

“Growing For the Market”: Quality Feedstock for Fiber

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by

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Inc.**



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- Flax 2015 (\$)
- AAFC - Swift Current Research Station
- Farmer/Cooperants
- Biolin Research staff

QUALITY

- “Is in the eye of the beholder”
- Refers to a property or characteristic that an end user will pay for
- Is high fiber % in straw “high quality”?
 - *cattle operation would not pay extra;*
 - *insulation maker would pay extra*

BIOMASS QUALITY

- Maximum YIELD and QUALITY potential is made in the field
- Processing systems can seldom “un-do” or compensate for low yield or poor quality biomass produced in the field (e.g., we cannot stretch fibers once they are cut)

Flax Straw

- Without more attention to quality we can't add much value to flax straw
- Without price incentives we will not get much improvement in straw quality

Flax Straw

- Our processed products must be high enough in value that everyone can receive a net benefit
- Will we get the consistent quantity and quality we need, if we assume we can get farmers' “waste” for free”?

QUALITY vs PROFITS

- The value of a quality attribute must be higher than the cost to produce that attribute
 - *finer fibers vs coarse fibers; (enzyme retting, field retting or no retting)*
 - *very clean fibers vs roughly cleaned fibers*
 - *long fibers vs short fibers*

QUALITY vs PRICES

- Price premiums for different levels of quality characteristic depend on how easy it is to get that property from an alternative source material

Examples

- Price for flax straw or shive “pellets”
 - *limited by price paid for coal or sawdust pellets*
- Price for flax fiber for plastic composites
 - *limited by prices paid for fibers from glass, jute, sisal, hemp*

Point to take Home

For certain end uses,
flax can physically be used

BUT

cannot compete cost wise,
with existing substitutes

UNLESS

we find ways to reduce cost of producing
the required properties in flax

Example

- How to reduce cost of getting longer, finer, cleaner fibers from flax straw to allow it to be more cost competitive with other fibers?
 - *More powerful hammer mill?*
 - *Enzyme retting?*
 - *More effective field operations to get faster, more consistent field retting?*

Example

- What are we doing to try to improve quality of flax straw?
 - Trying new agronomic practices
 - Enzyme retting

Stripper Header in Flax: Wright Farm



Final Straw
Height:
24 – 26”



Gleaner
- Hired
Operator



Stripper

Current Straw Systems...

- Add-ons following grain harvest
- Quality of chaff and straw is managed after the seed is harvested
- High cost systems because of the existing combine technology



...Harvest System Challenges

c. Combine type: Rotary vs. Conventional Combines:

- **Rotary combine: grinding action leaves less “baleable” straw.**
- **Rotary combine: grinding action may either enhance or worsen further processing.**
- **Conventional combines: less harvest capacity and increasingly difficult to purchase.**

30' Header - Rotary



20' Header - Conventional



Using a Stripper Header - 2006



Flax Straw Rolling



Raking Rolled Retted Straw



Baling Raked Straw



APF Flax Initiative

- Biolin Research & Thompson Farms
 - Fibre for composites, textiles & other material uses.
 - Harvest impact on retting and fibre quality.



Cutting
Treatments



Improving Retting

Packing Treatments



Source: Mark Stumborg, Flax Straw Alternatives Workshop - July 6th & 7th, 2006

Harvest Mechanization Trials...

- Large scale demonstrations: Straight cut vs. Stripper technology
- Measure
 - *Straw yield*
 - *Straw quality*
 - *Energy, time, and machine depreciation impacts*
 - *Impact on following crop if not harvested*

Harvest Mechanization Trials...

- Agronomic systems for retting:
 - *Early stripper harvest based upon different seeding dates*
 - *Impact of harvest date and straw cutting on fiber content*
 - *Development of a straw clipper to clip of seed holders and cut straw at 7.5cm*
 - *Use of trap strips spaced at 8 - 9 m for wind and snow management*

Harvest Mechanization Trials...

- Agronomic systems for retting.....
 - *Packing of cut straw into soil using flexible packer similar to crowfoot in effect*
 - *Raking of straw when retting is complete with rake designed to turn all the straw. This may be done in fall or spring, depending on weather and time*
 - *Baling and removal when dry*

Harvest Mechanization Trials...

- Development of optimized harvester:
 - Takes advantage of:
 - Energy savings of the stripper header;
 - Existing equipment (forage equipment);
 - Producer benefits;
 - Lower harvest cost
 - earlier harvest
 - Reduced time/labor needs
 - Improved seed quality
 - Biomass options

Harvest Mechanization Plans...

- Development of optimized harvester will lead to Producer benefits:
 - *lower harvest cost*
 - *earlier harvest*
 - *reduced time/labor needs*
 - *improved seed quality*
 - *biomass options*

Harvest Mechanization Plans...

- Includes:
 - Evaluation of fibre for pulp and structural uses
 - Evaluation of shives for thermal, physical, and biological processes
 - Industrial cooperators
 - NGOs
 - Federal partners

Traditional Flax Crop Management

| | |
|-----------------------------|--------------------|
| • Seed: | <u>\$/ac</u> |
| – Sales (20 bus @ \$7.50) | 150 |
| – Variable costs | <u><100></u> |
| – Gross Margin | 50 |
| • Straw: | |
| – Sales (none) | 0 |
| – Variable costs | <u><5></u> |
| – Gross Margin | <5> |
| – TOTAL Gross Margin | 45 |

“Better Management Practices”

Flax

| | |
|--|--------------------|
| • Seed: | <u>\$/ac</u> |
| – Sales (25 bus @ \$7.50) | 188 |
| – Variable costs (extra seed, seeding cost, herbicide) | <u><125></u> |
| – Gross Margin | 63 |
| • Straw: | |
| – Sales (1 tonne @\$60) | 60 |
| – Variable costs | <u><30></u> |
| – Gross Margin | 30 |
| – TOTAL Gross Margin | 93 |

What Should we Aim for?

- Traditional Flax
- Crop Management \$45/ac
- “Better Management Practices” Flax \$93/ac

Better Quality Straw will also:

- Make it more profitable to set up primary and secondary processing plants
- Create new sources of wealth in rural areas
- Create new jobs
- Allow profitable, consistent production of “greener” products for consumers

Take Home Message

- Improving management practices for seed yield will also generally improve straw yield and quality
- Plant
 - shallow (but in moisture)!
 - even depth!
 - spread seed out!

Any Questions?

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