

USA
Sunflower Survey



*Partnership of
University, USDA & Industry*

2023
*NATIONAL
SUNFLOWER
ASSOCIATION
SURVEY*

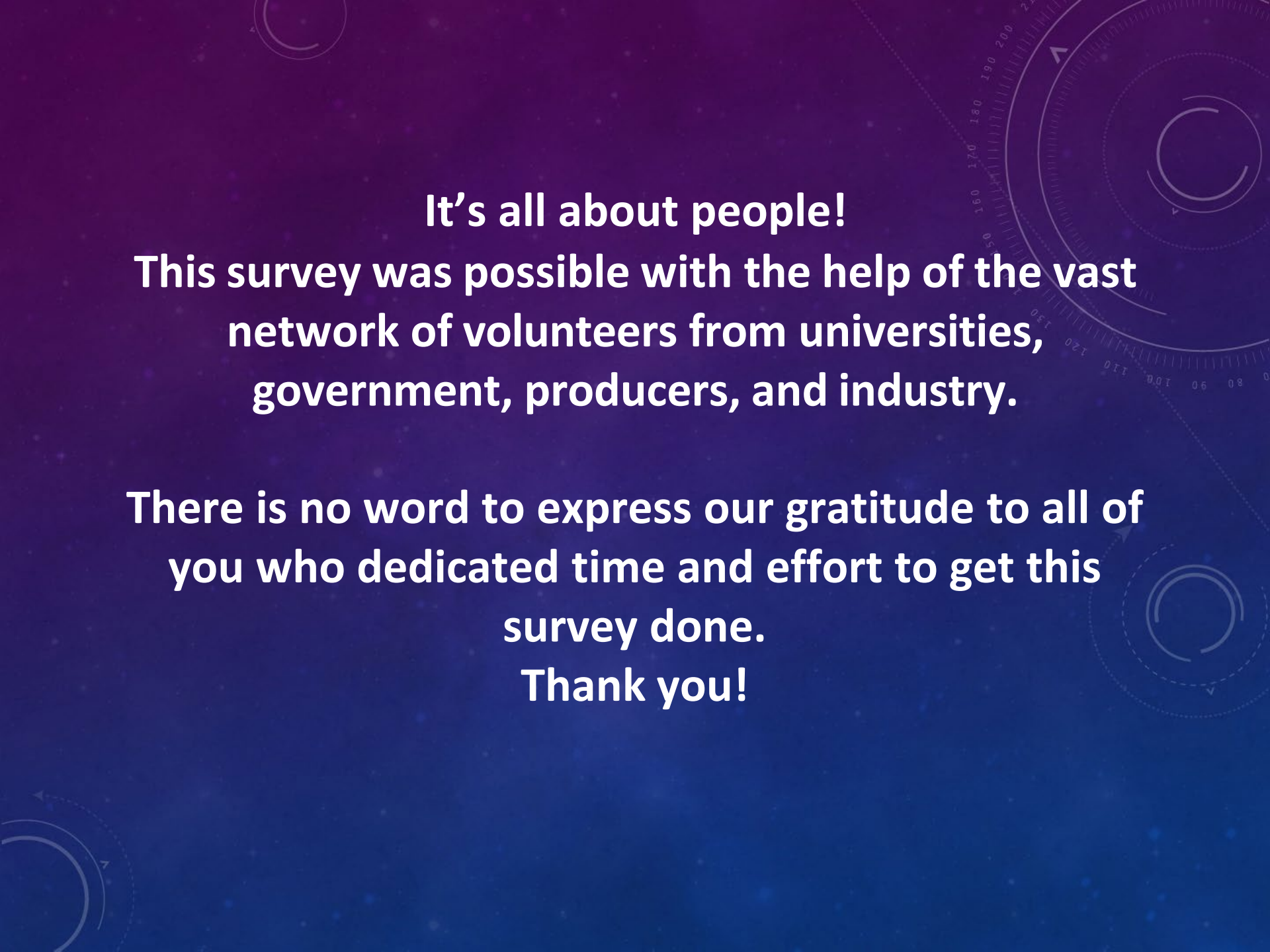
Project Leaders:

Leo Bortolon, Research Agronomist, NDSU-NCREC

Febina Mathew, Associate Professor, Plant Pathology, NDSU

Jarrad Prasifka, Research Entomologist, USDA-ARS

Patrick Wagner, Entomology Field Specialist, SDSU



It's all about people!

This survey was possible with the help of the vast network of volunteers from universities, government, producers, and industry.

There is no word to express our gratitude to all of you who dedicated time and effort to get this survey done.

Thank you!

Training for surveyors in ND (in-person and remote):

- CREC
- DREC



SURVEY FORMAT

1. **Yield components** (*Plant population, head diameter, seed size, % good seed, % center set, bird damage*) = six components
2. **Agonomic info** (eight components)
3. **Weed assessment** (30 weeds)
4. **Diseases** - incidence and severity on 10 diseases
5. **Insect and bird damage** = In-field assessment and lab exam of seed samples – 10 components
6. **Two sites examined per field**

THUS.... $(6 + 8 + 30 + 10 + 10) \times 2 = 128$ observations /field x 220

fields = **+28,000 data points in one survey**

16 surveys = > 440,000 pieces of data

SUNFLOWER SURVEY - # FIELDS

2021

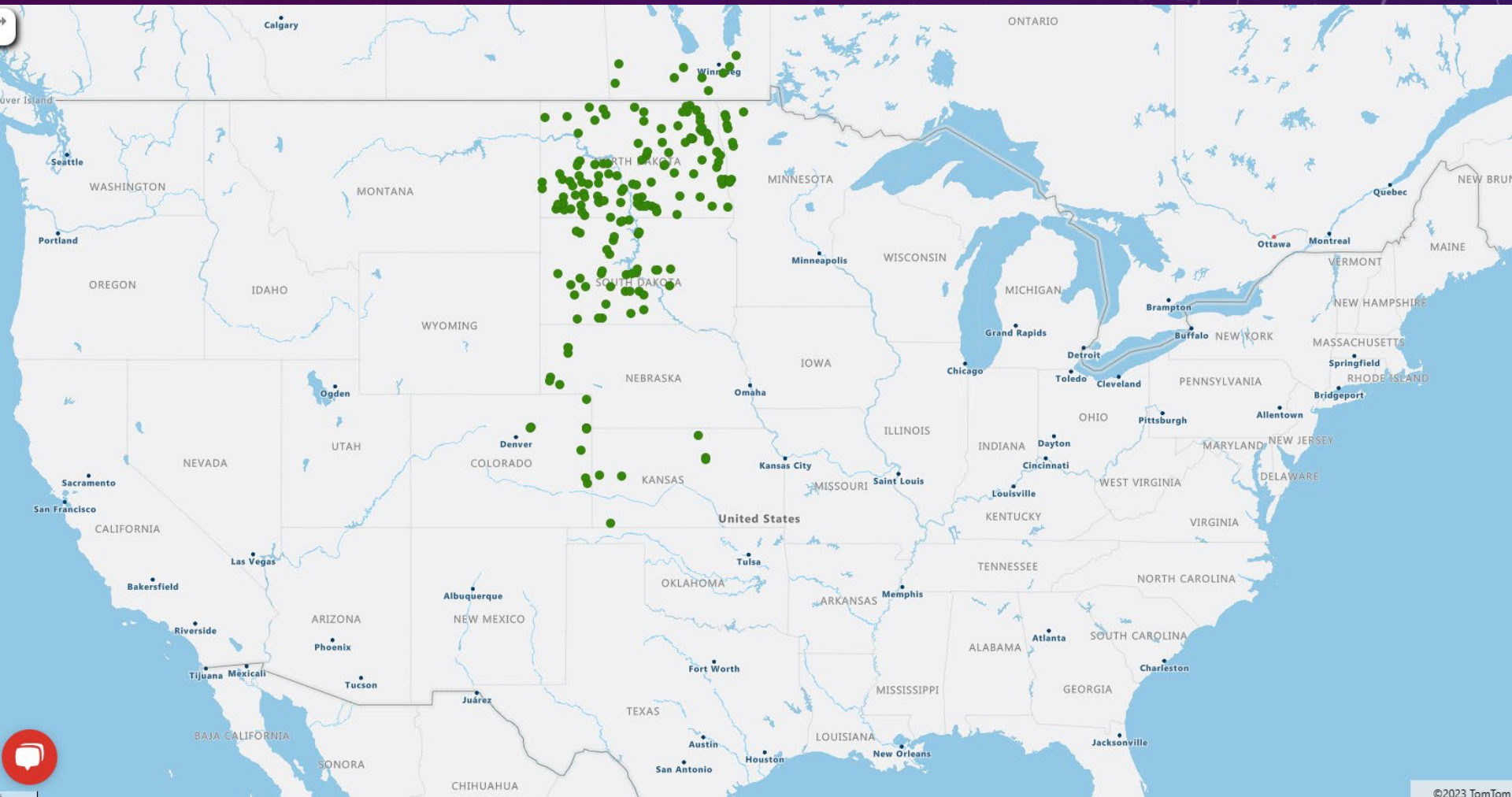
- North Dakota - 79
- Minnesota - 12
- South Dakota - 52
- Kansas - 5
- Colorado - 7
- Nebraska - 5
- Texas – 4
- Manitoba - 0

TOTAL - 164

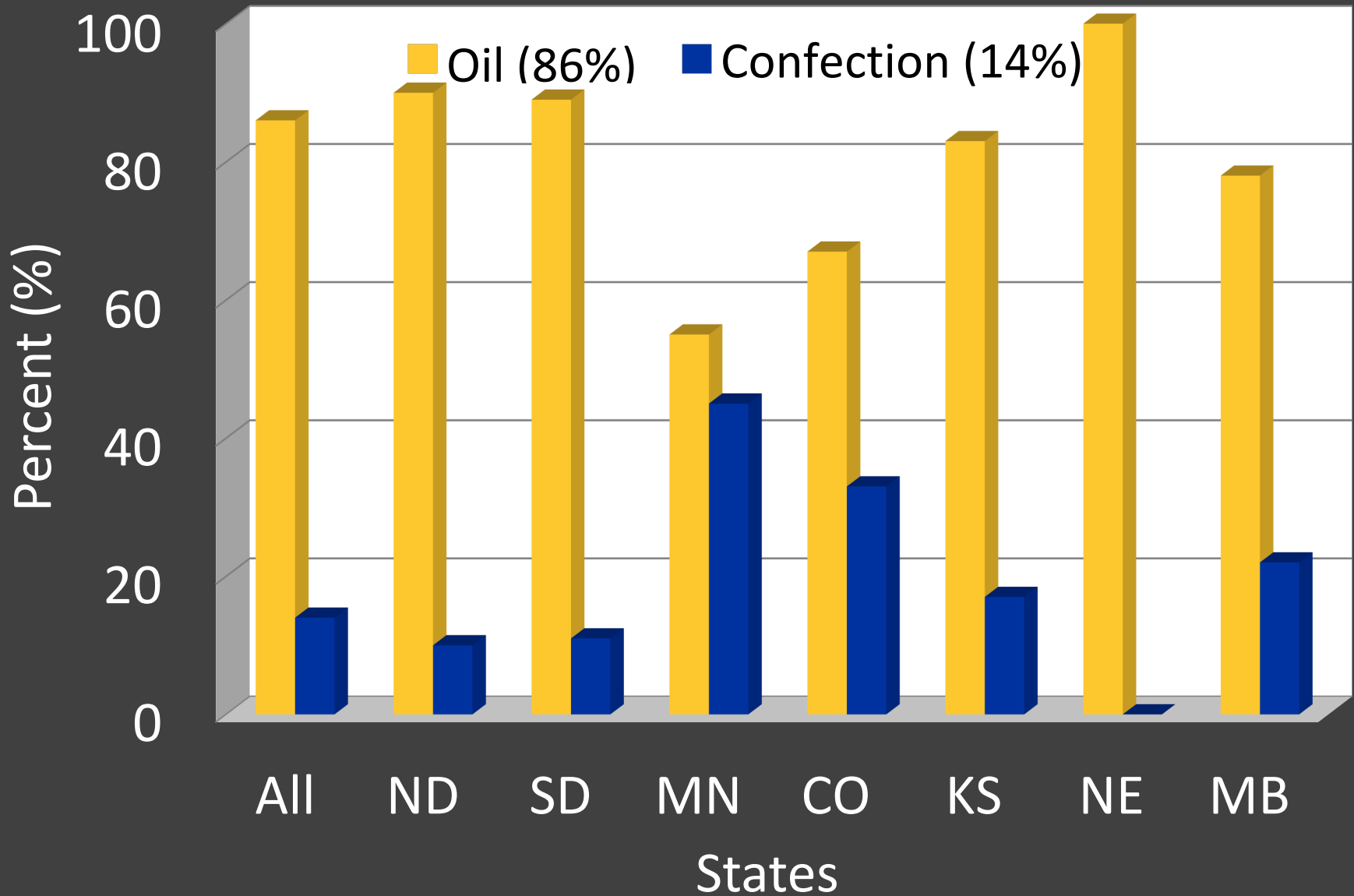
2023

- North Dakota - 127
- Minnesota - 11
- South Dakota - 52
- Kansas - 6
- Colorado - 9
- Nebraska - 6
- Texas – 0
- Manitoba - 9

