

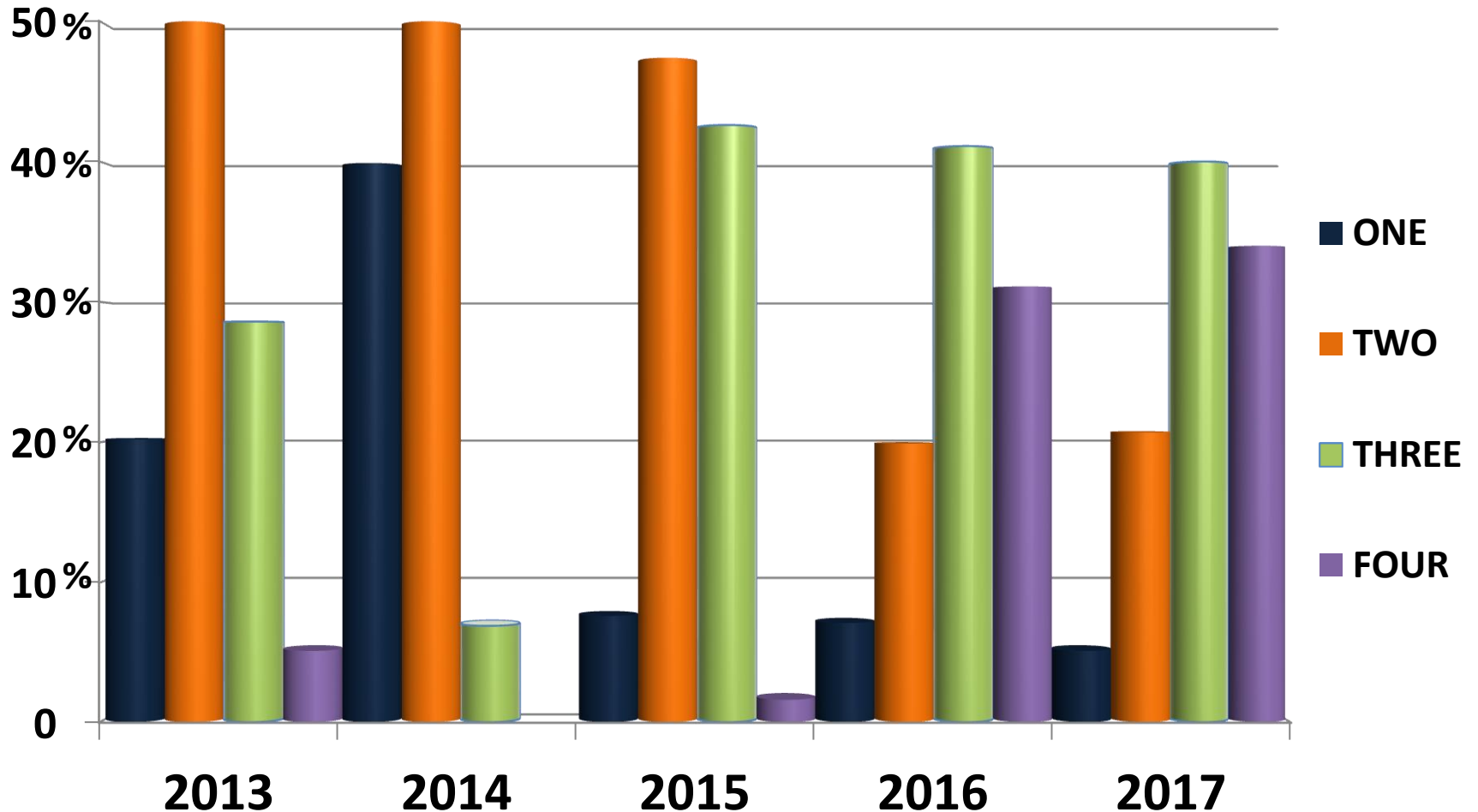
Disease and Insect Management

CERCOSPORA LEAFSPOT (CLS)

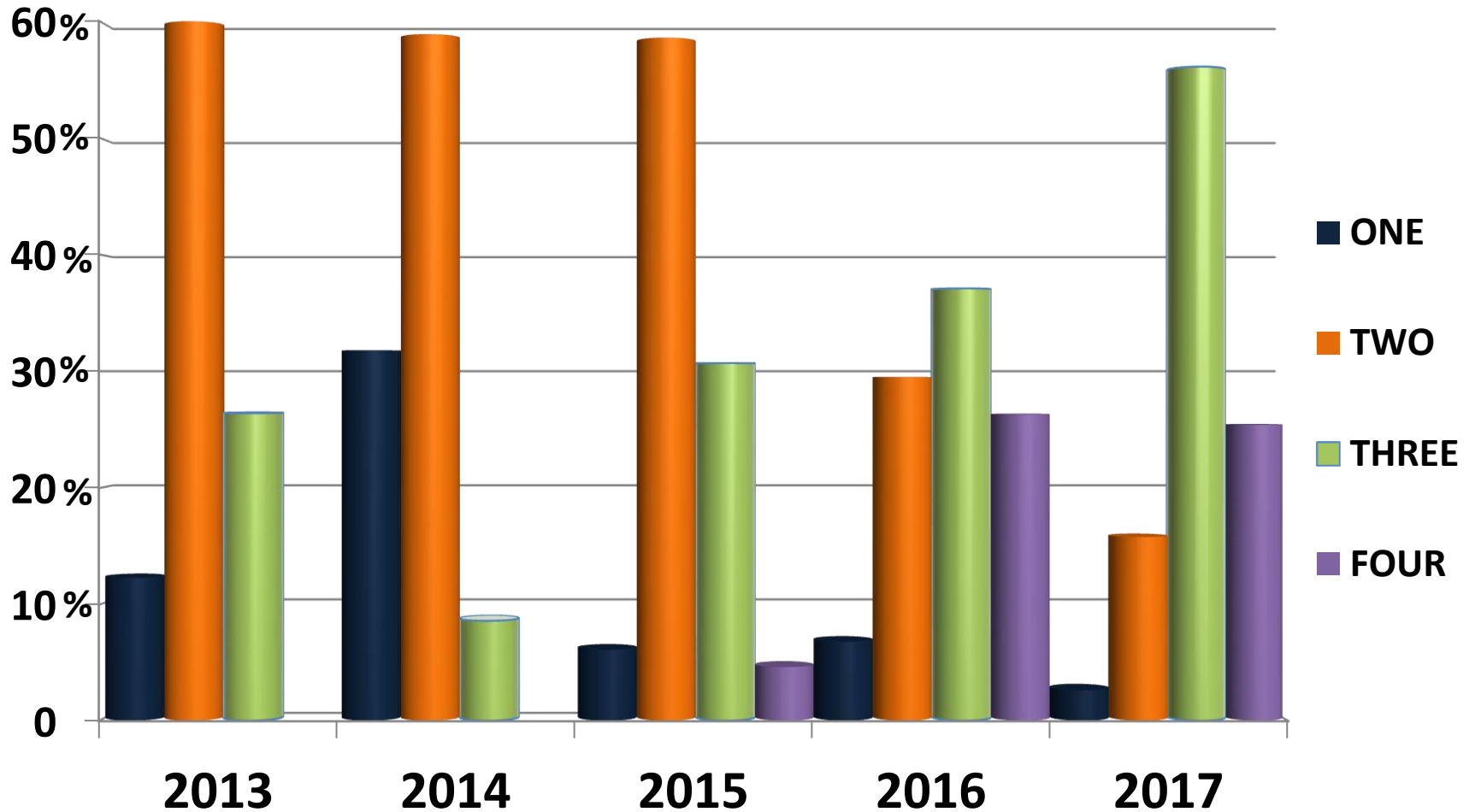
Strategies to Manage Fungicide Resistance



