EXTENDING KNOWLEDGE ›› CHANGING LIVES

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Disease Management

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SCN

https://www.ag.ndsu.edu/publications/crops/dry-edible-bean-disease-diagnostic-series

PP1820

Dry Edible Bean Disease Diagnostic Series

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Cover photo: Gary Stone, University of Nebraska

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White mold

Sclerotinia sclerotiorum

Figure 1

Figure 2

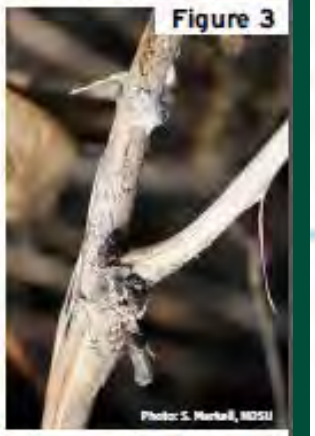

Figure 3

Figure 4

PP1820-9
Dry Edible Bean Disease Diagnostic Series

White mold

Sclerotinia sclerotiorum

AUTHORS: Julie Pasche, Bob Harveson and Sam Markell

SYMPTOMS

- Water-soaked lesion that becomes tan as it enlarges
- Stem lesions will dry out, lighten in color and tissue may shred
- White fungal growth and hard black sclerotia may form in or on stem

FIGURE 1 - Small tan mushrooms (apothecia) about ¼ inch in diameter emerge from hard, black structures (sclerotia)

FIGURE 2 - Enlarging tan lesions with white fungal growth

FIGURE 3 - Mature stem lesion with dried-bone appearance, white fungal growth and black sclerotia

FIGURE 4 - Severe white mold damage

FACTORS FAVORING DEVELOPMENT

- Wet soils prior to bloom; allows sclerotia to germinate and release spores
- Cool daytime temperatures (60 to 70F) during and after bloom
- Long periods of canopy wetness and/or frequent rainfall during bloom
- Lush plant growth

IMPORTANT FACTS

- All broadleaf crops and many weeds are susceptible to white mold
- Plants are only susceptible when in bloom
- Preventative fungicide applications may be economically viable
- Can be confused with wilt diseases or abiotic stress

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Bacterial Blights

Photo: R. Harveson

Recipe for bacterial blights

Infection source (seed/residue)

Frequent thunderstorms

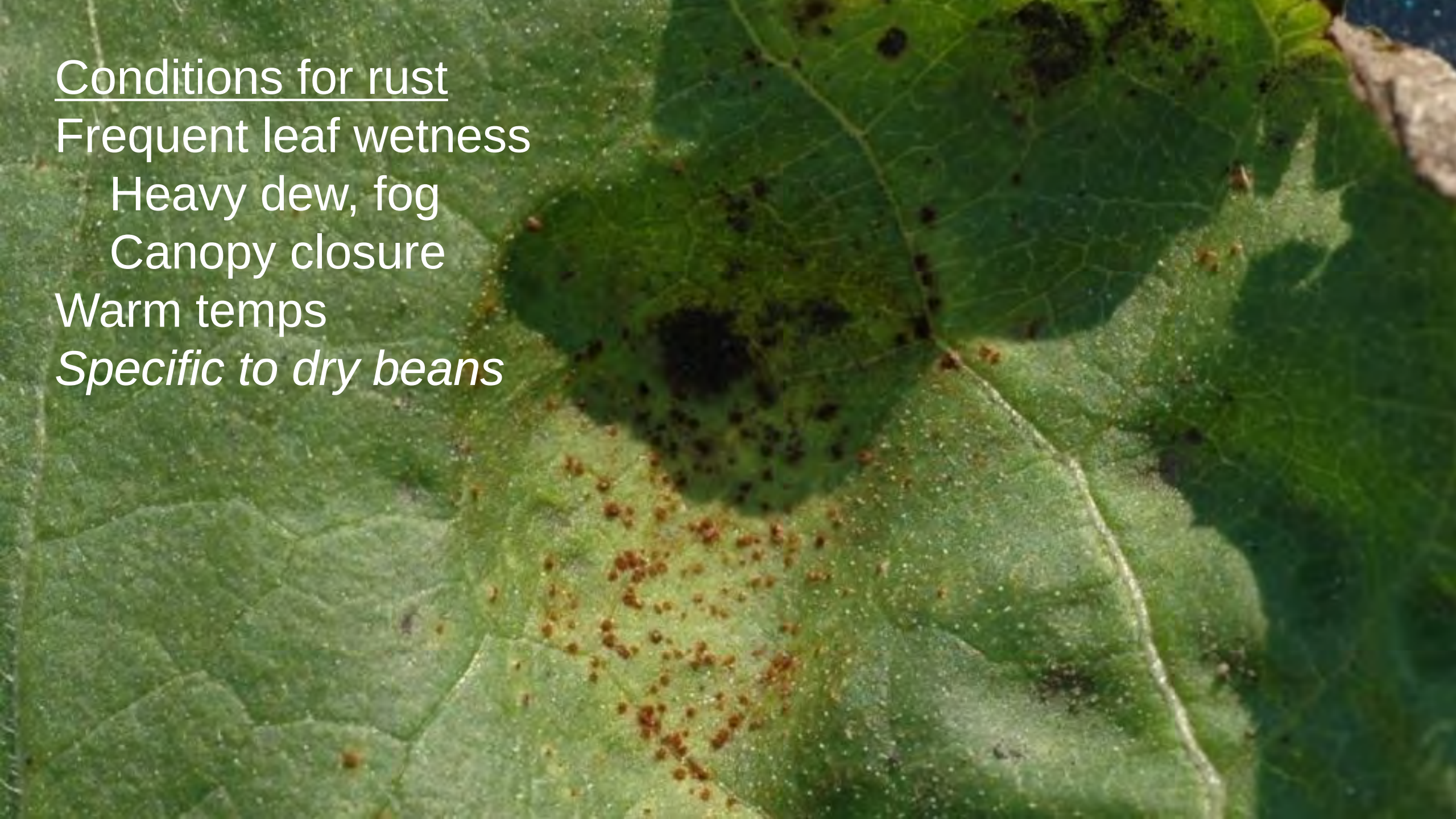
High wind, hail, etc.

