

# Evaluation of a seed treatment candidate for Downy Mildew

Ryan Humann

NDSU Plant Pathology

Keith Johnson

DuPont Field Development

Scott Meyer

NDSU Plant Pathology

Jim Jordahl

NDSU Plant Pathology

Andrew Friskop

NDSU Plant Pathology

Tom Gulya

USDA-ARS Sunflower Unit

Michael Wunsch

NDSU Carrington Research Extension Center

Sam Markell

NDSU Plant Pathology

# My Research Focus

- Grew up on a farm in south central ND
- Bachelor's degree in crop and weed science from NDSU
- Now a Ph.D plant pathology graduate student
  - Downy Mildew
  - Rust





# Introduction

Pathogen

*Plasmopara halstedii*



Disease

Downy Mildew



# Infection Process

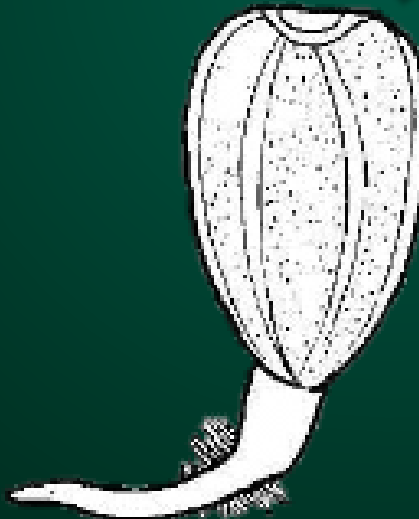
**motile  
zoospore**



**sunflower  
seedling**



**Systemically Infected  
Sunflower Plant**



**NDSU** NORTH DAKOTA  
STATE UNIVERSITY

<http://www.biology-resources.com/drawing-plant-seed-22.html>

<http://ars.els-cdn.com/content/image/1-s2.0-S0885576503000444-gr1.gif>

Photo: Markell

Gulya et al. 1997



# Symptoms



# Signs





# Management

- Fungicide seed treatments
  - Metalaxyl and mefenoxam (FRAC 4) had efficacy until resistant *P. halstedii* isolates were found in the late 1990s
  - Azoxystrobin and fenamidone (FRAC 11) available for suppression of downy mildew
    - High risk for resistance development

# Objective

- Evaluate an experimental fungicide for management of downy mildew





# Candidate Seed Treatment

- Oxathiapiprolin
  - New piperidinyl thiazole isoxazoline class of fungicides
  - Developed by DuPont

*Oxathiapiprolin is the first of the new piperidinyl thiazole isoxazoline class of fungicides discovered and developed by DuPont. Oxathiapiprolin represents a novel mode of action that offers growers new options for disease control in potatoes, grapes, vegetables and other specialty crops. Initial tests indicate outstanding performance in disease control and early crop establishment, even under heavy disease pressure.*

# Candidate Seed Treatment

- Oxathiapiprolin
  - New piperidinyl thiazole isoxazoline class of fungicides
  - Developed by DuPont

*Oxathiapiprolin is the first of the new piperidinyl thiazole isoxazoline class of fungicides discovered and developed by DuPont. Oxathiapiprolin represents a novel mode of action that offers growers new options for disease control in potatoes, grapes, vegetables and other specialty crops. Initial tests indicate outstanding performance in disease control and early crop establishment, even under heavy disease pressure.*



# Materials and Methods

- 2011-2013
  - Fargo
  - Carrington
  - Thompson
- Randomized Complete Block Design (RCBD)
  - Oil sunflower seeds – single row plots
  - 4 ratings (no yield data collected)
- Treatment rows inoculated pre-emergence
  - Inoculated with race 776

# Fungicide- Treatment List

	No.	Treatment	Rate ( $\mu\text{g}/\text{target}$ )	
Low	1	Oxathiapiprolin	9.37	
Medium	2	Oxathiapiprolin	18.75	
High	3	Oxathiapiprolin	37.50	
	4	Oxathiapiprolin Fludioxonil Mefenoxam	9.37 2.5 29.00	DuPont Combination
	5	Azoxystrobin Fludioxonil Mefenoxam	100.00 2.50 29.00	Standard 1
	6	Fenamidone	150.00	Standard 2
	7	Non-inoculated, NTC	-----	
	8	Inoculated, NTC	-----	

