Enhanced Efficiency Fertilizer

Nitrogen (N) is one of the most important nutrients for canola/wheat production in Saskatchewan. Producers have been challenged with maximizing nitrogen use efficiency while increasing yield and quality due to high fertilizer prices and government/societal pressure to minimize greenhouse gas emissions. As part of a nitrogen management plan producers have included the use of enhanced efficiency nitrogen fertilizer (EENF) products including urease inhibitors, nitrification inhibitors and controlled release nitrogen or combination products. These products have the potential to reduce nutrient loss and increase N fertilizer efficiency. Producers are interested in using an EENF to sustain or increase yield and quality on their farm but are unsure of the best practices for their growing conditions and operation and whether it is economical.

Objective:
The objective of this field scale trial is to examine different ratios or proportions of treated and untreated N fertilizer using an EENF product of choice, compared to 100% untreated N fertilizer, on canola or wheat establishment, yield, and quality under various management, soil, and weather conditions in Saskatchewan.

Project Overview:
Cooperators will implement a replicated field-scale trial in a canola or wheat field of their choice, using their own equipment and otherwise normal practices. An agronomist or trial manager will provide support throughout the season, including setting up the trial and collecting data. Statistical analysis of the data will be conducted following harvest, and a report with your results including economic analysis will be provided. Data from all on-farm trials will also be pooled to examine the results across different management, soil, and weather conditions. Results from all trials will be publicly available, however individual farm data will be kept anonymous, apart from the location of the trial (nearest town or R.M.). Collaborators will be invited to join a network of producers who are conducting on-farm research through field tours and a year-end results meeting and banquet. This program is only available to members in good standing.

Study Design:
Three treatments will be compared:

1) 100% untreated N fertilizer
2) 25% treated with EENF product + 75% untreated N fertilizer
3) 50% treated + 50% untreated

Producers will choose the EENF product they are going to use based on their N source, typical growing conditions, and management practices. Producers will be responsible for sourcing and cost of the EENF product. The applied N fertilizer rate will be determined by the producer and their agronomist using spring soil tests, yield goals and typical management practices.

The three treatments will be replicated four times, for a total of 12 strips, and randomly arranged within blocks in the field. Apart from fertility, all strips must be managed the same agronomically including seeding rate, seeding date, variety, seeding depth and pesticide application. An example randomized field plan is shown below.

An alternate layout may be used but will be discussed and decided on a case-by-case basis.

	Block 1			Block 2			Block 3			Block 4		
	1	2	3	2	1	3	1	3	2	3	1	2
Treatment	100% untreated N	25% treated: 75% untreated	50% treated: 50% untreated	25% treated: 75% untreated	100% untreated N	50% treated: 50% untreated	100% untreated N	50% treated: 50% untreated	25% treated: 75% untreated	50% treated: 50% untreated	100% untreated N	25% treated: 75% untreated

Data collection:
Agronomists or trial managers will help the cooperator seed the trial according to the protocol and will complete the following in-season data collection.

- Spring soil sample
- Plant density at 2-4 leaf stage
- Yield – weighed separately for each treatment strip using weigh wagon or grain cart scale
- Harvest samples for each treatment strip
- Regularly scouting for treatment differences in flowering, maturity, disease pressure, and plant health, and general scouting observations
- Management data
- Weather data

For more information or to participate in the program contact:

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Foliar-applied Nitrogen-fixing biological products

Wheat and canola generally require a large supply of nitrogen (N) to support high yields and quality, provided naturally from the soil as well as with applied fertilizer. New, commercially available biological products may have the ability to facilitate biological N fixation in non-legume crops, potentially reducing the N fertility requirements of these crops. However, there is little publicly available data regarding the performance of N-fixing biological products on wheat and canola.

Objective:

The objective of this field-scale trial is to determine if there are agronomic and economic benefits of applying a commercially available, foliar-applied N-fixing bacteria product in wheat or canola under various management, soil and weather conditions in Saskatchewan. Producers will determine the value of utilizing the product of their choice under the typical management practices and environmental conditions of their operation.

Project Overview:

Cooperators will implement a replicated field-scale trial in a canola or wheat field of their choice, using their own equipment and otherwise normal practices. An agronomist or trial manager will provide support throughout the season, including setting up the trial and collecting data. Statistical analysis of the data will be conducted following harvest, and a report with your results including economic analysis will be provided. Data from all field-scale trials will also be pooled to examine the results across different environments and varying fertility levels. Results from all trials will be publicly available, however individual farm data will be kept anonymous, apart from the location of the trial (nearest town or R.M.). Collaborators will be invited to join a network of producers who are conducting on-farm research through field tours and a year-end results meeting and banquet.

Study Design:

Producers will choose the foliar N-fixing bacteria product that they would like to use in the trial. Multiple products can be evaluated if desired. The treatments will compare crop treated with the foliar N-fixing bacteria product(s) to an untreated check:

1) Untreated Check
2) Foliar N-Fixing Biological Product 1
3) Product 2 (Optional)

Foliar N-fixing bacteria products must be applied according to the label, with consideration given to handling, storage, crop stage, application timing, application conditions, water volume and tank mixing.

