

# **MN Canola Production Center**

**Research Results 2016**



UNIVERSITY OF MINNESOTA

# Research Team

- **Dr. Nancy Ehlke - Overall project lead, trial design and data analysis**
- **Donn Vellekson - U of MN Mag Farm manager, field layout and data collection**
- **Dave Grafstrom - Coordinate day-to-day activities at CPC**
- **Summer intern/s assist in data collection**



# MN Canola Council - CPC

- **The 2016 CPC was located on Rice Farms, adjacent to the U of MN Magnusson Research Farm**
- **CPC Partners:**
  - ❖ **MN Canola Council**
  - ❖ **U of MN**
  - ❖ **NDSU**
  - ❖ **Canola seed companies and industry**
- **Canola rotation trial - Peter Grafstrom, 5 miles east of Roseau, MN**



# Magnusson Research Farm



# CPC Research Trials in 2016

- **Small plot variety trial**
- **Small plot fertility trial**
- **Small plot fungicide trial**
- **Small plot row space/seeding rate**
- **Canola shatter trial**
- **Three year canola rotation trial**
  - **canola, wheat, soybeans**



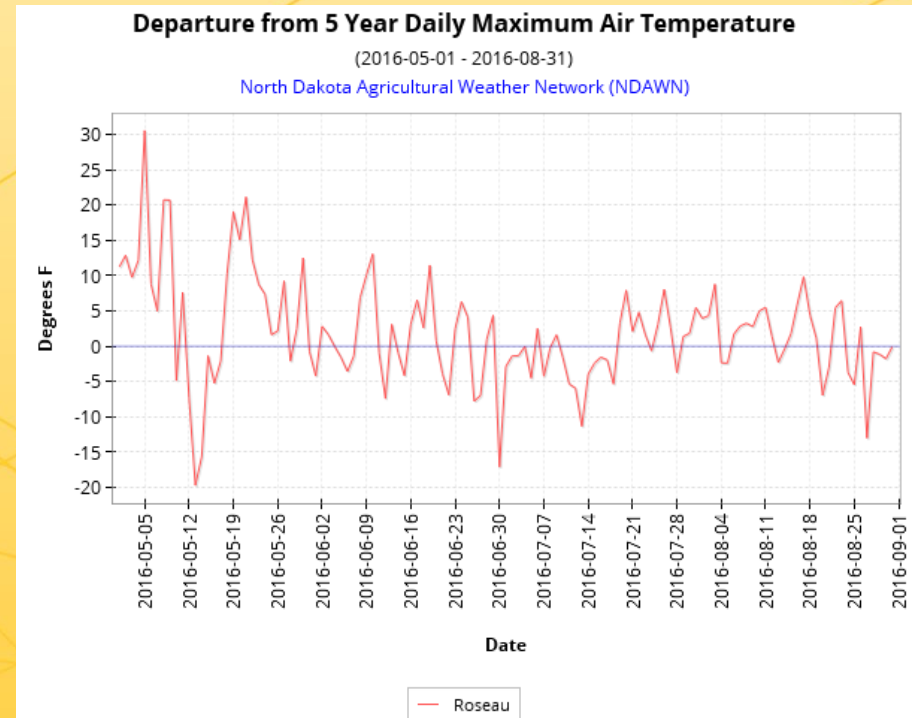
# Canola CPC: Activities in 2016

- **Small plot trials planted May 18**
- **On-farm trials planted early May**
- **CPC Field Day - July 6**
- **First canola swathed August 15**
- **Final harvest date September 3**