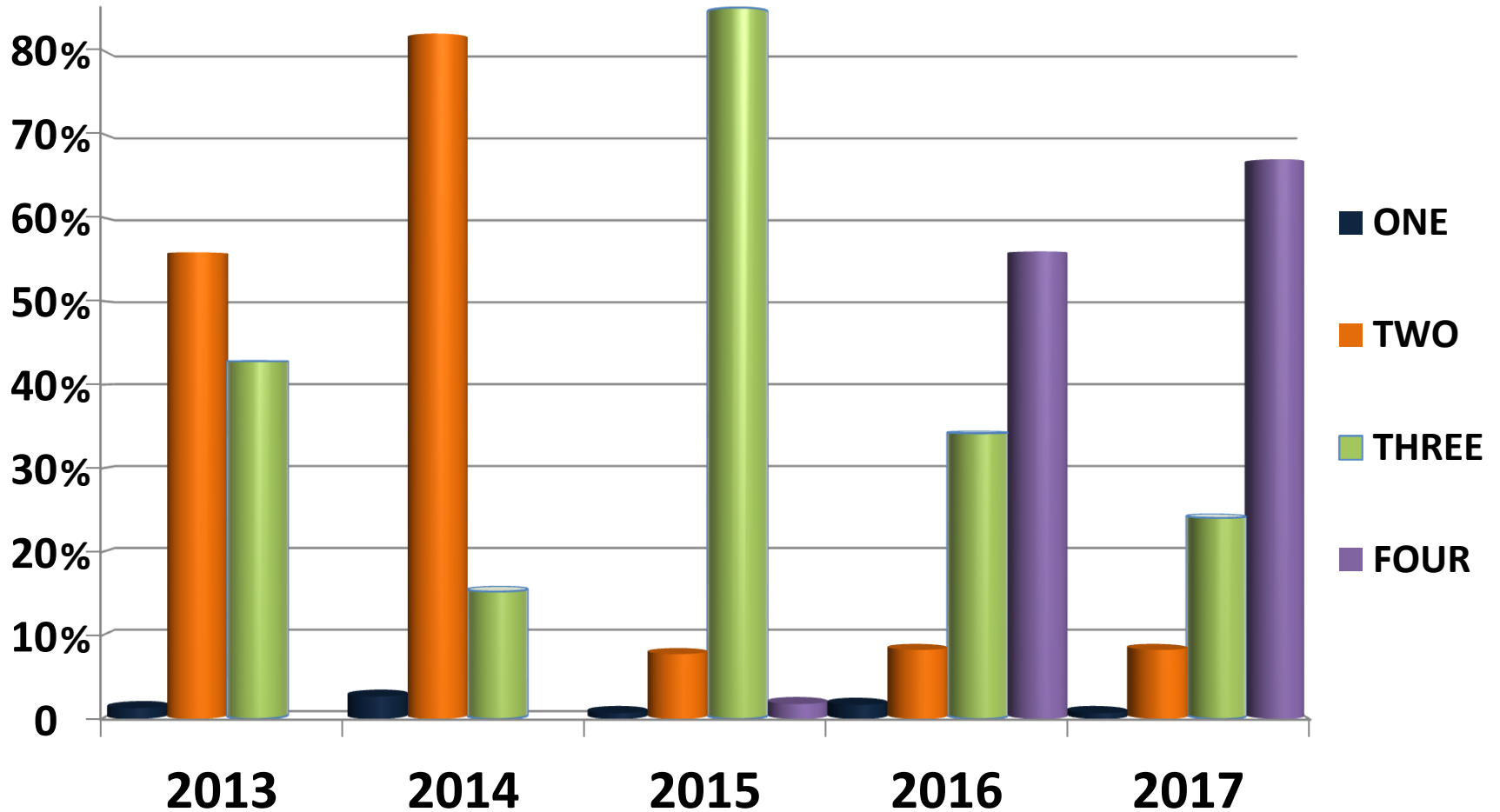
ACSC RED RIVER VALLEY NUMBER OF SPRAYS PER FIELD



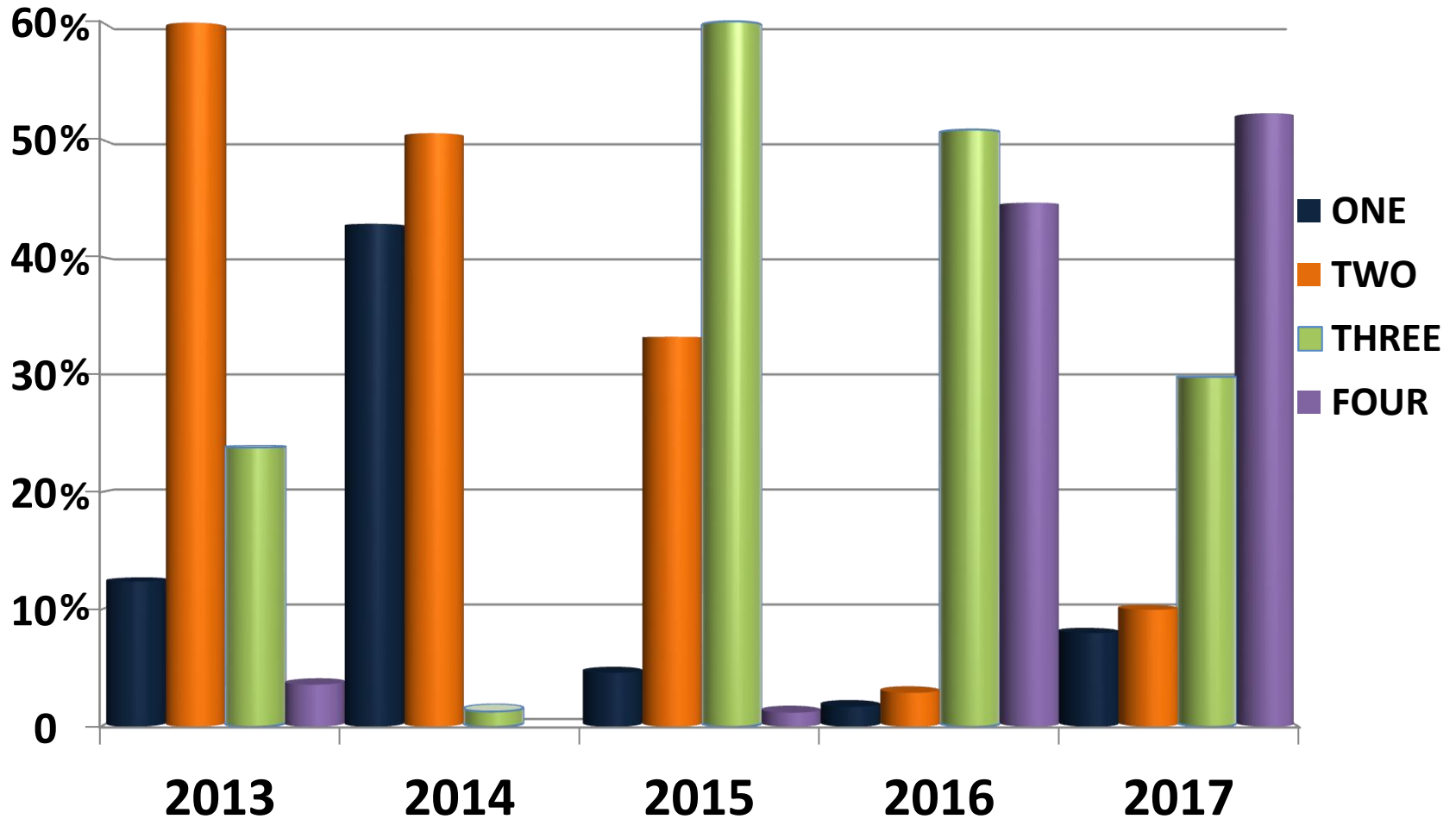
EAST GRAND FORKS DISTRICT NUMBER OF SPRAYS PER FIELD



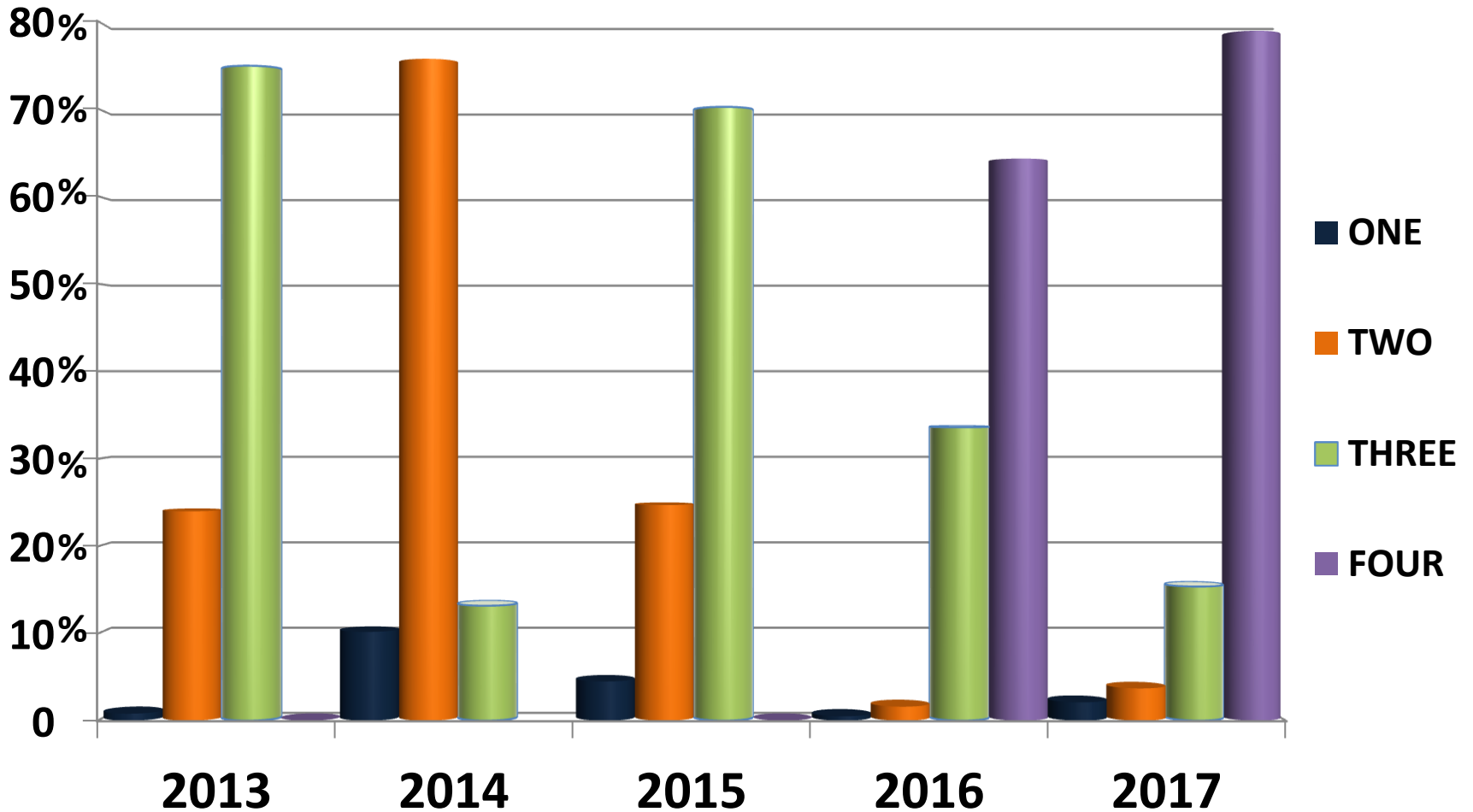
HILLSBORO DISTRICT NUMBER OF SPRAYS PER FIELD



