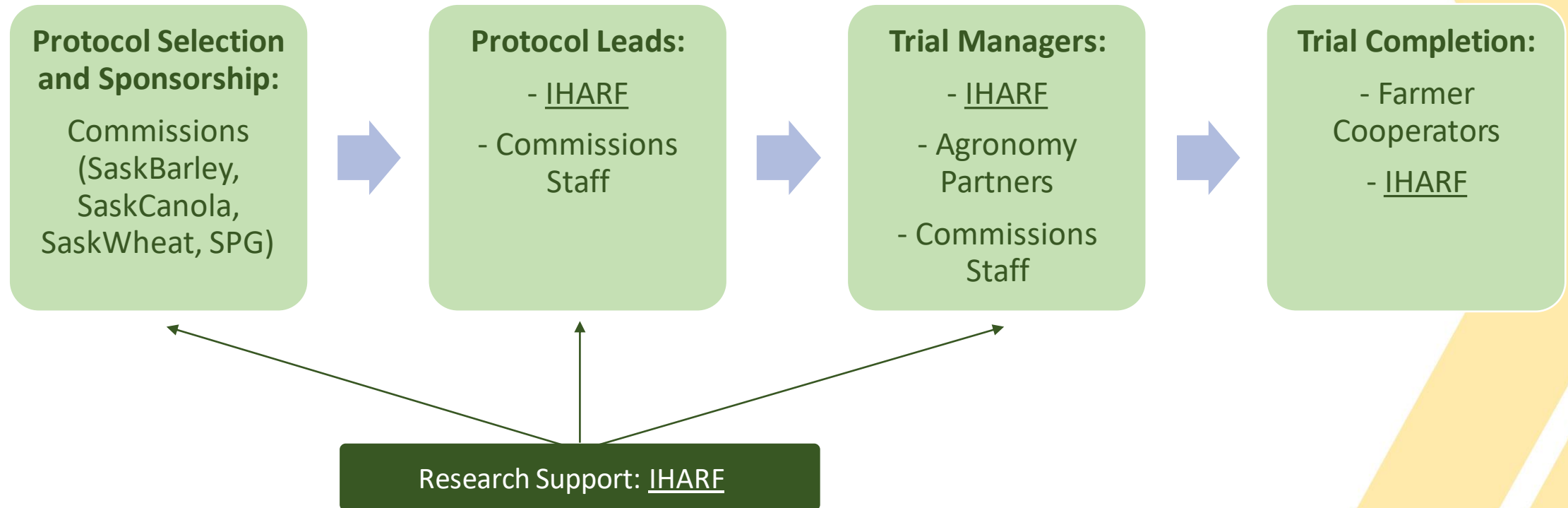


2023 On Farm Field-scale Research Program Review

Results, lessons learned and looking forward



Program Organization



2023 Protocols & Sites

Protocol	Crop	No. Sites
Foliar-Applied Nitrogen-Fixing Biological Products	Sask Wheat	12
Foliar-Applied Nitrogen-Fixing Biological Products	SaskCanola	9
Lentil Seeding Rate	SPG	17
Barley Seeding Rate	SaskBarley	2



Foliar N-fixing biological on wheat and canola

Option A: Two Treatments x 4 replicates

1	No foliar N-fixing biological
2	Envita [®]


Option B: Four Treatments x 3 replicates

1	Normal N rate + No Envita [®]
2	Normal N rate + Envita [®]
3	Reduced N rate + No Envita [®]
4	Reduced N rate + Envita [®]



Trial Seeding Dates

MAY 2023

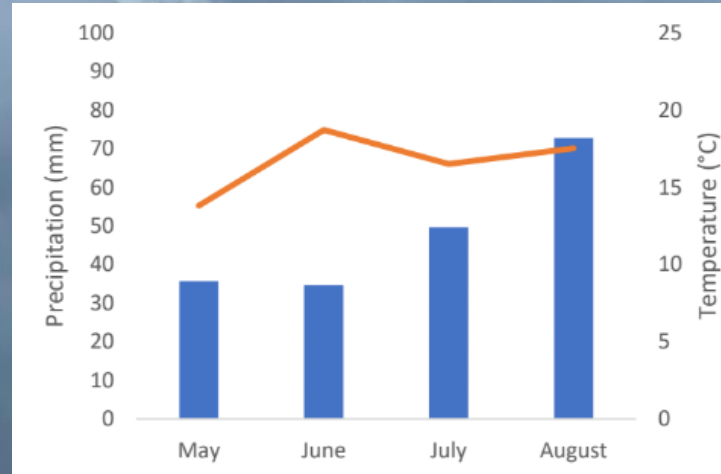
SUN	MON	TUE	WED	THU	FRI	SAT
30	1	2 	3	4	5	6 
7	8	9	10 	11	12	13  
14 	15	16	17	18	19 	20 
21 	22	23 	24	25 	26 	27 
28	29 	30 	31	1	2	3

Product Application Dates

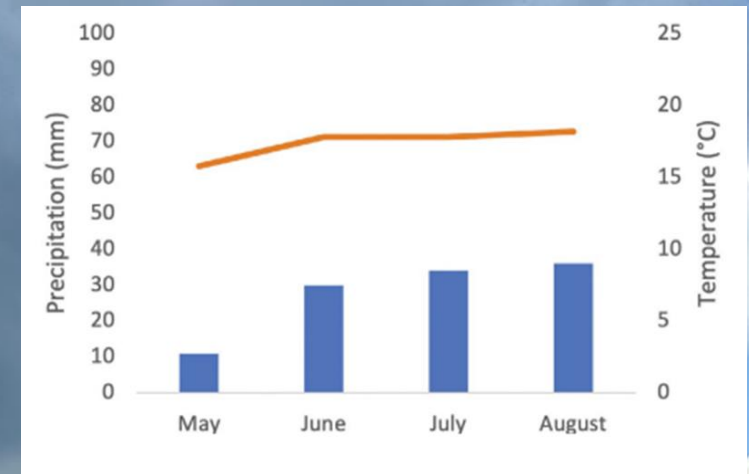
June 2023

SUN	MON	TUE	WED	THU	FRI	SAT
28	29	30	31	1 	2	3
4	5 	6 	7 	8	9 	10
11 	12	13 	14	15 	16 	17
18	19  	20	21 	22 	23	24
25	26 	27 	28	29	30 	1

