Canola tolerance to Spartan (sulfentrazone)

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Background

- Canola growers rely solely on postemergence herbicides (Glyphosate, Liberty)
- Spartan is a soil-applied herbicide that controls broadleaf weeds
- Have observed previously that Spartan is weak on mustard species
- Spartan is not labeled for use in canola
- Current rotation restriction to canola is 12-24 months depending on label
- If safe on canola, Spartan could control some Gly-resistant weeds, such as kochia
- Could help canola growers not be so reliant on postemergence herbicides.

Spartan activity in soil

- Spartan is more active (most injury) in soils with:
  - High pH
  - Low organic matter
  - Light texture (e.g., sandy loam)

- High organic matter can serve as a buffer and reduce crop injury in high pH soils.

Objectives

- Determine canola tolerance to Spartan at different stages (PRE and early POST)
- Evaluate two rates (2 and 4 fl oz)
- Four environments (Landgon and Minot, ND; Roseau, MN; Bozeman, MT)

Canola tolerance to Spartan (sulfentrazone)

Treatment	Rate	Timing	Yield			
			Langdon	Roseau	Minot	Bozeman
No Spartan			3270	2846	1792	1602
Spartan	2 oz	PRE	3139	---	1782	1451
Spartan	4 oz	PRE	3221	---	1720	1060
Spartan	2 oz	Cracking	3048	2712	1684	1281
Spartan	4 oz	Cracking	2673	2467	1582	1282
Spartan	2 oz	1-leaf	3195	2806	1490	1587
Spartan	4 oz	1-leaf	3073	2780	1401	1618
Spartan	2 oz	2-3 leaf	3049	2753	1610	1674
Spartan	4 oz	2-3 leaf	3218	2610	1550	1622
LSD (0.05)			NS	223	NS	224
CV			6.3	5.6	9.8	10.5
			Loam pH 6.7 OM 4.8	Loam pH 8.3 OM 4.5	Loam pH 7.2 OM 3.2	Silt Loam pH 7.0 OM 2.6

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Results and Discussion

- Spartan caused some visible injury at all locations.
- Injury was generally greater with 4 oz compared to 2 oz
- We observed a “rep effect” at Minot and Bozeman, with more injury as pH increased. In other words, one rep had a higher pH than another rep.
- Yield was reduced slightly by Spartan in some treatments
- Langdon and Roseau data showed how higher OM can reduce crop injury
- Canola can tolerate Spartan in fields with the right soil characteristics, but unfortunately, soil characteristics vary even within a field.
- Conditions were generally very dry in 2018. We plan to repeat the study in 2019 and hope for more rainfall to evaluate canola tolerance under wetter conditions. Timing of rainfall may influence crop tolerance.

Effect of planting row width on canola yield

Dave Grafstrom, MN

Background

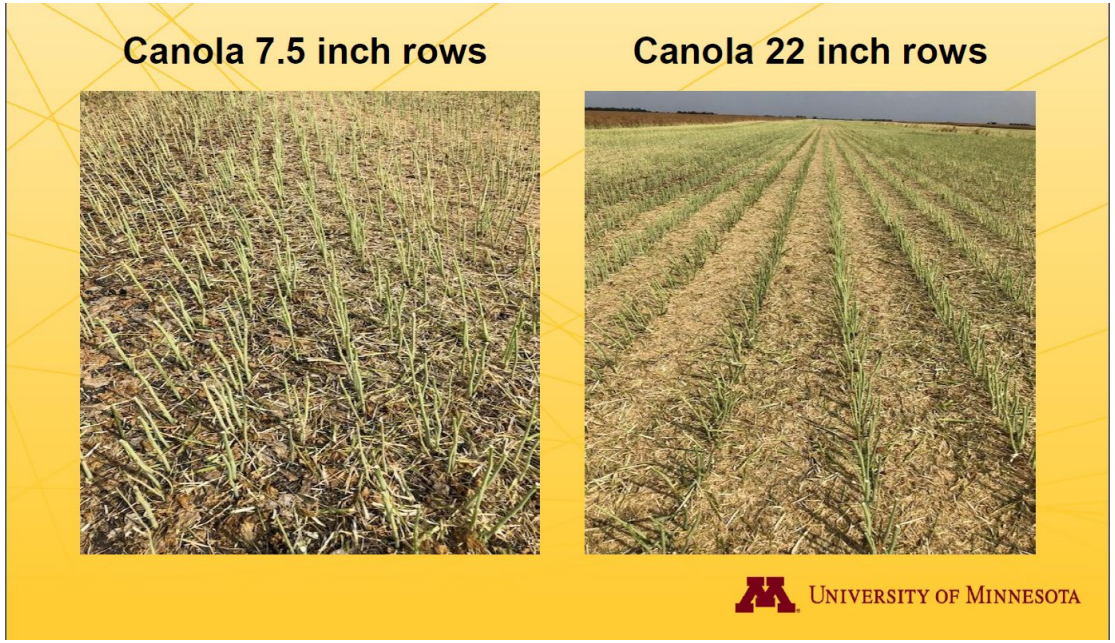
- Canola is typically planted in rows spaced 7.5 inches
- Planting in 22 inch rows could reduce production costs (e. g. saving on seeds)
- Canola growers harvest in two steps, cutting and windrowing and threshing
- Direct harvest would save time and reduce costs