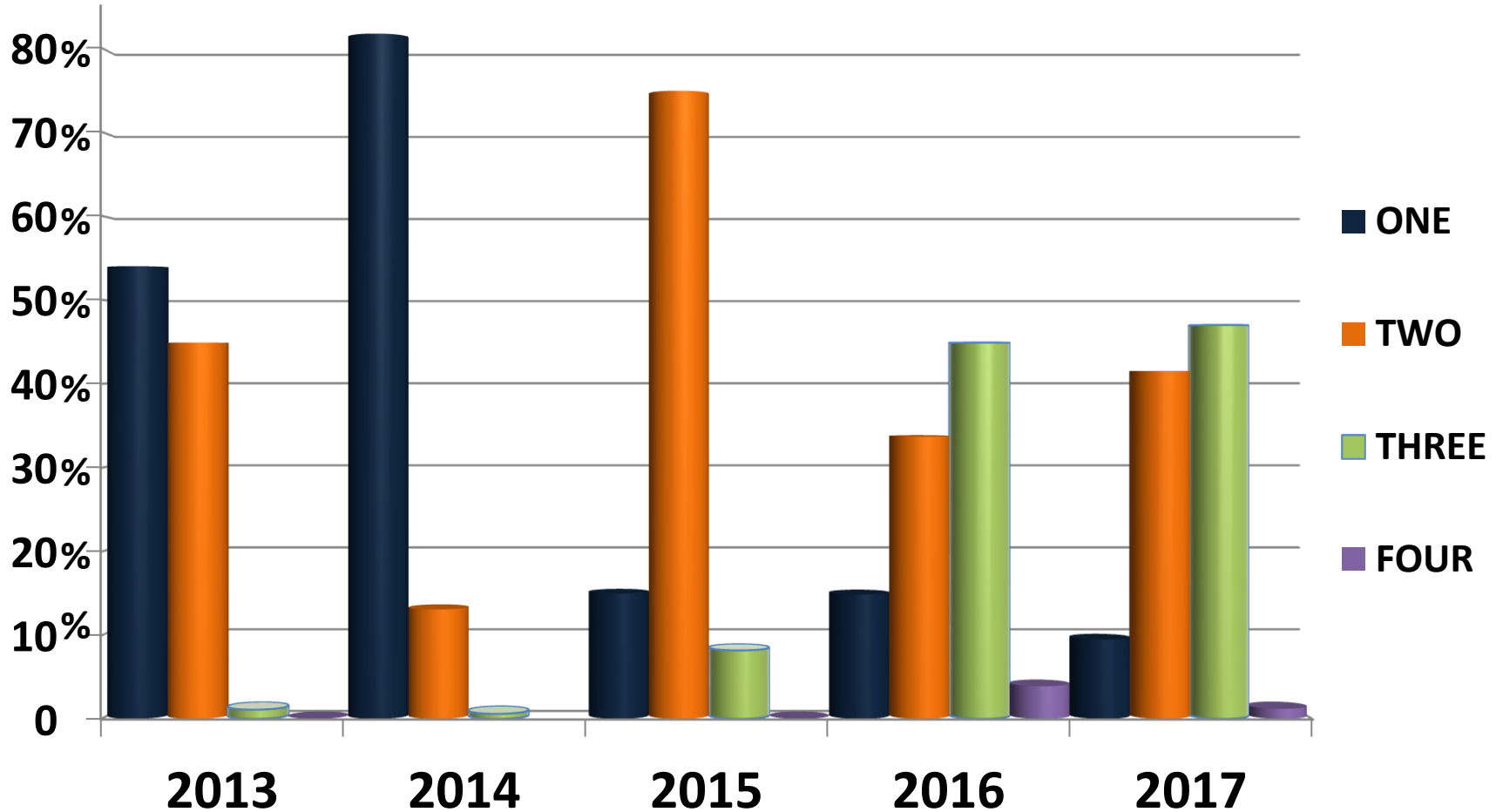
MOORHEAD DISTRICT NUMBER OF SPRAYS PER FIELD



CROOKSTON DISTRICT NUMBER OF SPRAYS PER FIELD



DRAYTON DISTRICT NUMBER OF SPRAYS PER FIELD



Future of CLS Management

- No new chemistry in pipeline - None
- Background work on possible additive for improved CLS control, fast-track, yet a few years away
- **Critical** - Timing, coverage, PSI and Tank-mixes



CLS Conditions

- Warm, humid, rainy weather conducive for development of Cercospora Leafspot
- Leaf spots develop 5 to 21 days after infection, depending on: amount of inoculum, temp, & duration of wet period.
- Leaf spots typically occur first on lower, older leaves & progresses to younger leaves

NDSU - U of M bulletin March 2013



Cercospora Daily Infection Values (DIV)

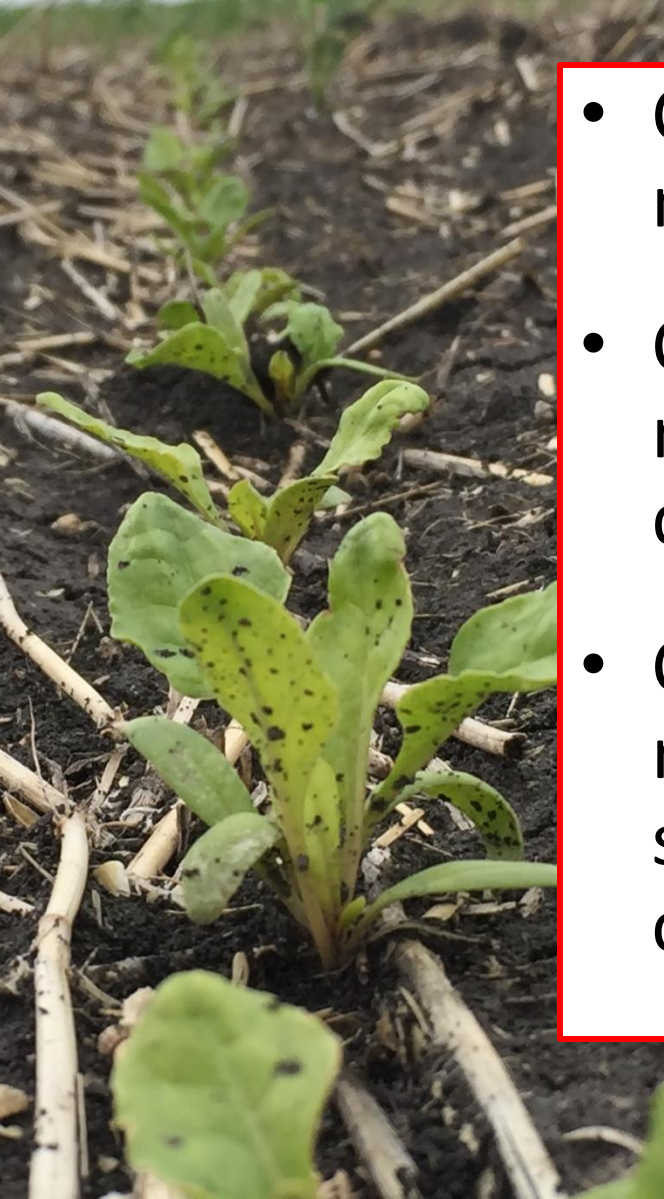
Found on:

- Crystal Agronomy App
- NDAWN
- Crystalsugar.com



Grand Forks						
Date	Daily Infection Value	Two-Day Total Infection Value	Daily Infection Risk	14-Day Accum Infection Values	21-Day Accum Infection Values	Season Total Infection Values
2017-08-29	4	4	Moderate	4	4	4
2017-08-30	0	4	Moderate	4	4	4
2017-07-01	0	0	Slight	4	4	4
2017-07-02	0	0	Slight	4	4	4
2017-07-03	0	0	Slight	4	4	4
2017-07-04	0	0	Slight	4	4	4
2017-07-05	1	1	Slight	5	5	5
2017-07-06	2	3	Slight	7	7	7
2017-07-07	0	2	Slight	7	7	7
2017-07-08	0	0	Slight	7	7	7
2017-07-09	2	2	Slight	9	9	9
2017-07-10	0	2	Slight	9	9	9
2017-07-11	1	1	Slight	10	10	10
2017-07-12	4	5	Moderate	14	14	14
Grand Forks						
Date	Daily Infection Value	Two-Day Total Infection Value	Daily Infection Risk	14-Day Accum Infection Values	21-Day Accum Infection Values	Season Total Infection Values
2017-07-13	2	6	Moderate	12	16	16
2017-07-14	0	2	Slight	12	16	16
2017-07-15	1	1	Slight	13	17	17
2017-07-16	0	1	Slight	13	17	17
2017-07-17	2	2	Slight	15	19	19
2017-07-18	2	4	Moderate	17	21	21
2017-07-19	0	2	Slight	16	21	21
2017-07-20	1	1	Slight	15	18	22
2017-07-21	3	4	Moderate	18	21	25
2017-07-22	3	6	Moderate	21	24	28
2017-07-23	2	5	Moderate	21	26	30
2017-07-24	2	4	Moderate	23	28	32
2017-07-25	4	6	Moderate	26	32	38
2017-07-26	2	6	Moderate	24	33	38

Variety Cercospora Ratings



- CLS Rating < 4.40 – Best resistance; monitor for disease development
- CLS Rating $4.41 - 4.80$ – Moderate resistance; monitor for disease development
- CLS Rating > 4.80 – Low disease resistance, Cercospora likely to show up in these varieties. Monitor closely

Factors That Can't be Ignored

- Use right products
- Apply proper rate
- Application timing critical
- Monitor weather
- Use right nozzle with the right pressure and volume



Products

- Best resistance management is necessary to maintain our limited arsenal of fungicides
- Know the level of resistance in your area – review 2017 tolerance maps
- Be aware when using fungicides where tolerant strains of *Cercospora* are high or resistance is known in your area
- Know the PHI of the fungicides you use

Rates

- Use only the recommended full rate of the fungicides
- Tank Mixes: Always use full rates of all tank mix partners
- Watch the number of applications for each product

Timing

- Planting date effect
- Spend time in your fields
- Monitor Daily Infection Values (internet & App)
- Know your farm history
- Begin fungicide applications when disease is first identified in your area
- Do not stretch application intervals – Stay on recommended spray schedule

Weather

- DIVs
- Local events
- Dew on canopy
- Fog
- “Air conditioner nights”

Application Method

- Use correct spray volume: 15 – 20 gpa for max coverage
- Use correct pressure: utilize upper level of manufacturers recommended pressure for nozzle
- Use correct nozzles (fungicide specific), boom height & speed for best uniform coverage
- Ground applications of fungicides have been observed to give better control across entire fields
- Aerial applications can be made when a spray is necessary and ground rigs can't get in a field

Rotate Modes of Action

STROBILURIN	TRIAZOLE	TINS (TPTH)	BENZIMIDAZOLE	EBDC	COPPER
Headline	Minerva	Supertin	Topsin M	Several	Several
Priaxor	Proline	Agritin	Thiophanate Methyl 85		
Gem	Inspire XT				

- Good resistance management starts with rotating different modes of action
- Never use fungicides from same mode of action back-to-back
- Use multiple modes of action in each spray
- Use full rates of all tank mix partners, all the time

Tank Mixing Fungicides

- Always start with a tank that is $\frac{1}{2}$ full of water
- Good, aggressive agitation is critical to maintain a good spray solution
- Know your products and add accordingly
- Always empty and clean your tank, lines, and strainers at the end of the day use

Tank Mixing Fungicides

- Do Not tank mix fungicides with Glyphosate or other herbicides
- Fungicide and weed control are to be separate applications and each uses different nozzles, water volume and spray pressure

Mixing Order

A.P.P.L.E.S.

NDSU Weed Science recommendation

1. **Agitate**
2. **Powders Soluble (SG, SP)**
3. **Powders Dry (DF, WDG, WP)**
4. **Liquid flowables and Suspensions (ASC, FME, SC, SE)**
5. **Emulsi~~f~~iable Concentrates (EC, EW, OD)**
6. **Solutions (S, SL)**

Make sure that each product is uniformly mixed in the tank before adding another product

Summary

- Plant tolerant varieties
- Scout fields diligently
- Monitor the weather – models are not perfect
- Start on time with the right product
- Use correct spray volume & pressure for the most uniform fungicide coverage

Summary

- Full label rate of all products in a tank mix are best for resistance management
- Use correct nozzles, boom height & speed
- Ground versus aerial – both can work well
- Remember: Conditions that favor excellent sugarbeet growth also favor extreme CLS development
- Contact your Agriculturist for further information

Questions?

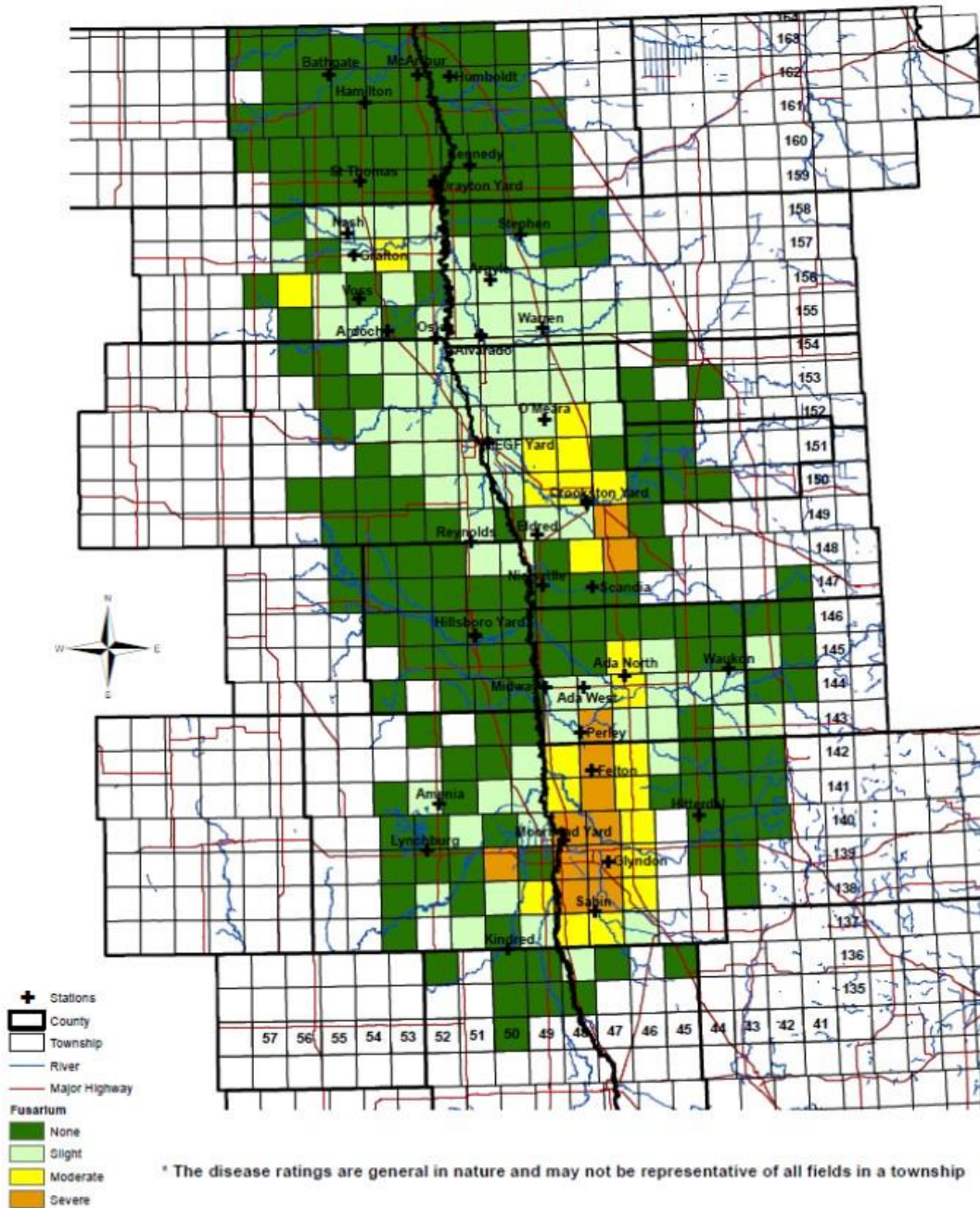


Fusarium



- Continues to be RRV Production Issue
- Managed best with Fusarium tolerant varieties
- Likes wet, poorly structured soils
- Persistent in soil