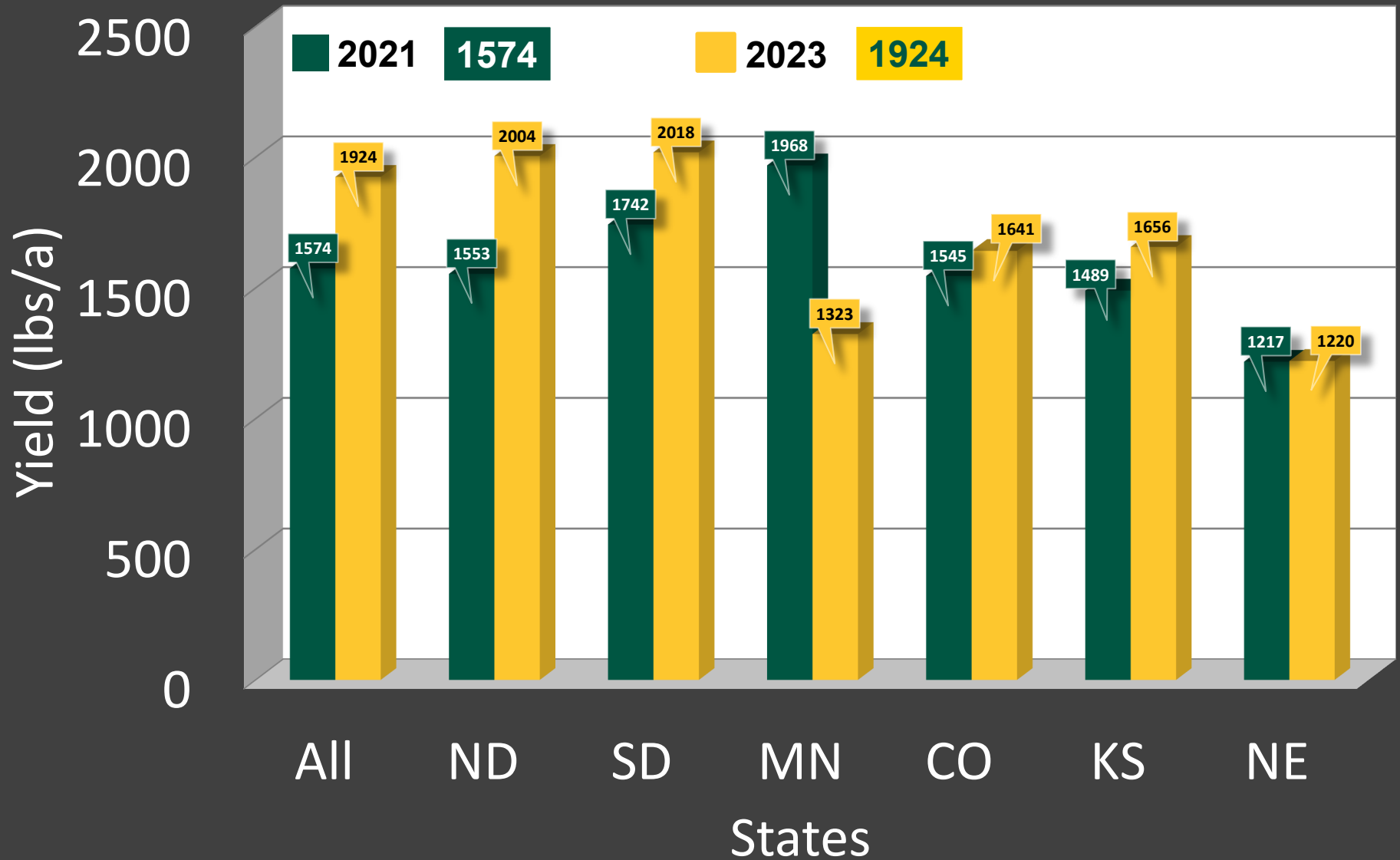
TOTAL - 220



SUNFLOWER TYPE

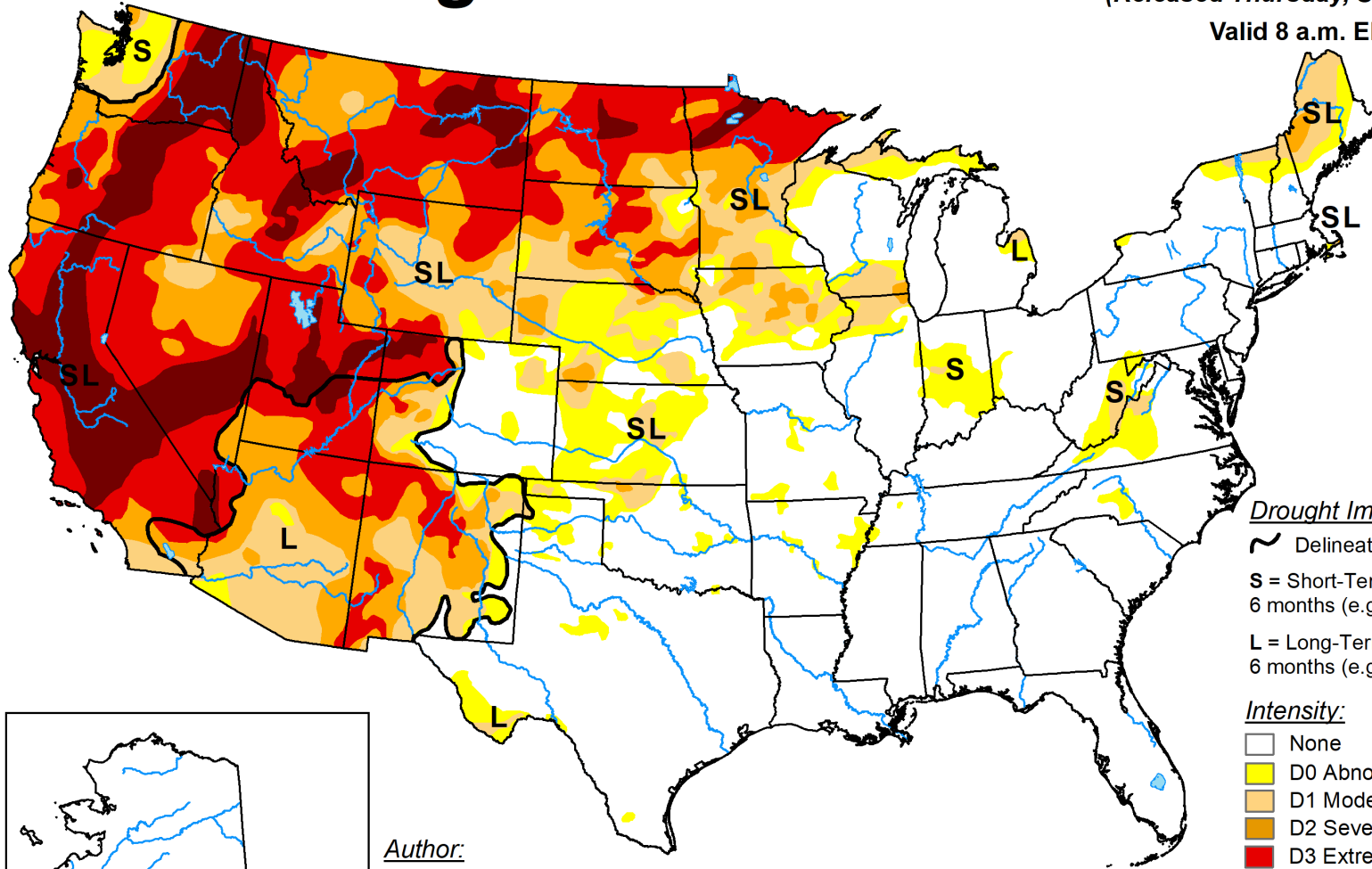


SUNFLOWER YIELD



U.S. Drought Monitor

August 31, 2021
(Released Thursday, Sep. 2, 2021)
Valid 8 a.m. EDT



Drought Impact Types:

- ~ Delineates dominant impacts
- S** = Short-Term, typically less than 6 months (e.g. agriculture, grasslands)
- L** = Long-Term, typically greater than 6 months (e.g. hydrology, ecology)

Intensity:

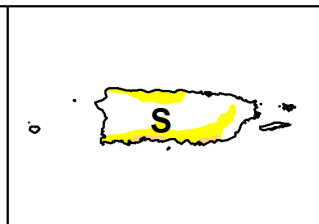
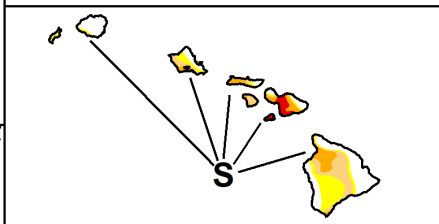
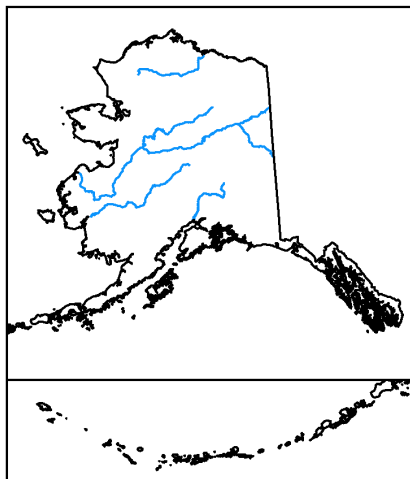
- None
- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

Author:
David Simeral
Western Regional Climate Center

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. For more information on the Drought Monitor, go to <https://droughtmonitor.unl.edu/About.aspx>