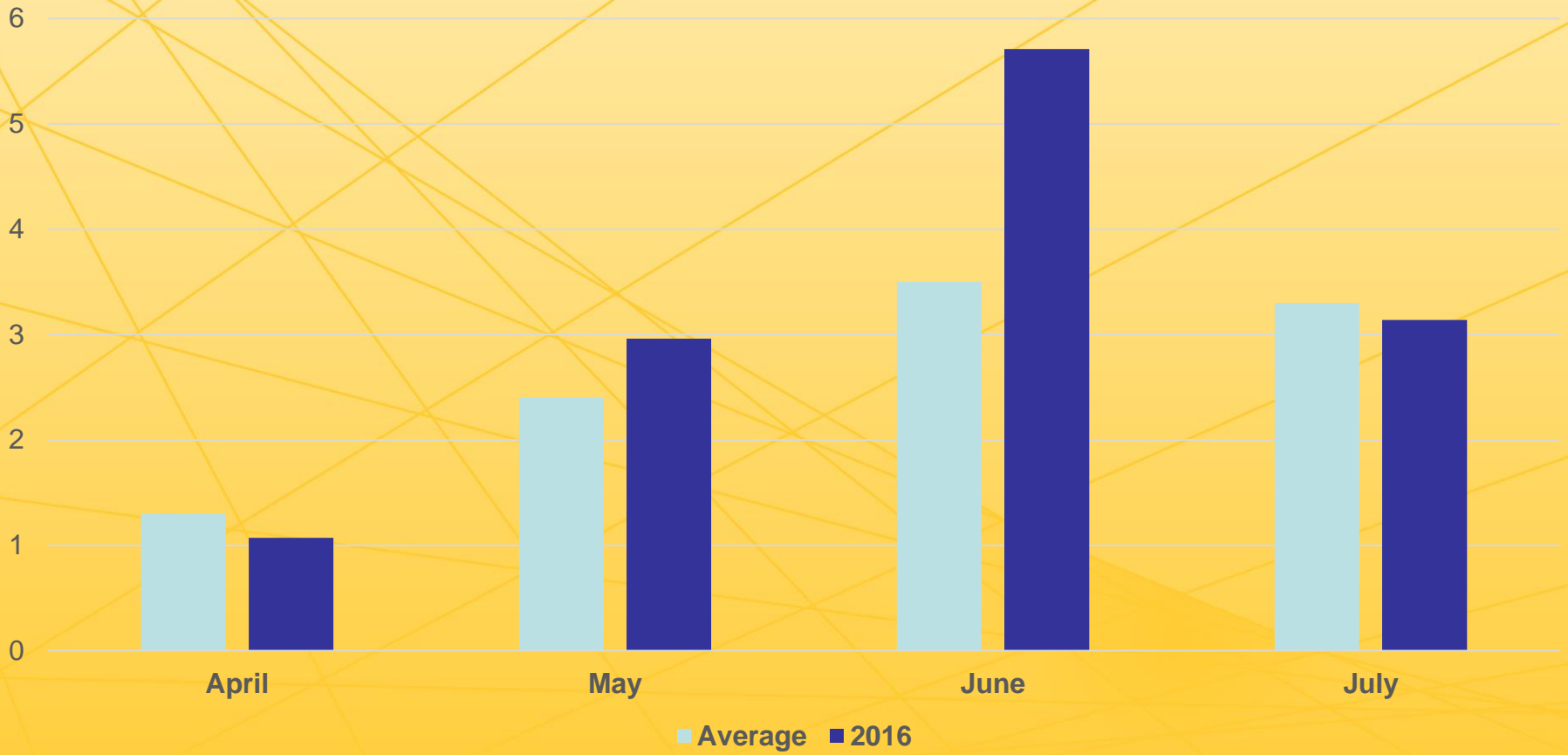
# 2016 Growing Season - Recap

- **Dry winter**
- **Dry early spring**
- **Cool and wet summer**
- **CPC canola yields average**
- **Production fields, dry early, wet conditions late May, June and July**



# Roseau Rainfall in April - July Average Compared to 2016

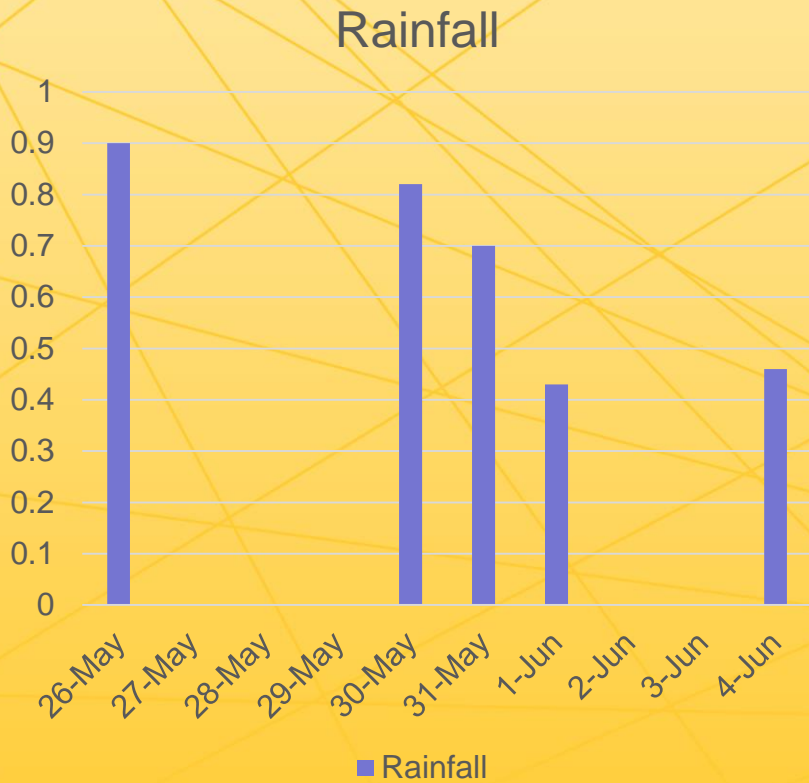
Rainfall in Inches



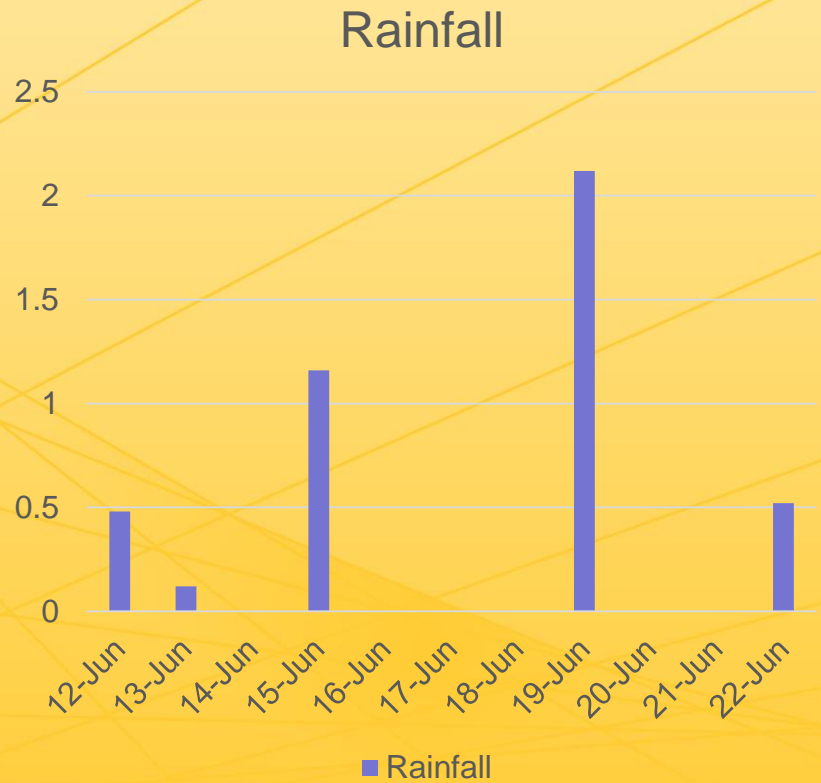


# Accumulated Rainfall from Two -10 day periods

**3.31 inches - 5/26-6/4**



**4.4 inches - 6/12-6/22**



# Small Plot Canola Variety Trial

- Planted May 18, 2016
- RCB w/4 replications
- 37 canola varieties
- 26 RR, 5 SU, 4 LL, 2 CL
- Harvested 8/27 & 9/3
- Yields ranged from 1,709 to 2,623 #/A
- Trial average yield was 2,147 #/A



# Small-Plot Variety Trial - 2016

- **37 entries**
  - 26 Roundup Ready®
  - 5 SU Tolerant®
  - 4 Liberty Link®
  - 2 Clearfield®
- **10 companies**
  - Bayer
  - Brett Young
  - Croplan
  - Cibus
  - DuPont Pioneer
  - Integra
  - Mycogen
  - Monsanto
  - Nuseed
  - Proseed
  - Star Specialty Seeds



# Summary Small-Plot Canola Variety Trial

- Trial average yield = 2,147 #/acre
- Trial range in yield - 1,709 - 2,623 #/acre
- Moderate white mold pressure, Proline 5.7oz/A applied to entire trial
- Limited flea beetle pressure in 2016
- Canola growers have good choices in RR, LL, CL, and SU canola varieties





