The Future of Flax: Priority Setting for the Next Agriculture Policy Framework

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We want to hear from you! Tell us what you think are the important areas we should focus our research efforts to increase yields and keep flax on farms. Visit https://www.surveymonkey.com/r/MAC2016FlaxSurvey or fill out the hard copy form below.

INTRODUCTION

Flax is an important crop for improving or maintaining on-farm diversity and sustainability in Manitoba. However, flax has not kept pace with yield improvements of most major crops in western Canada (Table 1). Although breeding has been an important means to develop various traits in flax, it has not been highly effective in increasing commercial yield. Data obtained from the Provincial Seed Guides indicate that over the last 30 years, breeding has added 1 extra bushel/acre every 10 years. The result is a decline of flax acres in Manitoba over the last 30 years (Fig. 1).

It is critical to identify the factors that have caused Manitoba producers to dramatically reduce their flax production, and ultimately identify the gaps that exist in current agronomic research. This paper highlights potential issues that may be contributing to low and unstable flax yields.

Table 1: Total area of flax planted, 1992–2016

<table>
<thead>
<tr>
<th>Year</th>
<th>Total flax acres-planted</th>
</tr>
</thead>
<tbody>
<tr>
<td>1992</td>
<td>1,000,000</td>
</tr>
<tr>
<td>2002</td>
<td>1,200,000</td>
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<tr>
<td>2012</td>
<td>1,400,000</td>
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EARLY SEASON ESTABLISHMENT

Target Seeding Rates and Plant Establishment

There has been significant amount of research into seeding rates for flax, which shows that a plant population of 30-40 plants/ft² should be targeted (Lafond et al. 2008). To achieve that, a 40-50 lb/acre seeding rate which assumes 40-50% emergence mortality. Seed is one of the highest costs in production, warranting investigation into how to reduce seed mortality.

Ideally, flax should be seeded between the 1st week of May and the 3rd week of May. Manitoba yield data indicates a 20% yield loss when flax is seeded in the first week of June (Fig. 2). However, flax is often seeded last on farms.

Iron/ Zinc Deficient Chlorosis

A frequent occurrence in Manitoba flax and soybean fields is the appearance of irregular patterns of chlorosis (yellowing of flax leaves) observed under wet soil conditions. Under severe conditions, this can result in plant stunting, delayed maturity and yield loss (Gubbels et al. 1994). Iron chlorosis may be contributed by:

1. Cool, wet growing conditions and saturated soils.
2. Calcareous (high levels of carbonates) soils common in Manitoba.
3. Compacted or saline soils.

Under these conditions, the iron ion is converted to a less plant available form and other minerals are more plant available and compete for uptake. AC Emerson is a flax variety that has excellent tolerance and recovery to iron chlorosis. However, although this variety was registered in 1994, seed is not available.

PEST MANAGEMENT

Weed Management

Poor weed control can cause significant yield loss in flax (Fig. 3). Research has shown 30 – 63% yield reductions from competition with weeds (Friesen et al. 1986, Wall and Smith 2000). To consistently increase flax yields, improvements in weed management are needed.

i. Need to screen new herbicides options and various tank mixes on flax.
ii. Need a new herbicide group for flax to control Group 1 resistant wild cat and other difficult to control weeds like cleavers.
iii. Need to determine effects of integrated weed management of flax.
iv. Need to determine the critical weed free period of flax.

Disease Management

Pasco is the most widespread disease for flax on the Prairies. Year after year, provincial disease surveys in Manitoba and Saskatchewan have found pasco in close to 100% of surveyed fields. Cultural management practices like crop rotation, seeding early, good weed management and adequate seeding rates are important for managing pasco.

There are two fungicides registered for pasco control: Headline EC and Pfixor. Research has shown both products have a significant yield increase and lodging resistance in the presence of the disease (Fig. 4). Recently published research by Grant et al. (2016) also demonstrated an interaction between nitrogen fertilizer rates, sources, pasco severity and yield that warrants further investigation. Preliminary work is underway towards the ultimate objective of breeding pasco resistance into Canadian flax cultivars.

HARVEST MANAGEMENT

Most of our understanding on flax harvesting comes from research completed in the early 1990s. However, harvest management is increasingly becoming an issue as changing weather creates less than optimal harvest conditions. There is need to investigate Best Management Practices for managing flax harvest.

Harvest Timing

Flax requires 90 – 125 days to mature depending on location, climate, variety and production practices. Anecdotal evidence shows that flax seeded in early May reaches maturity sooner than flax seeded in late May (Fig. 4). While research has shown that excess nitrogen can delay maturity in flax (Nutall and Malhi 1991), higher seeding rates may also accelerate maturity (Lafond et al. 2002). How can we manage these factors and interactions to get flax in the bin sooner?

Ease of Harvest

Stem wrapping on header reels is a major source of headaches for flax growers. Desiccants and pre-harvest herbicides can sometimes facilitate stem dry down. Swathing can do a good job of drying down stems, but it increases the risk of harvest losses by high winds. Some headers may be better at combing flax than others but no research of that kind has been conducted to date.

Straw Management

The primary method of straw management by most flax growers is to burn. With more of the populations becoming urban dwellers and a potential Carbon Tax, burning is less than desirable. Certain varieties are shorter than others (Fig. 5) which may lessen the amount of residue to manage, although taller varieties may provide more vigorous weed control. However, the tough fibrous straw is not conducive to chopping under typical management practices. Future research should look at reducing stem fibre of flax cultivars.

LITERATURE CITED


Figure 1. Flax Acres in Canadian Prairie Provinces (1992-2016)

Figure 2. Seeding Date Effect on Crop Yields (1989-2008)

Figure 3. Flax with WWM (left) and without WWM (right)

Figure 4. Flax seeded May 20th, 2016 (left) and seeded May 30th, 2015 (right) showing maturity difference.

Figure 5. Height difference at Prairie Grande (left) and CDC Soral (right).

Figure 6. Three years of yield and Oil content of iCentaRapeseed.

Figure 7. Three years of yield and Oil content of iCentaRapeseed.