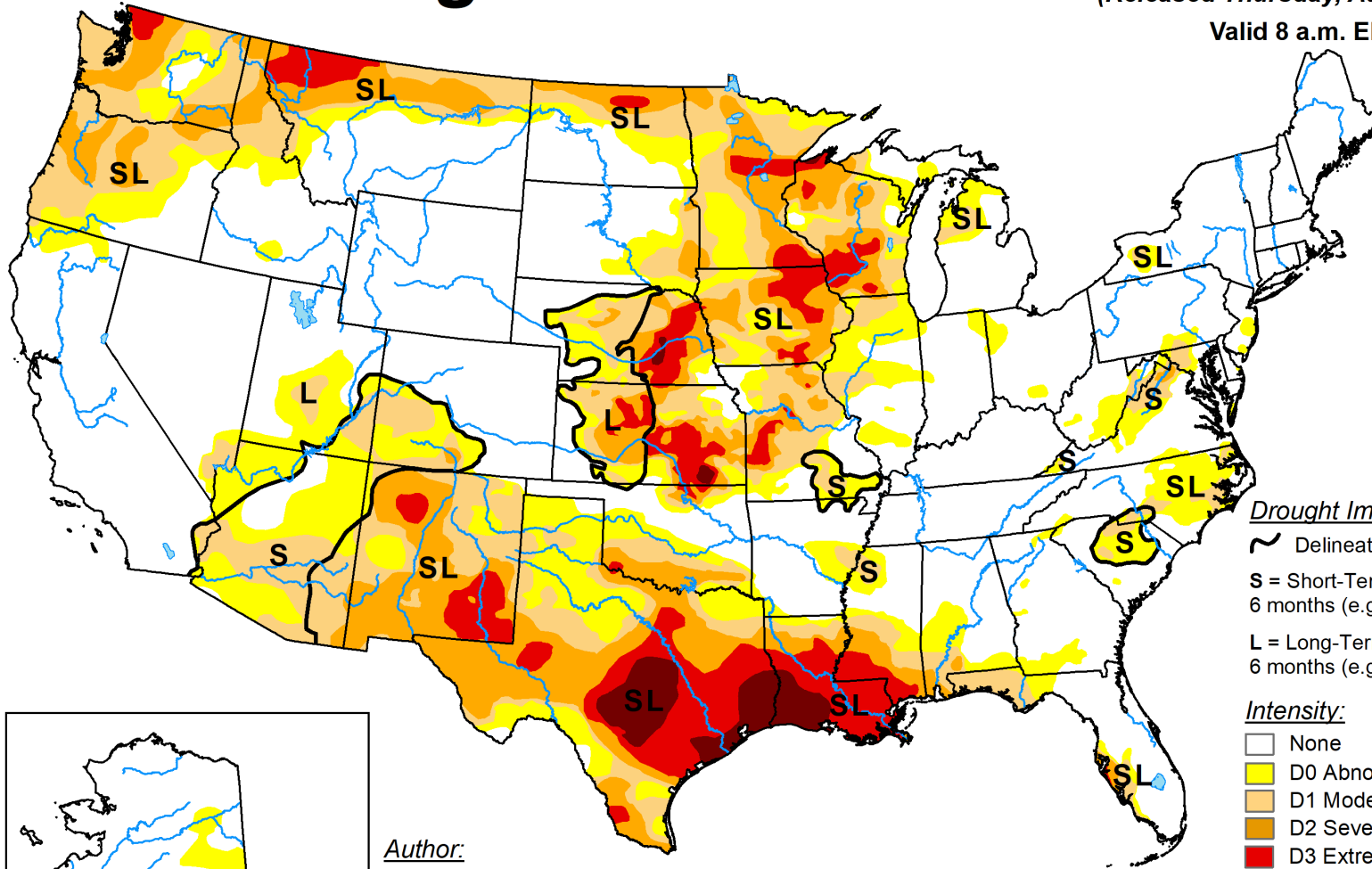


droughtmonitor.unl.edu



U.S. Drought Monitor

August 29, 2023
(Released Thursday, Aug. 31, 2023)
Valid 8 a.m. EDT



Author:
David Simeral
Western Regional Climate Center

Drought Impact Types:

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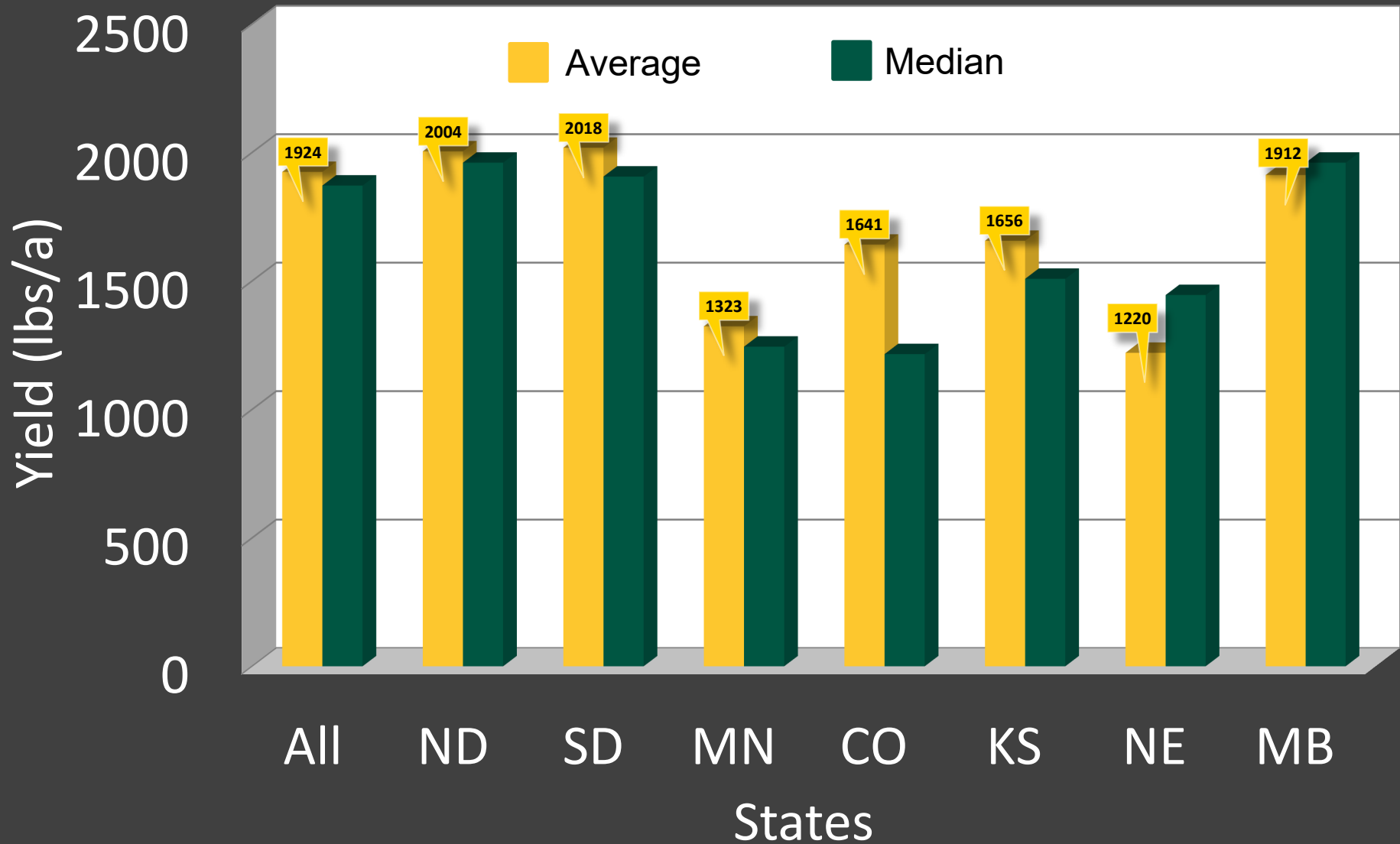
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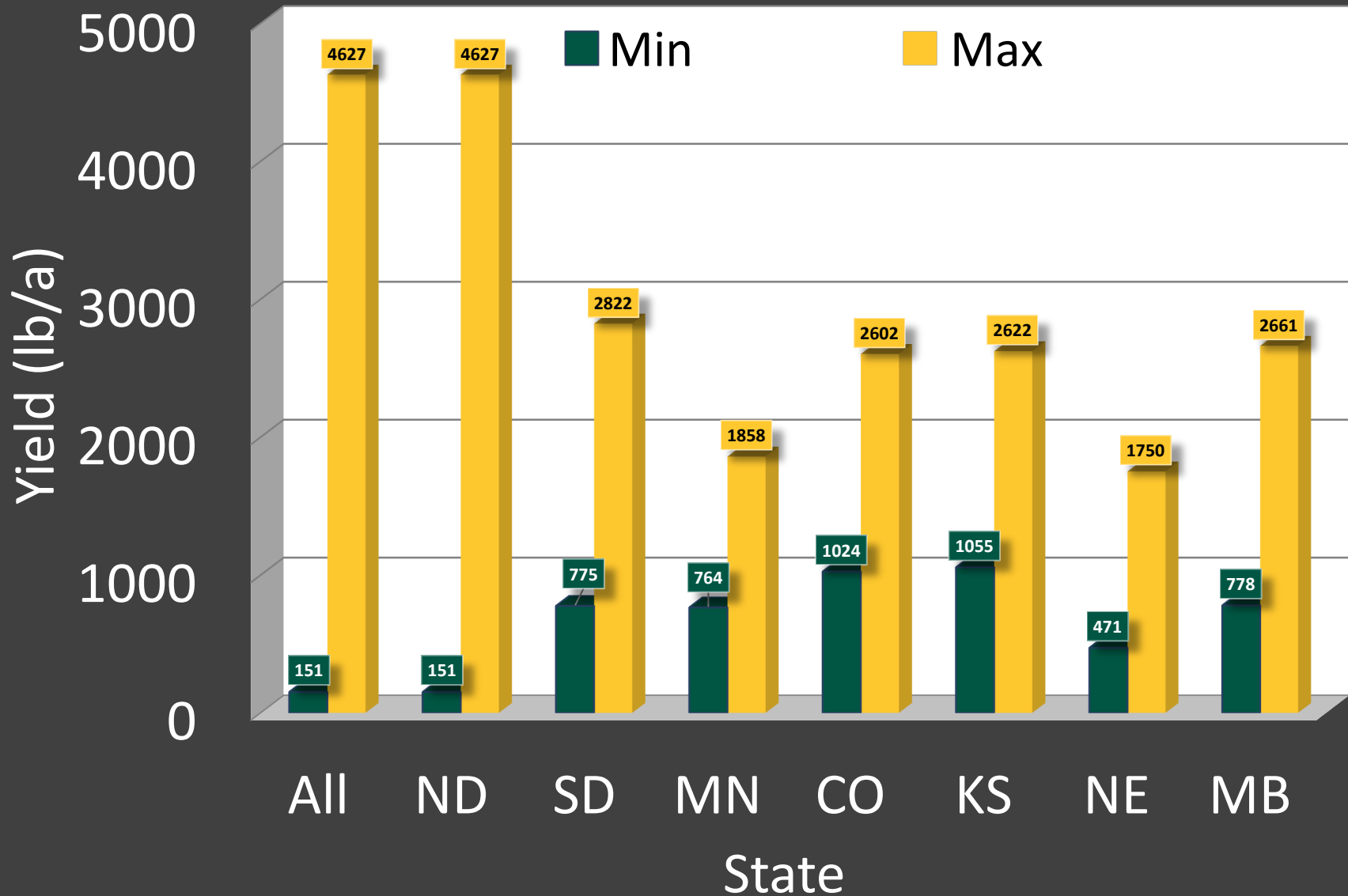


