



RESEARCH FUELS FUTURE OPPORTUNITIES FOR OUR INDUSTRY

An overview of our current research investments

Wayne Thompson, Executive Director



Often the first question I get asked is, “what is new in flax?” Not a complicated question, but it can be a complicated answer.

At SaskFlax we are currently focused on investing in research that will help grow the future of our industry. Our top priority is agronomy research that will update our knowledge of best practices and continually inform your current practices around growing flax.

For example, we just received the results from the first year of an extensive nitrogen and phosphorus research project, coordinated and administered through the Indian Head Agricultural Research Foundation (IHARF). The data from the first year looks good and we anticipate that after a couple more growing seasons there should be some useful information for flax producers.

Last year, IHARF also carried out an Agricultural Demonstration of Practices and Technologies (ADOPT)-funded project and you can see a summary of this research on Pg. 3-4.

SaskFlax also participates in the Saskatchewan Ministry of Agriculture – Agriculture Development

Fund (ADF) process and along with producer organizations like the Western Grains Research Foundation, we have funded research through the University of Saskatchewan’s Crop Development Centre looking at rust resistant genetics in flax and the development of northern adapted traits for flax. This research will lead to new and improved flax varieties for producers.

We also fund and support research in areas beyond agronomy. There is growing consumer interest in the relationship between flax and human health, which is why SaskFlax supports research by Dr. Grant Pierce of the University of Manitoba (for more information, see Dr. Pierce’s recent Market Prospects interview at www.marketprospects.usask.ca). About a year ago, SaskFlax also supported a study looking at the potential benefits of flax for people suffering from multiple sclerosis. This exciting new research yielded such encouraging early results that we decided to fund a new five-year study on the topic, led by Dr. Adil Nazarali of the University of Saskatchewan. For more information on this, flip to Pg. 5.

As consumer interest in the health benefits of flax grows around the globe, so too do our market development opportunities. In February we participated in an ingredient mission to Mexico, organized by the Saskatchewan Trade and Export Partnership. Building on previous trade missions to Mexico, this tour was an opportunity to promote flax consumption in food in Mexico. We saw firsthand that interest in flax is on the upward swing throughout the country; food distributors are looking to purchase more Canadian flax and food manufacturers are looking for information about using flax in their products and promoting the health benefits to consumers. By participating in these types of market development opportunities, SaskFlax expects to see growth in this and other growing markets such as China and South Korea, where we know consumers are already thinking about flax more often and that Canadian flax is regarded for its quality.

Finally, it’s important to us to get your input on our research investments. Last year we asked for your input into the agronomy topics that are most important to you. Flip to Pg. 7 for a summary of your responses. This information will guide SaskFlax in deciding what research is needed for flax production and what research will go into our proposal for Agriculture and Agri-Food Canada’s next agriculture policy framework, which is currently being developed.

As you think about your planting intentions for the spring of 2017 I hope flax is a consideration. Remember, the future of flax is bright.

2017 FIELD DAYS

Western Applied Research Corporation (WARC)

Wednesday, July 12
Scott Research Farm, Scott, SK

Wheatland Conservation Area (WCA)

Thursday, July 13
WCA Research Farm, Swift Current, SK

Irrigation Crop Diversification Corporation (ICDC)

Thursday, July 13
Outlook Research Farm,
Outlook, SK

East Central Research Farm (ECRF)

Thursday, July 13
ECRF Farm, Yorkton, SK

Indian Head Crop Management Day

Tuesday, July 18
Indian Head Research Farm,
Indian Head, SK

South East Research Farm (SERF)

Wednesday, July 19
Redvers, SK

InnoTech Alberta

Thursday, July 20
Vergreville, AB

Northeast Agriculture Research Foundation (NARF) & Agriculture and Agri-Food Canada (AAFC)

Wednesday, July 26
Melfort Research Farm,
Melfort, SK

FALL 2016 ELECTION RESULTS



“IT WILL BE A PLEASURE FOR THE BOARD TO CONTINUE WORKING WITH NANCY, SHANE AND GREG.”

Director. “There is a lot of work to be done for flax producers and this Board will continue that work in research and market development.”

Nancy, Shane and Greg will sit on the board for a four-year term.

SaskFlax also thanks Patricia Lung from Humboldt for running in the election.

The next call for nomination for directors will be in 2018. SaskFlax thanks all the flax producers that voted.

At the annual general meeting in January, SaskFlax officially announced the results of its fall elections, which were held to fill three Director roles on the SaskFlax Board.