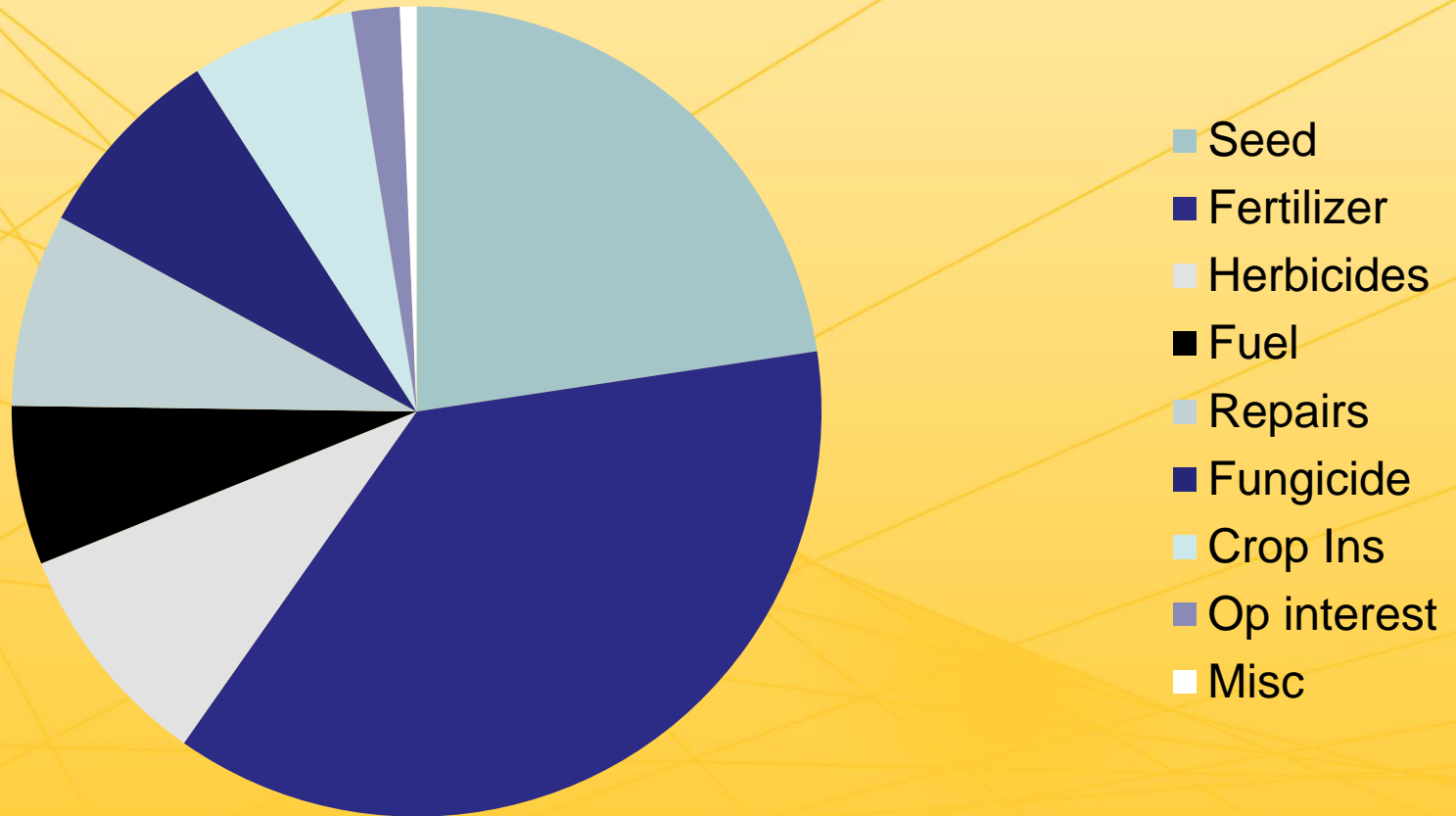
## **Canola Fertility**

**What do we know?**

# Canola Direct Costs (\$221.44) \$/A

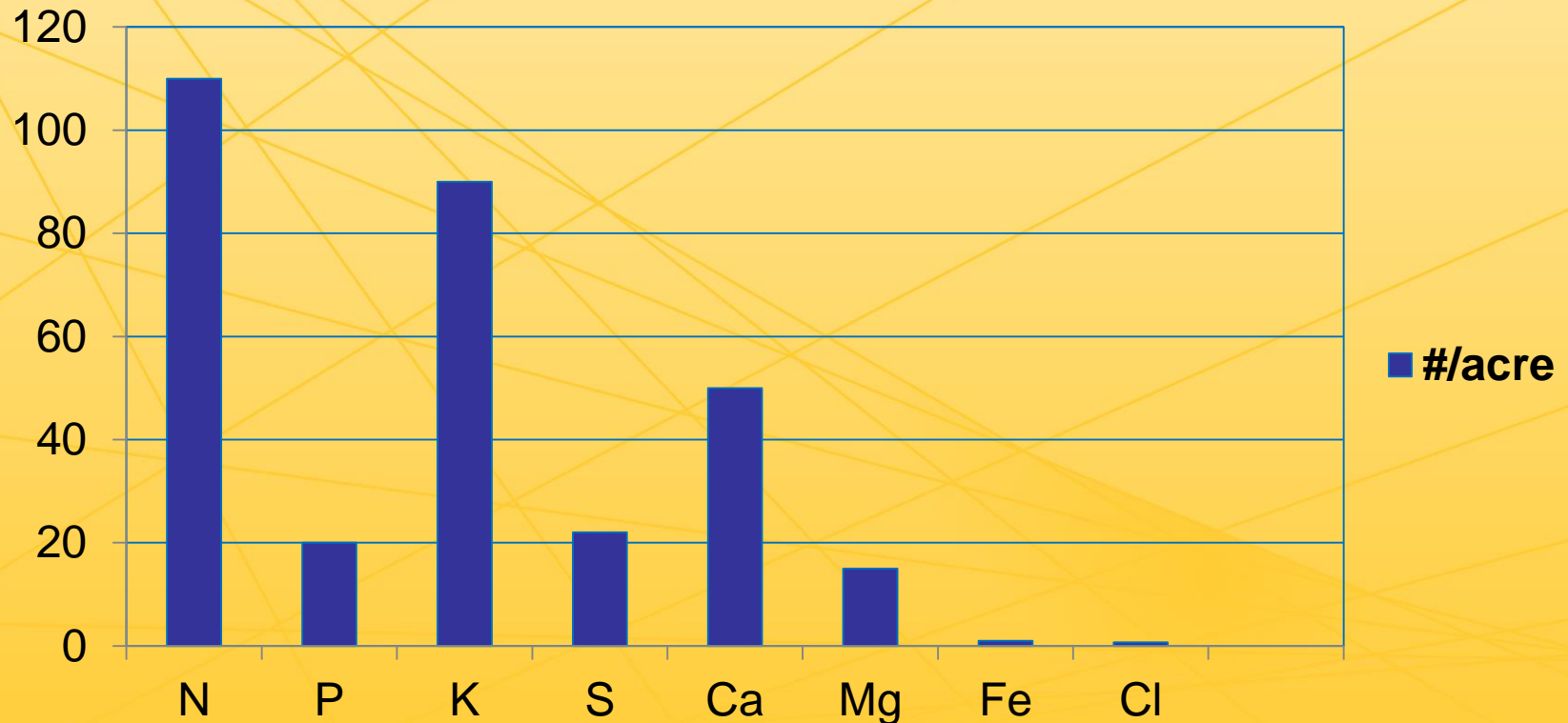
Source: NDSU Crop Budget - 2016

\$/acre



# Nutrient Content (#/acre) in 35 (bu/acre) Canola Crop

Nutrient Content



# Nitrogen Use Efficiency

- **Strategies to reduce applied nitrogen loss**
  - Reduce waterlogged soil conditions
  - Incorporate nitrogen when possible
  - Delay N availability
  - Split applications
  - Coated urea (ESN)
  - Stabilized nitrogen (Agrotain)





# Canola Fertility Trial

- **Objective to compare 100% soil applied nitrogen to a base nitrogen applied at planting and followed up with post emergence dry and liquid nitrogen**
- **Post emergence timing 3 to 5 leaf canola**
- **Soil applied N only: 0,90,135 and 180**
- **Soil base N of 45 followed by post emergence dry and liquid rates: 45, 90, 135**



# Small Plot Fertility Treatments

- Urea PPI - 0, 90, 135, 180
- Urea + ESN - 0, 90, 135, 180
- Urea PPI + Post w/Agrotain Ultra
  - 45+45, 45+90, 45+135
- Urea PPI + Post + 28%
  - 45+45, 45+90, 45+135
- Post urea applied 3-5 leaf canola on June, 14 and 28% applied on June 16



# Small Plot Fertility Trial

- Previous crop – Perennial ryegrass
- Planting date: May 18
- RCB w/4 reps
- Background nitrogen @ 0-24 = 33#
- 26-40-40-20S - applied PPI to entire trial
- Post fertility applied June, 14 & 16 (3-5 lb canola)



# Canola Fertility Trial

- **Canola variety - Star 402**
- **Seeding date: May 18**
- **Post fertilizer applied June 14 & 16 to 3 to 5 lb canola**
- **0.5 inch rain after post fertilizer treatments applied**
- **Canola yields ranged from 1,78 to 3,036 #/A**