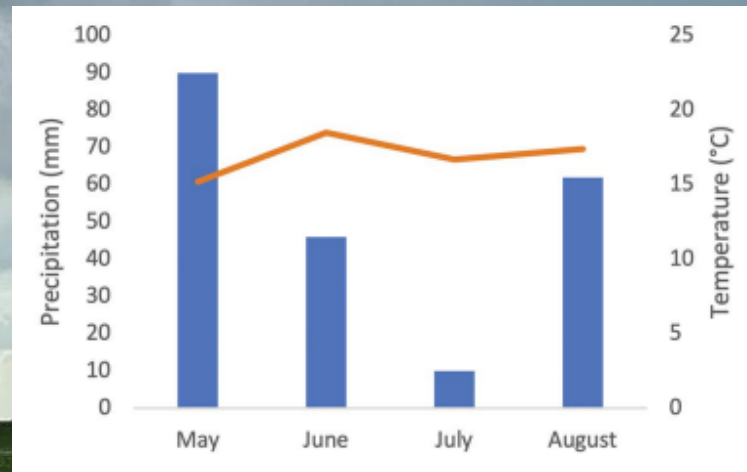
Weather



Carrot River



Plenty



Hepburn



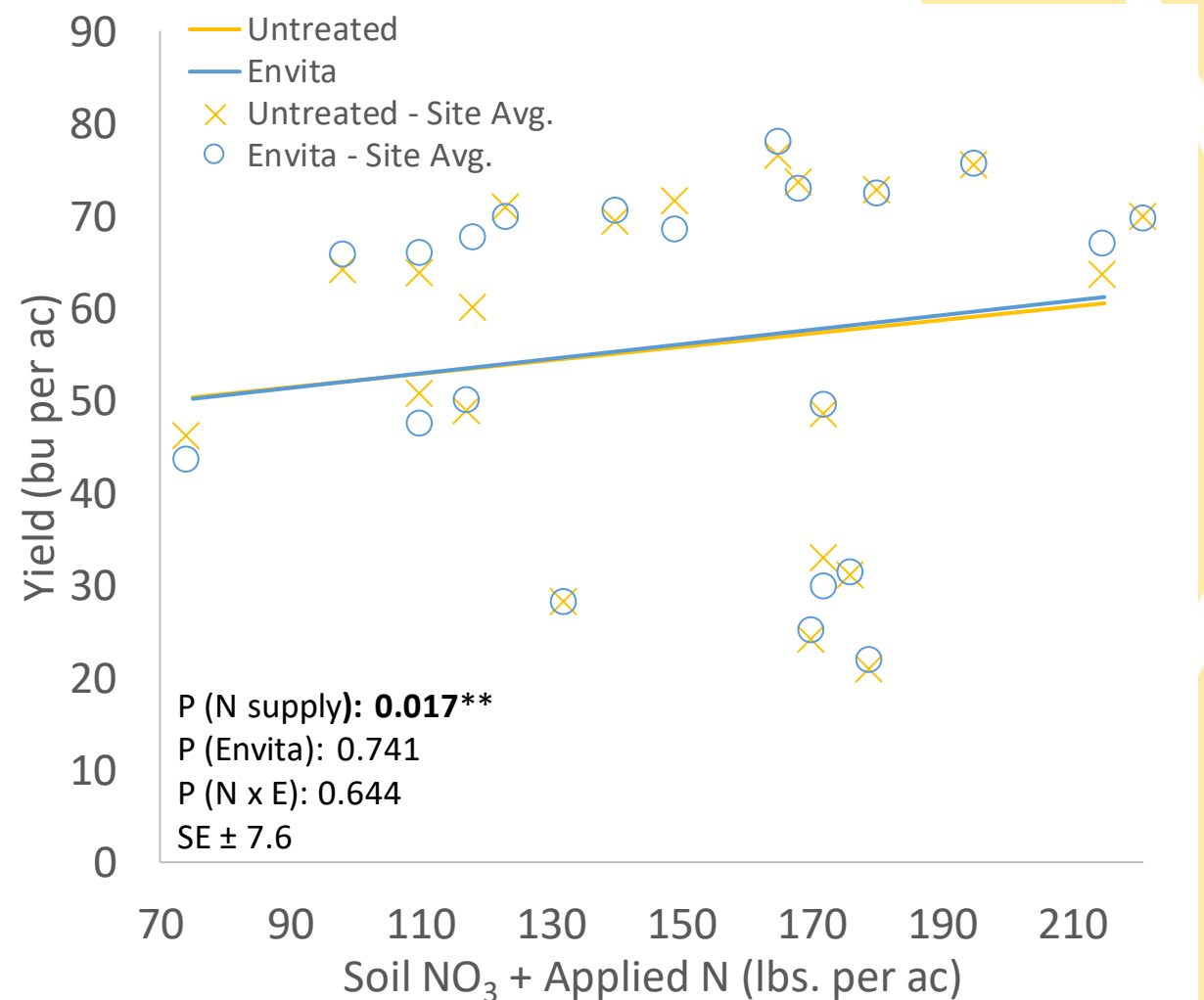
Wynyard

Wheat trial sites

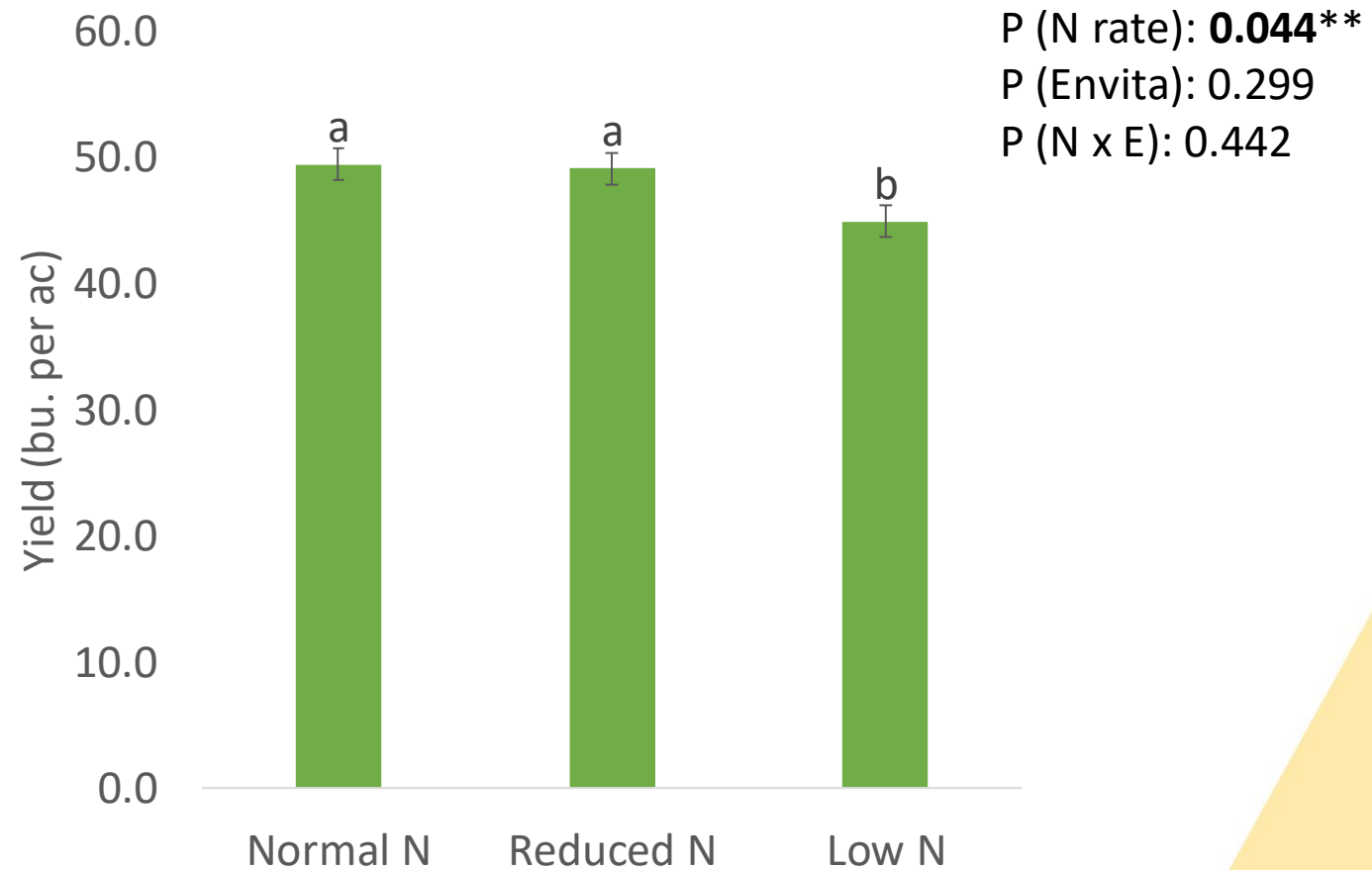


Wheat yield response to Envita and N supply

Site	N Rate	Yield (bu. per acre)			
		Untreated	Envita	SE	Difference
Wynyard	Normal	60.1	68.0	±1.8	+7.9
Hepburn	Reduced	63.6	66.9	±2.1	+3.3
Wynyard	Reduced	63.7	65.9	±1.8	+2.2
Wynyard	Low	64.2	65.9	±1.8	+1.7
Balgonie	Normal	76.5	77.9	±1.0	+1.4
Cutknife	Reduced	69.3	70.5	±1.5	+1.2
Davidson	Normal	48.8	50.0	±1.8	+1.2
Craik	Reduced	23.7	24.8	±1.6	+1.1
Craik	Normal	20.6	21.6	±1.6	+1.0
Plenty	Normal	31.0	31.4	±0.9	+0.4
Indian Head	Normal	75.5	75.7	±1.2	+0.2
Kipling	Normal	28.0	28.1	±2.1	+0.1
Hepburn	Normal	69.8	69.6	±2.1	-0.2
Milestone	Reduced	73.5	72.9	±3.0	-0.6
Delisle	Normal	50.1	49.5	±2.6	-0.6
Milestone	Normal	72.8	71.9	±3.0	-0.9
IHARF	Normal	71.0	69.9	±0.9	-1.1
Davidson	Low	46.1	43.5	±1.8	-2.6
Cutknife	Normal	71.6	68.5	±1.5	-3.1
Plenty	Reduced	32.8	29.7	±0.9	-3.1
Davidson	Reduced	50.7	47.5	±1.8	-3.2