The successful candidates were Nancy Johns from Zelma, Shane Stokke from Watrous, and Greg Sundquist from Watrous.

All three of these candidates were re-elected after having served a previous term on the Board and they join current Directors Erwin Hanley from Regina, Jordon Hillier from Southey, and Dave Sefton from Broadview.

“It will be a pleasure for the board to continue working with Nancy, Shane and Greg,” says Erwin Hanley, SaskFlax

NEW PROVINCIAL SPECIALIST, OILSEED CROPS, PASSIONATE ABOUT PLANT OILS

An introduction to Matthew Bernard

In October of last year, the Saskatchewan Ministry of Agriculture welcomed Matthew Bernard into the role of Provincial Specialist, Oilseed Crops.

Matthew is a farm boy from Trossachs, Saskatchewan. His previous roles in private industry involved research and development in both crop protection and breeding.

He received a Bachelor's of Science degree and a Master's of Science degree from the University of Saskatchewan in plant biotechnology, where his Master's thesis research investigated the molecular events underlying the biosynthesis of omega fatty acids (the "healthy oils") in oat seed.

Since deciding to pursue post-secondary studies, Matthew's driving motivation has remained the same –exploring the potential of plant oils for both food and industrial applications to improve health and enhance our quality of life.

Matthew is excited to start tackling industry challenges by bringing agriculture, science and health industries together in this role. As Regina is close to home, he will also be able to get out to the field regularly and maintain a strong connection with the family farm.



Matthew Bernard is the new Provincial Specialist, Oilseed Crops, with the Saskatchewan Ministry of Agriculture. He is passionate about exploring the potential of plant oils for food and industrial applications.

RESURGENCE IN FLAX PRODUCTION MEANS MORE INTEREST IN RESEARCH

An update on some of our recent findings

IHARF staff

With a resurgence of flax production in Saskatchewan, flax agronomy research has been a priority for producer organizations and the flax industry in recent years.

In collaboration with SaskFlax, producer groups have conducted several research studies, examining various aspects of flax production such as fertility, seeding date, seeding rate, seed treatment, foliar fungicide application, and row spacing.

Here are some of our recent findings in these areas.

Fertility

Fertility has been a priority in flax research as fertilizer constitutes the largest input cost for flax producers,

and typically provides a good return on investment when applied efficiently. In 2015, a single site trial in Indian Head found that flax yield increased with nitrogen (N) and phosphorus (P) applications, but not sulphur. A nitrogen application rate of 45 kg/ha resulted in a 35% yield increase over the control treatment (no N applied). However, further increasing the rate to 90 kg N per ha only resulted in an additional 2% yield increase. Flax's response to P fertilizer was small but significant with a 3.3% yield increase at 45 kg P₂O₅ per ha.

Expanding on this research, a new three-year flax fertility study began in 2016 at eight locations across Western Canada. This project, funded by the Agriculture

"FLAX AGRONOMY RESEARCH HAS BEEN A PRIORITY FOR PRODUCER ORGANIZATIONS AND THE FLAX INDUSTRY IN RECENT YEARS."

Development Fund, Western Grains Research Foundation, and SaskFlax, aims to evaluate the yield response of flax to N and P fertilizer applications in a broad range of Western Canadian environments and using modern varieties and seeding equipment. The collaboration of eight sites over three years will produce 24 site years of data and should provide conclusive results for flax's response to increased fertility. Treatments include four



Early-seeded (May 3, left) and late-seeded (May 30, right) flax on June 30, 2016 at Indian Head.

nitrogen rates (0, 50, 100, and 150 kg N kg/ha) combined with four phosphorus rates (0, 20, 40, and 60 kg P₂O₅ per ha), all side-banded. Rates used in this trial are significantly higher than what are typically used in production and flax fertility research, in order to determine optimal fertility rates for producing consistently high-yielding flax.

The first year of the trial was conducted successfully at all locations. Results to date have shown consistent and sometimes strong responses to higher rates of N fertilizer, while responses to P fertilizer were smaller and detected less frequently.

Best management practices

Trials were also conducted to help the industry redefine best management practices for flax establishment. The effects of seeding dates and rates on flax establishment, maturity, and yield were examined at Indian Head, Melfort, and Yorkton over three years from 2013 to 2015. It was found that increasing the seeding rate beyond the recommended 300 plants m² resulted in earlier and more uniform maturity, but had little effect on seed yield. Earlier seeded flax was ready to harvest earlier but did not yield more than late-seeded flax. There was no interaction between seeding date and seeding rate, indicating that the seeding rate effect was the same regardless of seeding date.