2016 Disease Rating* Fusarium



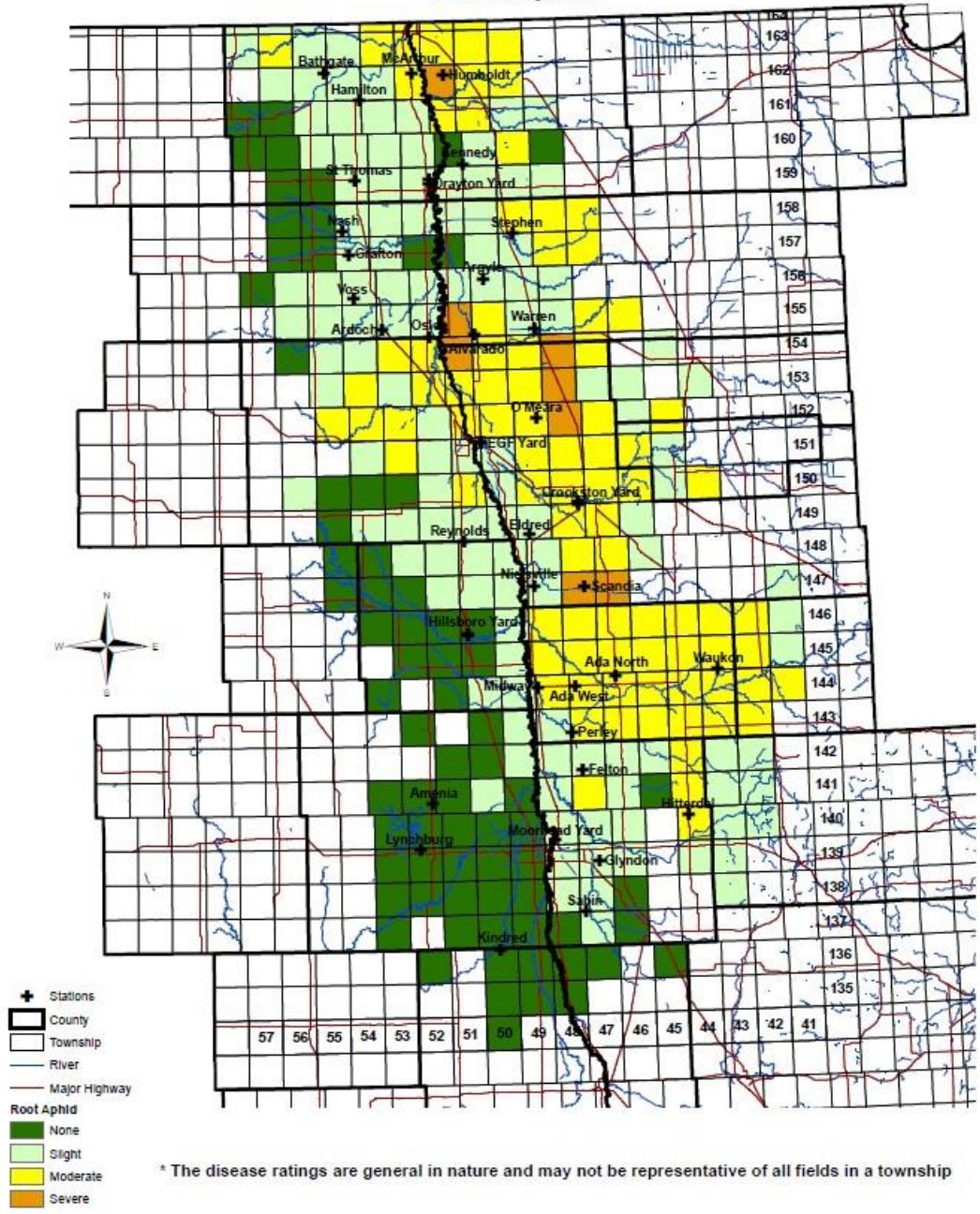
* The disease ratings are general in nature and may not be representative of all fields in a township

Root Aphid

- Field observations:
 - Low incidence in 2016 & 2017
 - Dry soil conditions usually higher presence
- U of Minnesota Root Aphid traps:
 - Very low Root Aphid counts in 2017
- Plant tolerant varieties
- Root aphid presence or Frass is indicator



2016 Disease Rating* Root Aphid



* The disease ratings are general in nature and may not be representative of all fields in a township

ACSC Versalime

Made for all districts, Use all or just
your district for presentation

Moorhead Factory Versalime '17

- Nitrogen
 - 5 Lbs/ton Average
- Phosphorus
 - 12.2 Lbs/ton Average
- Potash
 - 1.8 Lbs/ton Average
- Sulfur
 - 5.4 Lbs/ton Average
- Applying Versalime at a 10 Ton/Acre Rate would provide 50#N, 122#P, 18#K, 54#S
- Benefits include decreased Aphanomyces and improved soil tilth
- Apply 1 year before beets for best results
- Contact Ag Staff for further assistance

Hillsboro Factory Versalime '17

- Nitrogen
 - 5.2 Lbs/ton Average
- Phosphorus
 - 14 Lbs/ton Average
- Potassium
 - 1.3 Lbs/ton Average
- Sulfur
 - 7.6 Lbs/ton Average
- Applying Versalime at a 10 Ton/Acre Rate would provide 52#N, 140#P, 13#K, 76#S
- Benefits include decreased Aphanomyces and improves soil tilth
- Apply 1 year before beets for best results
- Contact Ag Staff for further Assistance

Crookston Factory Versalime '17

- Nitrogen
 - 5.1 Lbs/ton Average
- Phosphorus
 - 11.6 Lbs/ton Average
- Potassium
 - 2.2 Lbs/ton Average
- Sulfur
 - 5.7 Lbs/ton Average
- Applying Versalime at a 10 Ton/Acre Rate would provide 51#N, 116#P, 22#K, 57#S
- Benefits include decreased Aphanomyces and improves soil tilth
- Apply 1 year before beets for best results
- Contact Ag Staff for further Assistance

East Grand Forks Factory Versalime '17

- Nitrogen
 - 4.3 Lbs/ton Average
- Phosphorus
 - 10.7 Lbs/ton Average
- Potassium
 - 2.0 Lbs/ton Average
- Sulfur
 - 6.4 Lbs/ton Average
- Applying Versalime at a 10 Ton/Acre Rate would provide 43#N, 107#P, 20#K, 64#S
- Benefits include decreased Aphanomyces and improves soil tilth
- Apply 1 year before beets for best results
- Contact Ag Staff for further Assistance

Drayton Factory Versalime '17

- Nitrogen
 - 5.8 Lbs/ton Average
- Phosphorus
 - 16.8 Lbs/ton Average
- Potassium
 - 2.3 Lbs/ton Average
- Sulfur
 - 6.7 Lbs/ton Average
- Applying Versalime at a 10 Ton/Acre Rate would provide 58#N, 168#P, 23#K, 67#S
- Benefits include decreased Aphanomyces and improves soil tilth
- Apply 1 year before beets for best results
- Contact Ag Staff for further Assistance

Springtails

- Tiny wingless primitive animals. (very small, nearly microscopic)
- They are adapted to and reproduce more rapidly in soil moisture levels at or near saturation.
- Although feeding may occur on mature sugarbeet roots, injury is most apparent and harmful in seedlings.
- Above-ground symptoms of springtail injury to sugarbeet seedlings include wilting plants and reduced plant stand.



Photo: NDSU.ag.edu



Thinned stand and stunted plants from springtail feeding

Springtails

Management

- Not much is known about rotational crop management of springtails to help control in sugarbeet crop year.
- Hard to predict because pressure is variable from year to year and field to field. Fields with fine-textured soils (i.e., clay or silty clay) are more likely to have problems.
(NDSU extension bulletin March 2001)
- Best line of defense usually a moderate rate of Counter but not always statistically better than the seed treatments.



Wireworms

- Smooth somewhat hard bodied larvae varying in length from $\frac{1}{2}$ to $1 \frac{1}{2}$ inches. They are most damaging when smaller.
- Color from yellowish-white to copper hues.
- Feed on a wide variety of crops and weeds and are difficult to detect and control.