# Post Emergence Fertility Timing

Plot Overview



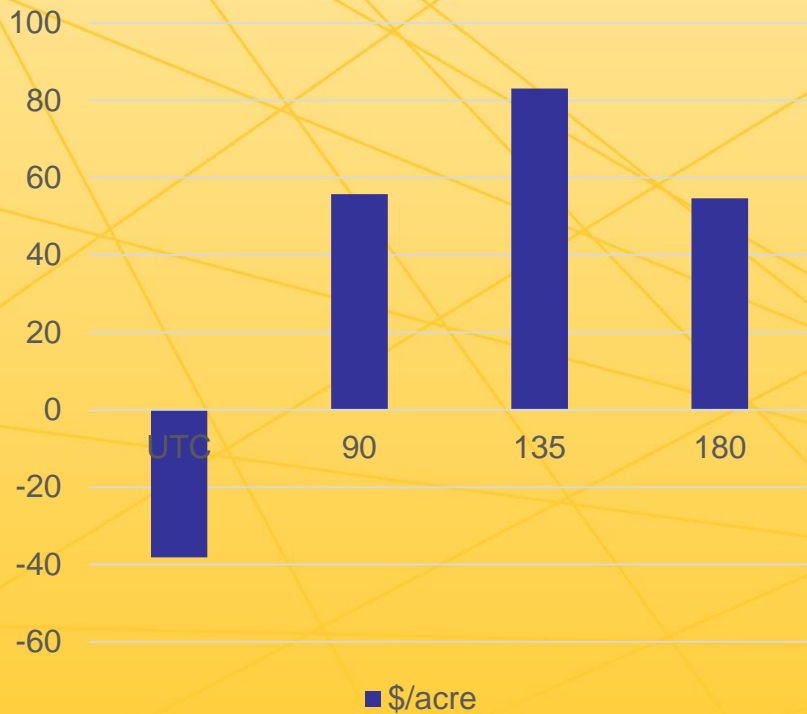
Close up



# Canola Net Return/Acre

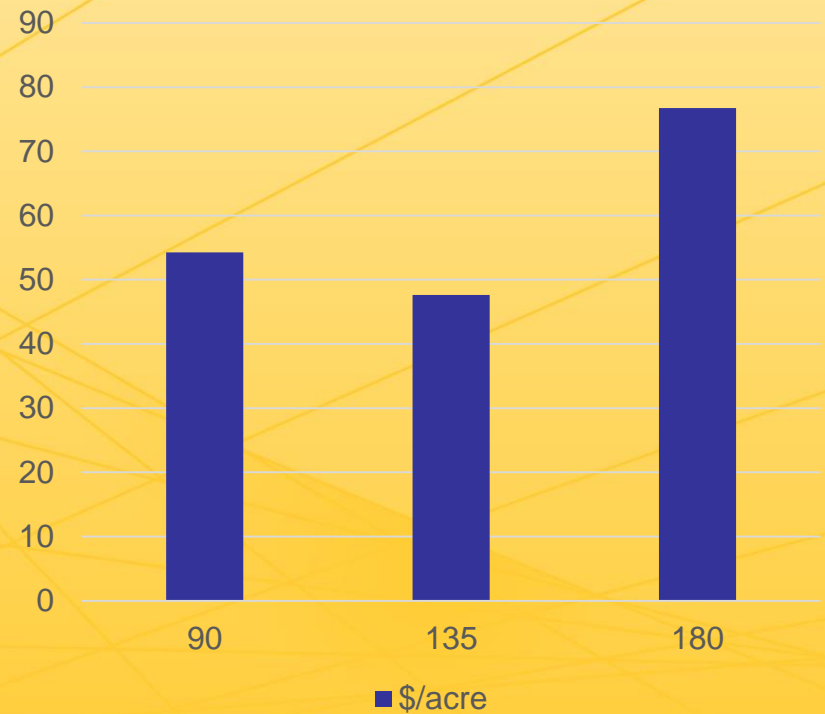
## PPI - Nitrogen

\$/acre



## Nitrogen 50/50 – ESN/Urea

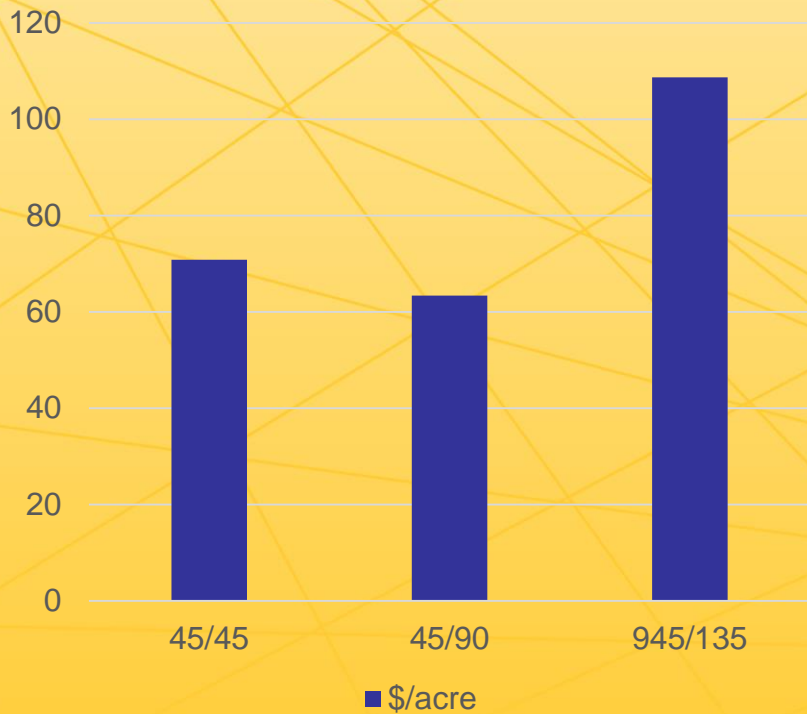
\$/acre



# Canola Net Return/Acre

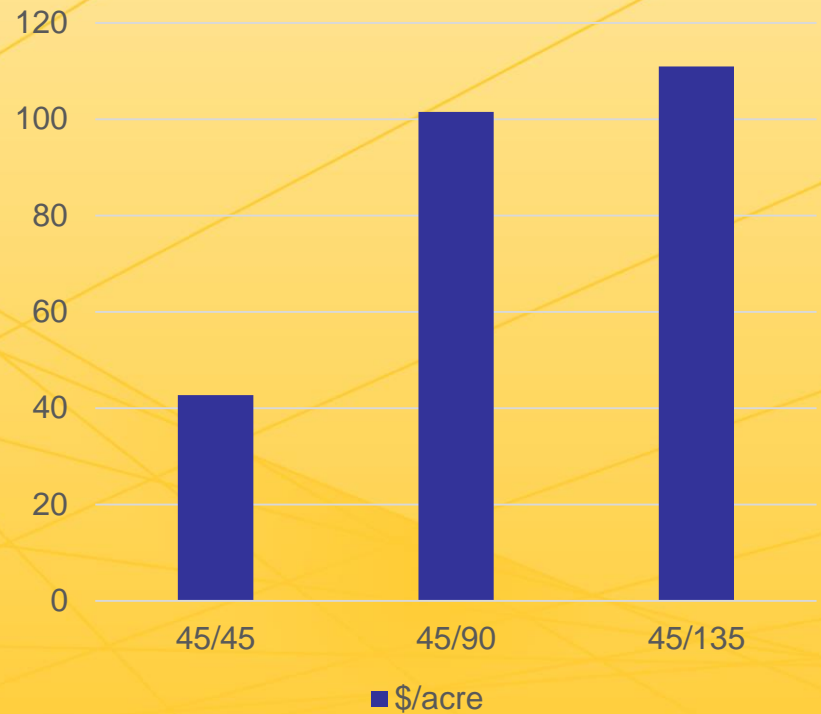
## Liquid 28%

\$/acre



## Dry Urea

\$/acre



# Canola Fertility Summary

- **No 'Silver Bullet'**
- **Treatments that improve N efficiency**
  - **Urea PPI with ESN**
  - **Urea PPI followed by urea post emergence dry or liquid**
- **Majority of nitrogen uptake 4-lf to bloom**
- **Crop sensors and UAV as a diagnostic tools??**