The same study was conducted at Indian Head in 2016 and included an additional agronomic element, seed treatment. In 2016, delayed seeding resulted in an 18%

increase in plant population as a result of the warmer soils and better moisture conditions. Delaying seeding also reduced the number of days to maturity. However, the early-seeded flax was nonetheless ready to harvest earlier than the late seeded flax and interestingly, the average yield for early seeded flax was a substantial 75% higher than late seeded flax. This was in contrast to previous results at Indian Head which showed little difference in yield between early and late-seeded flax.

Adding a seed treatment and increasing seeding rate also improved flax establishment at Indian Head in 2016, but did not have a positive effect on yield. Utilizing seed-applied fungicides and higher seeding rates are relatively low cost practices which may help producers improve flax establishment, but may not necessarily result in higher yields, depending on growing season conditions. The effects of seed treatment and seeding rate on flax establishment were observed with both early and late seeding. However, such practices are more likely to be beneficial when combined with early seeding into cold soils where emergence is slow and seedling survival is often lower.

Fungicides

Response to fungicide at various row widths is another area of flax agronomy being studied. Varying crop row spacing influences the micro-environment within the crop canopy and could result in conditions that are conducive to disease development. Row spacing can be utilized as part of an integrated disease

management approach, along with, or as an alternative to foliar fungicide application, which may not always provide a return on investment in flax.

Field trials at Indian Head over the past three years have tested flax row widths from 10" (25 cm) to 24" (61 cm), with and without fungicide application. Fungicide application significantly increased yield in one of three years only but there was an average 6% yield increase with fungicide application over the three years, with greater yield benefits in years when disease pressure was high.

Yields declined linearly with increasing row spacing and the results were consistent across years, despite the wide range in growing conditions and flax yield potential. Yield loss is likely a result of reduced competitiveness with weeds, and the crop not attaining canopy closure at wider row widths. There were no interactions between foliar fungicide applications and row spacing for flax, which indicates that flax's response to fungicide was similar regardless of row spacing. Similarly, the observed row spacing effects were consistent regardless of whether fungicide was applied.

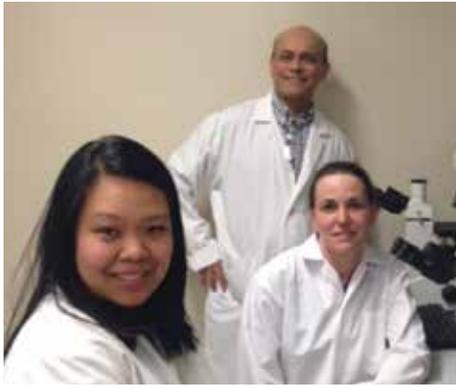
The projects outlined above are just a small snapshot of the work that has and is being done in Saskatchewan. With the continued support and efforts of all groups involved, flax production and profitability will continue to expand into the future.

**For more information visit
www.iharf.ca**

FIGHTING DISEASE

One Saskatchewan researcher is looking at the role flax might play in treating multiple sclerosis

Delaney Seiferling



University of Saskatchewan Researcher Adil Nazarali (back) is exploring the role flax might play in treating multiple sclerosis, with help from Senior Postdoctoral Fellow Dr. Kendra Furber (right) and doctoral graduate student Glai Tan (left).

Flax consumption has often been linked to human health, but new research being done in Saskatchewan is exploring whether it could also play a role in fighting disease.

University of Saskatchewan Researcher and Professor Adil Nazarali is currently leading a project that explores the role flax might play in treating multiple sclerosis (MS), an autoimmune disease of the central nervous system that affects a disproportionately high number of people in our province.

"I was concerned about the high incidence of MS in our province and wanted to conduct research on this disease because I live in Saskatchewan and I love this province," says Nazarali, who has spent twenty years studying human genes that affect the central nervous system and development of the body.

"I want to investigate the how and why of MS and find ways to help people who suffer from this dreadful disease."

We already know, through research, that omega fatty acids are beneficial to brain health. Previous research specific to MS has also shown that polyunsaturated fatty acids tend to reduce the frequency of relapses in MS patients.

Using these building blocks, Nazarali

wanted to further explore the role that a very controlled diet of flaxseed oil could play in reversing symptoms of MS.