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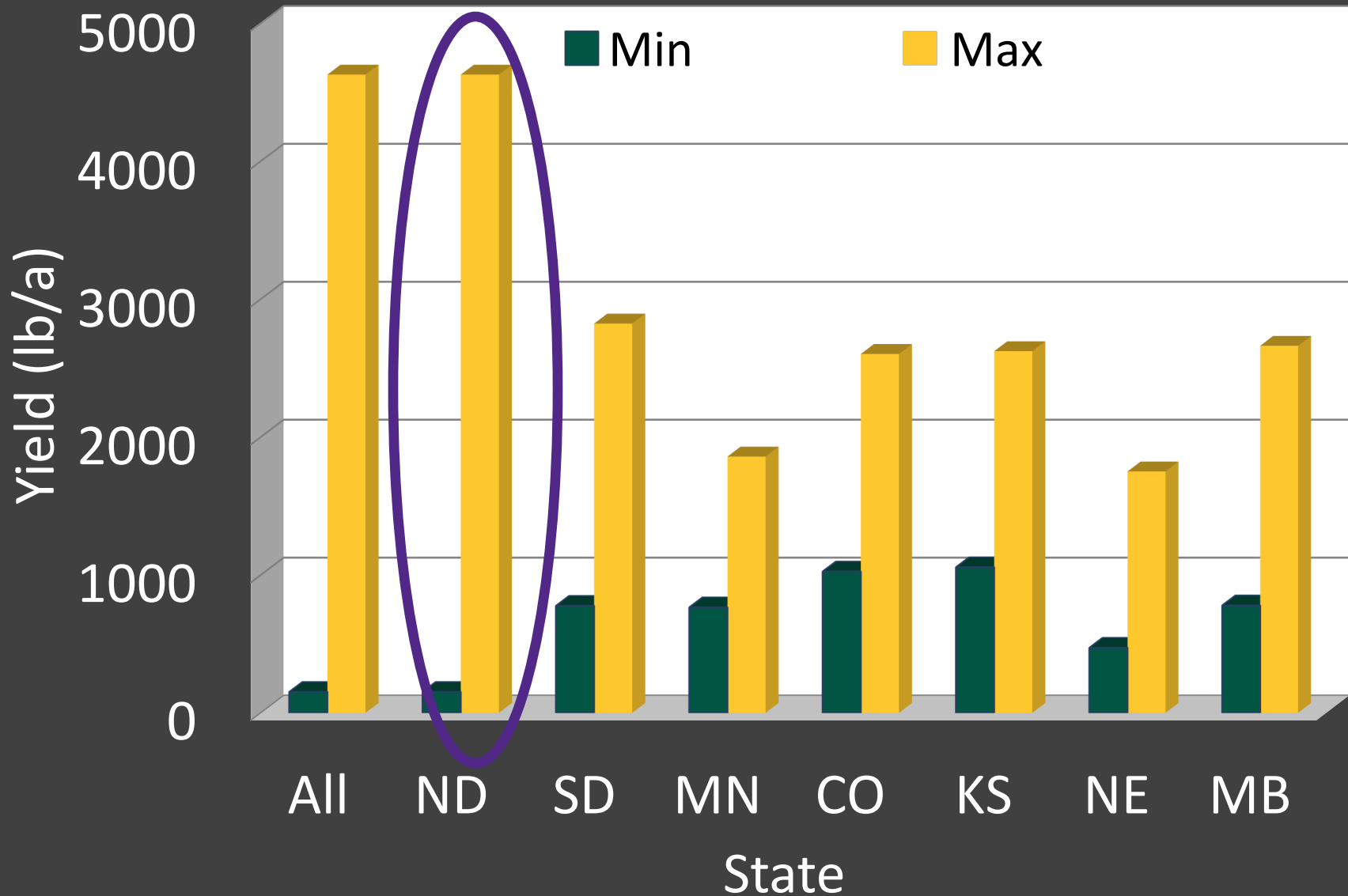
SUNFLOWER YIELD