https://www.ag.ndsu.edu/cpr/plant-pathology/managing-bacterial-blight-in-dry-beans-07-13-17

Treatment	Rate	Bacterial Blight Severity (%)						
		Fargo		Prosper		Oakes		Average
Non-treated		43.8	a	95.8	a	79.5	a	73.0
Wakeup Summer (Early)	5 OZ/A	37.0	b	89.5	ab	77.3	ab	67.9
Badge SC	2 PT/A	34.0	bc	86.5	bc	76.8	a-e	65.8
Wakeup Summer	5 OZ/A	32.8	bcd	87.0	bc	75.5	a-d	65.1
eA300 (Early)	2.5 OZ/A	34.0	bc	85.0	bc	72.0	a-e	63.7
MasterCop	1 PT/A	32.5	cd	83.8	bc	66.8	def	61.0
SaniDate 12.0	2.56%	29.3	de	83.0	cd	67.5	c-f	59.9
eA300	2.5 OZ/A	29.0	de	80.8	cd	69.3	b-e	59.7
GoldShield	20%	34.0	bc	80.0	bcd	64.3	ef	59.4
Kocide 3000	1.24 LB/A	31.0	cd	75.5	de	67.5	c-f	58.0
OxiDate 2.0	0.5%	29.3	de	80.5	cd	59.0	f	56.3
OxiDate 2.0	1%	25.8	e	72.0	e	64.5	ef	54.1
Pr>F		<0.0001		<0.0001		0.0029		

If letters following disease severity values are the same among treatments within trial locations, there is no statistical difference between treatments. If letters following disease severity values are different among treatments within trial locations, there is a statistical difference. For example, 'Wakeup Summer (Early)' has a value of 37.0 '**b**'. This is statistically better than the Non-treated control (43.8 '**a**') but statistically the same as Badge SC (34.0 '**bc**').

Rust



Conditions for rust

Frequent leaf wetness

Heavy dew, fog

Canopy closure

Warm temps

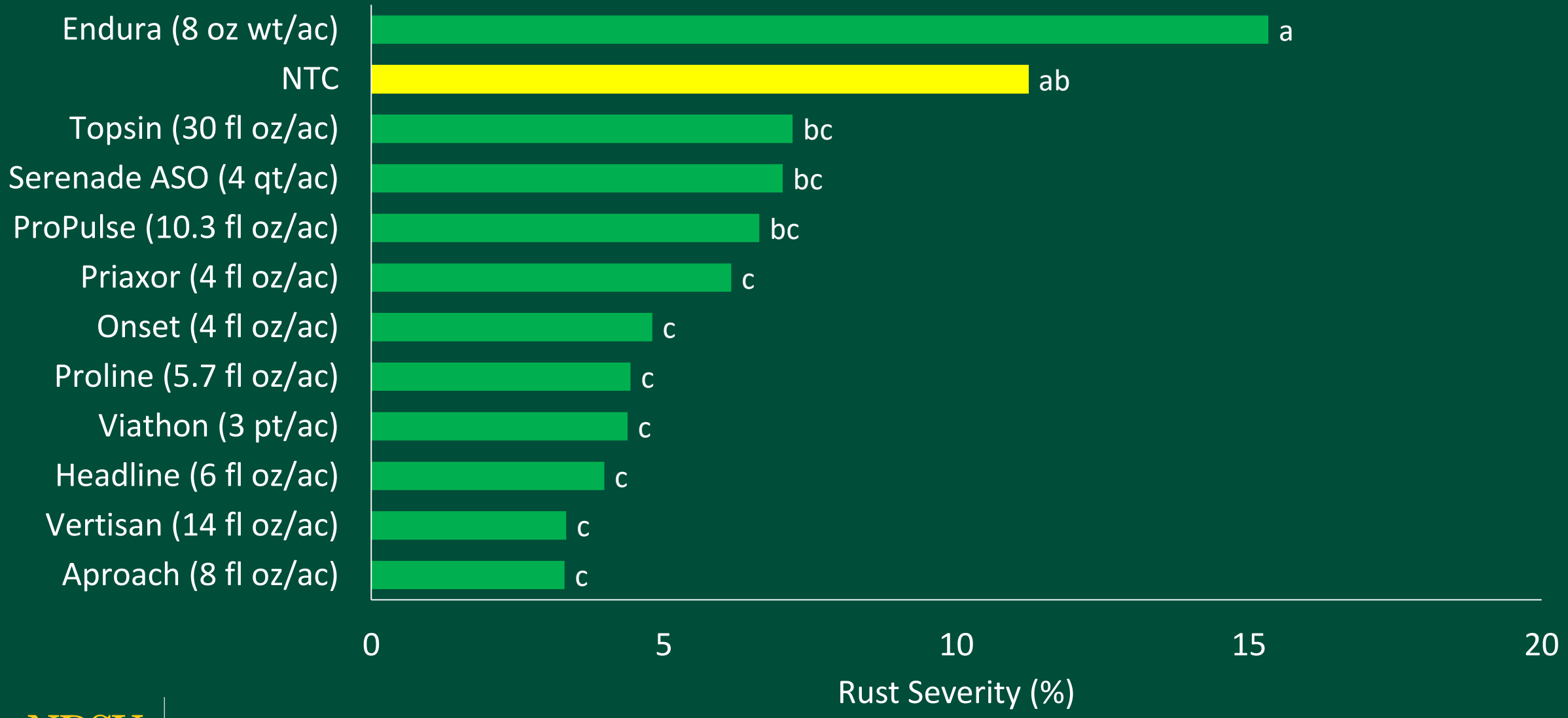
Specific to dry beans


Hot Spot

Rust Management

- Rotation
- Genetic Resistance
  - Awesome, when it works
- Fungicides
  - Timing …. Scout
  - Typically after a leaf wetness event, in July
  - Multiple chemistries are effective