Objectives

- Compare yield and harvest amenability of canola planted at 7.5 and 22 inches using direct harvest

On-Farm trials – Stephen MN

- InVigor L-140P (Clearfield) planted in 7.5 and 22 in rows
- RoundUp used as desiccant



Effect of row spacing on canola production

Production variables	7.5 inch	22 inch	l.s.d (P=0.05)
Seeding rate (lb/A)	4.0	2.5	
Seeds/yard at planting	14.7	27.0	
Plants/yard at harvest	9.3	21.8	
Pant survival (%)	63	81	
Yield (lb/A)	2839	2869	n.s.

Canola 7.5 inch rows

Canola 22 inch rows

Summary

- No yield differences between 7.5 and 22 inch rows
- Plant stands and plant survival at harvest were more variable and lower, respectively, in 7.5 rows than in 22 inch rows
- Intend to conduct the study again to evaluate under different environment

CLUBROOT OF CANOLA: PREVALENCE AND EVALUATION OF SOIL AMENDMENTS

Venkat Chapara, PhD

Plant Pathologist

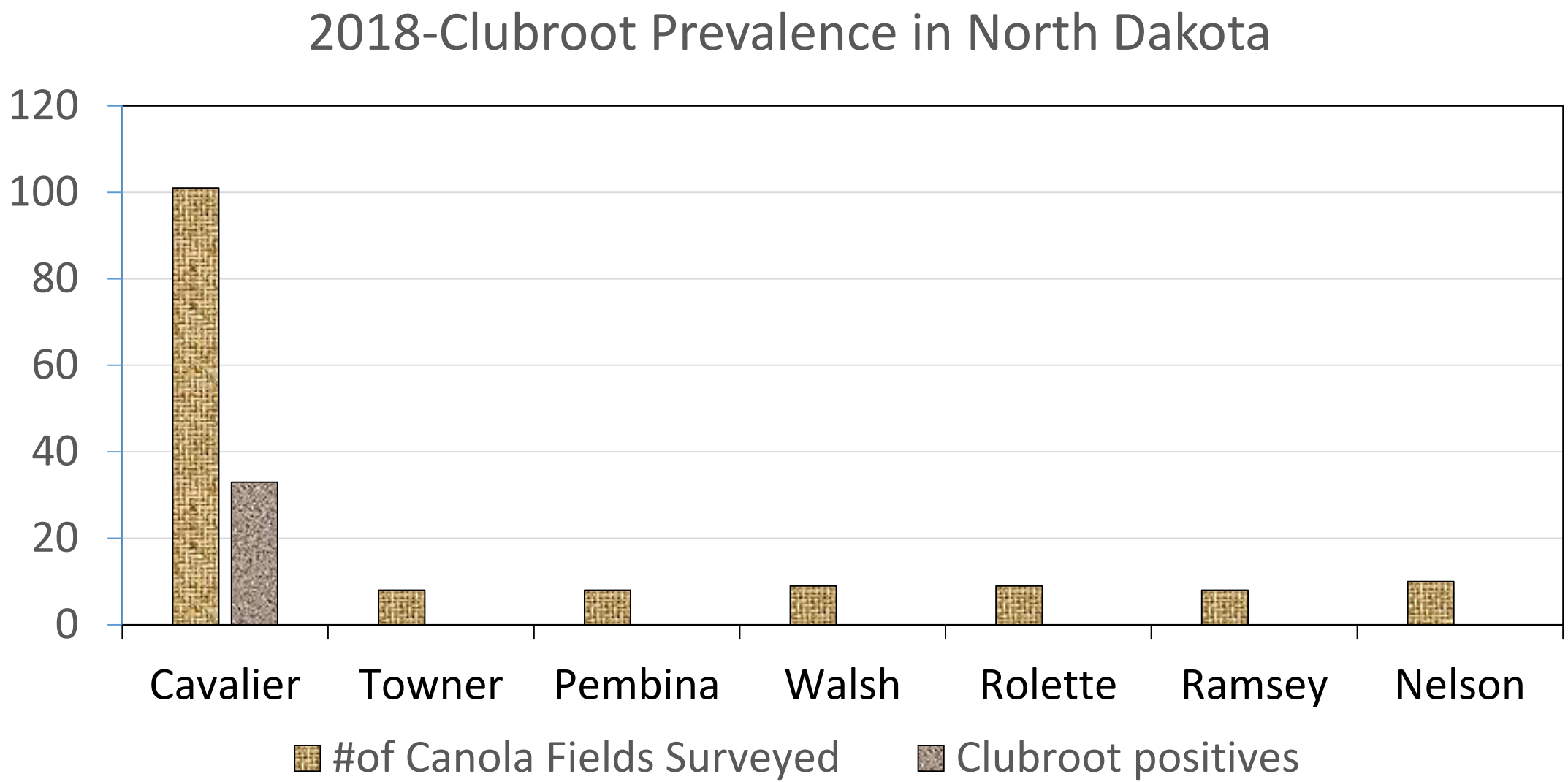
NDSU Langdon REC

Background

- Caused by Protista pathogen *Plasmodiophora brassicae*
- Intracellular parasite with characteristics of some fungi, amoeba, and slime mold
- Affects Brassicaceae (e. g. canola, cauliflower, cabbage, rutabaga, radish, turnip, Brussels sprout, kale, wild mustard, Shepherd's purse, penny cress, stink weed)
- Prefers acidic soils and can survive for up to 20 years in absence of host
- Pathogen causes galls that restrict flow of water and nutrients to plant and can result in 50-100% reduction in yields
- Recently found in Cavalier County
- How prevalent is the disease and how can we manage it?