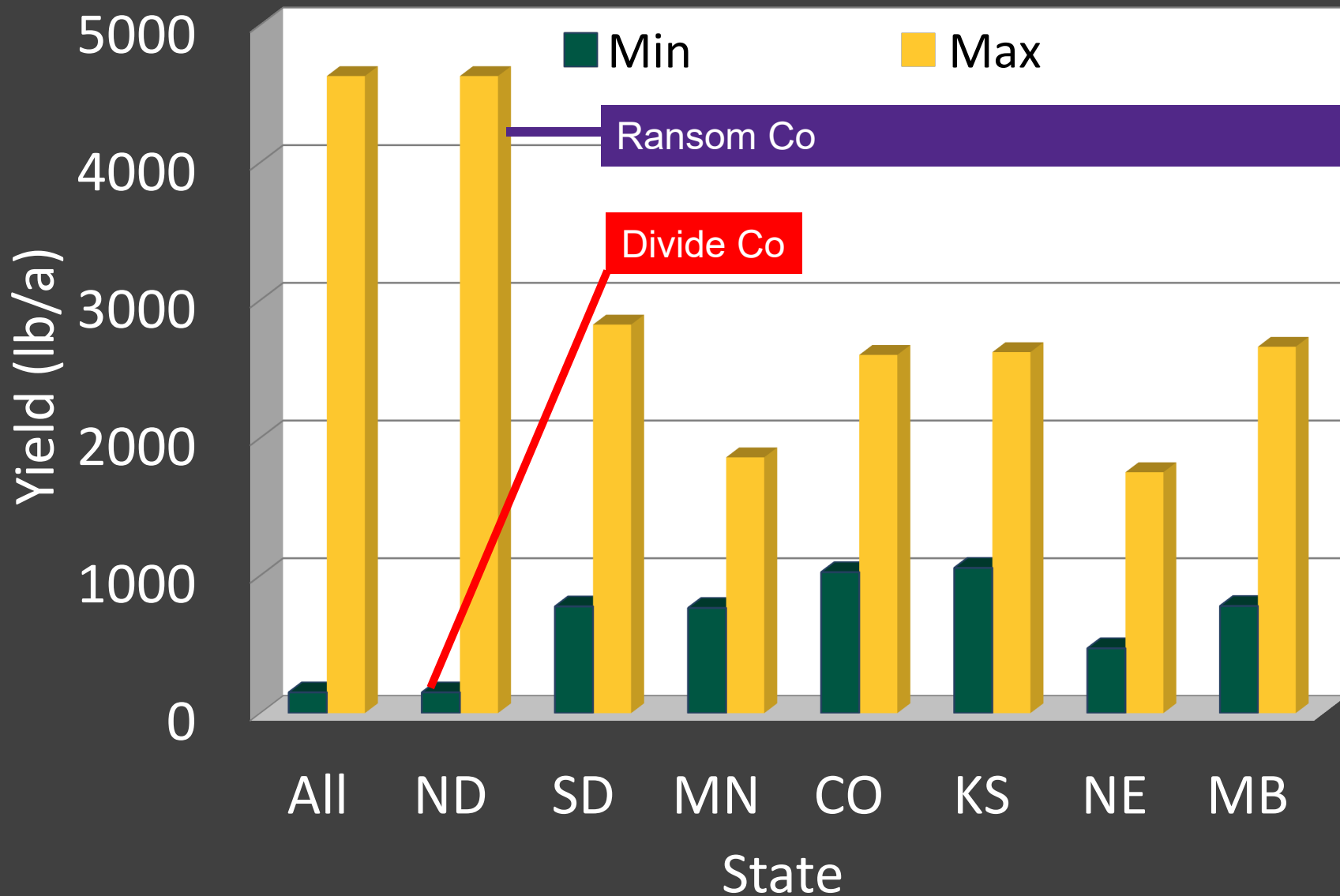
SUNFLOWER – YIELD MIN AND MAX



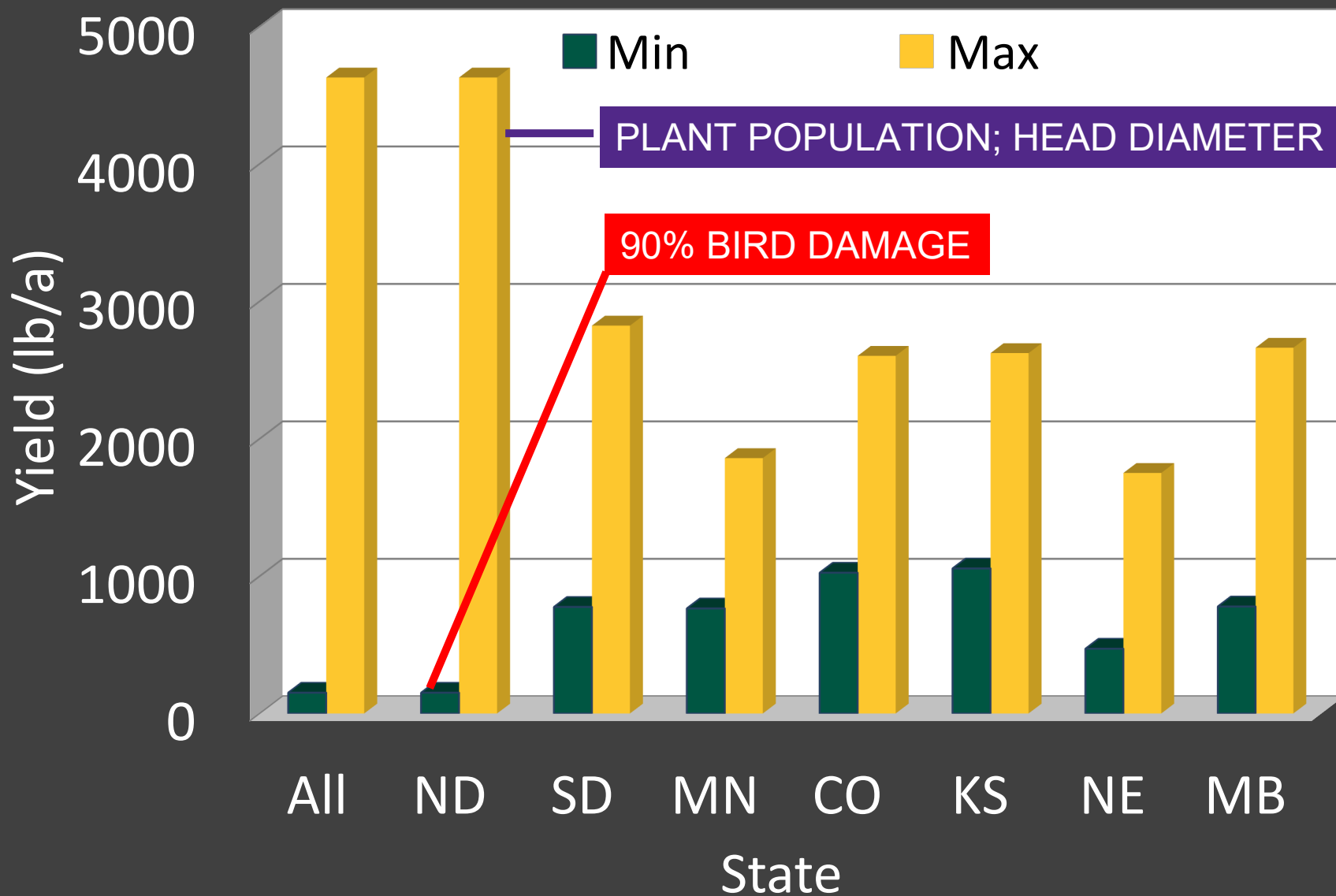
SUNFLOWER – YIELD MIN AND MAX



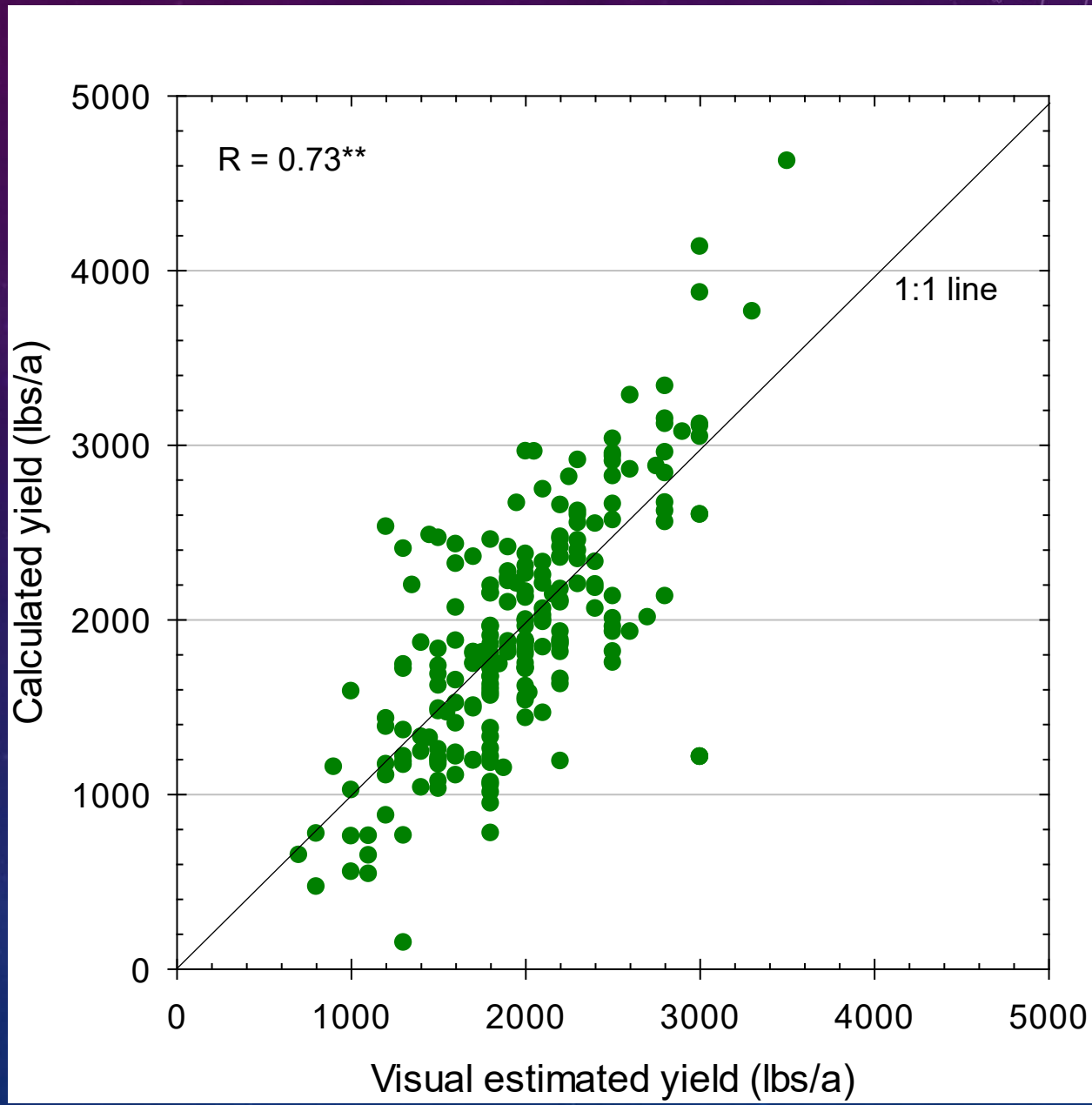
SUNFLOWER – YIELD MIN AND MAX



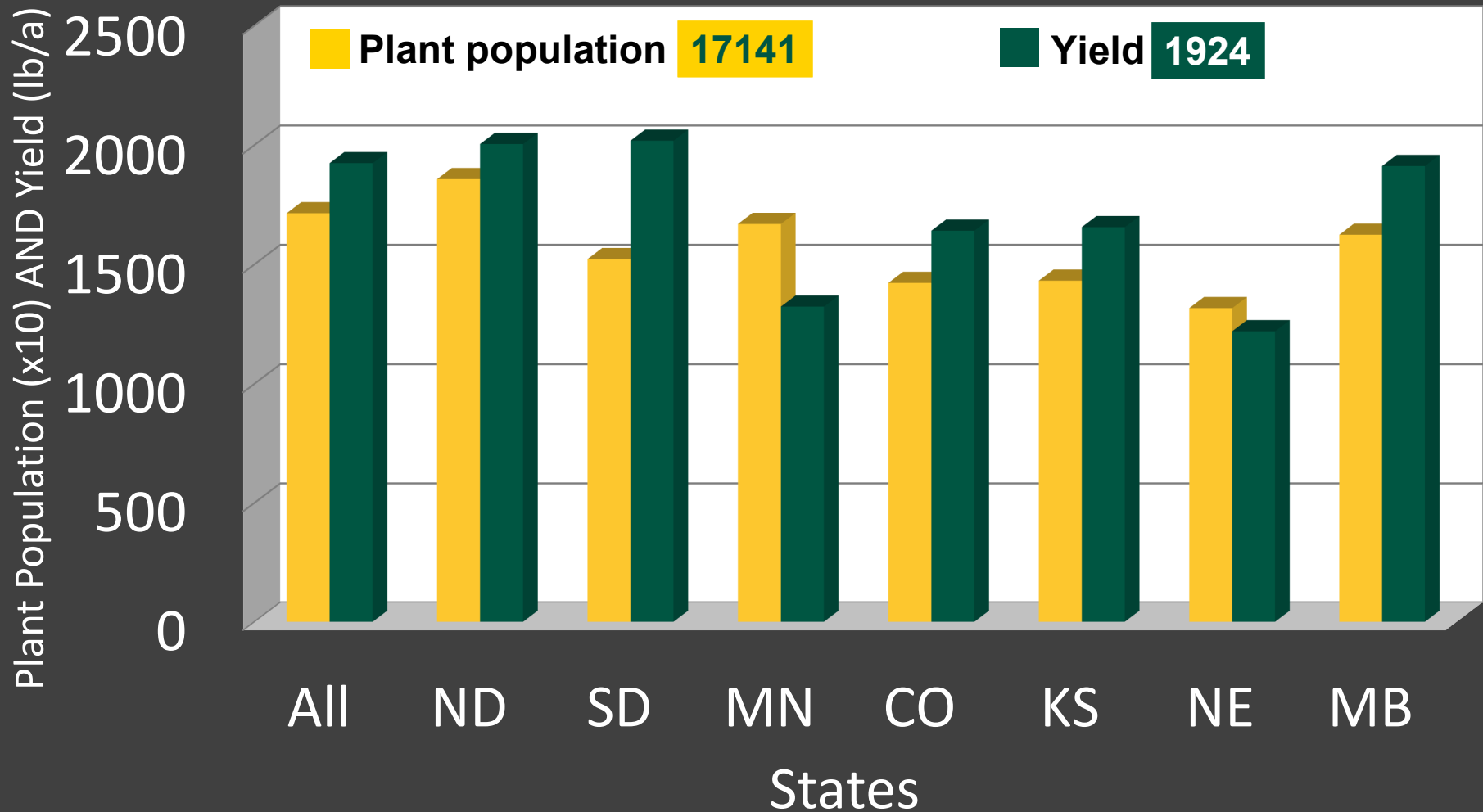
SUNFLOWER – YIELD MIN AND MAX



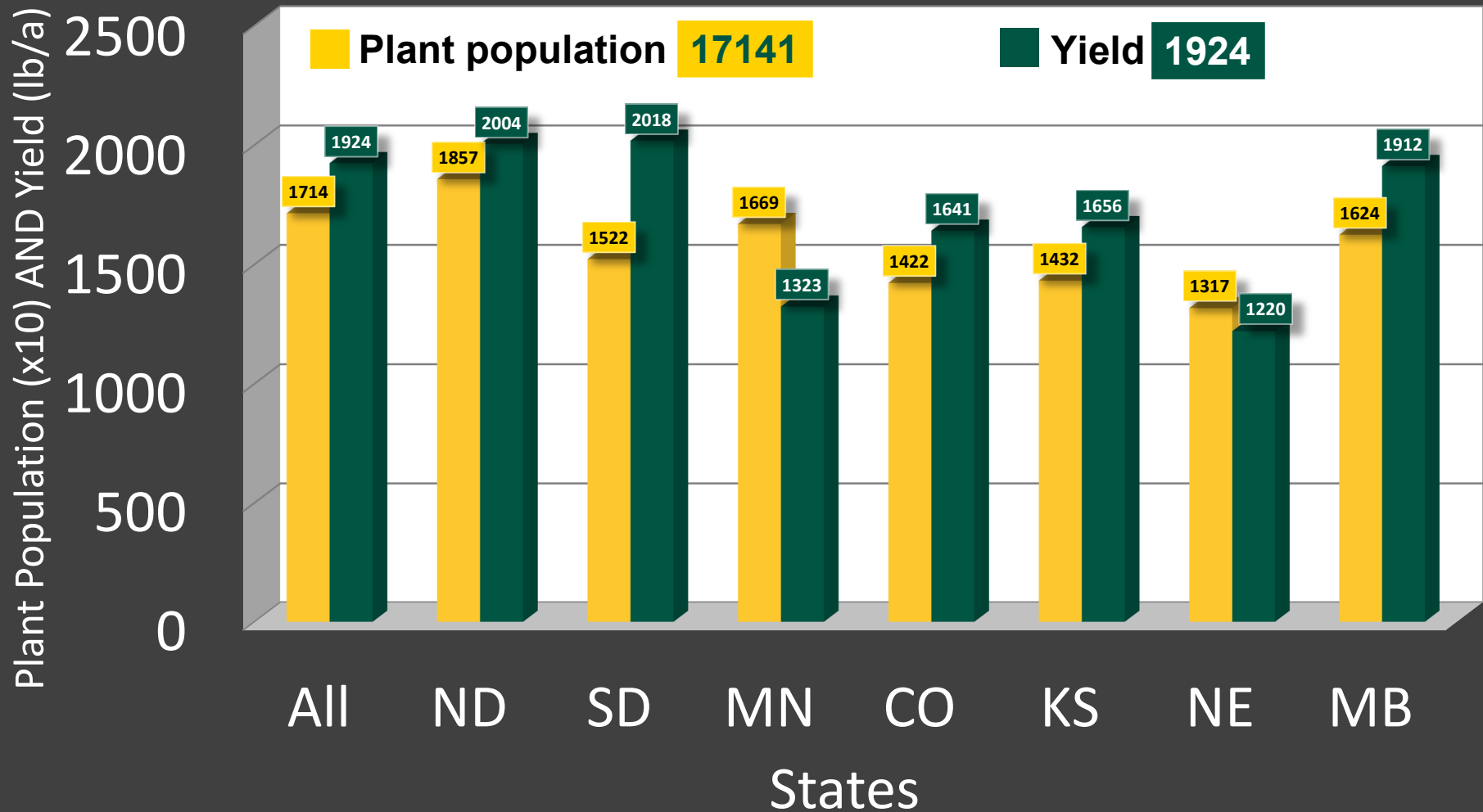
SUNFLOWER YIELD – VISUAL VS CALCULATED



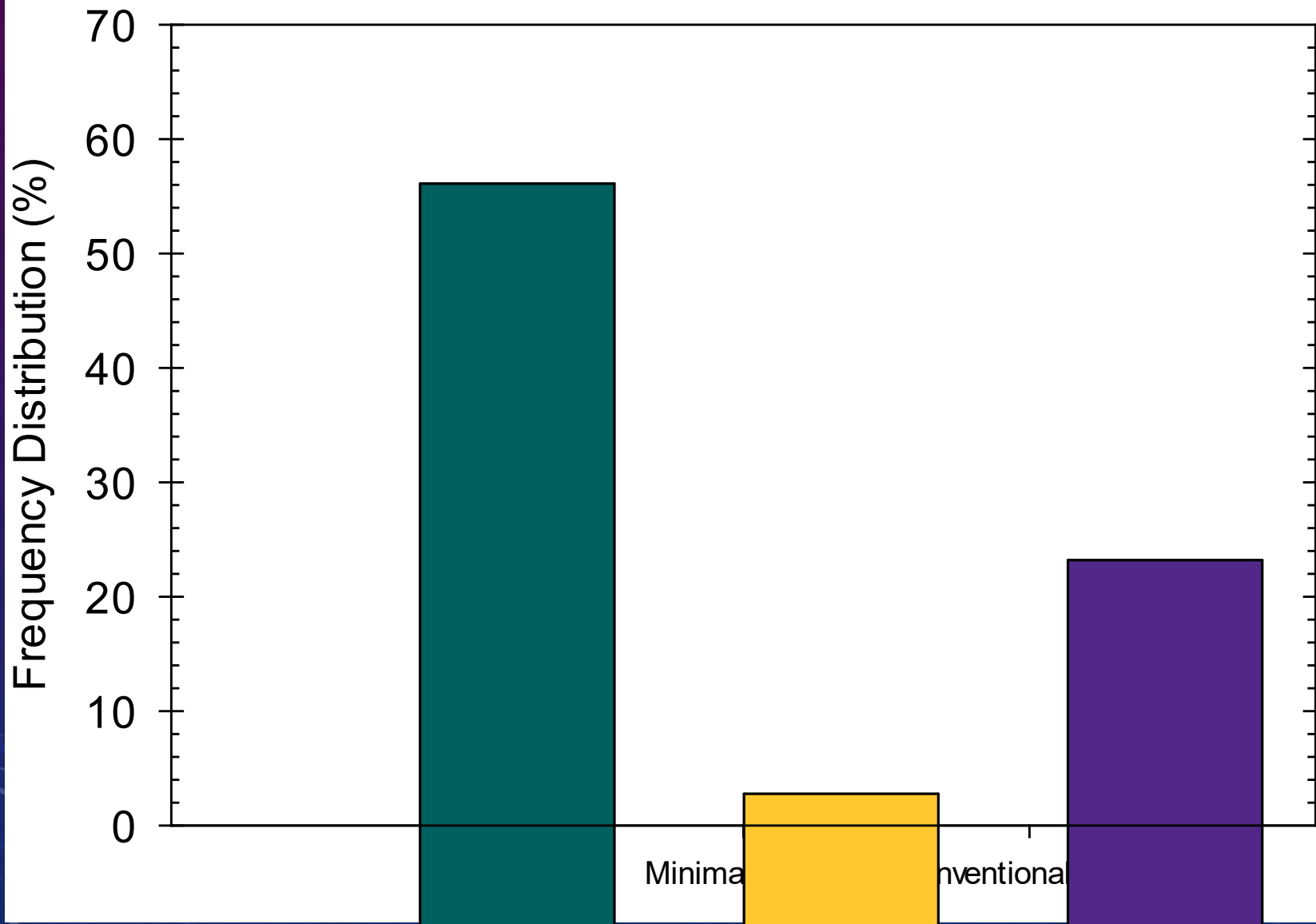
SUNFLOWER PLANT POPULATION AND YIELD



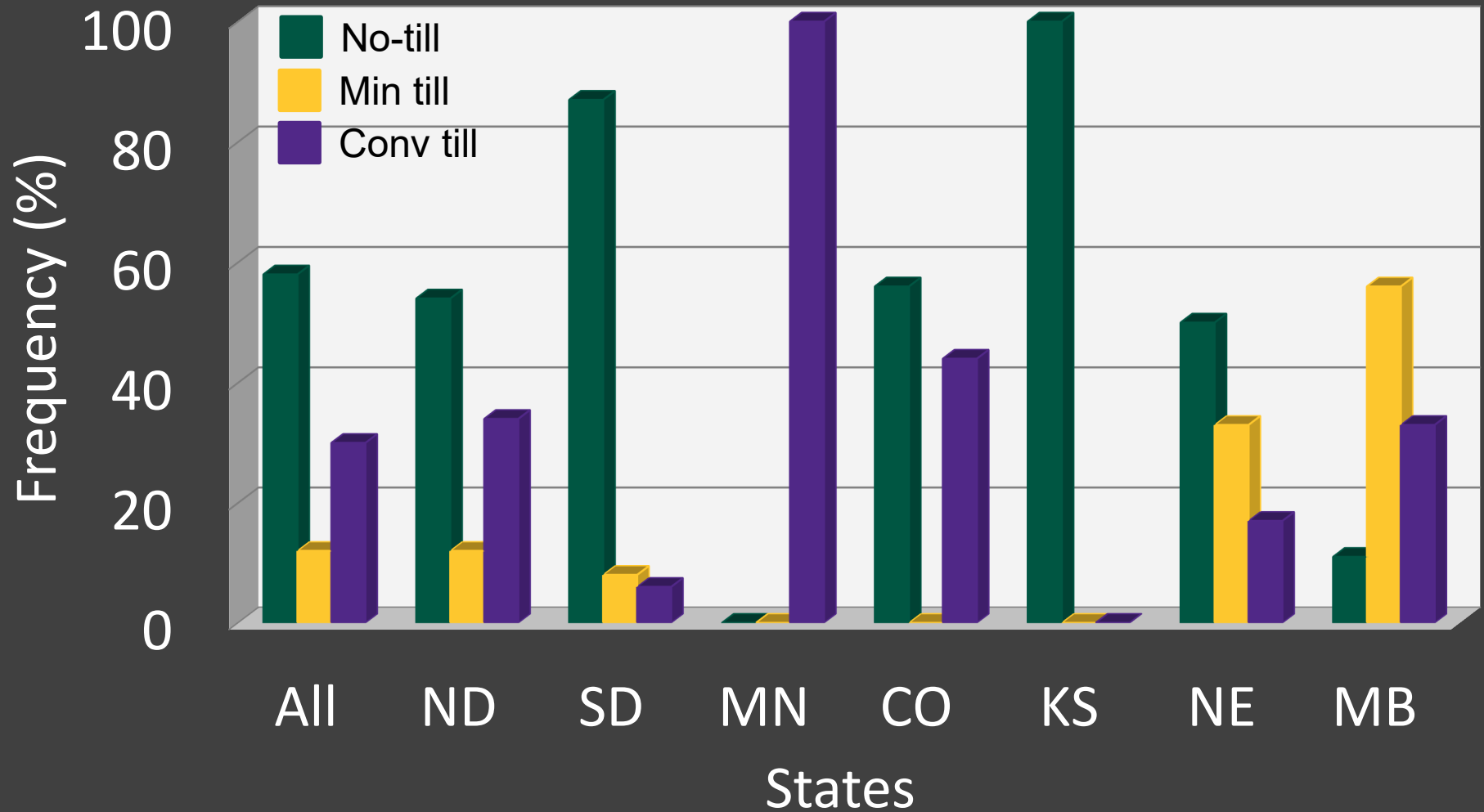
SUNFLOWER PLANT POPULATION AND YIELD



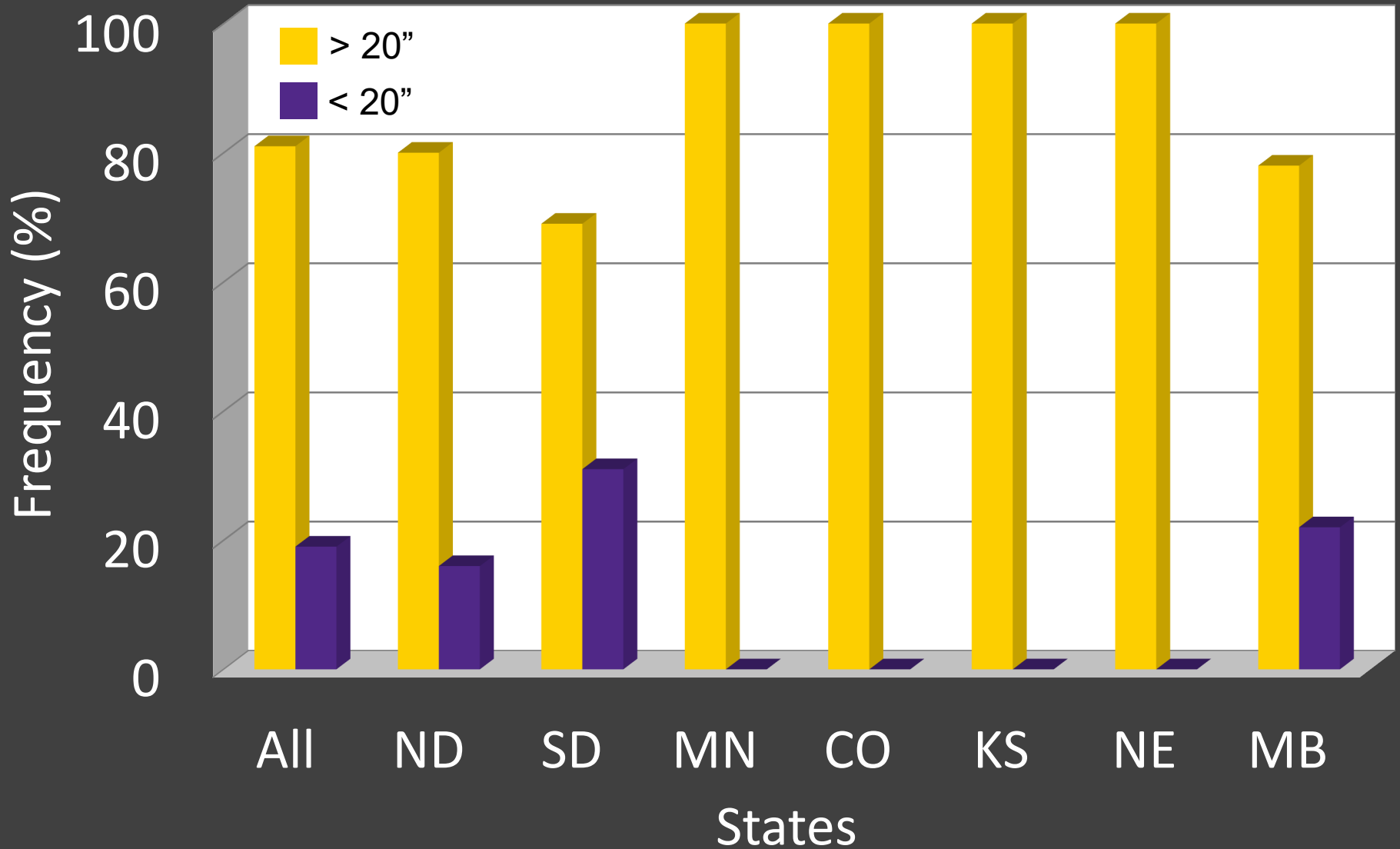
SUNFLOWER - TILLAGE



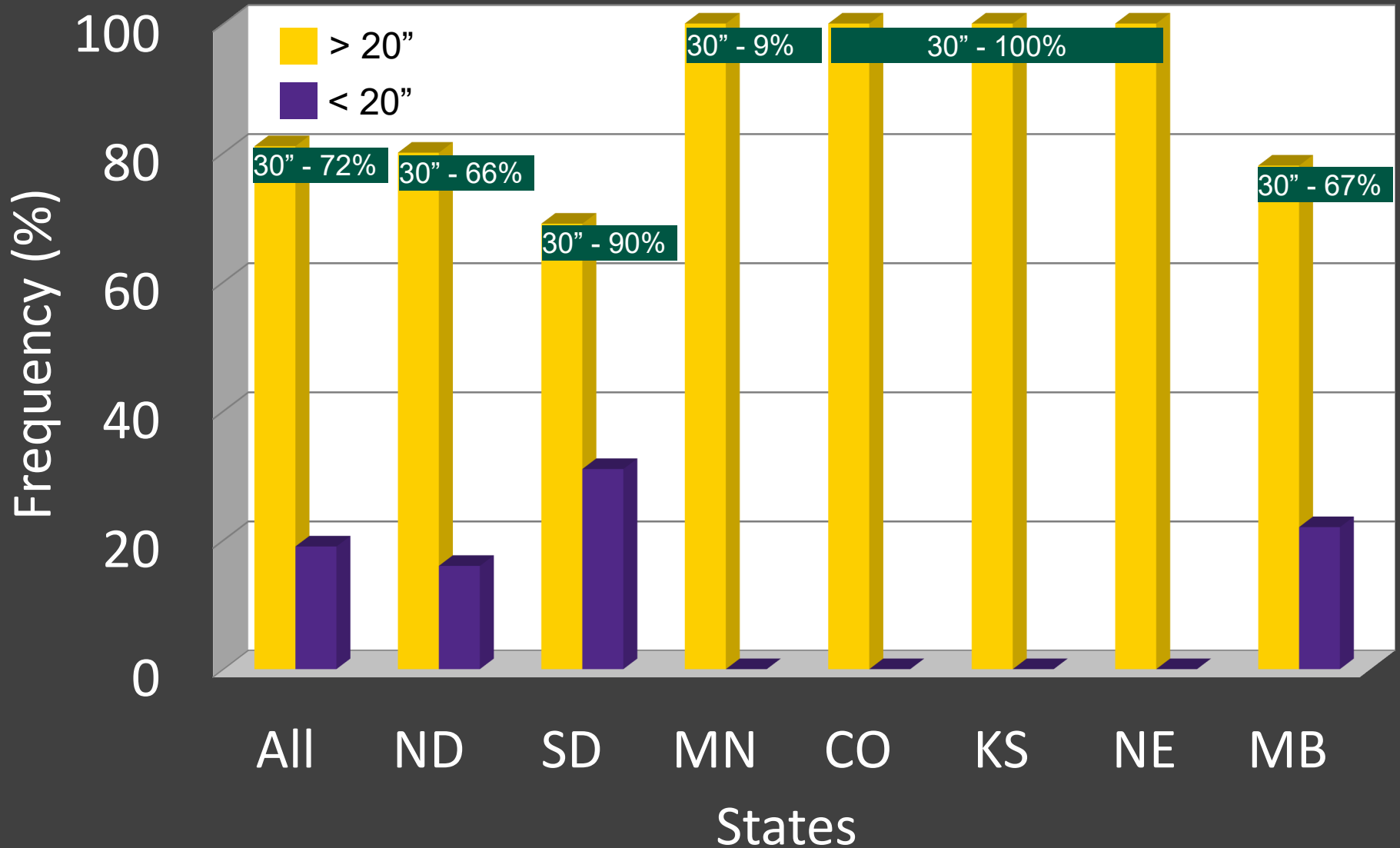
SUNFLOWER - TILLAGE



SUNFLOWER – ROW SPACING



SUNFLOWER – ROW SPACING



SUNFLOWER YIELD-LIMITING FACTOR

2023 NSA Survey Yield Limiting Factor

What was the number one and number two factor that limited yield?¹

0. No problem

1. Birds

2. Disease

3. Drought

4. Uneven Plant Growth

5. Hail

6. Herbicide Damage

7. Insects

8. Lodging

9. Plant Spacing
within the row

10. Weeds

11. other

#1. __

#2. _

2021 #1 YIELD LIMITING FACTORS (164 FIELDS)

- **Disease** 7 %
- **Plant spacing in row** 9 %
- Lodging 2 %
- Weeds 2%
- Birds 6 %
- Insects 5 %
- **Drought** 51 %
- Uneven plant growth 1 %
- Other 4 %
- **No Problem** 9 %



2023 #1 YIELD LIMITING FACTORS (220 FIELDS)

- **Disease** 18 %
- **Plant spacing in row** 10 %
- **Lodging** 5 %
- **Weeds** 10%
- **Birds** 10 %
- **Insects** 10 %
- **Drought** 9 %
- **Uneven plant growth** 6 %
- **Other** 11 %
- **No Problem** 7 %
- **Hail** 3 %



2021 #2 YIELD LIMITING FACTORS – (ALL 164 FIELDS)

• Disease	9 %
• Plant spacing in row	15%
• Lodging	4 %
• Weeds	13 %
• Birds	4 %
• Insects	7 %
• Drought	10 %
• Hail	3 %
• Uneven plant growth	5 %
• Other	1 %
• No Problem	24 %



2023 #2 YIELD LIMITING FACTORS (220 FIELDS)

• Disease	15 %
• Plant spacing in row	15 %
• Lodging	7 %
• Weeds	7 %
• Birds	5 %
• Insects	13 %
• Drought	9 %
• Uneven plant growth	8 %
• Other	5 %
• No Problem	15 %
• Hail	1 %



2021 #1 YIELD LIMITING FACTORS - NORTH DAKOTA (79 FIELDS)

