problems with Traditional Canadian Linseed Production.....



Weeds
or
Plastic
Mixed
With
Unretted
Straw



Problems with
Traditional
Canadian
Linseed
Production.....

Lodged
Crops

Problems with Traditional Canadian Linseed Production.....



Badly broken,
unretted straw
with seed holders
mixed in the
straw

Problems with Traditional Canadian Linseed Production.....



Seed
Holders

Problems with Traditional Canadian Linseed Production.....



“the
come
and take
my
garbage
away
attitude”

Potential Volume of Canadian Flax Fiber based on Traditional Harvest Methods

Type of Flax Field	Approx. Portion of fields	Approx. Area Kha	Salvageable Straw yield t/ha	Salvageable Straw Kt	Potential Fiber Kt	Potential Shive Kt
Too weedy, too short, too far, etc	20%	134	-	-	-	-
Less than knee height	50%	336	1.00	336	61	262
More than knee height	30%	202	1.50	303	55	236
Total		672		639	116	498

SOURCE: Author's estimates

Notes: 1) Traditional Harvest Methods = swath or straight cut; drop straw in windrows, bale windrows

2) Straw and fiber production numbers are based on a 10-year average of 672,000 ha and an estimated fiber content of 18%; shive content estimated at 78% and dust at 4% although actual content will vary considerably depending on the processing method used

Better Harvest Methods

Type of Flax Field	Extra Straw Expected	Approx. Portion of fields	Approx Area Kha	Salvageable Straw yields t/ha	Salvageable Straw Kt	Potential Fiber Kt	Potential Shive Kt
Too weedy, too short, too far, etc	0%	20%	134	-	-	-	-
Less than knee height	100%	50%	336	2.00	672	121	524
More than knee height	50%	30%	202	2.25	455	82	355
Total			672		1,127	203	879

SOURCE: Author's Estimates

Notes: Better Harvest Method = straight cut high or use stripper header; roll or cut straw, rake and bale

Better Agronomic Practices

Type of Flax Field	Extra Straw Expected	Approx Portion of ields	Approx Area Kha	Salvageable Straw yield t/ha	Salvageable Straw Kt	Potential Fiber Kt	Potential Shive Kt
Too weedy, too short, too far, etc	0%	10%	67	-	-	-	-
Less than knee height	50%	30%	202	1.50	303	55	236
More than knee height	50%	60%	403	2.25	907	163	707
Total			672		1,210	218	943

SOURCE: Author's Estimates

Notes: Better Agronomic Practices = using higher seeding rates, better depth control, wider seed spread and taller, higher fiber content oilseed varieties BUT Traditional Harvest Methods

Better Harvest AND Agronomic Practices

Type of Flax Field	Extra Straw Expected	Approx. Portion of fields	Approx Area Kha	Salvageable Straw yield t/ha	Salvageable Straw Kt	Potential Fiber Kt	Potential Shive Kt
Too weedy, too short, too far, etc	0%	10%	67	-	-	-	-
Less than knee height	300%	30%	202	3.00	606	109	473
More than knee height	225%	60%	403	3.38	1,362	245	1,062
Total			672		1,968	354	1,535

SOURCE: Author's Estimates

Notes: Better Agronomic Practices = using higher seeding rates, better depth control and seed spread and taller,
higher fiber content oilseed varieties AND Better Harvest Methods

Potential FIRST STAGE Value of Canadian Fiber and Shive

Scenario	Potential Fiber Kt	Volume Shive Kt	Average Fiber \$/t	Price Shive \$/t	Gross Fiber \$M	Value Shive \$M	Total \$M
Present Situation ¹	40	80	450	2	18.0	0.2	18.2
Potential for the Present Situation	116	498	450	2	52.2	1.0	53.2
Better Harvest Methods	203	879	800	50	162.4	44.0	206.4
Better Agronomic Practices	218	943	800	50	174.4	47.2	221.6
Better Harvest AND Agronomic Practices	354	1,535	800	50	283.2	76.8	360.0

SOURCE: Author's estimates and calculations

¹ The present situation is the approximate situation now with one large producer of hammer milled unretted straw; the Potential for the Present Situation show the approximate situation if all the existing salvageable straw were hammer milled in a similar manner.

In other words....

- By changing agronomic and harvest practices on the same area, we could go from roughly \$20M to \$360M in straw value
- Secondary processing could double or triple this value
- Increased area planted to flax would also increase this value
- no value put on possible genetic improvements

Some things that would have to change...