Why flaxseed? Because it contains high quality omega-3 fatty acids, in the form of alpha-linolenic acid, and high-quality omega-6 fatty acids, in the form of linoleic acid. Balancing the ratio of these two polyunsaturated fatty acids is another key component of Nazarali's research.

Currently the average human diet in Western countries contains 10 to 25 times more omega-6 fatty acids than omega-3s, he says, and this ratio is important.

"Our hypothesis is that if you bring the ratio of omega-3 to omega-6 fatty acids down to 1:1 it can lead to better brain health."

What causes MS?

In cases of MS, there is damage to the myelin sheath, the fatty white substance that surrounds nerve tracts in the central nervous system, acting as a layer of insulation.

Nazarali describes the myelin sheath as similar to the plastic casing surrounding an electric wire.

"Without it you will find the electric current is discharged and it sends off signals that aren't efficiently conducting electricity," he says. "The same thing happens in the brain – if the myelin sheath is unravelled, the neurotransmission that goes from the brain to other parts of the body is not there."

This is why MS patients lose their cognitions, are very tired, and have low energy levels, he says.

But the myelin sheath also regrows, through a process called remyelination. Remyelination can help reverse the symptoms of MS and reduce the frequency of relapse of the disease.

What role can flax play?

Since the myelin sheath is comprised of approximately 70% lipids, foods rich in omega fatty acids may be beneficial for myelination. Preliminary research done in

Nazarali's lab, using brain slice cultures, has shown promising results towards his current hypothesis.

"In our preliminary experiments, we were able to show that in the presence of certain types of fatty acids, we could actually facilitate myelin growth or prevent myelin damage in the presence of a chemical that would break down myelin.

The next step of the research will involve testing the theory in mice. The mice involved will be fed very controlled diets of flaxseed oil containing strict ratios of omega-3s to omega-6s, with ratios varying between 1:1, 1:10, and 1:20. The researchers will then monitor the mice for signs of improvement in MS symptoms and will monitor their brain tissue for signs of myelination.

Although it's still very early in the research, Nazarali is hopeful that within two to three years he will have some positive results to share. He is also hopeful that, after careful analysis, the next phase of the research could include human trials.

"If we can show the myelin sheath is being repaired or prevented from damage, this could open up an area of interest for many neurodegenerative diseases," he says.

"Myelin abnormalities contribute to the cognitive impairments in Alzheimer's disease, Parkinson's disease, depression, autism, schizophrenia, Fragile X and Huntington's disease."

For now, Nazarali is very grateful to be able to facilitate this type of research in a province that is uniquely affected by this disease.

"The support from SaskFlax has given us the boost to continue this work; their support is very timely and much appreciated. This support will have multiplying effect -- we hope to obtain complementary funding from other sources."

ACHIEVING HIGH YIELDING FLAX

Ongoing SaskFlax-funded research looks at using integrated crop management to help improve your flax production



Ongoing research, partially funded by the Saskatchewan Flax Development Commission, the Western Grains Research Foundation, and the Agriculture Development Fund, is looking at how to help you grow flax better.

The project, led by Dr. Chris Willenborg at the University of Saskatchewan's Department of Plant Sciences, examines using integrated crop management to achieve high yielding flax production.

And although the multi-year project won't be completed until 2020, the results from the 2016 trials are in.

Herbicide screening

A herbicide screening portion of the research was conducted in 2016 across three sites – Saskatoon, Indian Head, and Carman, Manitoba. From these trials researchers concluded there are several promising new pre- and post-emergence herbicide options – tompramezone (group 27, post-emergence), pyroxasulfone (group 15, pre-emergence), and fluthiacet-methyl (group 14, post-emergence).

(Flumioxazin was also examined but was found to cause severe damage to crops in high moisture conditions).

"There were notable differences between the research sites, with pre-products causing more crop injury at Carman, MB, than at any of the Saskatchewan locations," Dr. Willenborg says. "As such, it is possible that use of these herbicides may be restricted provincially or even regionally based on soil type and spring moisture conditions."

He says it will be important to determine that spectrum of weed control for these products going forward.

Integrated weed management

For the integrated weed management portion of the study, researchers looked at the combined effect of seeding rate, seeding date, height, and herbicide rate on the ability of flax to compete with wild oats.

"Preliminary analysis from this trial is showing that while there may not be a four-way interaction of these factors, they all do appear to have an additive effect on each other," Dr. Willenborg says.

"By choosing the optimum combination of these four factors, we are not only improving crop yield, but we are improving the competitive ability of an uncompetitive crop by implementing easily adoptable agronomic techniques.