Rust Fungicides – 2015 Severity



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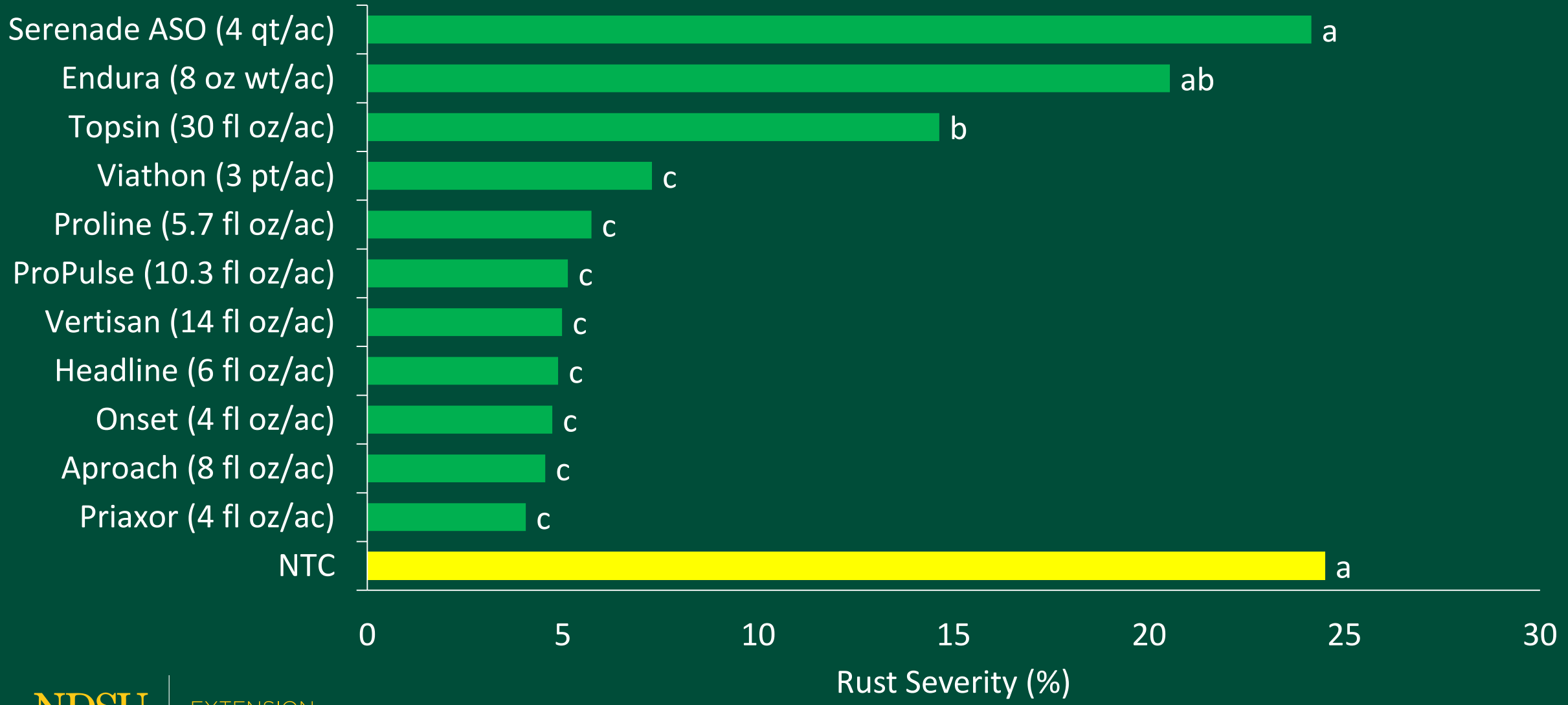
LSD $P = 0.05$