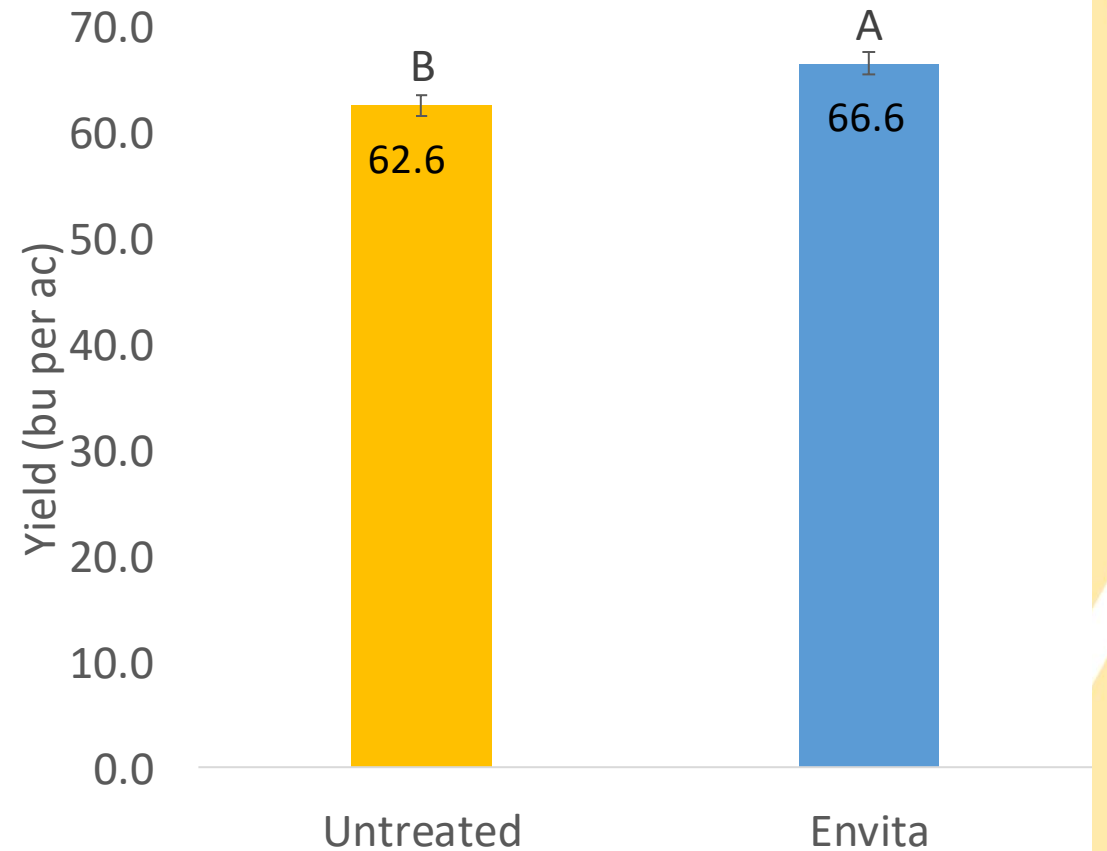
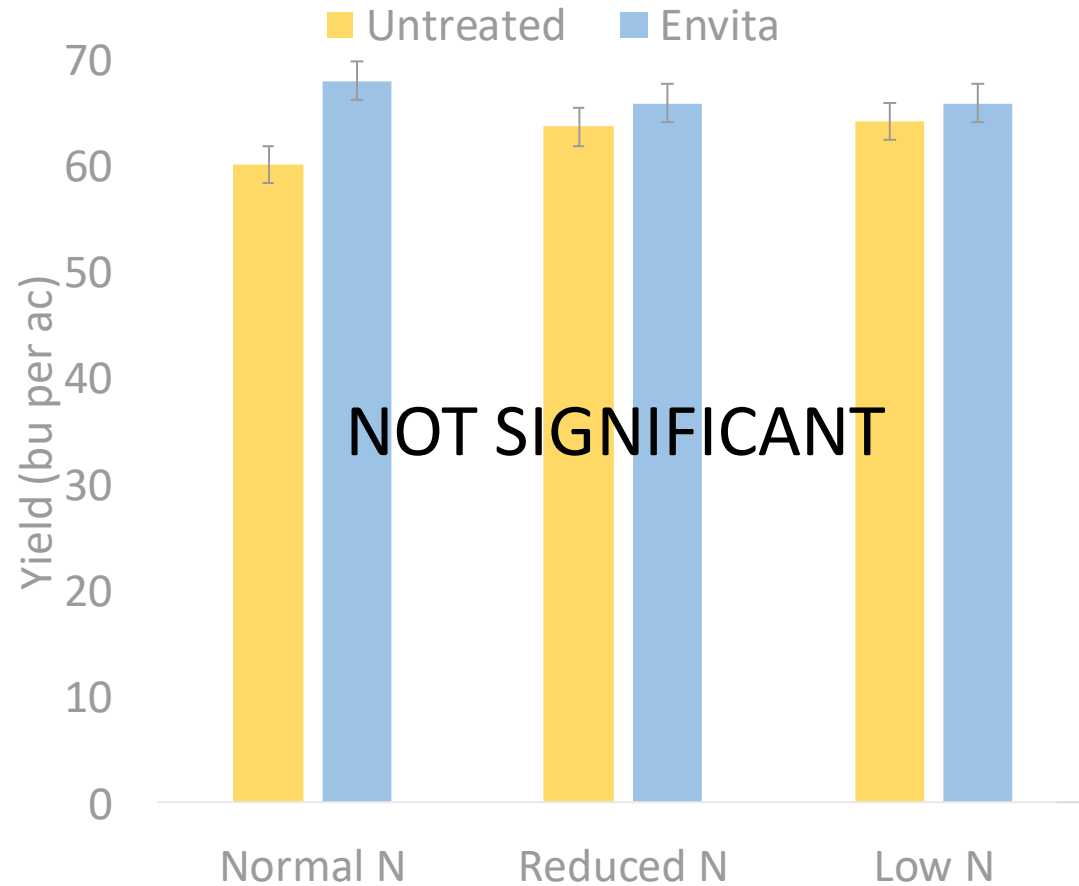