• Disease	6 %
• Plant spacing	10 %
• Lodging	3%
• Weeds	1%
• Birds	10%
• Insects	3%
• Drought	47%
• Hail	0%
• Uneven plant growth	1%
• Other	6%
• No Problem	8%



2023 #1 YIELD LIMITING FACTORS - NORTH DAKOTA (127 FIELDS)

• Disease	17 %
• Plant spacing	12 %
• Lodging	8 %
• Weeds	7 %
• Birds	7 %
• Insects	11 %
• Drought	9 %
• Hail	2 %
• Uneven plant growth	6%
• Other	9%
• No Problem	13 %



2021 #2 YIELD LIMITING FACTORS - NORTH DAKOTA (79 FIELDS)

• Disease	16 %
• Plant spacing	11 %
• Lodging	4 %
• Drought	10 %
• Weeds	11 %
• Insects	5 %
• Birds	3 %
• Uneven plant growth	5 %
• Other	1 %
• No Problem	23 %



2023 #2 YIELD LIMITING FACTORS - NORTH DAKOTA (127 FIELDS)

• Disease	17 %
• Plant spacing	12 %
• Lodging	8 %
• Drought	9 %
• Weeds	7 %
• Insects	11 %
• Birds	7 %
• Uneven plant growth	6 %
• Other	9 %
• Hail	2 %
• No Problem	13 %



2021 #1 Drought



2023 #1 Diseases

2021 # 1 AND #2

YIELD LIMITING FACTORS SOUTH DAKOTA

(52 FIELDS)



#1 Factor

- Disease 4 %
- **Plant Spacing** 8 %
- Lodging 0 %
- **Weeds** 2 %
- Birds 2 %
- Insects 0 %
- **Drought** 63 %
- Hail 2 %
- Uneven growth 0 %
- No problem 10 %

#2 Factor

- Disease 2%
- **Plant spacing** 12 %
- Lodging 2 %
- **Weeds** 15 %
- Birds 6 %
- Insects 12 %
- **Drought** 13%
- Hail 6 %
- Uneven growth 4 %
- **No Problem** 17 %

2023 # 1 AND #2

YIELD LIMITING FACTORS SOUTH DAKOTA

(52 FIELDS)



#1 Factor

- **Disease** 15 %
- **Plant Spacing** 15 %
- Lodging 10 %
- Weeds 4 %
- Birds 2 %
- **Insects** 19 %
- **Drought** 12 %
- Hail 4 %
- **Uneven growth** 12 %
- No problem 6 %
- Others 2 %

#2 Factor

- **Disease** 10 %
- **Plant spacing** 25 %
- **Lodging** 10 %
- Weeds 8 %
- Birds 4 %
- **Insects** 19 %
- Drought 6 %
- Hail 2 %
- **Uneven growth** 13 %
- No Problem 4 %
- Others 0 %



2023 # 1 AND #2

YIELD LIMITING FACTORS MINNESOTA

(11 FIELDS)

#1 Factor

- **Disease** 18 %
- **Plant Spacing** 18 %
- **Lodging** 27%
- Weeds 0%
- Birds 0 %
- Insects 0 %
- Drought 0 %
- Hail 0 %
- **Uneven growth** 18 %
- No problem 9 %
- Others 9 %

#2 Factor

- Disease 0 %