- adopt Better Management Practices
to improve straw quantity and
quality









Better Management Practices.....

- Methods won't be adopted by farmers if the cost of adopting them is greater than the benefit
- Such practices (with the possible exception of greatly increased seeding rates) will not only increase the straw yield per hectare; they also tend to increase the seed yield per hectare

Better Management Practices.....

- Machinery that enables better depth control and wider seed spread within a row will also improve the emergence and weed competitiveness of other non-flax crops and hence their yield
- Cost of newer machinery could be shared by a number of crops besides flax.

Better Management Practices.....

- Some oilseed varieties have elevated levels of fiber content without sacrificing seed yield
- The seed of fiber enhanced oilseed varieties (and hence the marginal cost to adopt these fiber enhanced varieties) is no greater than a non-enhanced variety

BUT!!!

- Typical seeding rates presently used with oilseed flax in Canada are 30 to 40 kg/ha
- Increasing seeding rates above this level produce little or no increase in seed or straw yields if there is no change made to row spacing

However....

- Increasing seeding rates to 60 or even 80 kg/ha for oilseed flax will significantly increase straw yield and maintain or slightly increase seed yield if
 - row spacing is narrowed below 30 cm,
 - the width of the seed spread is increased above 5 cm in the row, and
 - consistency of shallow seeding into moisture is improved

However....

- All of these requirements are possible by using a second generation seeding implement (e.g., an air drill) with modified row spacing and seed boots
- Trash can still be cleared and the same seeding implement can be used for other crops with positive results (e.g., better weed control because of denser plant stands)

However....

- The maximum benefits from seeding oilseed flax will, of course, come if the straw is treated so that the value of fiber and shive produced from the straw is maximized.
- This, in turn, is related to the harvest and post harvest methods that are used.

Prices, Markets and Gross Values

- There are many types of flax straw, fiber and shive and hence a very wide range of prices
- Prices are influenced not only by quality attributes but also by:
 - distance to markets,
 - size of shipments,
 - consistency of product within a shipment, and
 - regularity of shipments

Market Possibilities.....

- **Coarse tow**
 - partly retted; 20%+ shive
- \$300 - 500/t
- used in
 - specialty pulps and papers
 - low end composites
 - some geotextiles
- **STABLE** market demand

Market Possibilities.....

- **Medium tow**
 - retted; < 20% shive
- \$400 - 900/t
- used in
 - specialty pulps and papers
 - medium end composites
 - insulation
 - lower end textiles
- **GROWING** market demand

Market Possibilities.....

- **Fine tow**
 - retted; < 10%+ shive
- \$800 - 1,500/t
- used in
 - medium composites
 - medium end textiles
 - raw material for cottonized fiber
- **GROWING** market volume

Market Possibilities.....

- **Cottonized fiber**

- retted; < 5%+ shive;
- similar to cotton in dimensions

- \$1,400 - 4,000/t

- used in

- pure or blended yarns in medium and high end textiles to enhance properties
- high end composites
- **GROWING** market volume

Market Possibilities.....

- **Shive**

- various sizes
- various amounts of fiber and dust contamination

- \$0 - 300/t

- used in

- biofuel
- animal bedding
- mulch
- plastic composite reinforcing fillers

Given the results of research plot, field and processing trials:

- very significant physical increases in fiber and shive production are possible in Canada
- very significant increases in the quality and value of straw, fiber and shive are possible

Whether it will actually happen or not will depend on:

- The ability to get sufficient quantities of quality straw to meet the requirements of the first couple processing plants
- the ability of markets to absorb the fiber and shive at the price levels mentioned previously

Whether it will actually happen or not will depend on:

- the relative profitability of oilseed flax production relative to other crops
- the ability to produce retted flax straw either in the field or by non-traditional methods

Whether it will actually happen or not will depend on:

- the development of more cost effective technology to process flax straw, fiber and shive; and
- the ability to manage field processing and storage facilities to produce large, commercially attractive lots of consistent fiber and shive

Conclusions

- Canada has a very large potential to be a big supplier of various types of flax fiber and shive
- There are a number of challenges and constraints to overcome but on-going funding of research and commercialization efforts by both the private and public sectors should overcome these challenges

The question is no longer

will

they take place; the question

is

when

will they take place.

Any Questions?

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