Wheat yield - Davidson

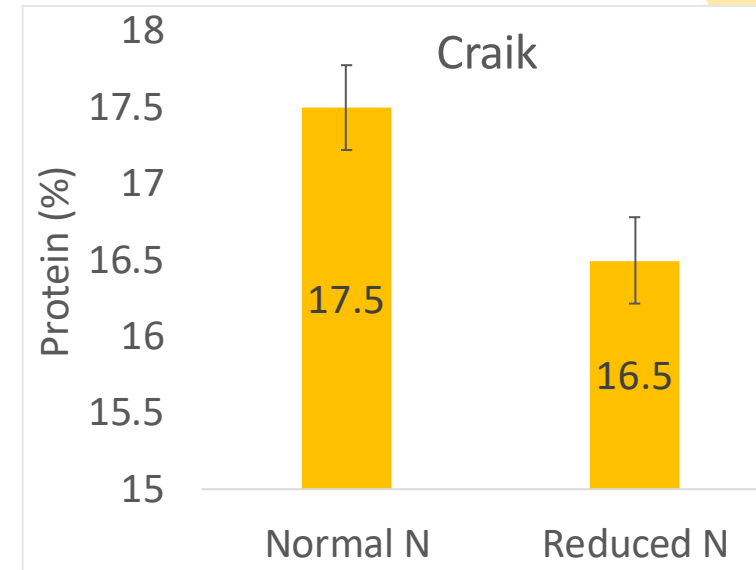
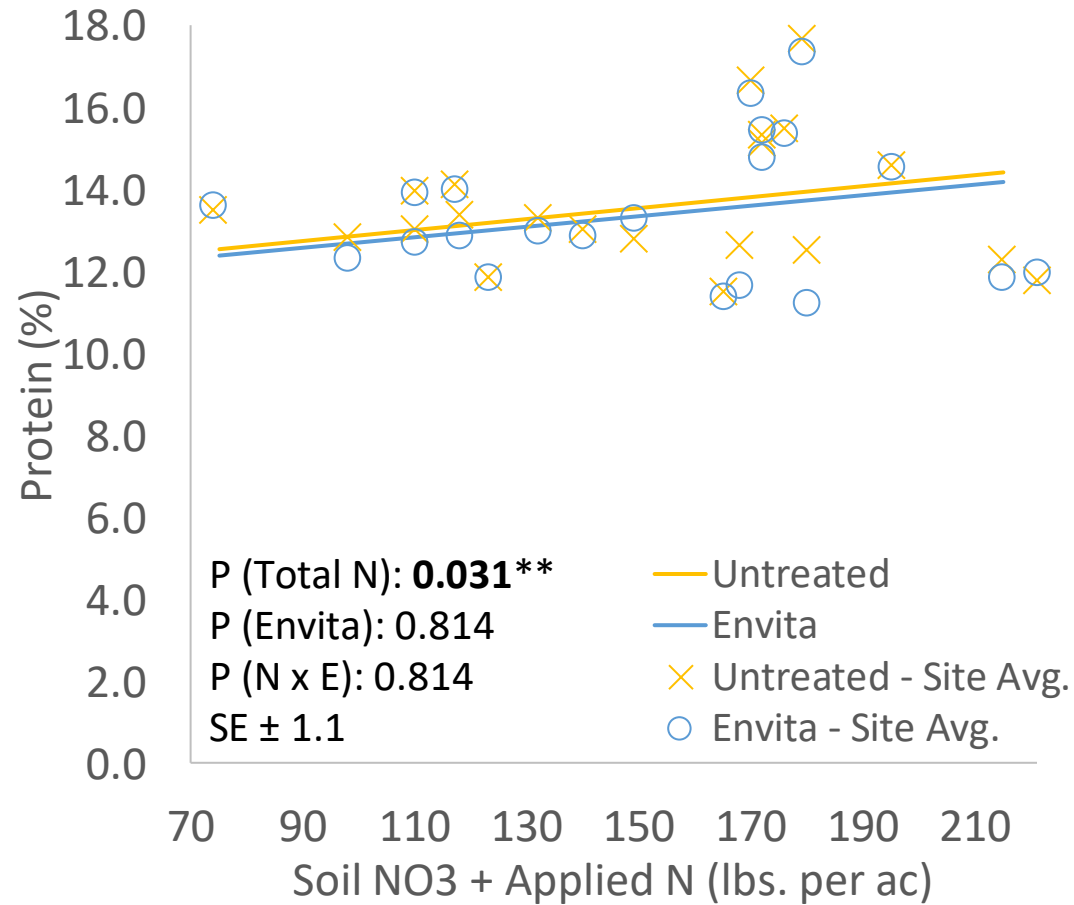


Wheat yield - Wynyard

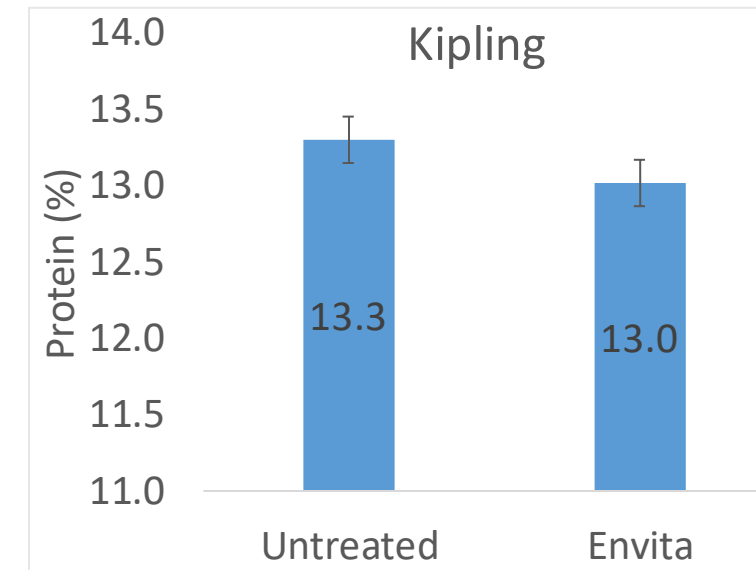
P (N rate): 0.814
P (Envita): **0.057***
P (N x E): 0.162