Rust Fungicides – 2016 Severity



White mold

Spores

Sclerotia → Apothecia → Spores

- Sclerotia near surface
- Wet soil before bloom

Infection

Needs flower petals

Cool and wet

Every broadleaf crop susceptible

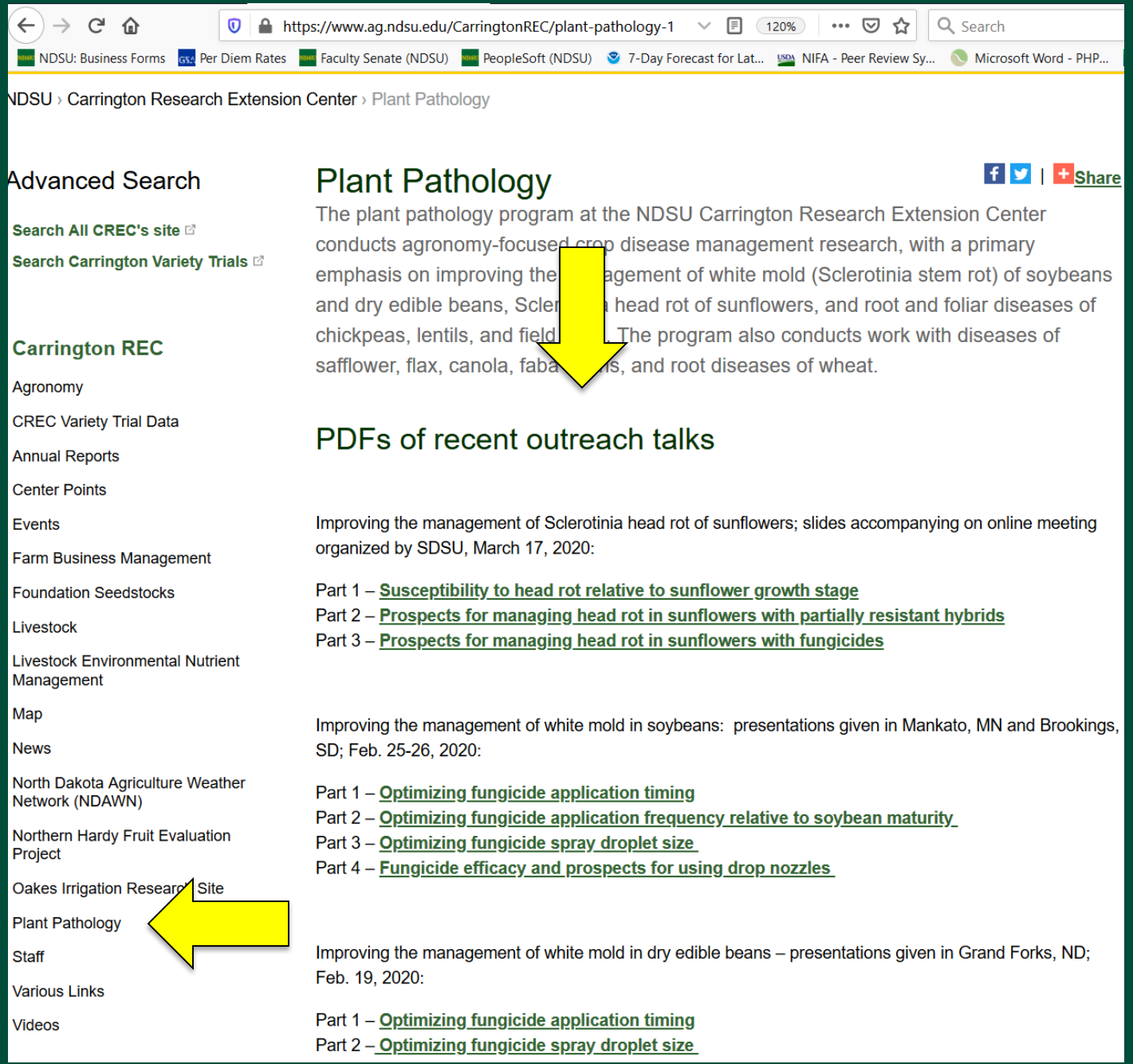

Wunsch


Markell

Managing white mold with fungicides

- Timing
  - Favorable conditions – bloom stages
- Fungicide efficacy
  - Don’t cut rates
  - Multiple chemistries are effective
- Resources
  - Carrington REC (Dr. Michael Wunsch)
  - Canola risk map

https://www.ag.ndsu.edu/CarringtonREC/plant-pathology-1



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Plant Pathology

Share

The plant pathology program at the NDSU Carrington Research Extension Center conducts agronomy-focused crop disease management research, with a primary emphasis on improving the management of white mold (Sclerotinia stem rot) of soybeans and dry edible beans, Sclerotinia head rot of sunflowers, and root and foliar diseases of chickpeas, lentils, and field peas. The program also conducts work with diseases of safflower, flax, canola, faba beans, and root diseases of wheat.

PDFs of recent outreach talks

Improving the management of Sclerotinia head rot of sunflowers; slides accompanying on online meeting organized by SDSU, March 17, 2020:

Part 1 – Susceptibility to head rot relative to sunflower growth stage
Part 2 – Prospects for managing head rot in sunflowers with partially resistant hybrids
Part 3 – Prospects for managing head rot in sunflowers with fungicides

Improving the management of white mold in soybeans: presentations given in Mankato, MN and Brookings, SD; Feb. 25-26, 2020:

Part 1 – Optimizing fungicide application timing
Part 2 – Optimizing fungicide application frequency relative to soybean maturity
Part 3 – Optimizing fungicide spray droplet size
Part 4 – Fungicide efficacy and prospects for using drop nozzles

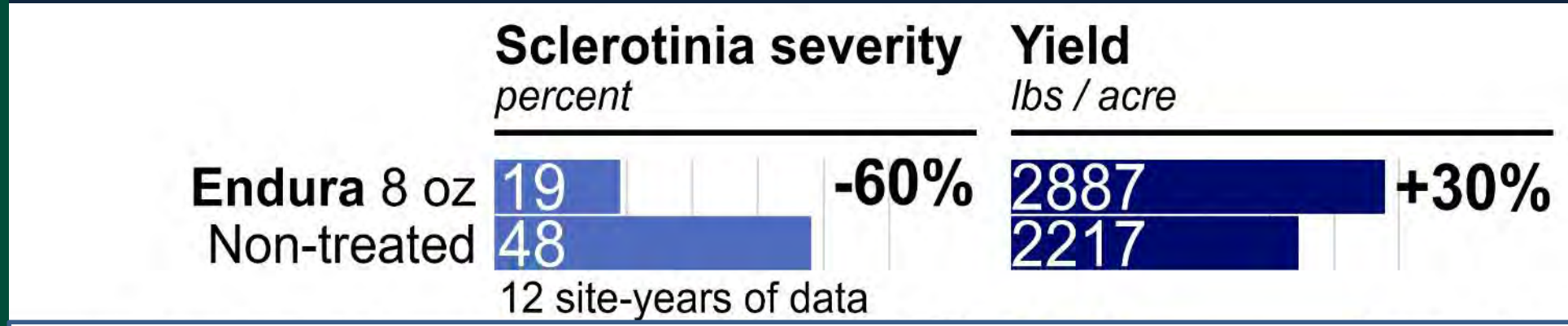
Improving the management of white mold in dry edible beans – presentations given in Grand Forks, ND; Feb. 19, 2020:

Part 1 – Optimizing fungicide application timing
Part 2 – Optimizing fungicide spray droplet size

https://www.ag.ndsu.edu/CarringtonREC/plant-pathology-1

SCLEROTINIA MANAGEMENT IN DRY BEANS

Fungicide efficacy – Multi-year summary



15 gal/ac,35 psi 8001, flat fan nozzles. Two applications first at 80-100% bloom (Wunsch).