Non-treated  
controls



# Evaluation and Data Collection

## INCIDENCE

No Infection

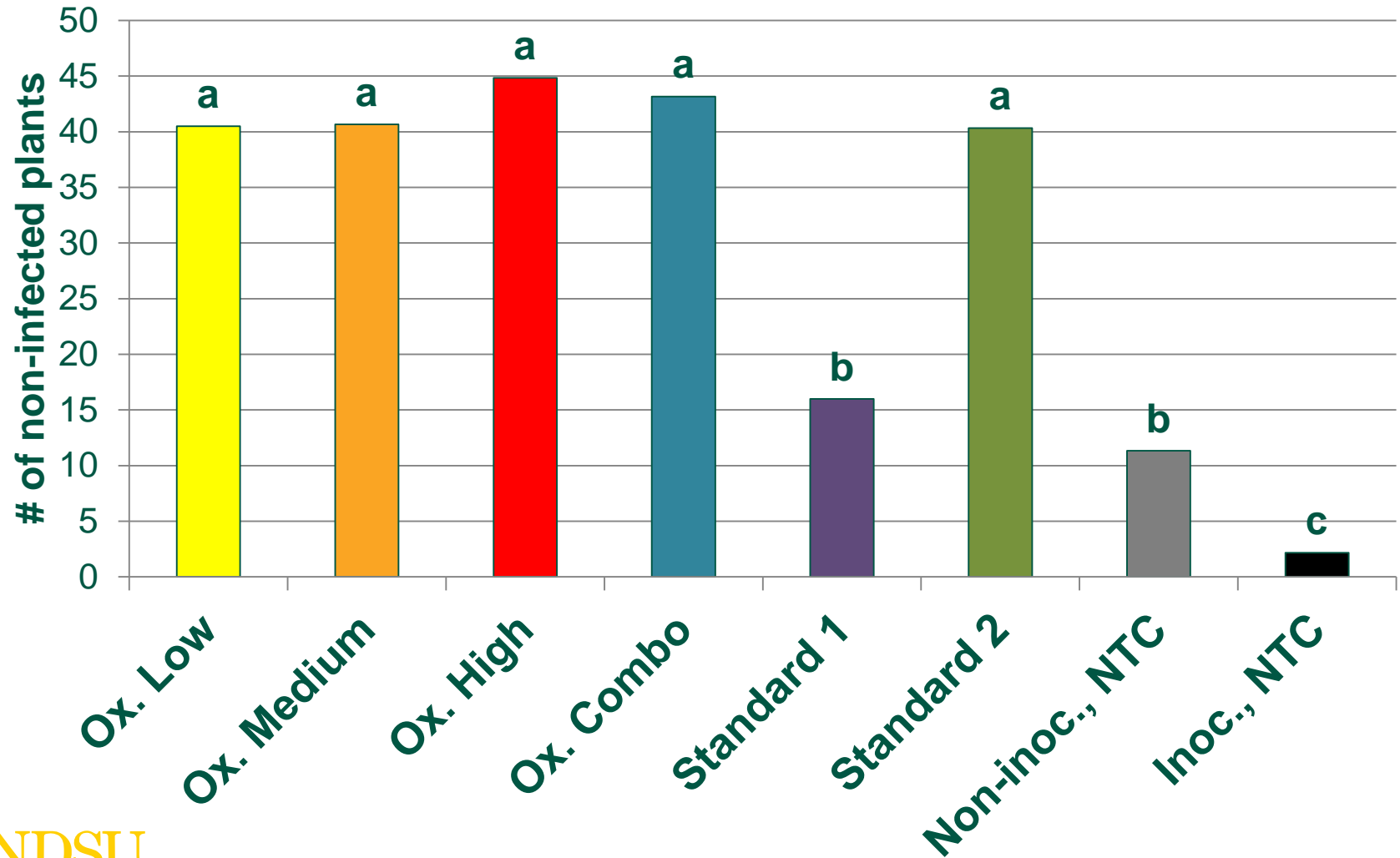


Systemically Infected



# Results- Fargo (round 1)

Growth Stage: R1





Fargo  
July 11, 2013  
Late Vegetative Stage



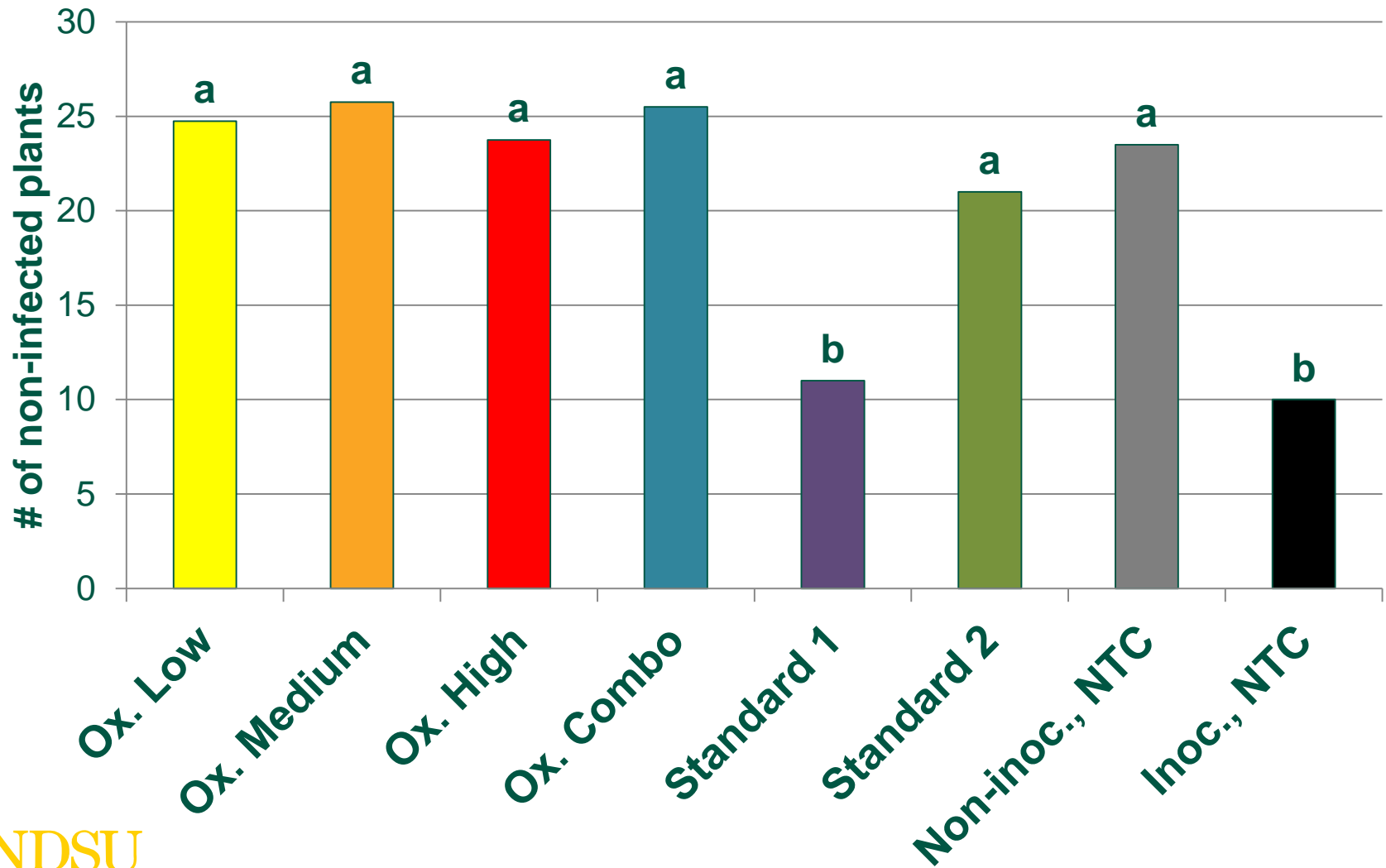


# Late Vegetative Stage on July 11, 2013



# Results- Fargo (round 2)

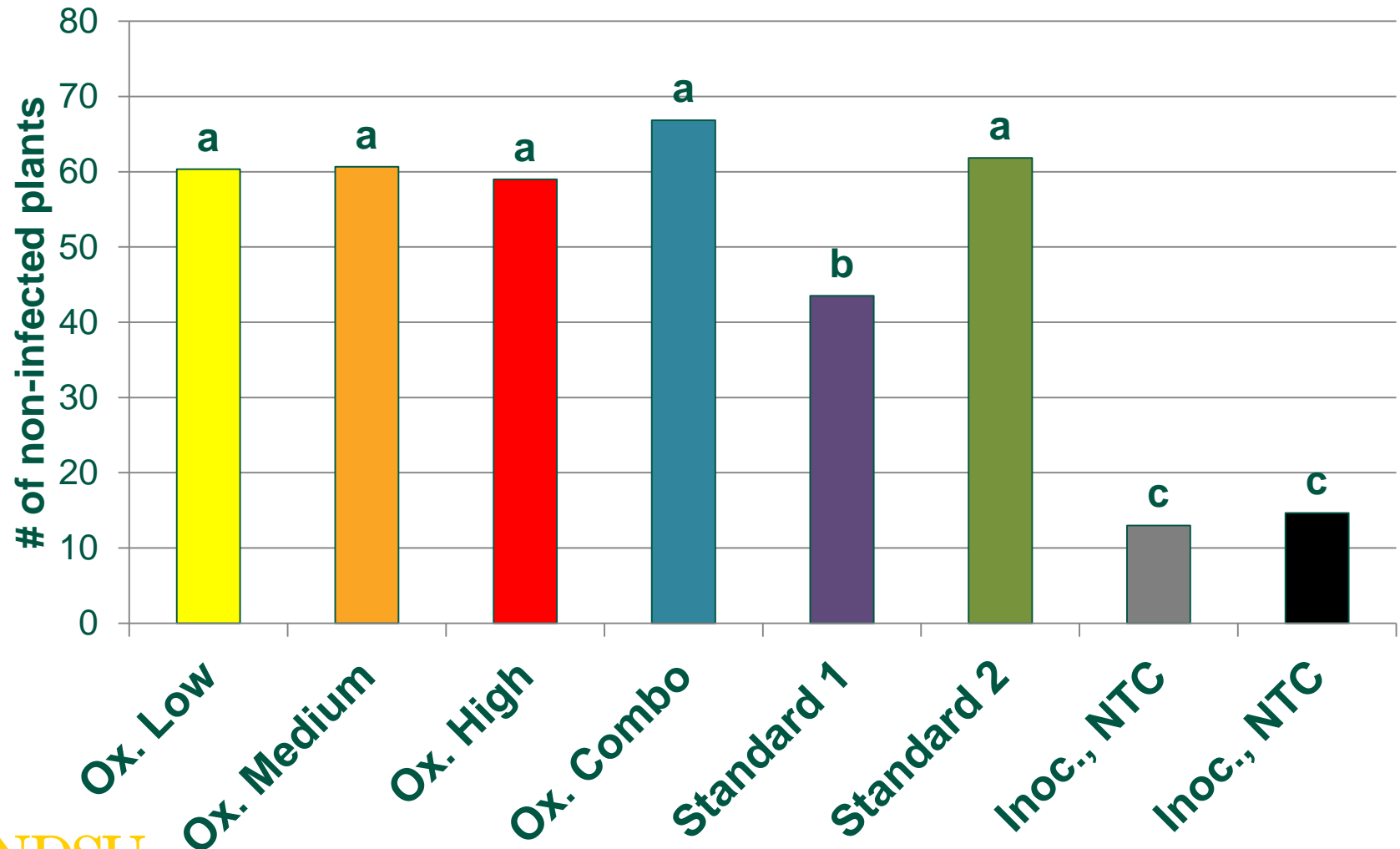