"Combining multiple factors offer an opportunity to improve the competitive ability of flax with weedy species, and by improving a crops competitive ability we are establishing more effective weed management methodologies."

High yield flax production

Field experiments with high yield flax production in Saskatoon showed that, of all the factors studied, decreasing row spacing exhibited the greatest effect on yield, which was consistent with results from 2015 trials.

"Fungicide application reduced the incidence and severity of pasmo disease at both Carman and Saskatoon, however,

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it did not result in a detectable yield increase at Saskatoon in either year," Dr. Willenborg says. "While fungicide application resulted in large yield responses in Carman, overall yields were low in both years – some other factor is limiting flax yield in this environment."

Diversified rotations

Last year was the second year of a field experiment looking at the best diversified rotations for integrated weed management in flax. This research is being conducted at Kernen Research Farm, Indian Head, and Carman, and examining 17 different treatments with various crop rotations.

It's too early to draw conclusions from this research so far, Dr. Willenborg says, but he aims to begin doing so after the third year is complete.

Takeaway for producers

Going forward, the goal of the research is to gain a better understanding of the effects of crop height, seeding rate, seeding date and herbicide rate, which will help producers make better decisions around crop rotation and in-season management, Dr. Willenborg says.

"This research and the high yields achieved will hopefully provide current producers with some answers to the questions they have, as well as pique the interest of producers who may be looking to grow flax once again," he says. "Any opportunity a producer can take to introduce added diversity into their rotation and production practices will ultimately improve their cropping system in the long run."

For more information on SaskFlax-funded research, visit www.saskflax.ca

THANKS FOR YOUR INPUT!

Highlights from our last agronomy survey



Last fall, we asked for your input into what areas agronomy issues were most important to you right now. We wanted to know this information so that we may invest your levy dollars into areas that will help you produce a more profitable flax crop.

We had approximately 50 surveys returned. We thank those of you who took the time to fill out the survey and help us prioritize research for flax – the information you provided us is very important and valuable.

Results

In the survey we asked you to rank agronomic issues by their level of importance to your operations. See below a list of the results.

Number 1 and 2: Weed control and pre-harvest weed control. These two areas have been ongoing research priorities for SaskFlax for some time, and we will continue to keep them as such. Flip to Pg. 6 for an update on some of our most recent research in this area, led by Dr. Chris Willenborg at the University of Saskatchewan.

Number 3 and 4: Nutrient recommendations for nitrogen and phosphorus (recommendations for potassium and sulfur ranked near the bottom.)

This area of research continues to be a priority for SaskFlax. Several ADOPT demonstrations have been carried out over the past few years dealing with this topic and a new project was launched in 2016, in conjunction with the Saskatchewan Ministry of Agriculture's Agriculture Development Fund program and Western Grains Research Foundation, which aims to provide fertilizer recommendations for as broad of area as possible across the flax growing area. This ongoing research will be completed in 2018, after which the results will be made available to flax producers to help you strengthen your operations.

Number 5: Seeding rates. Based on this feedback, SaskFlax is looking at new research projects involving seeding rates on a wider range of soils and climatic conditions. We are also looking specifically for research that examines factors that influence the use of different seeding rates, in order to help develop recommendations for management practices you are able to use on your farm.

Number 6: Disease control. This research remains a high priority for SaskFlax, and in coming years we will look to expand disease research that aims to develop recommendations. There are also fungicides available that may need further research, and we will continue to fund the

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development of new varieties with genetics for disease resistance.

Amongst the lower priorities were: crop rotation; product testing; seeding date; and pest and disease monitoring. We will make note of this when considering research projects in the future. The low ranking of pest and disease monitoring is hopefully a result of the excellent work being done by the federal and provincial governments through the Prairie Pest Monitoring Network (PPMN), which provides weekly updates during the growing season. The PPMN may be found online at prairiepestmonitoring.blogspot.ca/

Again, thank you to everyone that took the time to fill out the survey and provide thoughts about flax agronomy research. We are always ready to listen to your research needs and work toward finding the answers for your use on the farm.



SaskFlax

SaskFlax was established in 1996 and represents 6,600 registered flax producers in Saskatchewan. Directed by flax producers, SaskFlax operates via a mandatory but refundable producer levy on flaxseed and straw. These dollars are leveraged whenever possible to execute programs ultimately geared to increase net returns to its producers members and advance Saskatchewan's flax industry.

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