- **Plant spacing** 27 %
- Lodging 0 %
- Weeds 0 %
- Birds 0 %
- **Insects** 27 %
- Drought 0 %
- Hail 0 %
- **Uneven growth** 36 %
- No Problem 10 %
- Others 0%

2023 # 1 AND #2

YIELD LIMITING FACTORS COLORADO

(9 FIELDS)



#1 Factor

- **Disease** 33 %
- Plant Spacing 0 %
- Lodging 0 %
- Weeds 11 %
- Birds 0 %
- Insects 0 %
- **Drought** 33 %
- Hail 0 %
- Uneven growth 0 %
- **No problem** 22 %
- Others 0 %

#2 Factor

- Disease 0 %
- Plant spacing 0 %
- Lodging 0 %
- Weeds 0 %
- Birds 0 %
- Insects 0 %
- **Drought** 33 %
- Hail 0 %
- Uneven growth 0 %
- **No Problem** 67 %
- Others 0 %

2023 # 1 AND #2 YIELD LIMITING FACTORS KANSAS (6 FIELDS)



#1 Factor

- Disease 0 %
- Plant Spacing 0 %
- Lodging 0 %
- **Weeds 50 %**
- Birds 0 %
- Insects 0 %
- **Drought 33 %**
- Hail 0 %
- Uneven growth 0 %
- No problem 17 %
- Others 0 %

#2 Factor

- **Disease 17 %**
- **Plant spacing 17 %**
- Lodging 0 %
- **Weeds 32 %**
- Birds 0 %
- **Insects 17 %**
- Drought 0 %
- **Hail 17 %**
- Uneven growth 0 %
- No Problem 0 %
- Others 0 %

2023 # 1 AND #2

YIELD LIMITING FACTORS NEBRASKA

(6 FIELDS)



#1 Factor

- **Disease** 17 %
- Plant Spacing 0 %
- Lodging 0 %
- **Weeds** 17%
- **Birds** 50 %
- Insects 0 %
- **Drought** 17 %
- Hail 0 %
- Uneven growth 0 %
- No problem 0 %
- Others 0 %

#2 Factor

- **Disease** 67 %
- Plant spacing 0 %
- Lodging 0 %
- Weeds 0 %
- Birds 0 %
- Insects 0 %
- **Drought** 33 %
- Hail 0 %
- Uneven growth 0 %
- No Problem 0 %
- Others 0%

2023 # 1 AND #2

YIELD LIMITING FACTORS MANITOBA

(9 FIELDS)



#1 Factor

- **Disease** 56 %
- Plant Spacing 0 %
- **Lodging** 11 %
- **Weeds** 11 %
- **Birds** 11 %
- Insects 0 %
- **Drought** 11 %
- Hail 0 %
- Uneven growth 0 %
- No problem 0 %
- Others 0 %

#2 Factor

- **Disease** 11 %
- **Plant spacing** 11 %
- Lodging 0 %
- **Weeds** 11 %
- Birds 0 %
- Insects 0 %
- Drought 0 %
- Hail 0 %
- Uneven growth 0 %
- **No Problem** 67 %
- Others 0 %

Disease



Disease	% Incidence
Phoma	80
Rust	60
Sclerotinia	48
Phomopsis	34
Rhizopus	33
Verticilium	11
Charcoal Rot	5