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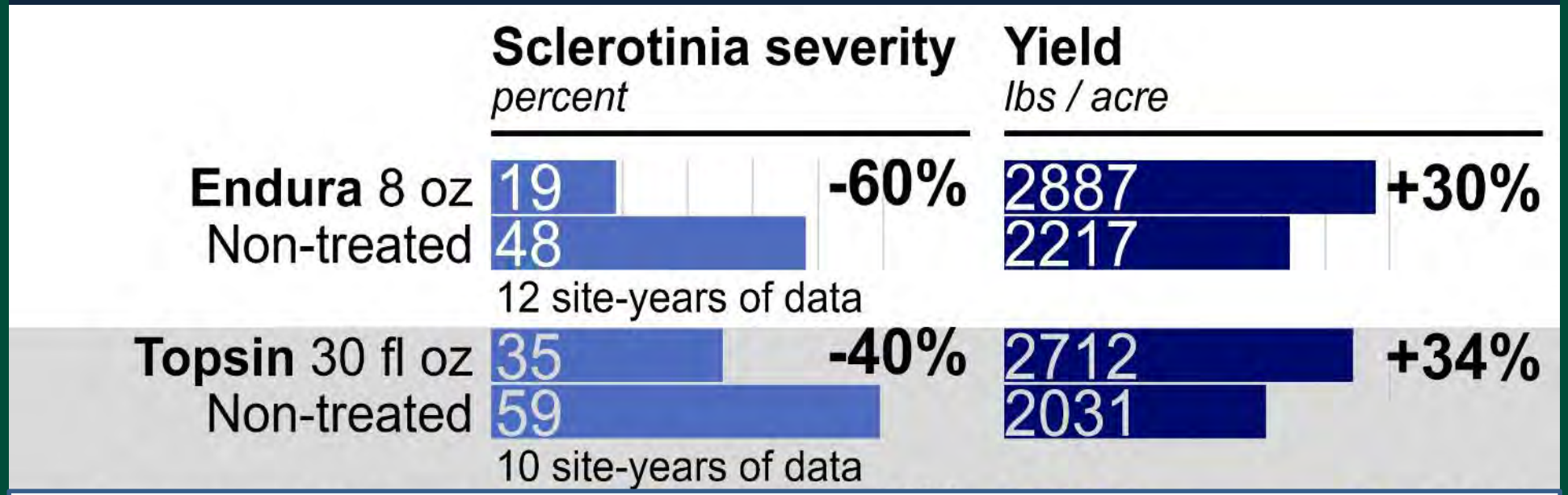

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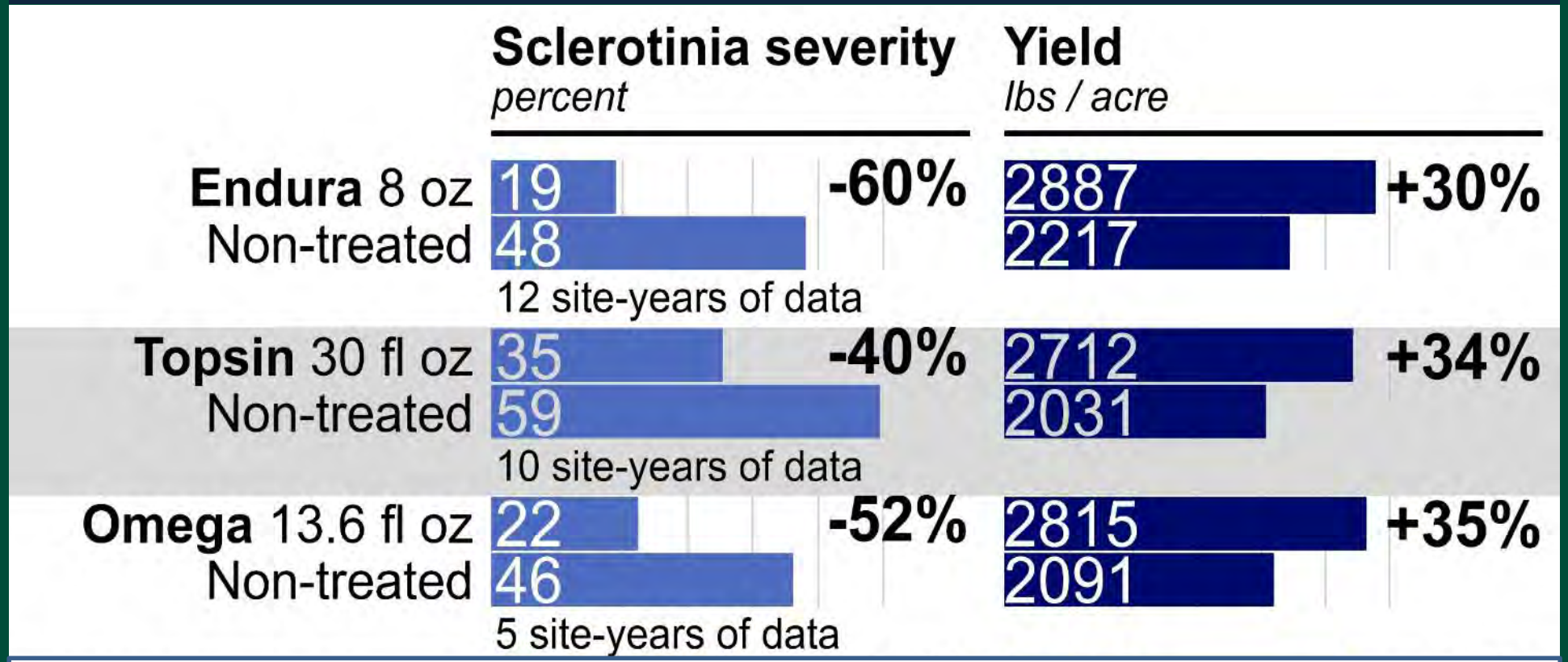