Wireworms

Management

- They tend to be more prevalent in light textured soils and in fields that were previously a grassy crop, or have not been in crop production for several years, or had several grass weed escapes the previous year.
- There is no economic threshold for wireworms established in sugarbeets.
- A low to moderate rate of Counter 20G (5-6 lb) should do just fine.
- Seed treatments appear to do fine but not a lot of data.
- Insecticide seed treating rotational small grain crops help.

Sugarbeet Root Maggot (SBRM)

Adult Fly



Maggot (larval stage)



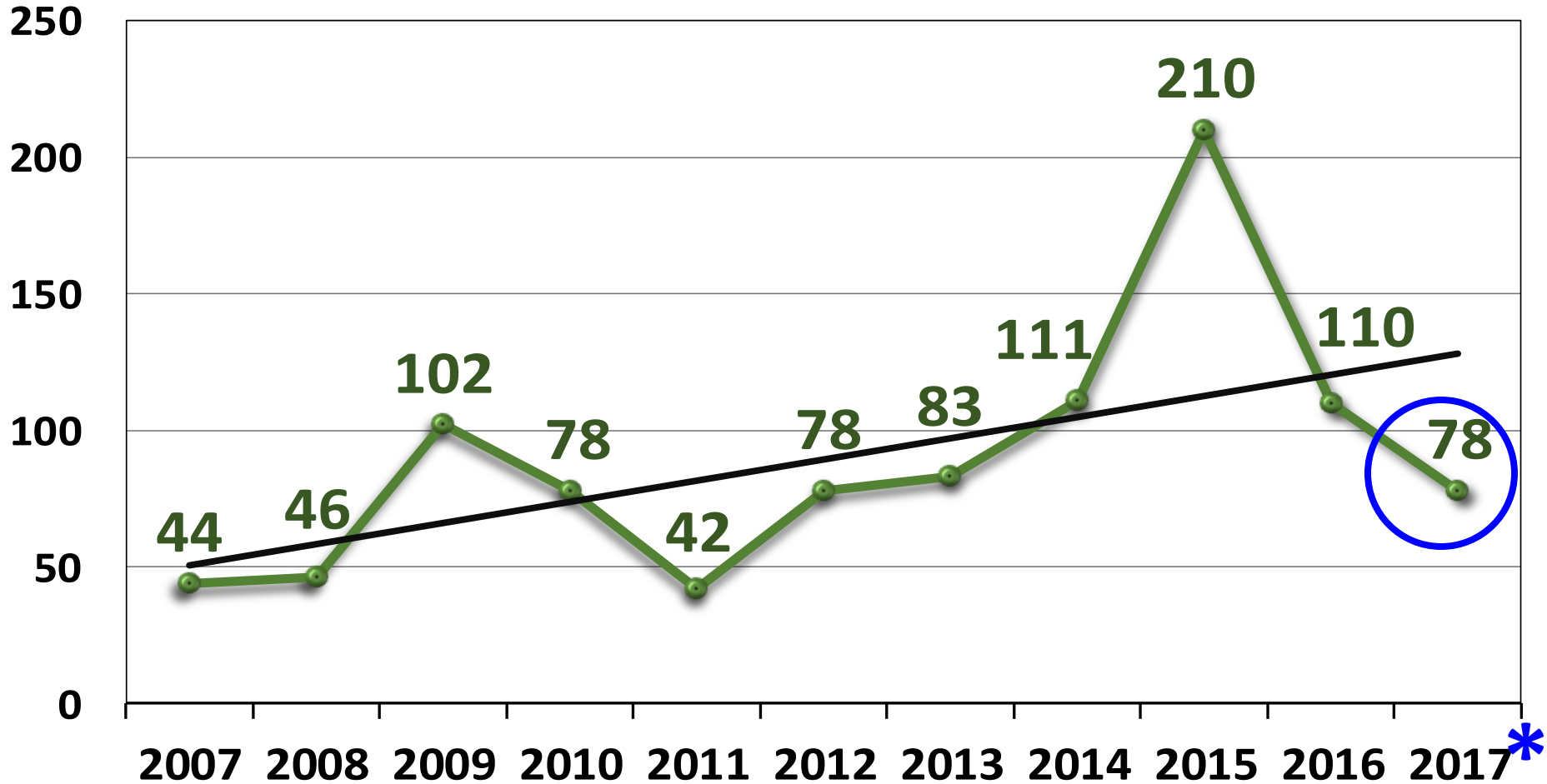
- Maggots overwinter as larvae, pupate and emerge in spring as flies in previous years beet fields
- Adult flies are monitored in current year beet fields with sticky stakes

(SBRM)

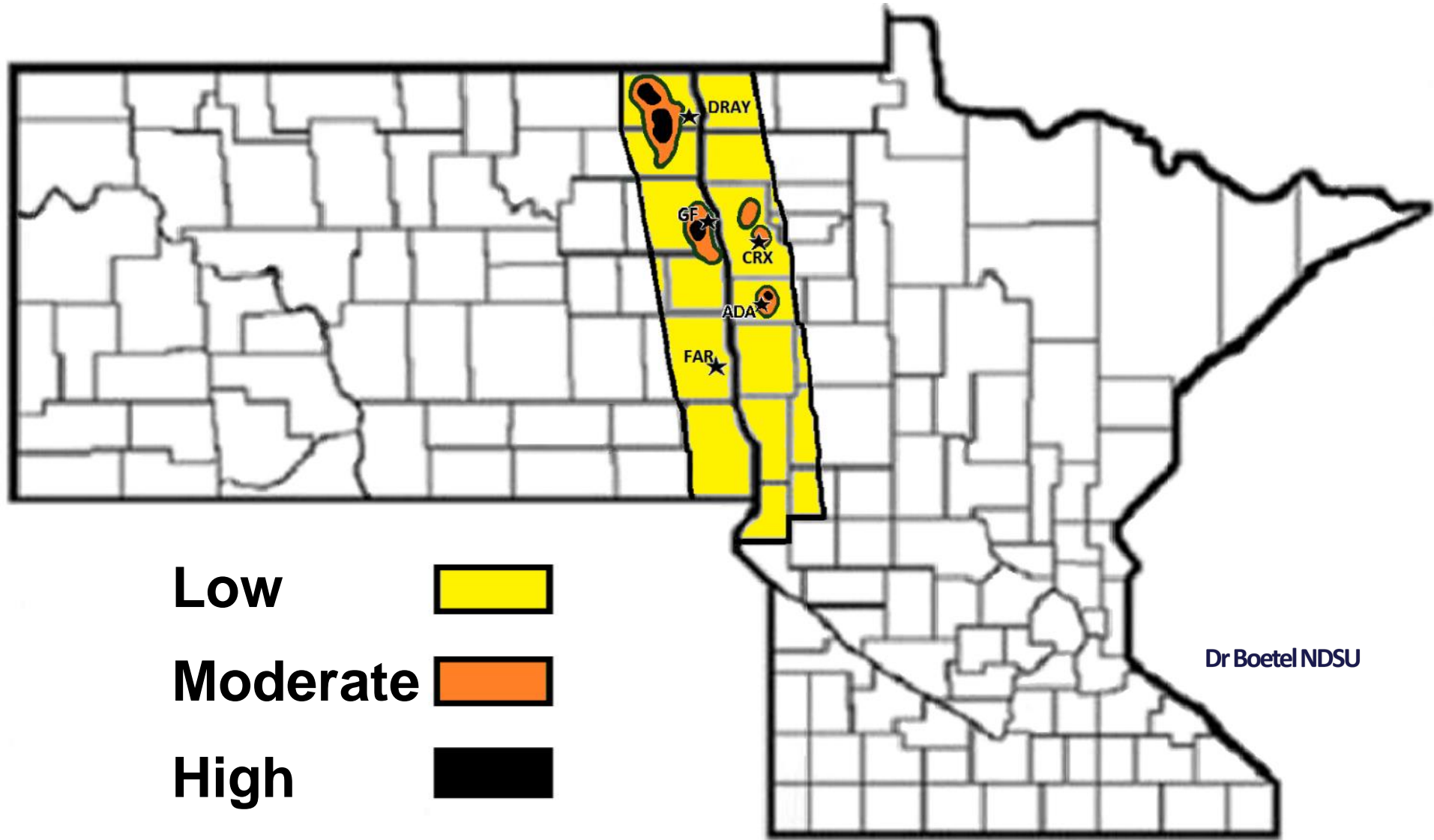
- Peak fly activity can occur anytime after 600 DD's are accumulated, on average, this occurs at 650 DD's
 - This is monitored at each NDAWN site in the RRV
 - NDSU monitors sticky stakes
- It is important to know that warm weather (around 80° F), and calm to low wind conditions are most conducive for fly activity
- Flies will remain fairly inactive in cool, rainy, or windy conditions