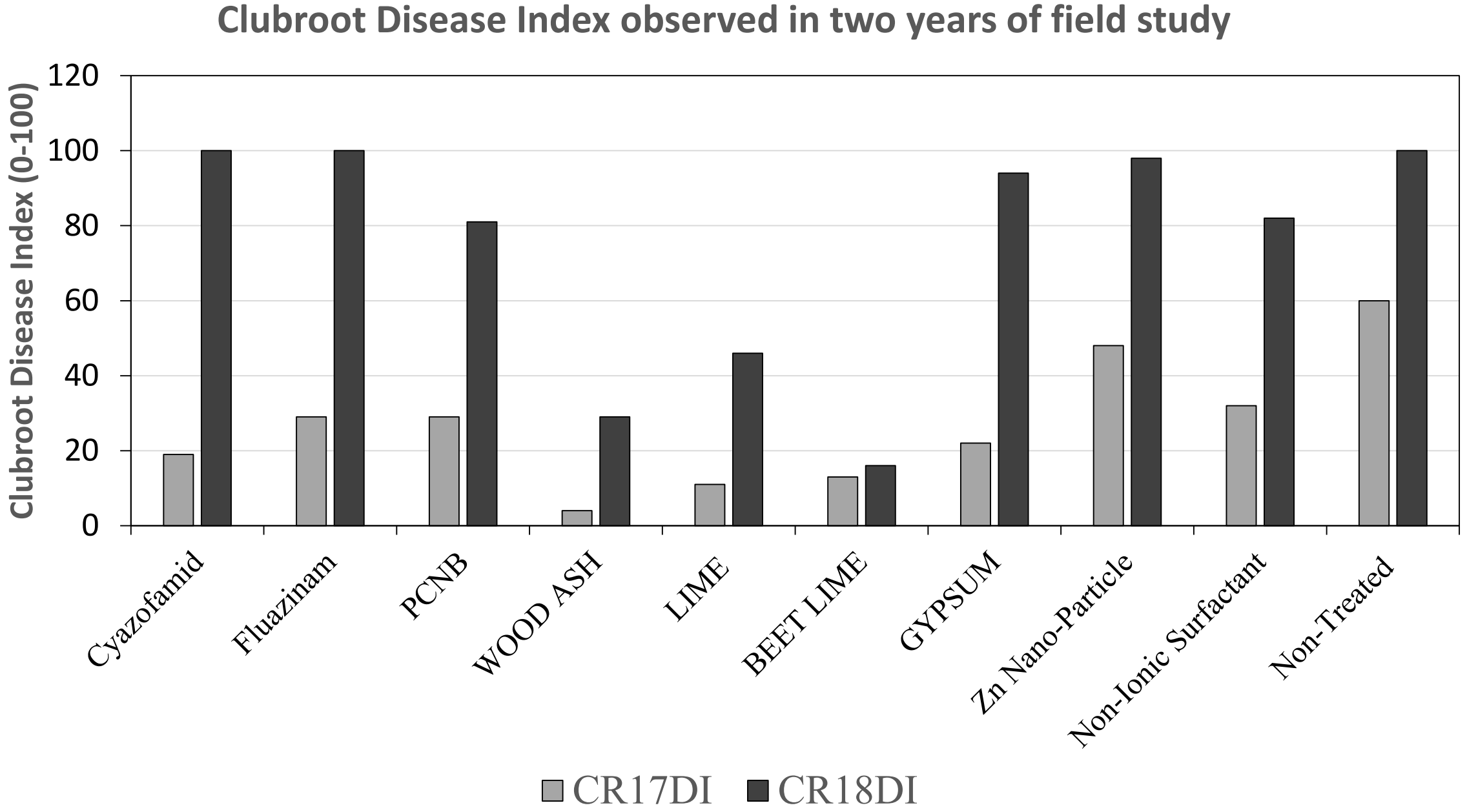
Objectives

- Conduct a survey to determine prevalence and raise awareness about the disease
- Evaluate efficacy of fungicides and soil ameliorating compounds
- Characterize response of commercial cultivars to clubroot
- Review host range of clubroot


2018-Clubroot Prevalence in North Dakota
120
100
80
60
40
20
0
Cavalier
Towner
Pembina
Walsh
Rolette
Ramsey
Nelson
#of Canola Fields Surveyed
Clubroot positives

Evaluation of chemicals, fungicides and soil ameliorating products

Treatment	Trade name	Dosage
Cyazofamid	Ranman	7.5 l/ha
Fluazinam	Allegro	2000 g/ha
PCNB	Blocker	67.5kg/ha
Wood ash	Fly Ash	7.5t/ha
Calcium Carbonate	Pellet Lime (Lime)	7.5t/ha
Beet lime	Versa Lime	15 t/ha
Gypsum	Gypsum	7.5 t/ha
Nano Particle	Zn	500mg/L of Zn
Non-Ionic surfactant	Aqua-Gro 2000	10g/m just before planting Incorporated into rows
Non-treated	CHK	


Clubroot Disease Index observed in two years of field study
Clubroot Disease Index (0-100)
120
100
80
60
40
20
0
Cyazofamid
Fluazinam
PCNB
WOOD ASH
LIME
BEET LIME
GYPSUM
Zn Nano-Particle
Non-Ionic Surfactant
Non-Treated
CR17DI
CR18DI

Summary

- Beet lime (Versa lime) and Pellet Lime showed promising results in both
- Wood ash (Fly Ash) has efficacy potential, more research and dose determination needed
- Urgent need of more products to be tested under field condition
- Resistant varieties can be used with recommended length of crop rotations

Future research

- Combination of a resistant variety and beet lime worth testing in high soil population to allow growers for a shorter rotations as their current practice
- Pathotype/race typing need to be done ASAP