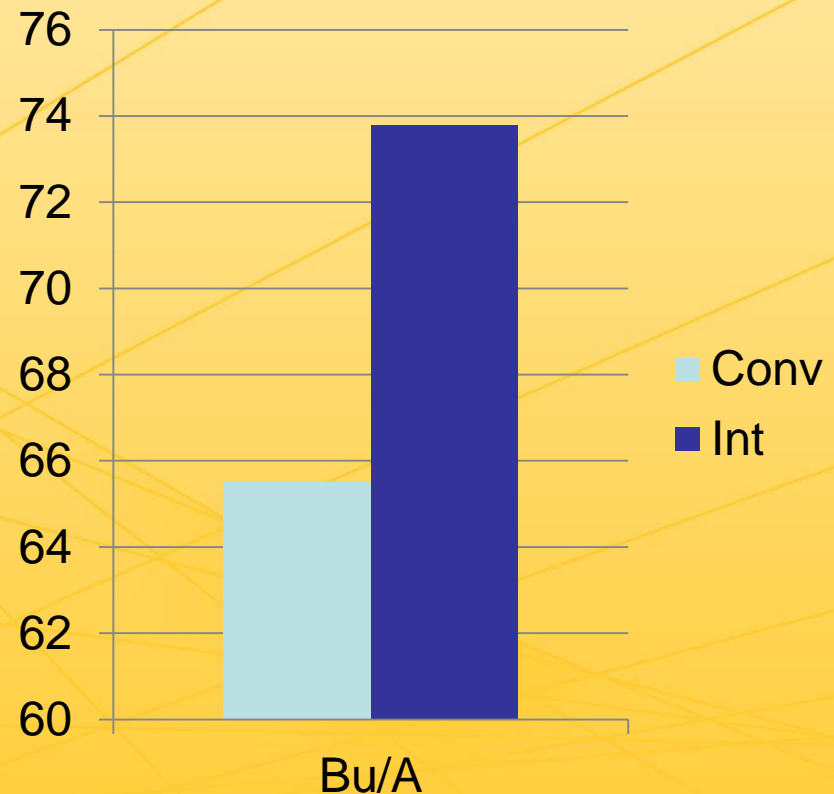


# Do Crops Respond to Multiple Fungicide Applications?

## Wheat and Ryegrass

- **MN Variety Trials 2015**
- **12.2 bu/a advantage in northern trials with intensive fungicide treatments compared to conventional**
- **Mnturfseed.org: ryegrass seed yield advantage of over 200 pounds/acre**

## Wheat Data – U of MN



# Small Plot Fungicide Trial

- **Previous crop perennial ryegrass**
- **RCB with 4 reps**
- **Canola seeded 5/18/16**
- **Canola seeded in 6 inch rows @ 12.5 and in 12 inch rows 9PLS/ft<sup>2</sup>.**
- **Fungicide treatments applied with backpack sprayer @ 17 gpa and 30 psi**
- **Plots swathed 8/16 and harvested 8/31/16**



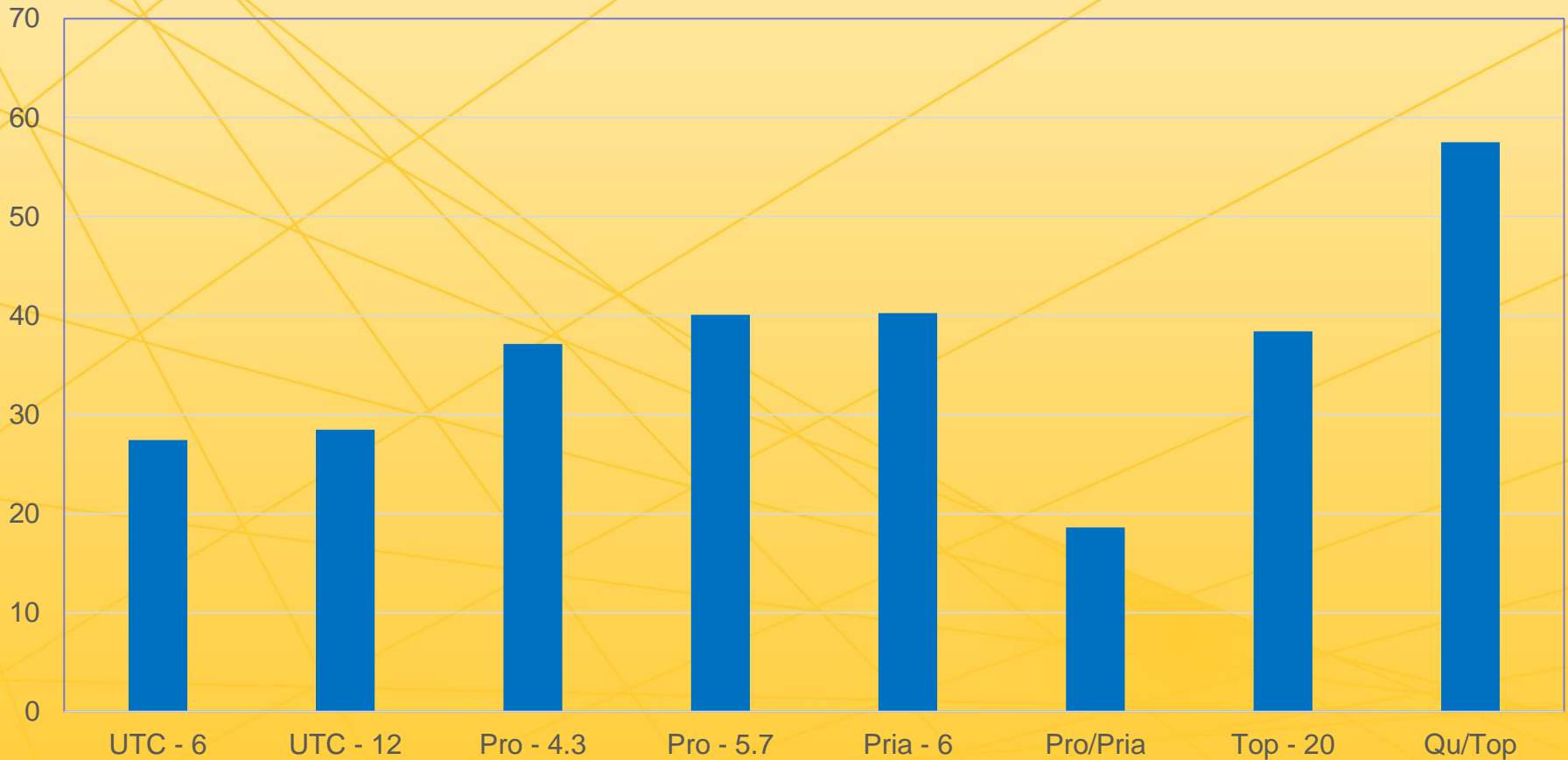
# Fungicide Treatments

- **First timing 20% bloom (first petal) fall**
- **Second timing 75% bloom**
- **Untreated canola, 6 and 12 inch rows**
- **Fungicide treated canola in 6 inch rows**
- **First timing - Proline 4.3 and 5.7, Topsin 20 oz/ac**
- **Second timing Priaxor 6 oz/ac**
- **Splits - Proline/Priaxor & Quash/Topsin**



# Canola Net Profit/Acre Influenced by Row Space and Fungicides

\$/acre



# Summary Fungicide Trial

- **Moderate white mold pressure in 2016**
- **No difference in canola yield from 6 or 12 inch rows**
- **A sequential treatment of Quash at first petal fall/Topsin at 75% bloom gave highest net return of \$57.51/ac**
- **Late season alternaria observed in 2016**
- **No evidence of Blackleg**