Wheat Protein

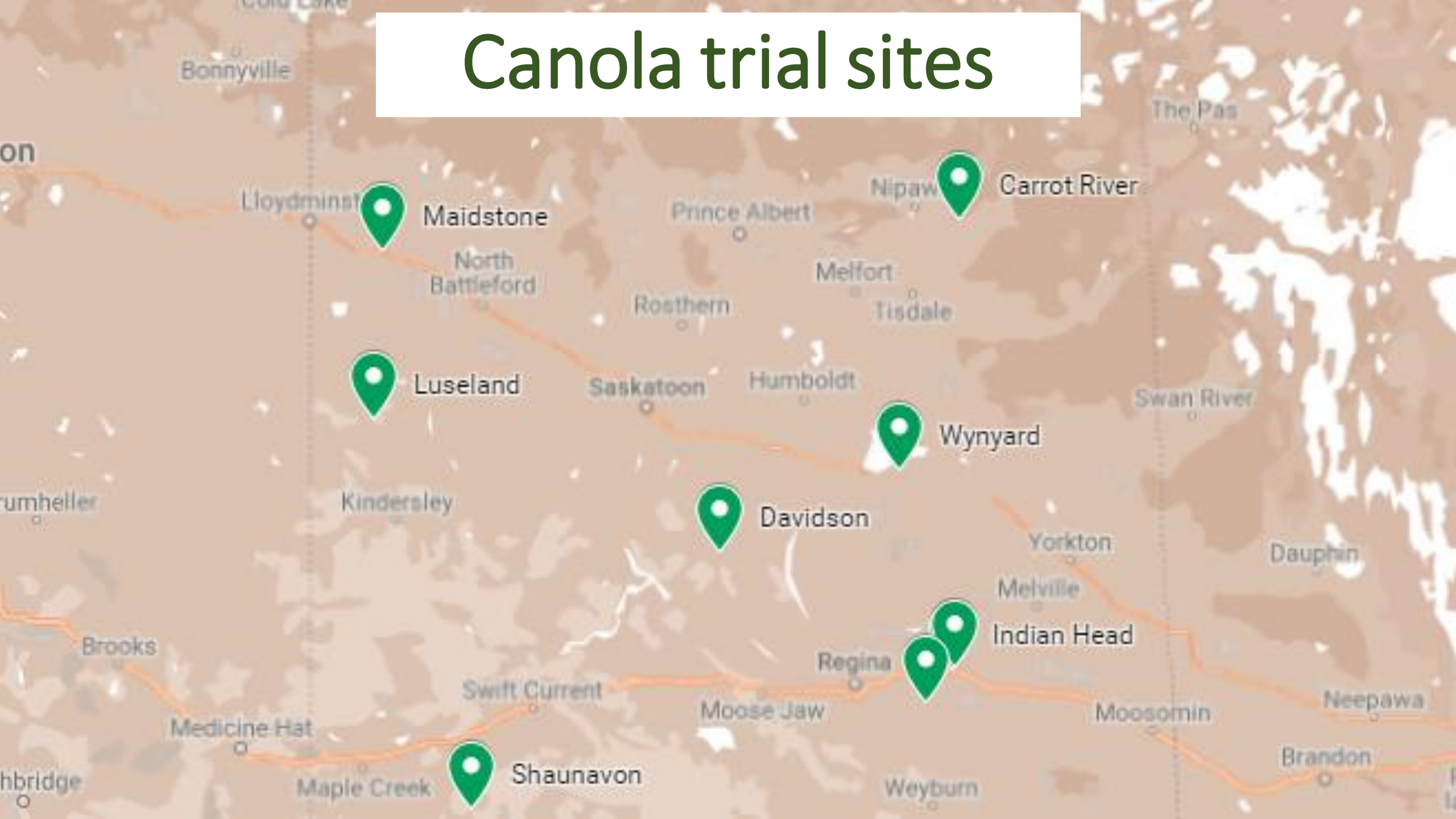


P (N rate): 0.035**
P (Envita): 0.478
P (N x E): 0.977



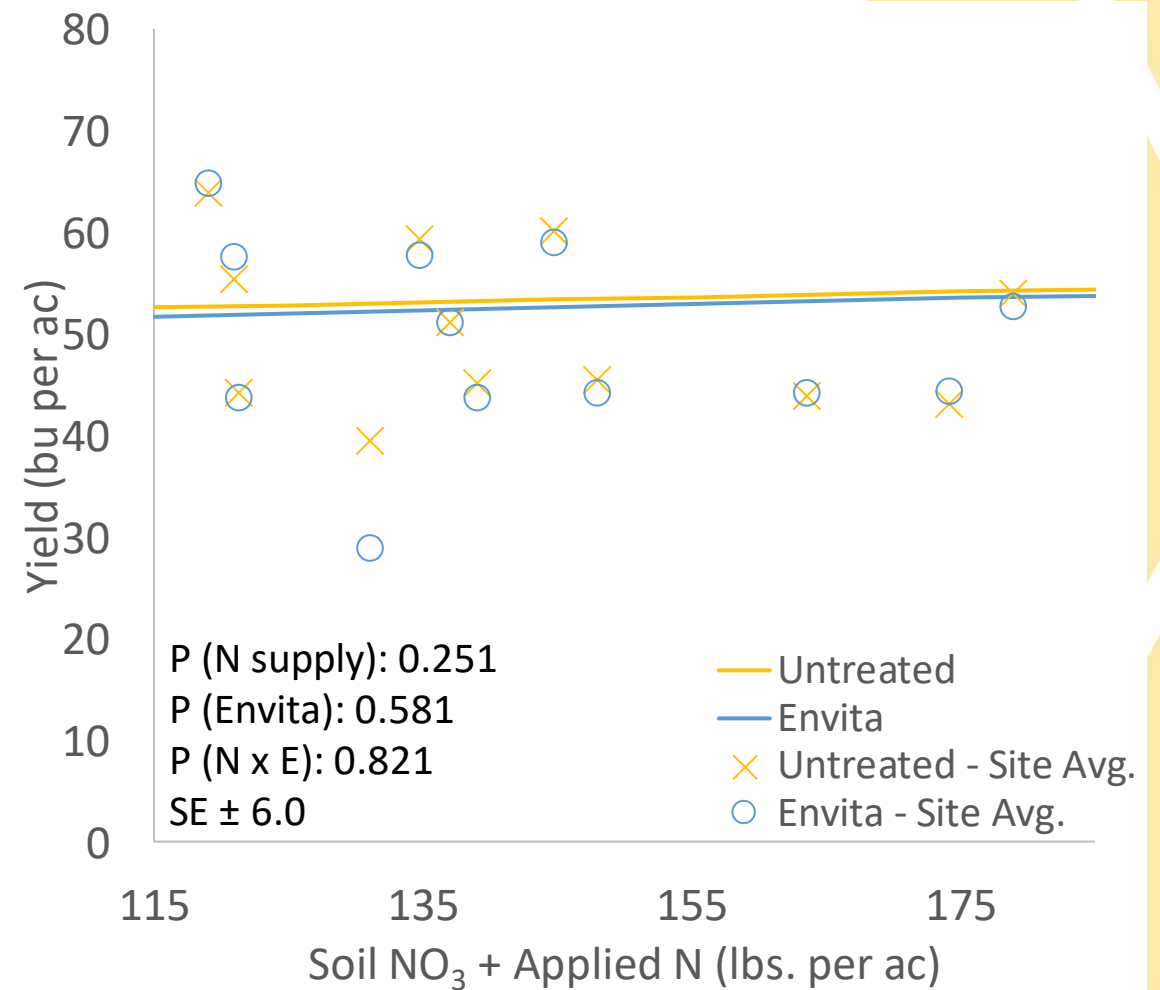
P (Envita): 0.047**

Canola trial sites

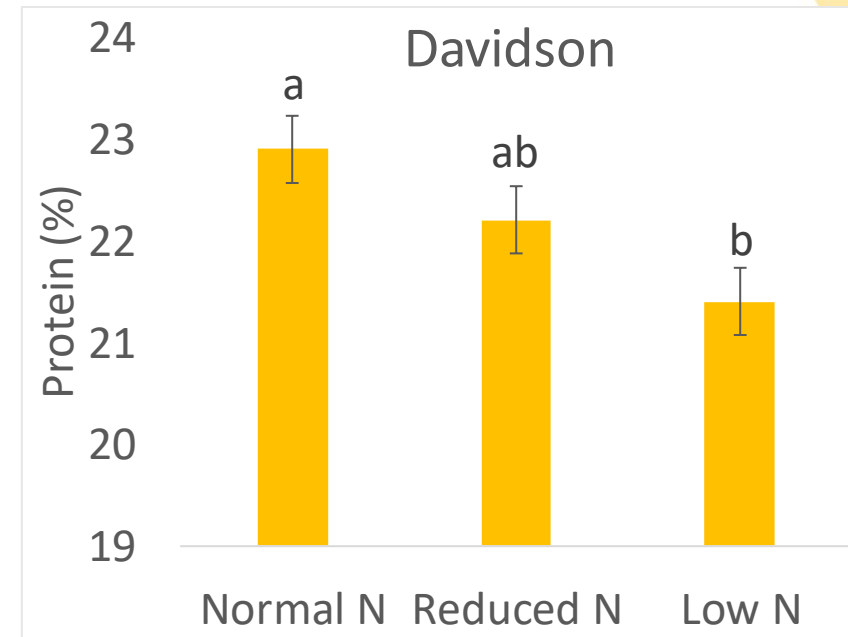
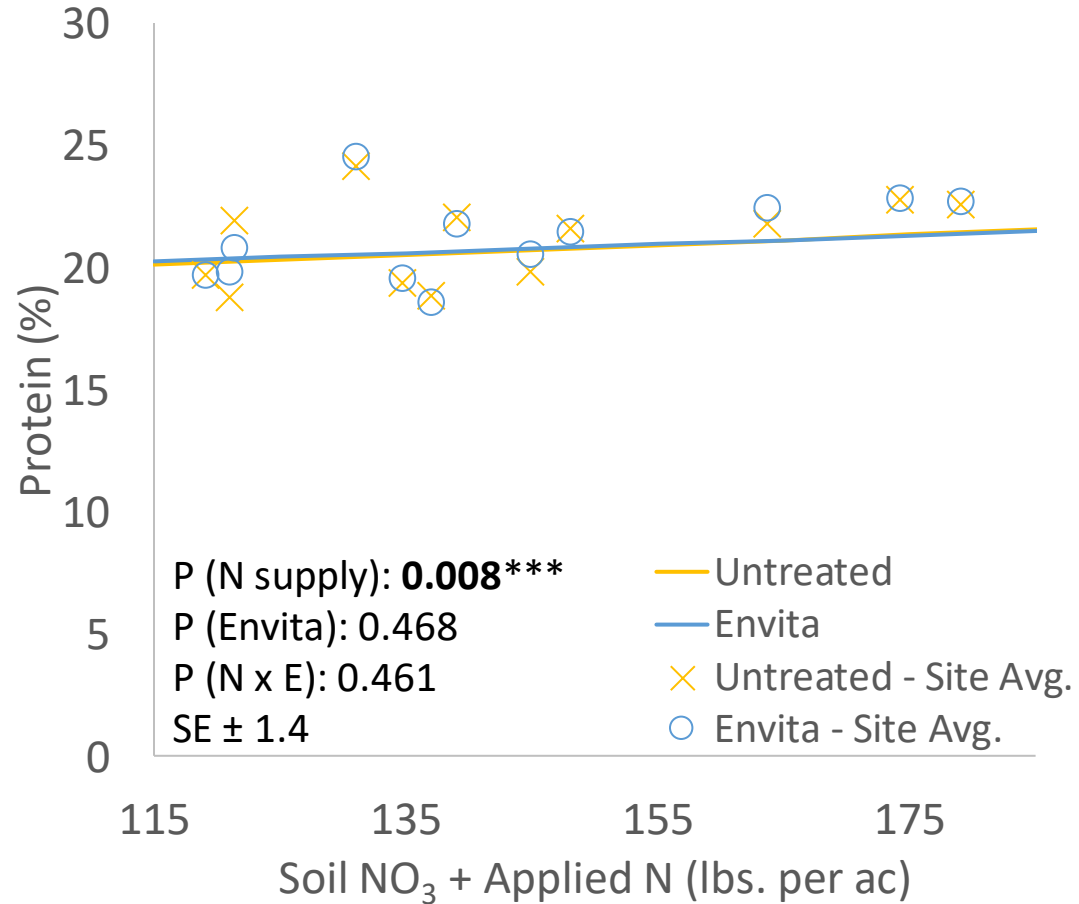