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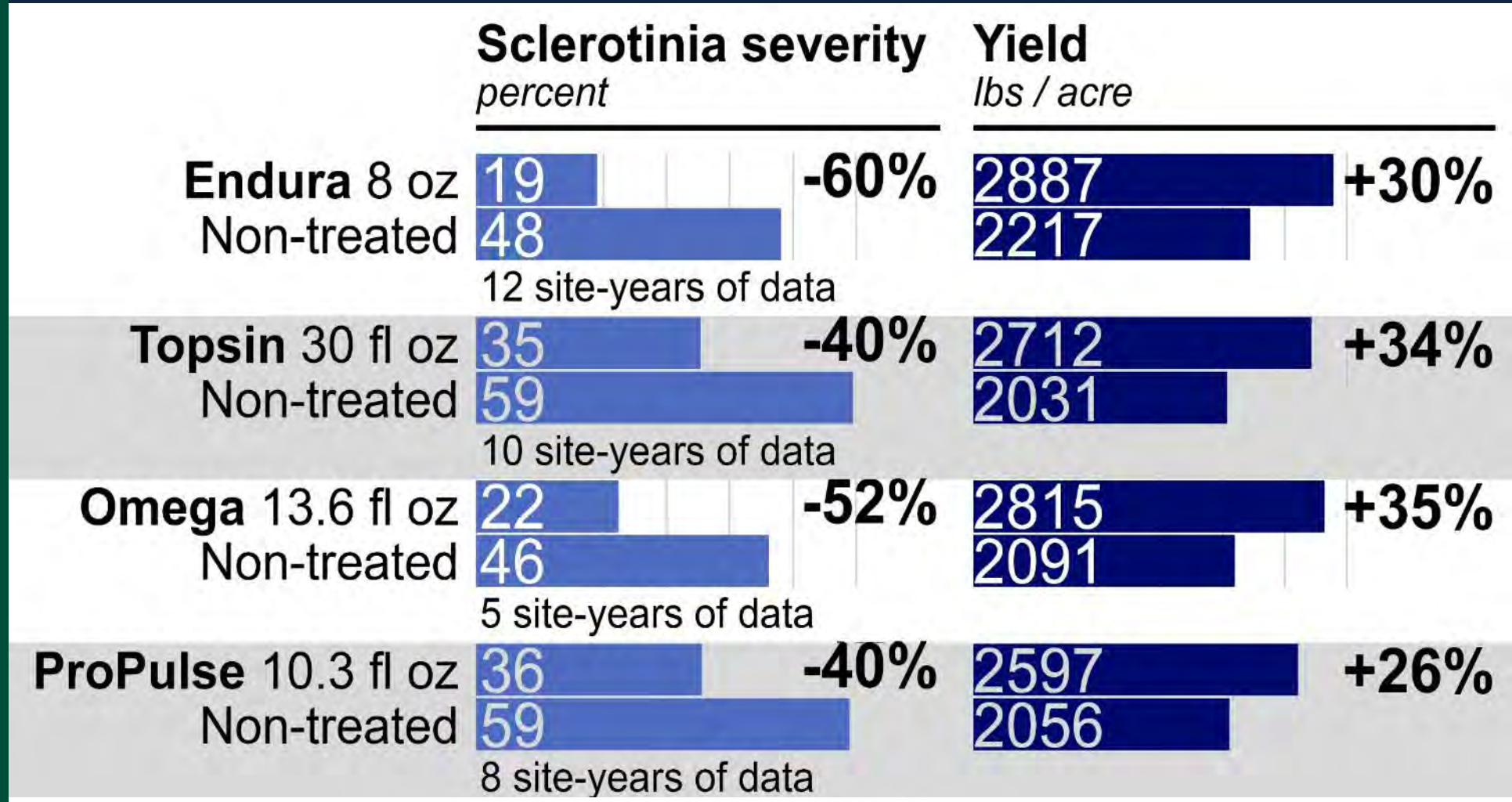

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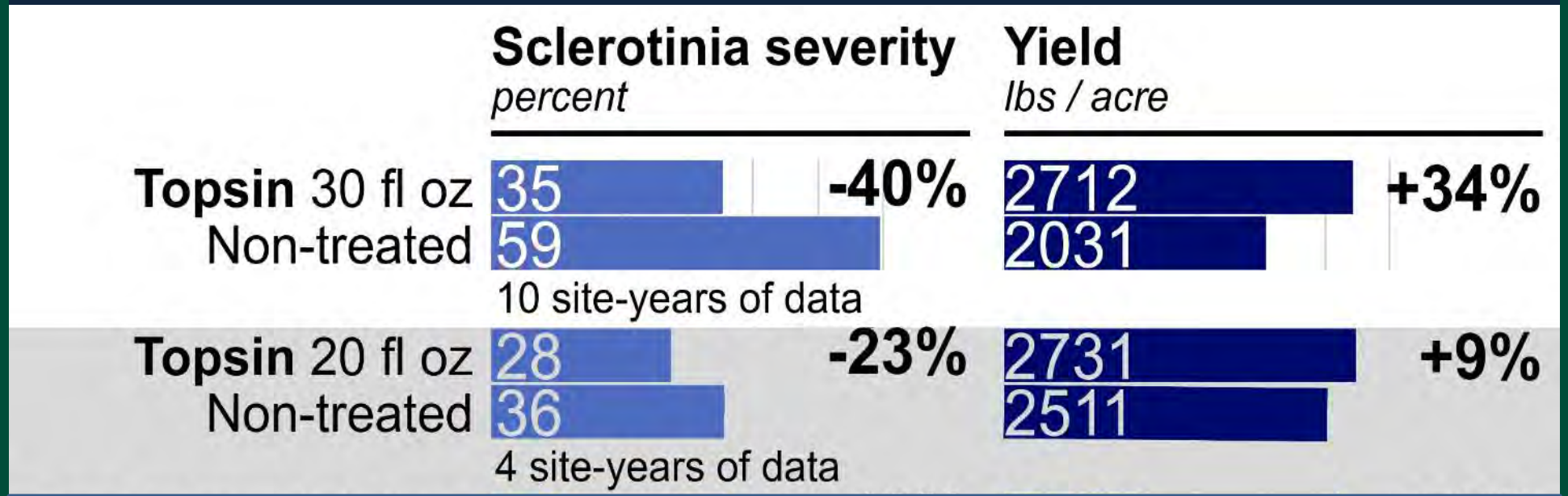