# Canola Row Space & Seeding Rate Trial

- **Cooperative trial with North Dakota Canola Growers**
- **Canola variety LL 140-P**
- **Row spacings - 6, 12 & 24 inches**
- **Seeding rates - 3, 6, 9 & 12 PLS/ft<sup>2</sup>**
- **Seeding rates - 1.6, 3.2, 4.8 & 6.4 #/acre**
- **Plots seeded with small research seeder gravity drop**



# Canola Stubble After Harvest

6 inch rows - 12 PLS/ft<sup>2</sup>



6 inch rows - 3 PLS/ft<sup>2</sup>



# Canola Stubble After Harvest

Canola 12 inch rows



Canola 24 inch rows

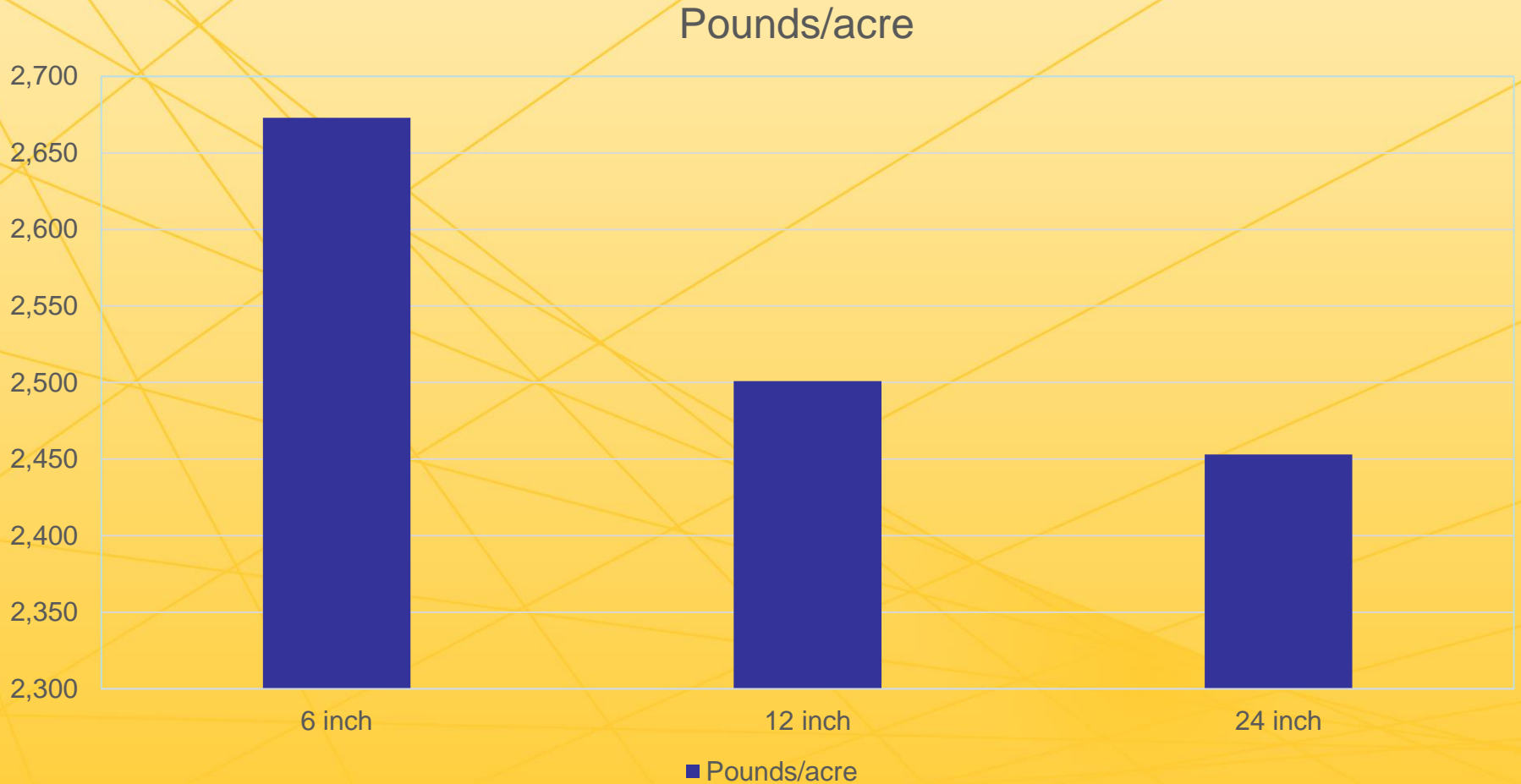




# Canola Row Spacing/Seeding Rate Trial 2015 & 2016

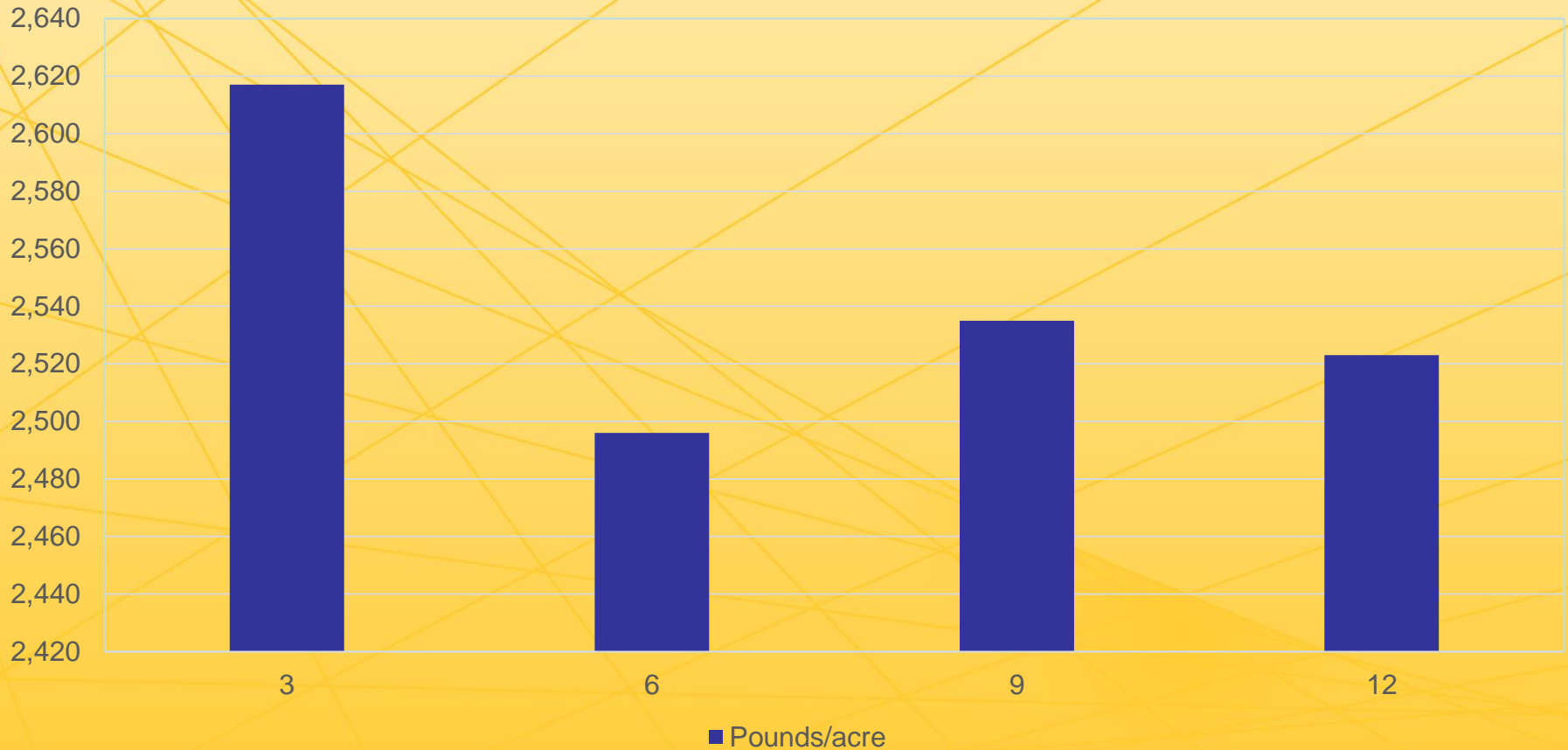
Trt.#	Row Spacing	PLS/Ft.2	Seeding Rate			Seed Yield(#/ac.) <sup>1</sup>			\$\$Profit/acre		
			2015 #/acre	2016 #/acre	pls/ac.	2015	2016	2Yr. Ave.	net 2016	net 2015	Net mean 2015-16
1	6"	3	1.6	1.3	131000	<b>2518</b>	<b>2706</b>	<b>2612</b>	\$91.90	\$62.09	<b>\$77.00</b>
2	6"	6	3.2	2.6	261000	<b>2636</b>	<b>2787</b>	<b>2712</b>	\$89.29	\$62.19	<b>\$75.74</b>
3	6"	9	4.8	3.8	392000	<b>2850</b>	<b>2533</b>	<b>2692</b>	\$35.69	\$76.69	<b>\$56.19</b>
4	6"	12	6.4	5.1	523000	<b>3194</b>	<b>2590</b>	<b>2892</b>	\$27.76	\$110.69	<b>\$69.23</b>
5	12"	3	1.6	1.3	131000	<b>2692</b>	<b>2498</b>	<b>2595</b>	\$60.70	\$88.19	<b>\$74.45</b>
6	12"	6	3.2	2.6	261000	<b>2972</b>	<b>2310</b>	<b>2641</b>	\$17.74	\$112.59	<b>\$65.17</b>
7	12"	9	4.8	3.8	392000	<b>2901</b>	<b>2695</b>	<b>2798</b>	\$59.99	\$84.34	<b>\$72.17</b>
8	12"	12	6.4	5.1	523000	<b>3337</b>	<b>2500</b>	<b>2919</b>	\$14.26	\$132.14	<b>\$73.20</b>
9	24"	3	1.6	1.3	131000	<b>2898</b>	<b>2568</b>	<b>2733</b>	\$71.20	\$119.09	<b>\$95.15</b>
10	24"	6	3.2	2.6	261000	<b>2561</b>	<b>2391</b>	<b>2476</b>	\$29.89	\$50.94	<b>\$40.42</b>
11	24"	9	4.8	3.8	392000	<b>2822</b>	<b>2376</b>	<b>2599</b>	\$12.14	\$72.49	<b>\$42.32</b>
12	24"	12	6.4	5.1	523000	<b>3018</b>	<b>2475</b>	<b>2747</b>	\$10.51	\$84.29	<b>\$47.40</b>