Canola yield response to Envita and N supply

Site	N Rate	Yield (bu. per acre)			
		Untreated	Envita	SE	Difference
Wynyard	Low	55.3	57.6	±1.2	+2.3
Davidson	Normal	43.1	44.4	±1.2	+1.3
Maidstone	Normal	63.8	64.8	±1.0	+1.0
Davidson	Reduced	43.9	44.1	±1.2	+0.2
IHARF	Normal	51.1	51.0	±0.5	-0.1
Carrot River	Normal	78.4	78.1	±0.9	-0.3
Davidson	Low	44.2	43.6	±1.2	-0.6
Wynyard	Normal	60.1	59.2	±1.2	-0.9
Luseland	Normal	45.3	44.2	±1.2	-1.1
Vibank	Normal	53.9	52.7	±1.1	-1.2
Luseland	Reduced	45.0	43.7	±1.2	-1.3
Wynyard	Reduced	59.3	57.7	±1.2	-1.6
Shaunavon*	Normal	39.4	28.9	±5.7	-10.5



Canola Protein



P (N rate): 0.029**
P (Envita): 0.681
P (N x E): 0.178

Foliar N-fixing biological on wheat and canola: Discussion

- Consider factors that may affect efficacy of foliar-applied biological products:
 - Storage, handling, application
 - Conditions after application – esp. moisture
 - N-supply – for N-fixing products
- Other research results:
 - USask – Knight/Farrell: colonization of tissues in most but not all cases; colonization did not always lead to N fixation
 - NDSU – Review of 61 site-years in 10 different states and with 4 crops; 59 sites showed no yield increase with product over N rate alone



Advanced N management for canola, wheat and soybean: Evaluation of a new biological for N-fixation in non-legumes

Researcher(s): Diane Knight, University of Saskatchewan; Richard Farrell, University of Saskatchewan

Term: 4 years, completed Feb 2023

Status: Complete

SaskCanola Investment: \$64,993



NDSU EXTENSION

EXTENDING KNOWLEDGE >> CHANGING LIVES

SF2080 (April 2023)

Performance of Selected Commercially Available Asymbiotic N-fixing Products in the North Central Region

Lentil Seeding Rate

RATIONALE

A common seeding practice for lentils is a flat rate of 60 lbs/ac for small red and 90 lbs/ac for large green lentils. Target plant stands of 12 plants/sq ft are currently recommended but research has seen up to 22 plants/sq ft can provide the highest yield.

OBJECTIVE

To evaluate the effect of seeding rate on survivability, yield, and grain quality of lentils across various growing conditions and landscape positions.

TREATMENTS

Three target plant densities:

12 plants / sq ft

18 plants / sq ft

24 plants / sq ft

Lentil Seeding Rate Trial Sites



Seeding rate definitions

Target plant density

- Desired plant population after emergence
- Takes into account germination rate and estimated mortality

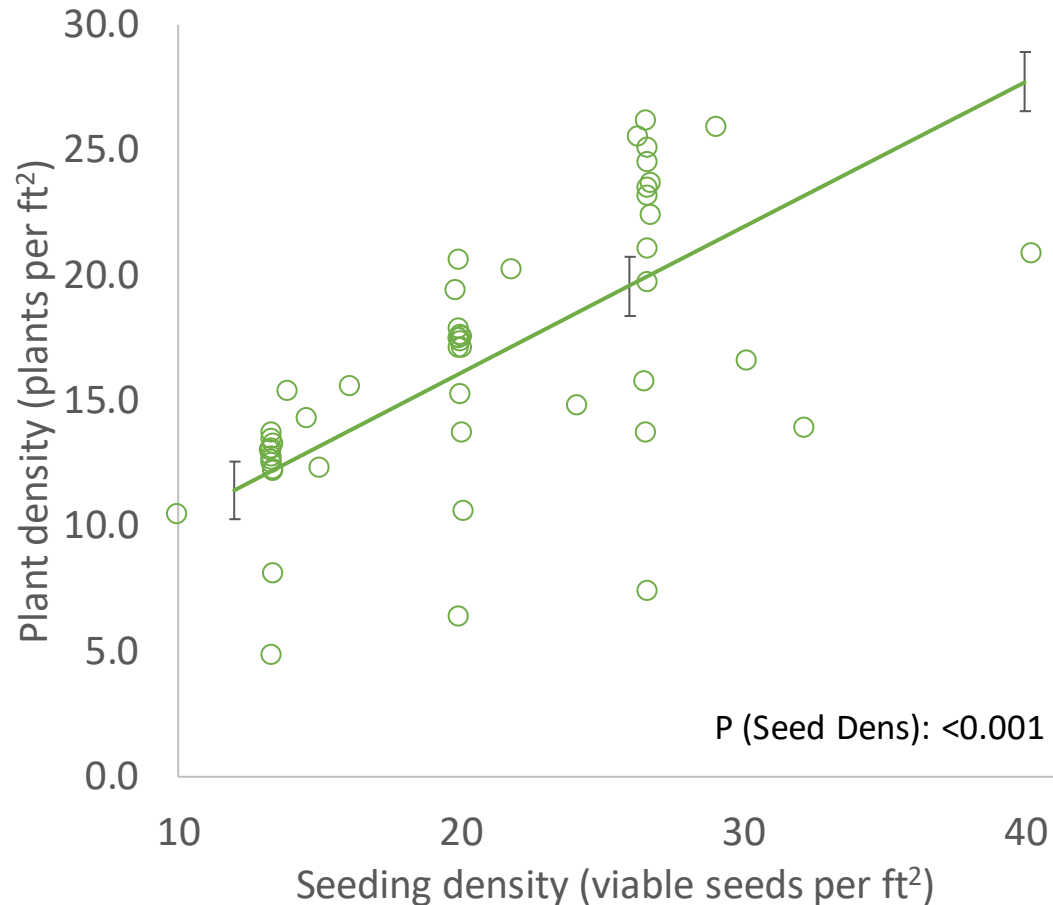
Seeding rate

- Weight per area (e.g. lbs per acre)
- When targeting a specific plant density, will depend on seed size (TKW), germination rate, and estimated mortality