Root maggot control efforts are working

Flies Per Trap in RRV: 2007 – 2017



2017



Low



Moderate



High



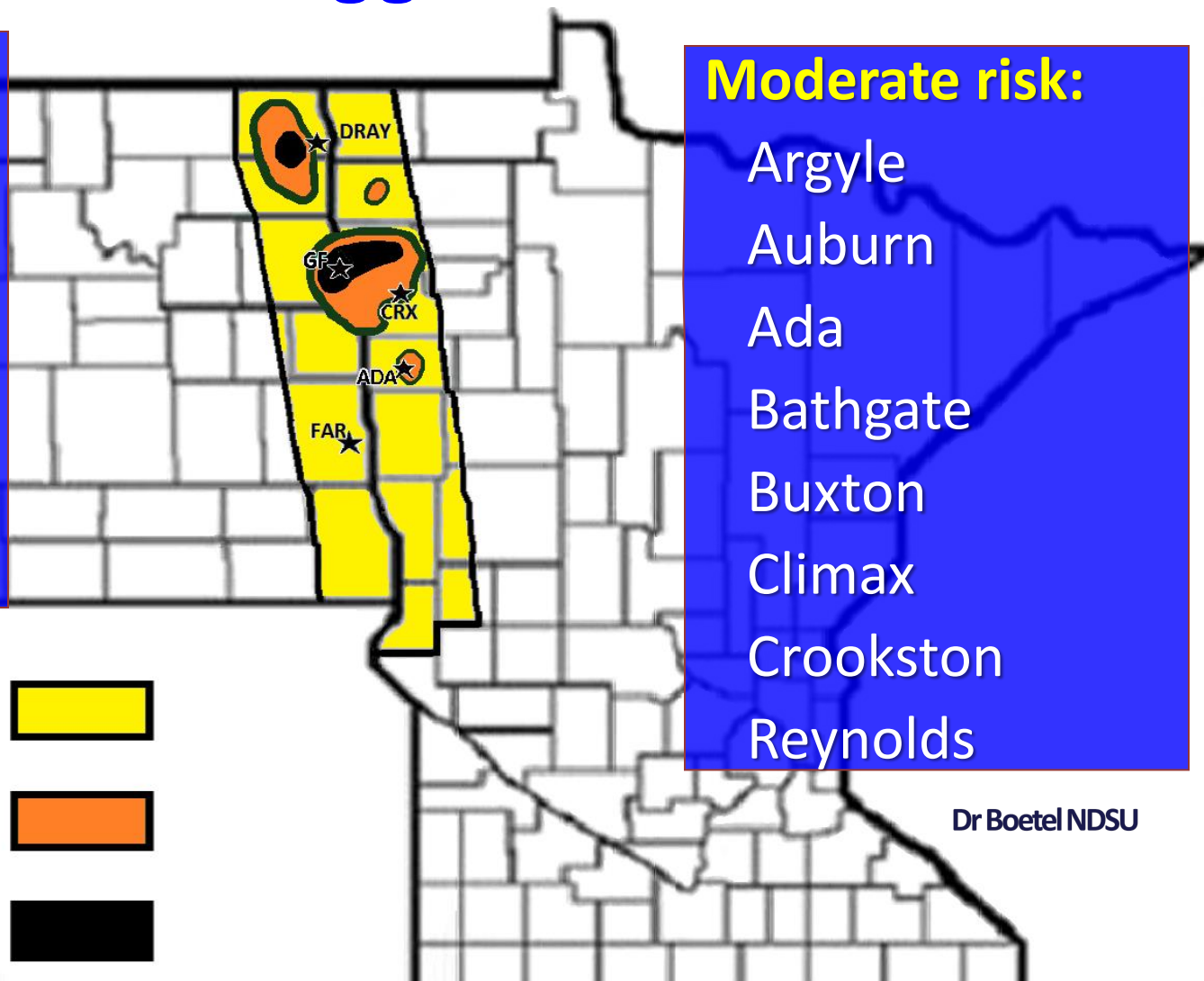
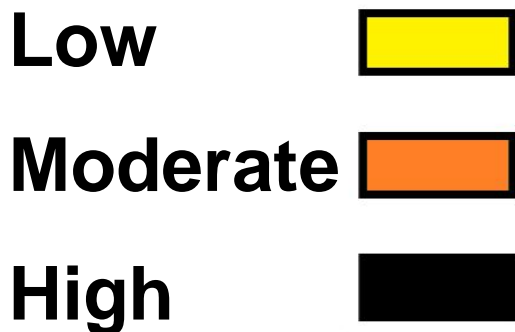
2018 Root Maggot Forecast*

High risk:

Grand Forks/
EGF
Euclid
Merrifield
St. Thomas
Thompson

Moderate risk:

Argyle
Auburn
Ada
Bathgate
Buxton
Climax
Crookston
Reynolds



Dr Boetel NDSU

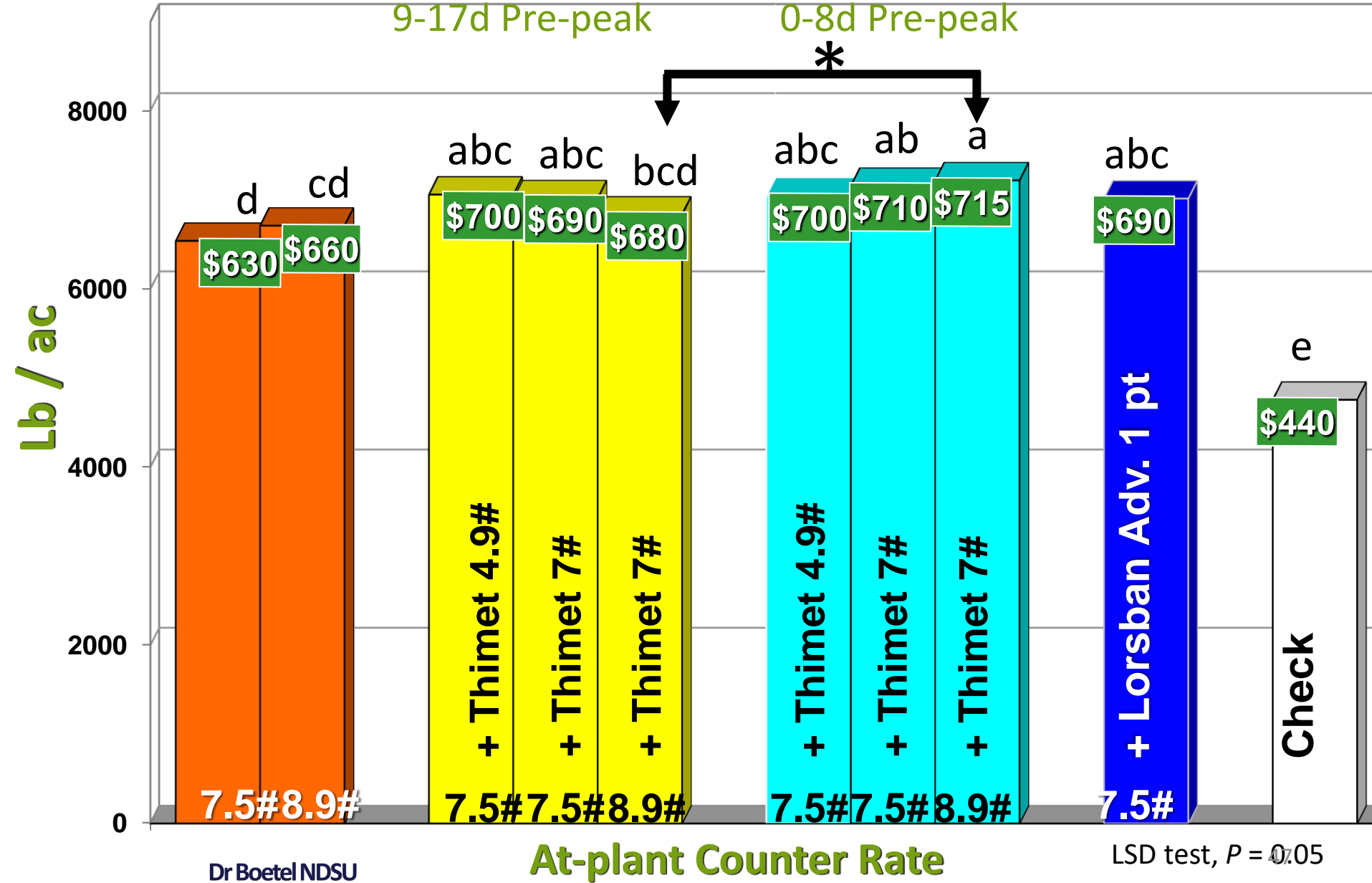
*Based on fly counts & root maggot feeding injury ratings