	LSD @5% level					<b>518</b>	<b>318</b>	<b>320</b>			
	CV(%)					12	8	8			

# Canola Yield (#/acre) Averaged over Seeding Rate - 2016



# Canola Yield (#/acre) Averaged over Row Space - 2016

Pounds/acre



# Summary Row Spacing Seeding Rate Trial

- **Years differential response to seeding rate. 2015 higher seeding rate gave better yields while in 2016 lower seeding rates were better especially at the 6 inch spacing**
- **Research planter not precision and as a result doubles and gaps in seed row observed**
- **Canola appears to respond to a wide range of seeding rates and row spacings**



# Canola Seed Shatter Trial

- **Objective to determine direct harvest potential in canola varieties by an evaluation in seed shatter and pod drop when canola allowed to stand past normal harvest window**



# Canola Shatter Trial Methods

- Trial seeded in 12 inch rows - 9PLS/ft<sup>2</sup>
- Two collection pans placed in each plot beginning at swathing timing
- Seed collected weekly for 28 days
- 19 canola entries
  - 15 RR
  - 3 SU
  - 1 LL



# Canola Shatter Trial

Collection pans



Plot overview



# Canola Shatter Trial

Plot overview 9/23/16



Seeds and pods





# Canola Seed and Pod Shatter

**Pods Open**



**Whole Pods & Clusters**



# Canola Seed and Pod Shatter

## Seed Shatter



## Pod and Seed Shatter



# Summary Canola Shatter Trial

- **Both seed shatter and pod drop contributors to total canola seed shatter losses**
- **Varietal differences observed in both canola seed shatter and pod drop**
- **In 2016, the majority of seed shatter occurred after production fields would have been harvested**
- **Canola have options in variety selection for direct harvest**



# Questions



# Contact Information

- [www.mncanola.org](http://www.mncanola.org)
- [dave.grafstrom@northlandcollege.edu](mailto:dave.grafstrom@northlandcollege.edu)
- **Dave Grafstrom**
- **Cell: 320-293-8722**