SUNFLOWER SURVEY - PHOMOPSIS

2019 – 25 STALKS
2021 – 300+ STALKS
2023 – 140+ STALKS
ND – 11 FIELDS
SD – 9 FIELDS
CO – 6 FIELDS
KS – 5 FIELDS
MN – 2 FIELDS



Figure 2

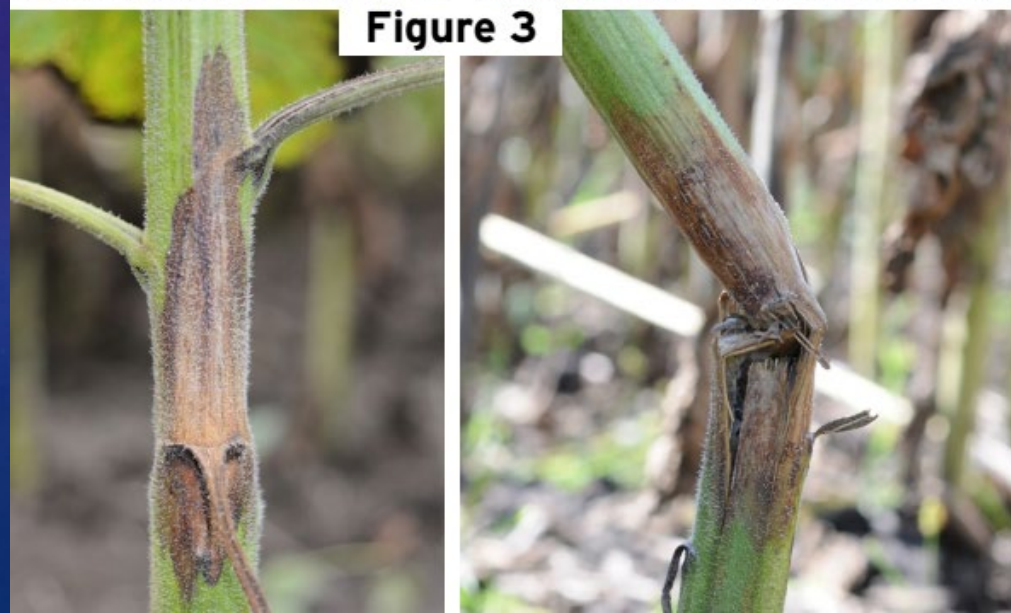


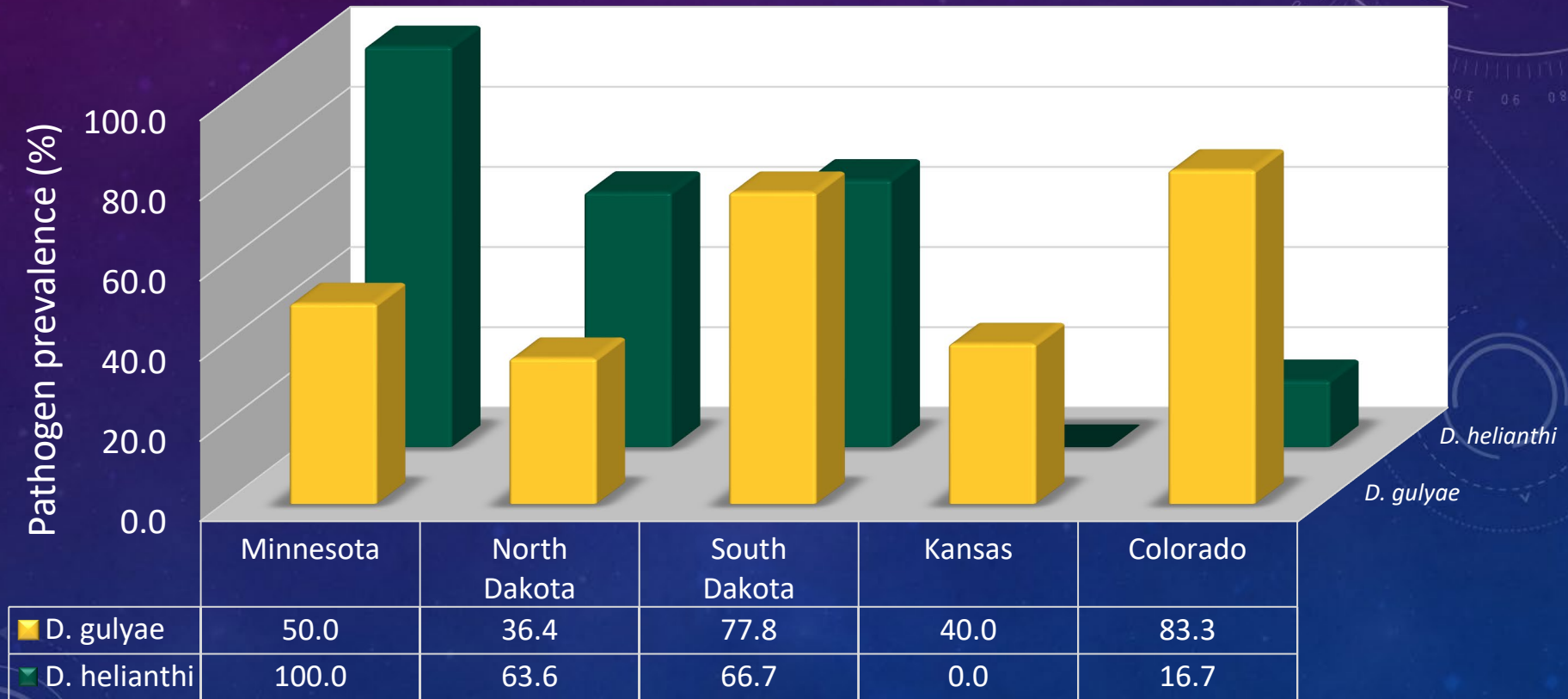
Figure 3

SUNFLOWER SURVEY - PHOMOPSIS

- Average Phomopsis stem canker prevalence = 44% in 2023 (compared to 11.2% in 2021)

Location	Average Disease Prevalence in 2023	Average Disease Prevalence in 2021	Disease incidence in 2023	Disease incidence in 2021
CO	100% (n=9)	0% (n=7)	100%	0
MN	90.9% (n=11)	8.2% (n=12)	0 to 45%	0 to 27%
ND	25.1% (n=127)	13.4% (n=79)	0 to 80%	0 to 95%
SD	36.5% (n=52)	56.3% (n=52)	0 to 100%	7.5 to 100%
KS	0% (n=6)	5% (n=5)	0	0 to 22%
NE	0% (n=6)	0% (n=5)	0	0
TX	--	0% (n=4)	--	0
Manitoba, CA	55.5% (n=9)		0 to 17%	

SUNFLOWER SURVEY - PHOMOPSIS



SUNFLOWER SURVEY - PHOMOPSIS

Four possibilities for increased prevalence of Phomopsis stem canker in 2023 when compared to 2021

- ✓ Susceptible hybrid, or isolate by genotype interaction by using a partially resistant hybrid
- ✓ Crop undergoing stress from drought and other factors
- ✓ No use of foliar fungicide
- ✓ Wet weather conditions closer to harvest

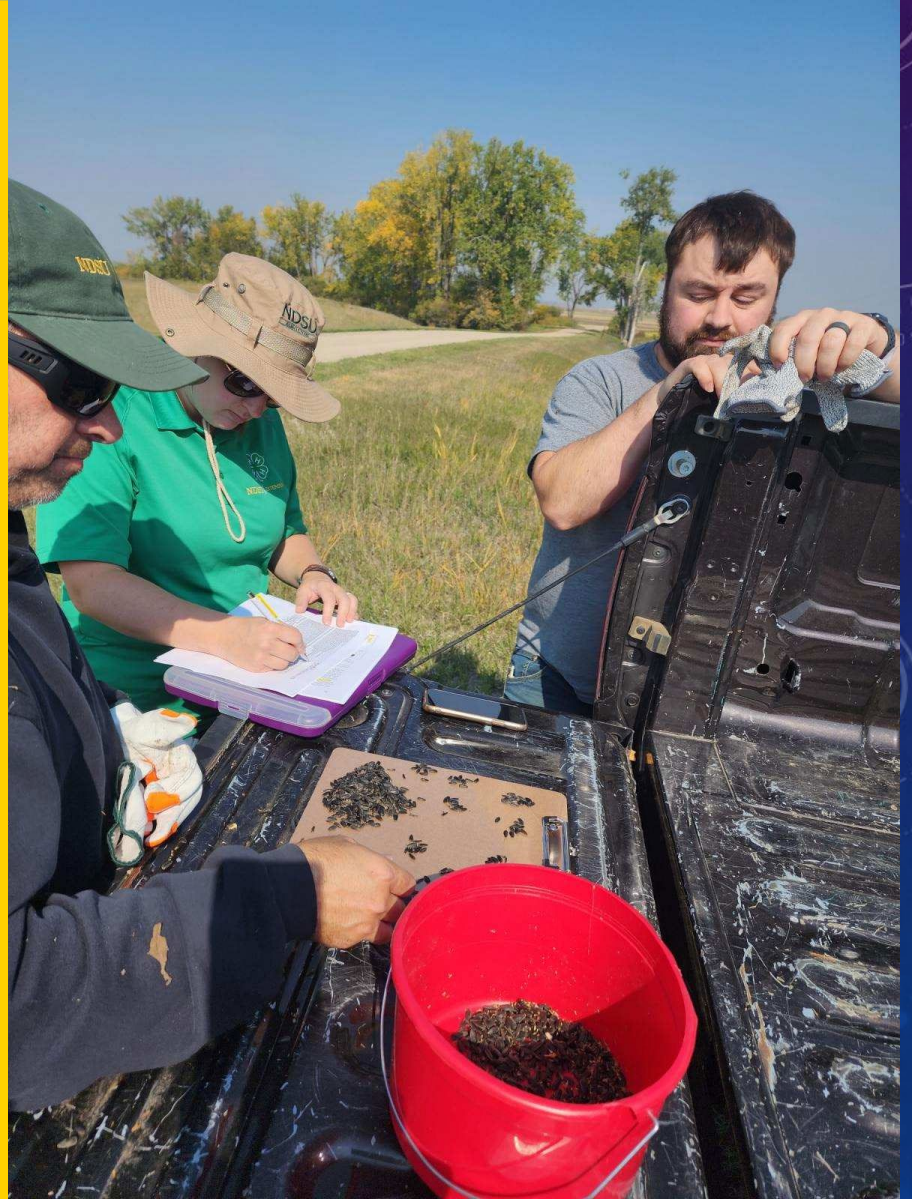
Weeds



Weeds	% Incidence	Prevalence (%)		
		Light	Mod	Heavy
Kochia	46	66	25	10
Redroot pigweed	20	78	10	12
Green foxtail	20	80	15	5
Volunteer grains	19	78	18	11
Canada thistle	15	90	3	7
Barnyard grass	10	85	10	5
Yellow foxtail	9	88	12	0

Weeds	State						
	ND	SD	MN	CO	KS	NE	MB
	% incidence						
Kochia	50	65	0	33	17	0	0
Redroot pigweed	22	29	9	0	0	0	11
Green foxtail	22	23	0	0	0	0	11
Volunteer grains	15	27	73	0	33	33	0
Canada thistle	13	19	27	0	0	17	22
Barnyard grass	9	17	0	0	0	0	11
Yellow foxtail	4	17	0	0	33	0	0
Palmer amaranth	0	0	0	0	100	0	0

Thank you to all the teams



***2023 SUNFLOWER SURVEY
SPONSORED BY THE***

NATIONAL SUNFLOWER ASSOCIATION