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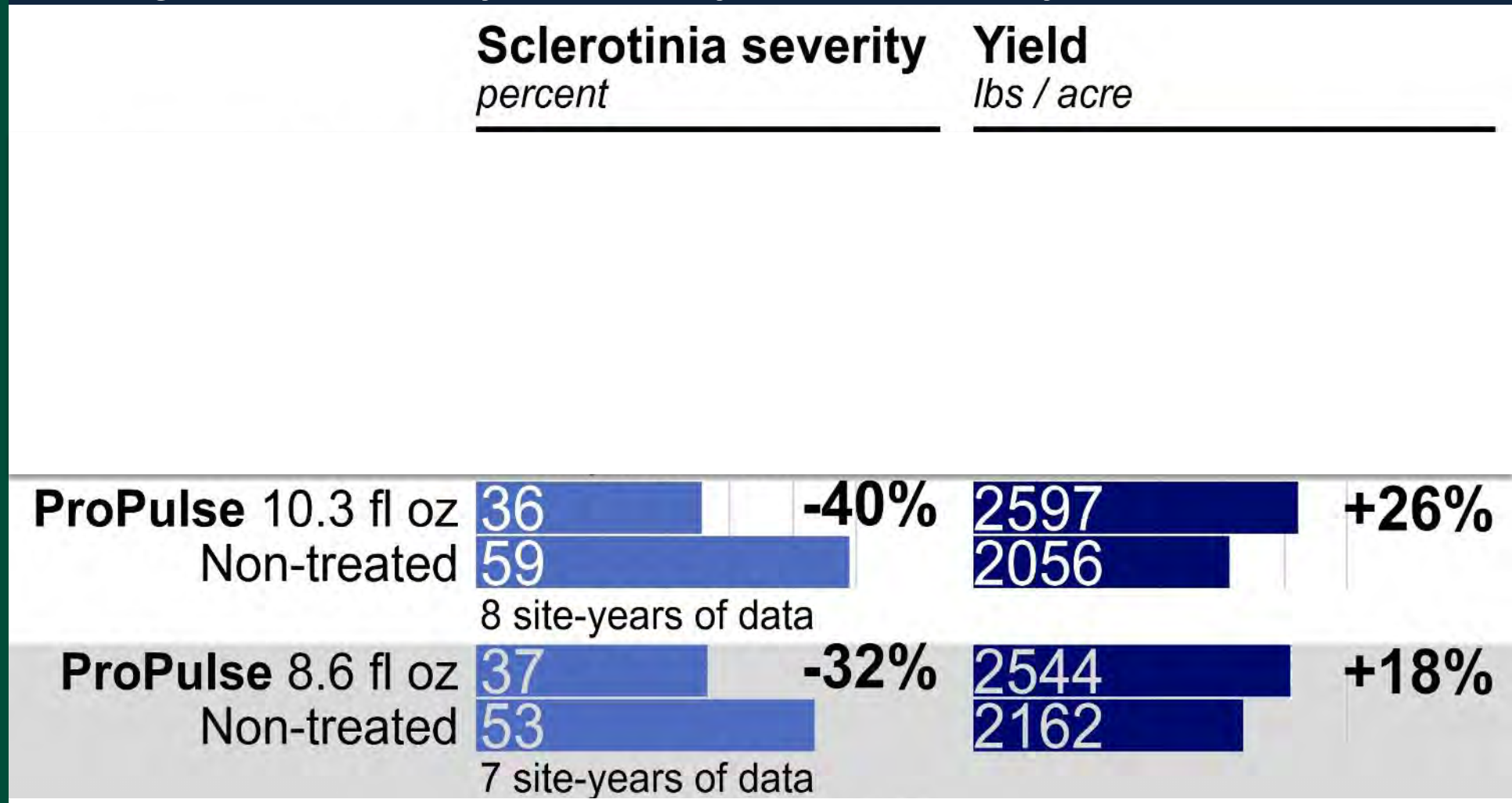

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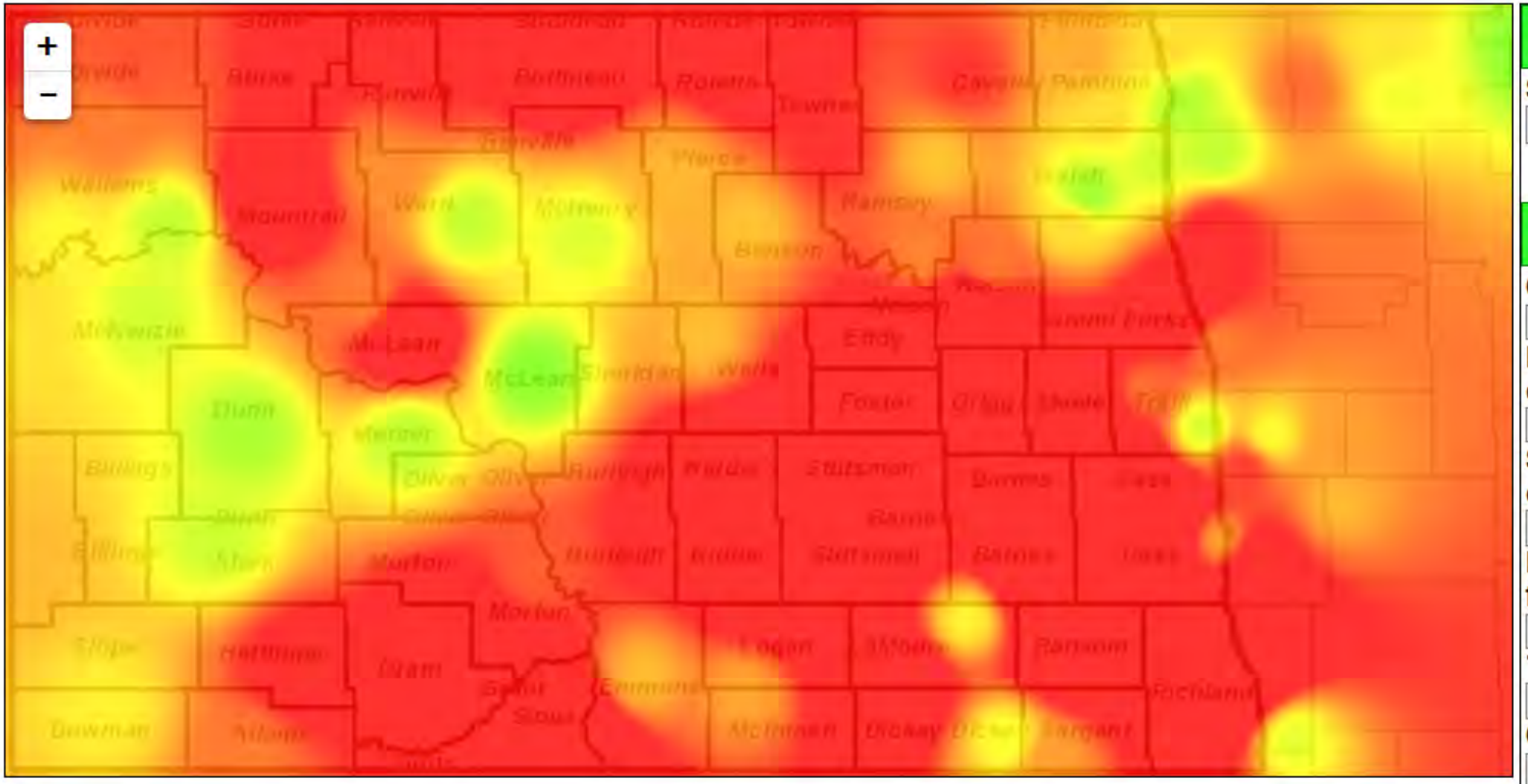
https://www.ag.ndsu.edu/sclerotinia/riskmap.html