Growth Stage: R4





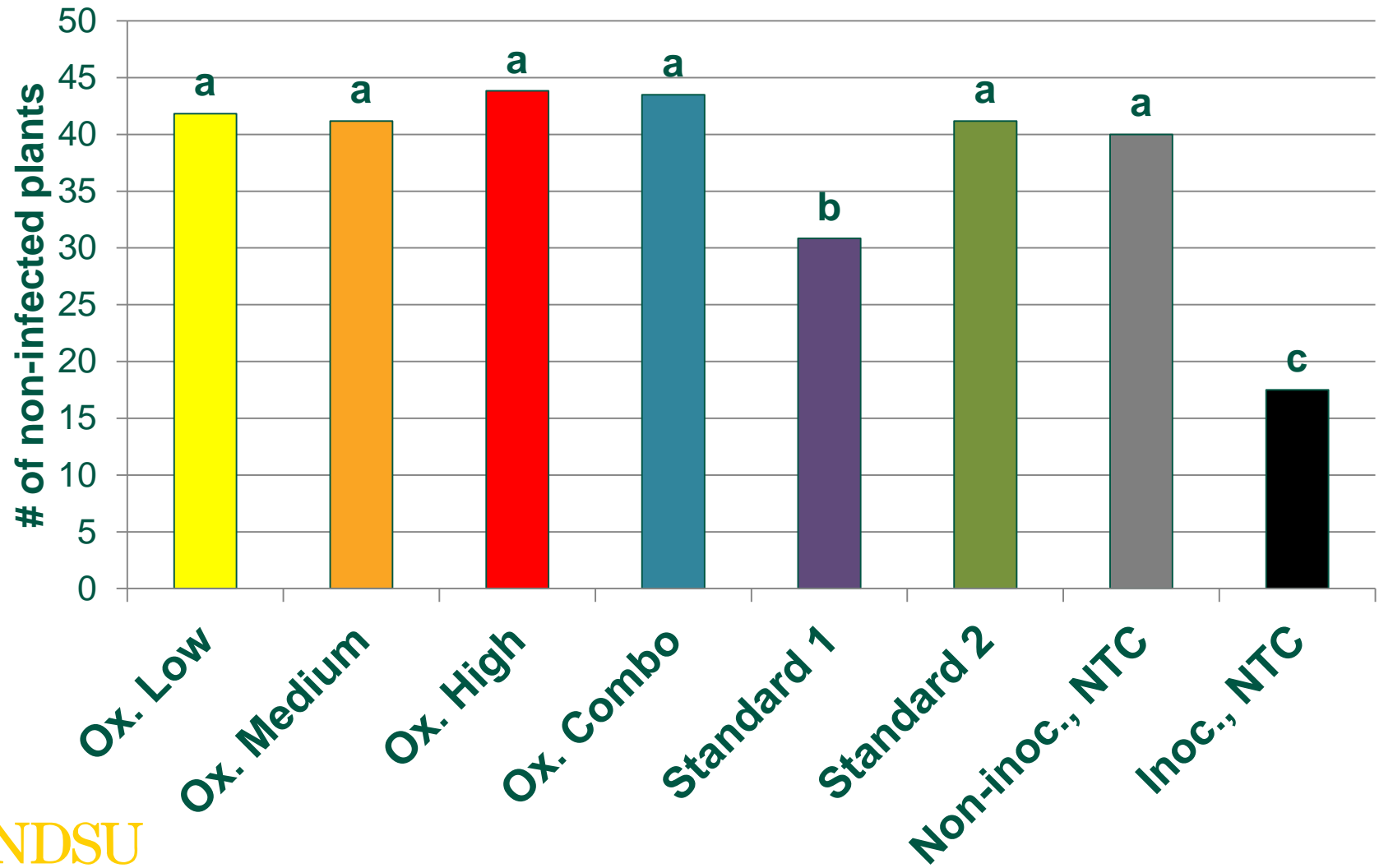
# Results- Carrington

Growth Stage: R1



# Results- Thompson

Growth Stage: R1



# Discussion

- All rates of Oxathiapiprolin were effective
- More testing planned for 2014



# Acknowledgements

- **National Sunflower Association**
- **DuPont**
- **NDSU Agriculture Experiment Station**
- **NDSU Extension Service**
- **NDSU Ext. Plant Path Group**
- **Carrington REC Group**

# Literature Cited

- Gulya, T., Kandel, H., McMullen, M., Knodel, J., Berglund, D., Mathew, F., Lamey, H. A., Nowatski, J., and Markell, S. 2013. Prevalence and incidence of sunflower downy mildew in North Dakota between 2001 and 2011. Online. Plant Health Progress. doi:10.1094/PHP-2013-0522-01-RS.
- Gulya, T., Markell, S., McMullen, M., Harveson, R., and Osborne, L. 2011. Emergence of new virulent races of *Plasmopara halstedii* inciting downy mildew on sunflower in the United States. Phytopathology 101:S2.3.
- Gulya, T. J., Rashid, K. Y., and Masirevic, S. M. 1997. Sunflower diseases. In: Schneiter AA (ed), Sunflower technology and production: 263-276. American Society of Agronomy, Madison USA.