Survey of canola pests and blackleg management

Luis del Río
North Dakota State University

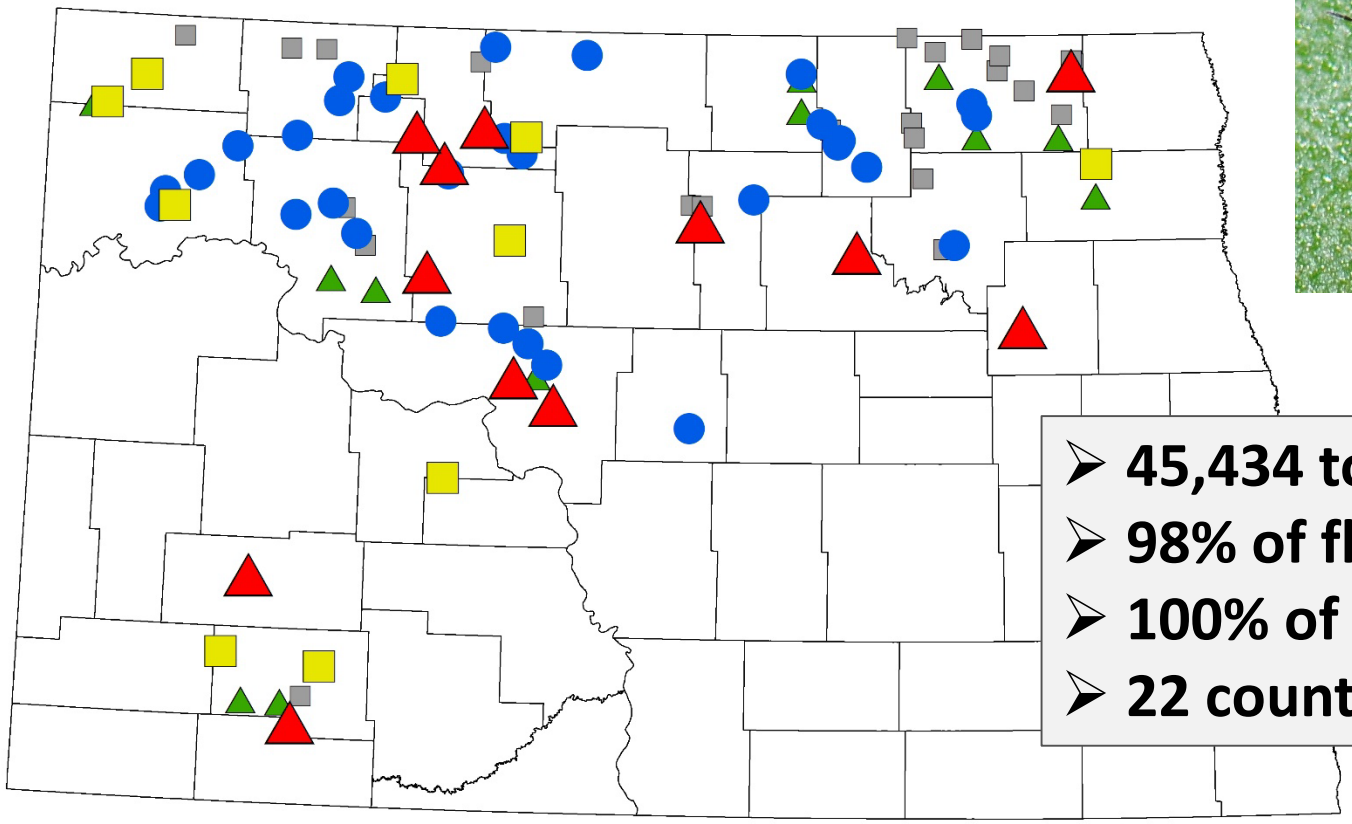
Objectives

- Characterize prevalence of pests affecting canola production
- Evaluate efficacy of seed treatments to manage blackleg




Insect pest survey

Crucifer flea beetle (*Phyllotetra cruciferae*)



- 45,434 total specimens
- 98% of flea beetles collected
- 100% of the fields positive
- 22 counties out of 22