Additive Granular Insecticides for SBRM Control: **2015 – 2017***

Treatment	RSA	Tons/ac	\$\$/ac above check
Poncho Beta + Counter 8.9# <u>At-plant Band</u>	9269 a	32.3 a	\$359
Counter 8.9# Band + Thimet 7# Post Band	9242 a	31.8 ab	\$377
Poncho Beta + Counter 8.9# <u>Post Band</u>	8814 ab	30.6 a-d	\$310
Poncho Beta + Counter 5.25# <u>At-plant Band</u>	8745 ab	31.2 ab	\$259
Counter 7.5# Band + Thimet 7# Post Band	8719 ab	31.0 abc	\$263
Counter 8.9# Band	8405 bc	30.1 bcd	\$211
Poncho Beta + Thimet 7# Post Band	8397 bc	30.1 bcd	\$210
Counter 7.5# Band	8225 bcd	29.0 de	\$215
Poncho Beta	8058 cd	28.9 de	\$167
Poncho Beta + Counter 5.25# <u>Post Band</u>	7958 cd	29.2 cde	\$124
Counter 5.25# Band	7715 d	27.9 e	\$119
CHECK	6700 e	24.2 f	
LSD 0.05	619.2	1.97	Dr Boetel ⁴⁶ NDSU

Thimet 20G Timing & Rate Impacts on Root Maggot Control:

Recoverable Sucrose (11-year combined analysis)



Impact of Single Post Sprays on SBRM Control

St. Thomas, ND, 2015 – 2017*

Treatment	RSA (lb/ac)	Tons/ac	Gross Rev. / ac
Counter 8.9# B + Lorsban Adv. 2 pts	8,707 a	29.9 a	\$955
Counter 8.9# B + Lorsban Adv. 1 pt	8,664 a	29.8 a	\$946
Counter 7.5# B + Lorsban Adv. 2 pts	8,211 ab	29.1 ab	\$855
Poncho Beta + Lorsban Adv. 2 pts	8,187 ab	28.8 abc	\$862
Poncho Beta + Lorsban Adv. 1 pt	8,011 ab	27.5 abc	\$880
Counter 7.5# B + Lorsban Adv. 1 pt	7,911 ab	26.9 bc	\$881
Counter 8.9# B	7,711 b	26.8 bc	\$829
Counter 7.5# B	7,628 b	26.6 bc	\$817
Poncho Beta	7,522 b	26.4 c	\$798
Check	5,780 c	21.0 d	\$578
LSD (0.05)	661	2.65	

Postemergence Spray Timing for SBRM Control

St. Thomas, ND: Combined Analysis (2015-2017)

Treatment	Timing (from peak fly)	RSA (lb/ac)	\$\$ above Check
Ctr. 7.5 lb + Lors. Adv. 2 pts 2X	7 d pre / 4 d post	9249 a	\$482
Ctr. 7.5 lb + Lors. Adv. 1 pt + Mustang 4 oz	2 d pre / 4 d post	8882 ab	\$357
Ctr. 7.5 lb + Lors. Adv. 1 pt 2X	7 d pre / 4 d post	8735 ab	\$413
Ctr. 8.9 lb + Lors. Adv. 2 pts	2d pre	8724 ab	\$352
Ctr. 7.5 lb + Lors. Adv. 2 pts	2d pre	8405 bc	\$321
Ctr. 7.5 lb + Mustang Maxx 4 fl oz	2d pre	8367 bc	\$372
Ctr. 7.5 lb + Lorsban Advanced 1 pt	2d pre	8302 bc	\$337
Counter 20G 8.9 lb		7806 cd	\$246
Counter 20G 7.5 lb		7443 d	\$193
Check	---	5882 e	---
LSD (0.05)		822.0	49

Single, Dual & Triple Applications for SBRM Control

St. Thomas, ND: 2016-2017

Seed Trt.	At-plant	Post	RSA (lb/ac)	Rev./ ac
Poncho Beta	Counter 8.9#		10061 a	\$1295
Poncho Beta	Counter 8.9#	Lorsban Advanced 1 pt	9934 ab	\$1288
	Counter 8.9#	Thimet 7#	9667 abc	\$1250
Poncho Beta		Thimet 7# + Lors. Adv 1 pt	9554 abc	\$1221
Poncho Beta		Counter 8.9#	9413 abc	\$1229
Poncho Beta	Counter 5.25#		9409 abc	\$1167
	Counter 7.5#	Thimet 7#	9122 bcd	\$1151
	Counter 8.9#		8940 cde	\$1100
Poncho Beta			8856 cde	\$1134
Poncho Beta		Thimet 7#	8833 cde	\$1059
Poncho Beta		Counter 5.25#	8266 ef	\$1002
Check			7713 f	\$965
		LSD (0.05)	855.5	50

Root Maggot Control Recommendations 2018

- **Lorsban 4E (Chlorpyrifos)** – Minimum of 10 days between application if used 2 times
- **Mustang Maxx or Asana XL** - can be used as 2nd or 3rd applications if flies resurge before 10 day Minimum is met for Lorsban (Chlorpyrifos)
- **Lorsban 4E (Chlorpyrifos)** – can be mixed with Glyphosate
- Do **NOT** mix *Lorsban Advanced* with Glyphosate

Root Maggot- Summary






- Average population has declined since 2016, but there is an increase in number of areas affected
 - Proper management control measures are working!
- Aggressive control is a must in areas of high risk and rising populations
- POST: Seed treatments or low rates of at-plant granules are not sufficient w/out a post insecticide
- POST: control tools are the key to success



ROOT MAGGOT

QUESTIONS?

2018 ACSC RHIZOCTONIA MANAGEMENT OPTIONS

				
	AT-PLANT	POST	POST	POST
METHOD	IN-FURROW/BAND (3-7")	BAND/BROADCAST	BAND (7-11")	BROADCAST
TIMING	AT-PLANT	4 to 5 weeks after planting	4 to 5 weeks after planting	4 to 5 weeks after planting
RATE	12 oz/Acre (1.65 lbs Ai/Gal)	6.7oz/Acre	10 oz/Acre (2.08 lbs Ai/Gal)	15 oz/Acre (2.08 lbs Ai/Gal)
TANK-MIXES	w/starter fertilizer	Glyphosate w/ surfactant	Glyphosate w/ surfactant	Glyphosate w/ surfactant
WATER VOLUME	5-10 gal/acre	10-15 gal/acre	10-20 gal/acre	10-20 gal/acre
NOTES (see reverse side)	<ul style="list-style-type: none"> Mixes with liquid fertilizers with no crystallization or clogging Do not apply in-furrow if cool weather follows planting Do not include COC or MSO in tank mix Applying w/starter in-furrow may increase risk of phytotoxicity 	<ul style="list-style-type: none"> Do not mix with conventional herbicides/insecticides Time application 3 days before or 3 days after conventional herbicide or insecticide application Narrower bands are most effective, do not reduce rate Additional surfactant along w/ glyphosate will <u>not</u> increase risk of injury Do not add deposition aids or any oil based additive when mixing with glyphosate Always add Priaxor 1st to spray tank 	<ul style="list-style-type: none"> Do not mix with conventional herbicides/insecticides Time application 3 days before or 3 days after conventional herbicide or insecticide application Do not add deposition aids or any oil based additive when mixing with glyphosate Additional surfactant along w/ glyphosate will <u>not</u> increase risk of injury Narrower bands are most effective, do not reduce rate Always add Quadris 1st to spray tank 	<ul style="list-style-type: none"> Do not mix with conventional herbicides/insecticides Time application 3 days before or 3 days after conventional herbicide or insecticide application Do not add deposition aids or any oil based additive when mixing with glyphosate Additional surfactant along w/ glyphosate will <u>not</u> increase risk of injury This is our least preferred method, but still beneficial Always add Quadris 1st to spray tank

RHIZOCTONIA MANAGEMENT OPTIONS



DISEASE SEVERITY	RECOMMENDATIONS
Slight	Seed treatment with Post Quadris/Priaxor
Moderate	Increase Crop Rotation Length, Tolerant Variety, Seed treatment, Post Quadris/Priaxor 1x
Severe	Increase Crop Rotation Length, Tolerant Variety, Seed treatment, AZteroid At-Plant, Post Quadris/Priaxor 1x or 2x

ADDITIONAL NOTES:

- Quadris and Priaxor are both SC formulations, always add them 1st to spray tank, use good agitation and apply the mixture promptly
- Quadris/Priaxor should never be tank-mixed with any oil-based additives or EC formulations of herbicides/insecticides due to increased risk of injury
- Seed treatments for the control of Rhizoctonia do not provide season long control and should be coupled with post Quadris/Priaxor
- 2018 Rhizoctonia fungicide standard seed treatments by company:
 - Betaseed = Systiva
 - Crystal = Kabina
 - Hillehog & Maribo = Vibrance
 - Seedex = Tri-Pak (Metlock + Rizolex + Kabina)
 - Ses Vanderhave = Fungicide Pack (Metlock + Rizolex + Vibrance)

Questions?