Estimated risk of Sclerotinia stem rot development for canola 07/04/2020



Previous risk maps

Select date:

Thu Jul 04 2019

Get Map

Risk calculator

Closest NDAWN Station:

Last time planted to canola:

Sclerotinia on last canola:

Last year's crop in this field:

Tillage last year:

Canola Row Spacing:

Soybean Cyst Nematode

Photos: G. Yan

https://www.ag.ndsu.edu/publications/crops/dry-edible-bean-disease-diagnostic-series

PP1820-4
Dry Edible Bean Disease Diagnostic Series

Soybean cyst nematode (SCN)

Heterodera glycines

Figure 1

Figure 2

Figure 3

PP1820-4
Dry Edible Bean Disease Diagnostic Series

Soybean cyst nematode (SCN)

Heterodera glycines

AUTHORS: Julie Pasche, Guiping Yan, Berlin Nelson, Sam Markell and Bob Harveson

SYMPTOMS

- **Plants can be infected with no above-ground symptoms**
- **Stunted or yellow areas of the field**
- **Small (1/32 to 1/6 inch) cream-colored and lemon-shaped cysts on roots**

FIGURE 1 – Yellow and stunted kidney beans with SCN

FIGURE 2 – Small cream-colored females on dry bean roots

FIGURE 3 – Stunting of pinto bean growing in pots with different levels of SCN; no SCN (C); 5,000 eggs/100cc (L); 10,000 eggs/cc of SCN (R)

FACTORS FAVORING DEVELOPMENT

- Rotation with soybeans
- Light soil texture
- High soil pH
- Warm and dry soil

IMPORTANT FACTS

- Soybeans and dry edible beans are hosts
- Dirty equipment, flooding and wind erosion are SCN dispersal mechanisms
- All market classes are hosts
- Research indicates that kidney beans are the market class most susceptible to SCN and black beans are the least susceptible

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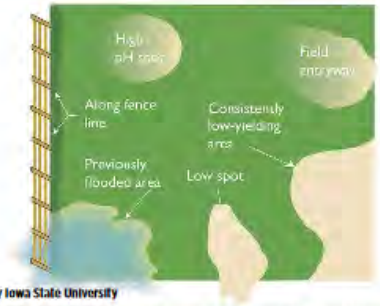
PP1820-5
Dry Edible Bean Disease Diagnostic Series

Soybean cyst nematode soil sampling

Heterodera glycines

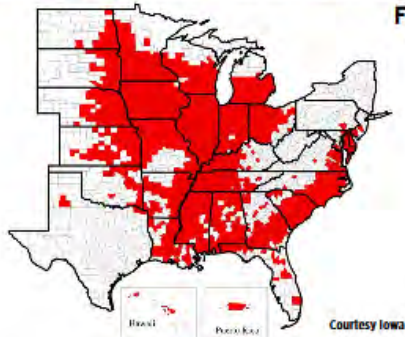
Figure 1



Courtesy Iowa State University

Figure 2

Figure 3



Courtesy Iowa State University

PP1820-5
Dry Edible Bean Disease Diagnostic Series

Soybean cyst nematode soil sampling

Heterodera glycines

AUTHORS: Sam Markell, Guiping Yan, Berlin Nelson, Julie Pasche and Bob Harveson

WHY SOIL SAMPLE

- **SCN is a microscopic worm that lives in the soil and parasitizes roots**
- **Soil sampling is the most reliable way to detect SCN**

WHEN TO SAMPLE

- **In late summer/fall (before or after harvest), when SCN population is highest and more easily detected**

WHERE TO SAMPLE

- **Anything that moves soil can move SCN**
- **Concentrate sampling in areas where SCN is likely to be introduced or develop, *especially field entrances***

FIGURE 1 – High-risk spots for SCN

FIGURE 2 – SCN causing yellowing and stunting in kidney beans

FIGURE 3 – Counties positive for SCN (detected on soybeans) as of 2014

HOW TO SAMPLE

- Aim for the roots, dig 6 to 8 inches deep, take 10 to 20 samples, mix and send to a lab

WHAT RESULTS MEAN

- Results are presented as eggs/100 cc, which is the number of nematode eggs in approximately 3.4 ounces of soil
- Low levels (for example, 50 or 100 eggs/100 cc) could be false positives and should be viewed with caution

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Thank You and Questions