Seeding density

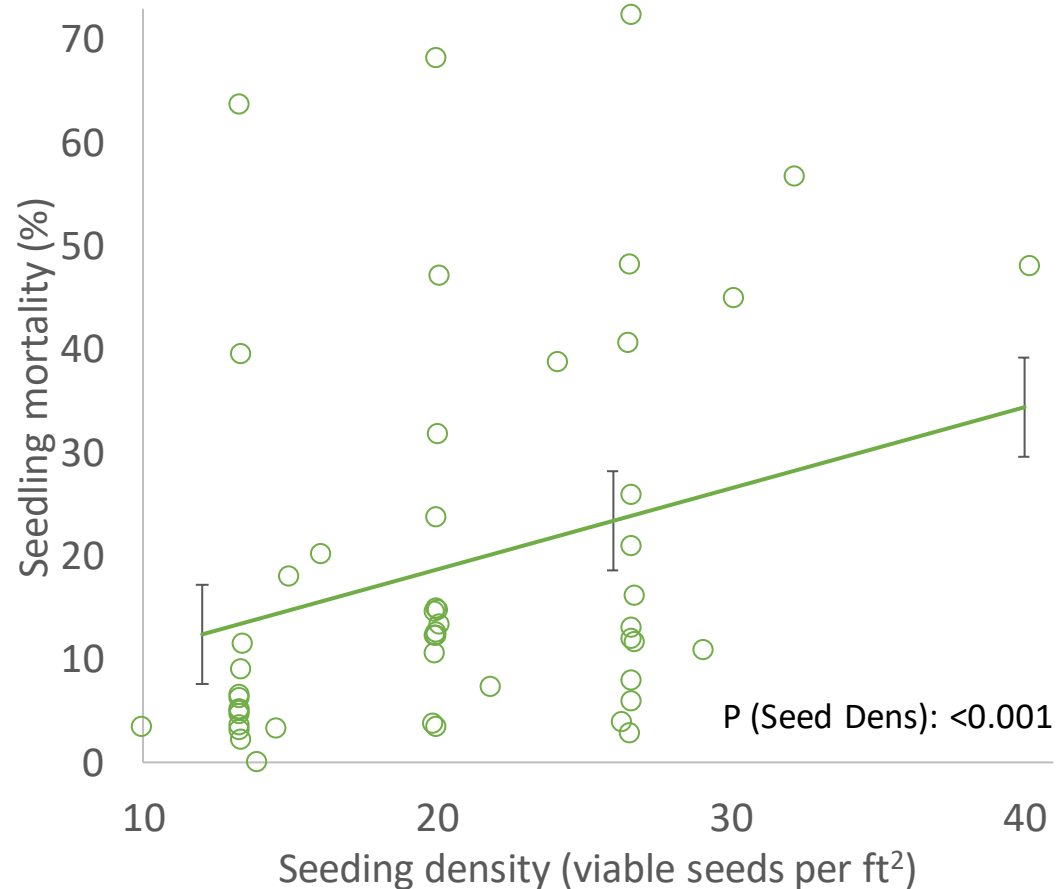
- Number of viable seeds per area
- Takes into account germination rate, but not estimated mortality

Lentil Seeding Rate – Plant density



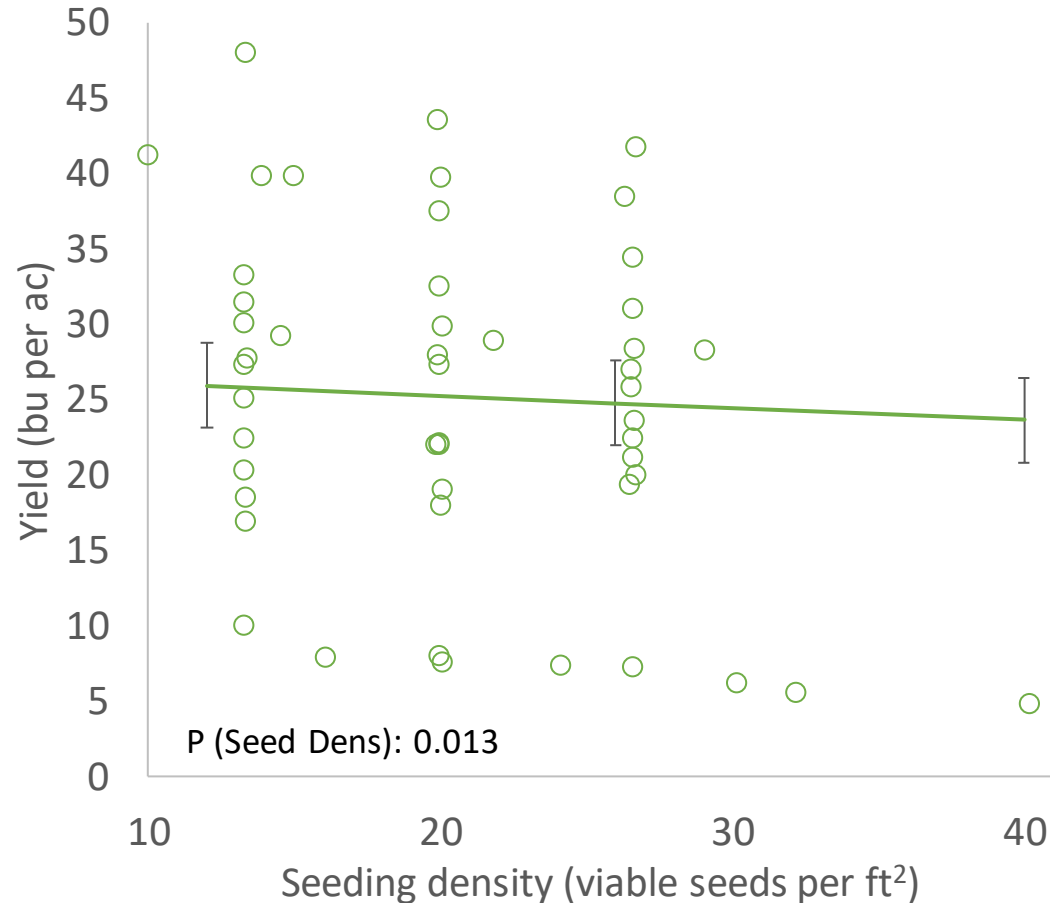
- 12 of 14 sites (86%): plant density increased significantly with seeding rate ($P < 0.05$)
- 2 sites: no significant difference in plant density ($P > 0.05$)
 - Shaunavon & Stranraer – poor emergence, high variability

Lentil Seeding Rate – Seedling mortality



- 8 of 14 sites (57%): seedling mortality increased significantly with seeding rate ($P < 0.05$)
 - 2 of 14 sites: $P < 0.1$
- 4 of 14 sites (29%): no significant change in seedling mortality with seeding rate