Total number of Flea Beetles Collected per 100 Sweeps

• 0 ■ 1-50 ▲ 51-100 ● 101-500 ■ 501-1000 ▲ >1000

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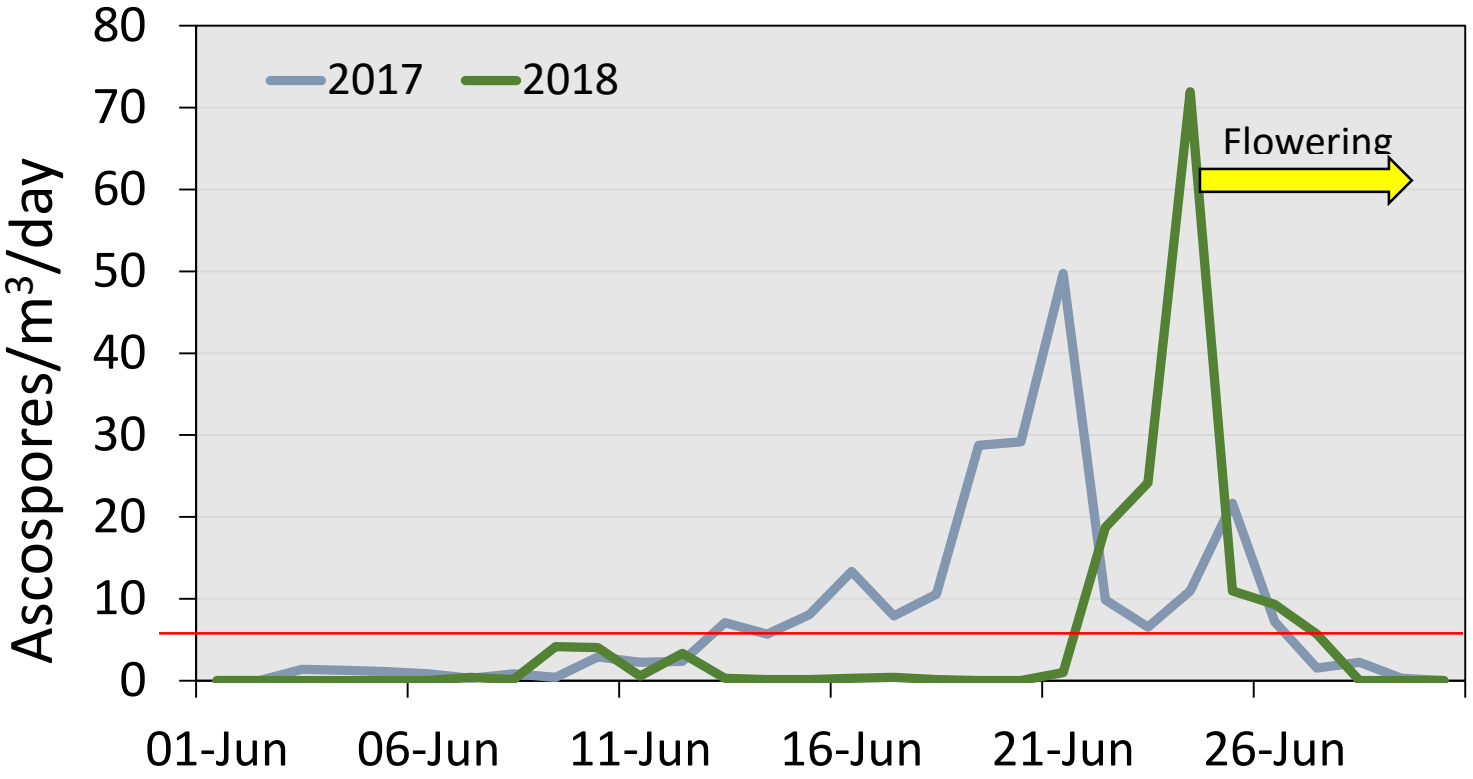
Disease survey

State-wide summary

Diseases	2016	2017	2018
Fields scouted	82	83	85
Mean Aster yellows incidence (%)	<1	<1	0
Fields with Aster yellows (%)	0	9	0
Number of new fields with clubroot	0	0	0
Mean SSR incidence (%)	7	<1	<1
Fields with SSR (%)	49	5	5
Mean blackleg incidence (%)	14	10	1
Fields with blackleg (%)	73	41	12
Fields with blackleg >30% (%)	17	16	1

Temporal patterns of *L. maculans* airborne ascospore concentrations in Langdon, ND



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Effect of seed treatments on blackleg severity under greenhouse and field conditions

Seed treatments (trade name)	Greenhouse trials[1]		Field trial[2]		
	Seedlings	Adult	Stand	Incidence	Severity
Dynasty	4.5 b	78 abc	31 a	98 a	89 a
Prosper EverGol	5.0 b	83 ab	-	-	-
Helix Vibrance	4.3 b	74 bc	32 a	98 a	88 a
Maxim	4.0 b	91 a	27 a	98 a	90 a
Obvius	2.8 c	68 c	24 a	97 a	88 a
Non-protected control	7.3 a	89 a	33 a	99 a	91 a

Summary

- All treatments reduced disease severity on seedlings
- Protective effect of seed treatments did not translate into lasting protection in fields
- Seed treatment protection wears out two weeks after planting
- Seed treatments as only management tool are not enough against blackleg
- Intend to repeat study adding cultivars with different sensitivities to blackleg