The treatments will be replicated four times for a minimum of 8 strips, and randomly arranged within blocks in the field. Apart from the treatments, all strips must be managed the same agronomically

including seeding date, seeding rate, applied fertilizer, and pesticide application. Variable rate (VR) fertilizer application can be used.

Example randomized field plans with two and three treatments are shown below.

Two treatments:

	Block 1		Block 2		Block 3		Block 4	
	1	2	2	1	1	2	1	2
Treatment	Untreated	Product 1	Product 1	Untreated	Untreated	Product 1	Untreated	Product 1

Three treatments:

	Block 1			Block 2			Block 3			Block 4		
	1	2	3	2	1	3	1	3	2	3	1	2
Treatment	Untreated	Product 1	Product 2	Product 1	Untreated	Product 2	Untreated	Product 2	Product 1	Product 2	Untreated	Product 1

Data collection:

Agronomists or trial managers will help the cooperator set up the trial according to the protocol and will complete the following in-season data collection.

- Pre-seed and post-harvest soil samples
- Yield – weighed separately for each treatment strip using weigh wagon or grain cart scale
- Harvest samples for quality from each treatment strip
- Regularly scouting for treatment differences in flowering, maturity, disease pressure, and plant health
- Management data
- Weather data

For more information or to participate in the program contact:

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Split N or Top-Up N

Nitrogen (N) plays a critical role in canola/wheat production in Saskatchewan. Producers are tasked with increasing yield, quality and economic return while using applied nutrients efficiently, considering factors such as cost and environmental impact. Two related management practices have emerged to potentially increase efficiency and reduce the economic risk of N fertilizer application, ***split N application and top-dressing N***. Split application is primarily a risk management approach, where only part of the total N required based on the yield goal, is applied at or before seeding, and the remainder applied in-crop if conditions are conducive to achieving the yield goal. Top-dressing entails applying 100% of the recommended N at seeding and supplementing with additional N in-season if growing conditions are conducive to further improving the yield or quality of the crop. These methods could potentially help crops utilize N more effectively, boost productivity, reduce costs, and minimize environmental impact from N losses.

Objective:
The objective of this field scale trial is to determine if there is an agronomic and economic advantage to using a split N application or top-dressing N compared to applying all nitrogen at seeding on canola/wheat yield, quality and economic return under various soil and weather conditions in Saskatchewan.

Project Overview:
Cooperators will implement a replicated field-scale trial in a canola/wheat field of their choice, using their own equipment and otherwise normal practices. An agronomist or trial manager will provide support throughout the season, including setting up the trial and collecting data. Statistical analysis of the data will be conducted following harvest, and a report with your results including economic analysis will be provided. Data from all on-farm trials will also be pooled to examine the results across different management, soil, and weather conditions. Results from all trials will be publicly available, however individual farm data will be kept anonymous, apart from the location of the trial (nearest town or R.M.). Collaborators will be invited to join a network of producers who are conducting on-farm research through field tours and a year-end result meeting and banquet. This program is only available to members in good standing.

Study Design:
There are two different options for this protocol:

A. Split N option, 2 treatments:
    1) 70% N at seeding + 30% in-crop
    2) 100% N at seeding

B. Split N + Top dress option, 3 treatments:
    1) 70% at seeding + 30% in-crop
    2) 100% N at seeding
    3) 100% N at seeding + additional in-crop

The full applied N rate (100%) and additional top-dress rate will be determined by the producer and their agronomist using spring soil tests, yield goals and typical management practices. Different N fertilizer sources can be used for seeding and in-crop applications. Treatments will be replicated four times, for a total of 8 strips with Option A and 12 strips for Option B.

Treatments will be randomly arranged within blocks in the field. Apart from fertility, all strips must be managed the same agronomically including seeding rate, seeding date, variety, seeding depth and pesticide application. An example randomized field plan is shown below. An alternate layout may also be used but will be discussed and decided on a case-by-case basis.

Option A (two treatments):

	Block 1		Block 2		Block 3		Block 4	
	1	2	2	1	1	2	1	2
Treatment	70% seeding + 30% in-crop	100% seeding	100% seeding	70% seeding + 30% in-crop	70% seeding + 30% in-crop	100% seeding	70% seeding + 30% in-crop	100% seeding

Option B (three treatments):

	Block 1			Block 2			Block 3			Block 4		
	1	2	3	2	1	3	1	3	2	3	1	2
Treatment	70% seeding + 30% in-crop	100% seeding	100% seeding + additional in-crop	100% seeding	70% seeding + 30% in-crop	100% seeding + additional in-crop	70% seeding + 30% in-crop	100% seeding + additional in-crop	100% seeding	100% seeding + additional in-crop	70% seeding + 30% in-crop	100% seeding

Data collection:

Agronomists or trial managers will help the cooperator seed the trial according to the protocol and will complete the following in-season data collection.

- Spring soil sample
- Plant density at 2-4 leaf stage
- Yield – weighed separately for each treatment strip using weigh wagon or grain cart scale
- Harvest samples for each treatment strip
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