Lentil Seeding Rate - Yield



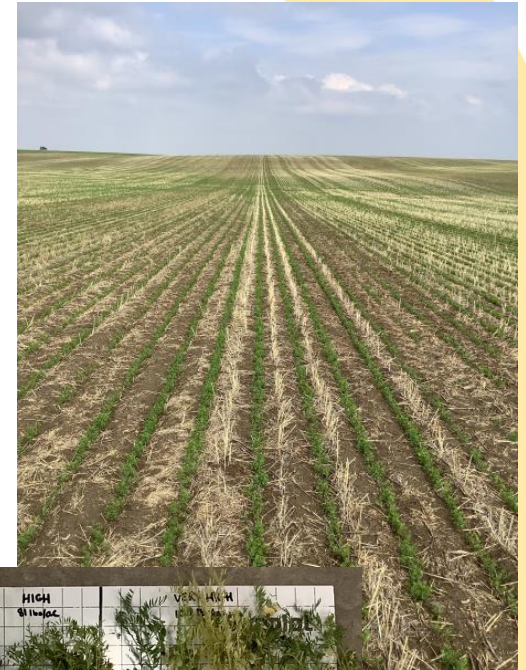
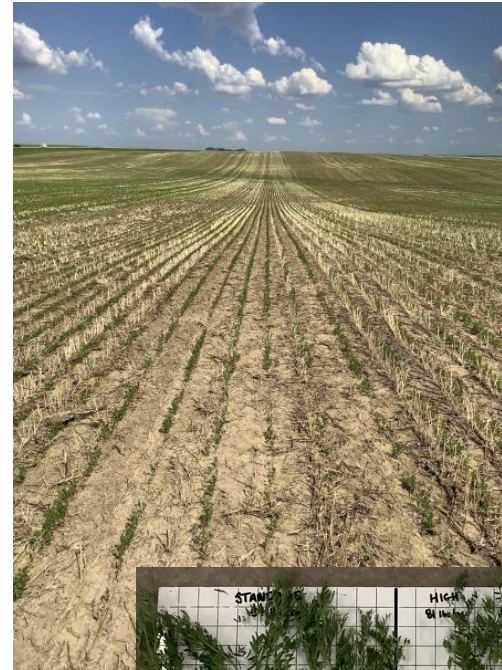
- 2 of 17 sites (12%): yield decreased significantly with seeding rate
 - Plenty, Shaunavon

- 2 of 17 sites (12%): yield increased significantly with seeding rate
 - Milden1, Milden2

- 13 of 17 sites (76%): no significant difference in yield with seeding rate

Lentil Seeding Rate - Discussion

- Other visual observations were noted but not formally assessed
 - More even emergence, earlier and more even canopy closure at higher seeding rates
 - More weed pressure at lower seeding rates
 - Healthier, bushier plants and roots at lower seeding rates
 - Earlier senescence (disease or maturity?) with higher seeding rate
- Sites to be characterized by differences in growing conditions to see if response varies
 - Also landscape position – implications for VR seeding



Lessons learned...

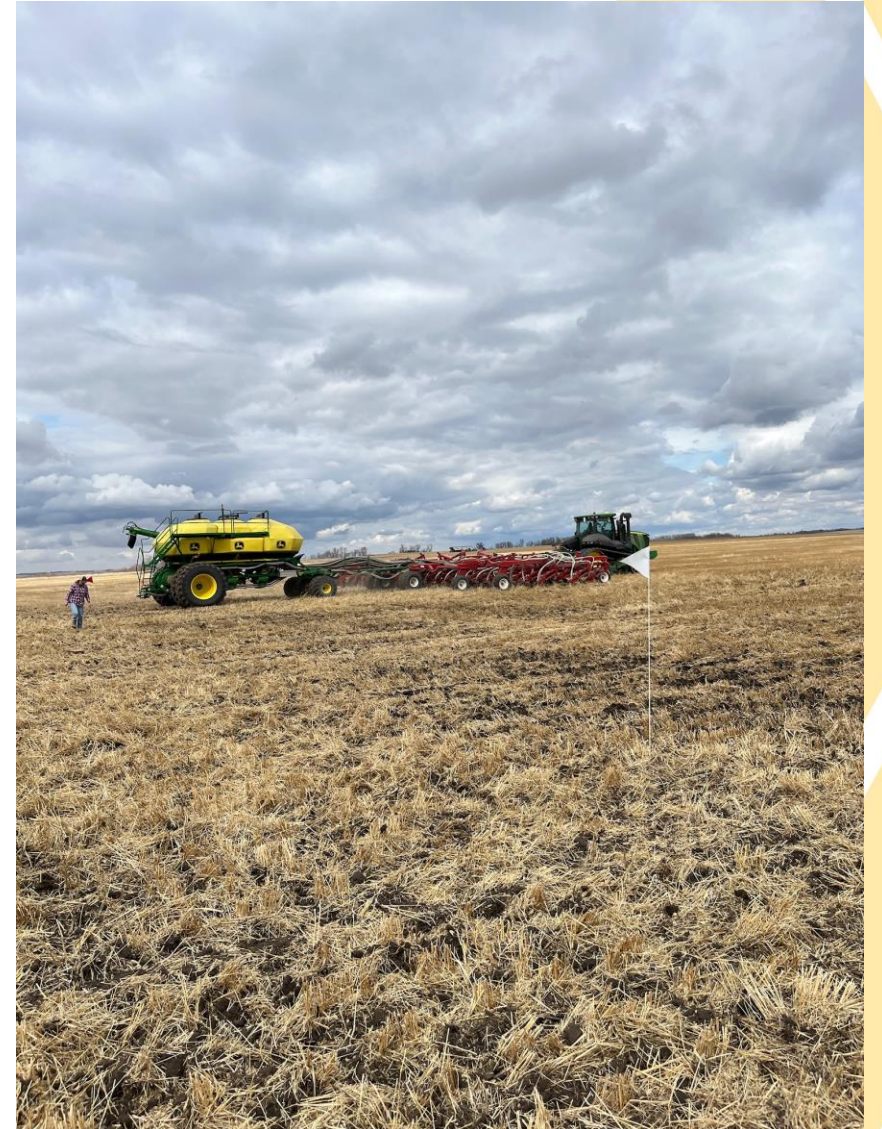
What is holding back farmers from participating in on-farm research?

- 1) Protocol selection
- 2) Protocol inflexibility
- 3)
- 4)



Protocol selection and inflexibility

- Protocols and treatments decided in advance and specific because:
 - Keep trial execution simple
 - Keep trials replicable
 - Ensure experimental validity
- From a research perspective, modifications can be made as long as does not affect replicability or experimental validity
- Participating in on-farm network – you get support
- Protocol choice will continue to expand as the programs grow
 - Previous collaborators will influence future protocol selection



Lessons learned...

What is holding back farmers from participating in on-farm research?

- 1) Protocol selection
- 2) Protocol inflexibility
- 3) Confidence, inexperience
- 4) Time management



Inexperience and time management

- Time management gets better with more experience!
- VR technology can help plan trial ahead of time; digital agronomy tools for record keeping and data collection
- Participating in on-farm network – you get support
 - Trial managers assigned to each trial and are responsible for ensuring the protocol is followed and for collecting data
- View time spent doing a trial as a good investment



Future Protocols



**WHEAT
WISE**

Plotting the Future

- Biologicals
- Seed Treatments
- Enhanced Efficiency Fertilizers
 - PGR's
- Variety Trials

Carmen Prang

Agronomy Extension Specialist

Office line: 1-306-653-7966

Cell: 1-306-550-3595

carmen.prang@saskwheat.ca

2024 BarleyBin Field Lab

- Applications due February 9
- Seeding Rates
- Fertility
- PGR
- Harvest Weed Seed Control





TOP NOTCH

FARMING

Future Protocols

- Foliar Applied Nitrogen Fixing Biological Products
- Seeding Rates
- Enhanced efficiency fertilizer

Kaeley Kindrachuk

Agronomy Extension Specialist, SaskCanola

Office: (306) 975-0273

Cell: (306) 260-2531

SASKATCHEWAN
pulse
Growers



PROFIT: Pulse Replicated On-Farm Independent Trials

- Lentil seeding rate
- Opportunities for other trials related to IPM, fertility, or other agronomic practices on all pulse crops

Michael Brown
Agronomy Manager
Lentil, chickpea, dry bean
Office: [306-651-0859](tel:306-651-0859)
Cell: [306-381-6038](tel:306-381-6038)

Meagen Reed
Agronomy Manager
Pea, faba bean, soybean, fenugreek
Office: [306-668-5560](tel:306-668-5560)
Cell: [306-381-8933](tel:306-381-8933)

Give me a call or email to chat about on-farm trials!

Christiane Catellier

Cell: 306-660-7322

ccatellier@iharf.ca

