Rust Research: Race Assessment in ND and Updates on Fungicides, Hybrid Evaluation, and Future Work

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SF Rust Research Outline

1. Fungicide Trials – 2008-2009, 2010-2011
2. Hybrid Evaluation and Yield Loss – 2009
3. Screen Sunflower Germplasm - 2012
4. Race Assessment – 2011

1. Fungicide Trials

Fungicide Trials 2008-2009

-Determine management recommendations for normal (~R5) disease onsets

-Single application at ~R5 when rust severity is at 1-3%

Fungicide Trials 2010-2011

-Determine management recommendations for early (V8+) disease onsets

-Disease severity not as high as hoped

-Presented in poster

2. Hybrid Evaluation

Hybrid Evaluation and Yield Loss

-Determine impact of rust severity on yield loss

-Natural rust infection in 2009 and 2010 hybrid performance trials – CREC

-High correlation between rust severity and yield loss

-Most available hybrids susceptible to rust

-Presented in poster

3. Germplasm Screening

Germplasm Screening

-Evaluate sunflower core set (128 lines) for rust resistance

-Screen against races predominant and highly virulent races

-Both greenhouse and field trials are planned for spring and summer of 2012

4. Race Assessment

Previous Race Work

- Numerous years of bulk virulence phenotype data (bulk race) from multiple states
  - -Provides valuable information for breeders
- 2007 and 2008 data (Gulya):
  - -Total of 39 bulk races recovered
  - -Races 336 and 334 most predominant
  - -Sampled Northern and Central Plains
- Sexual recombination event occurred in 2008

4. Race Assessment

Current Race Work

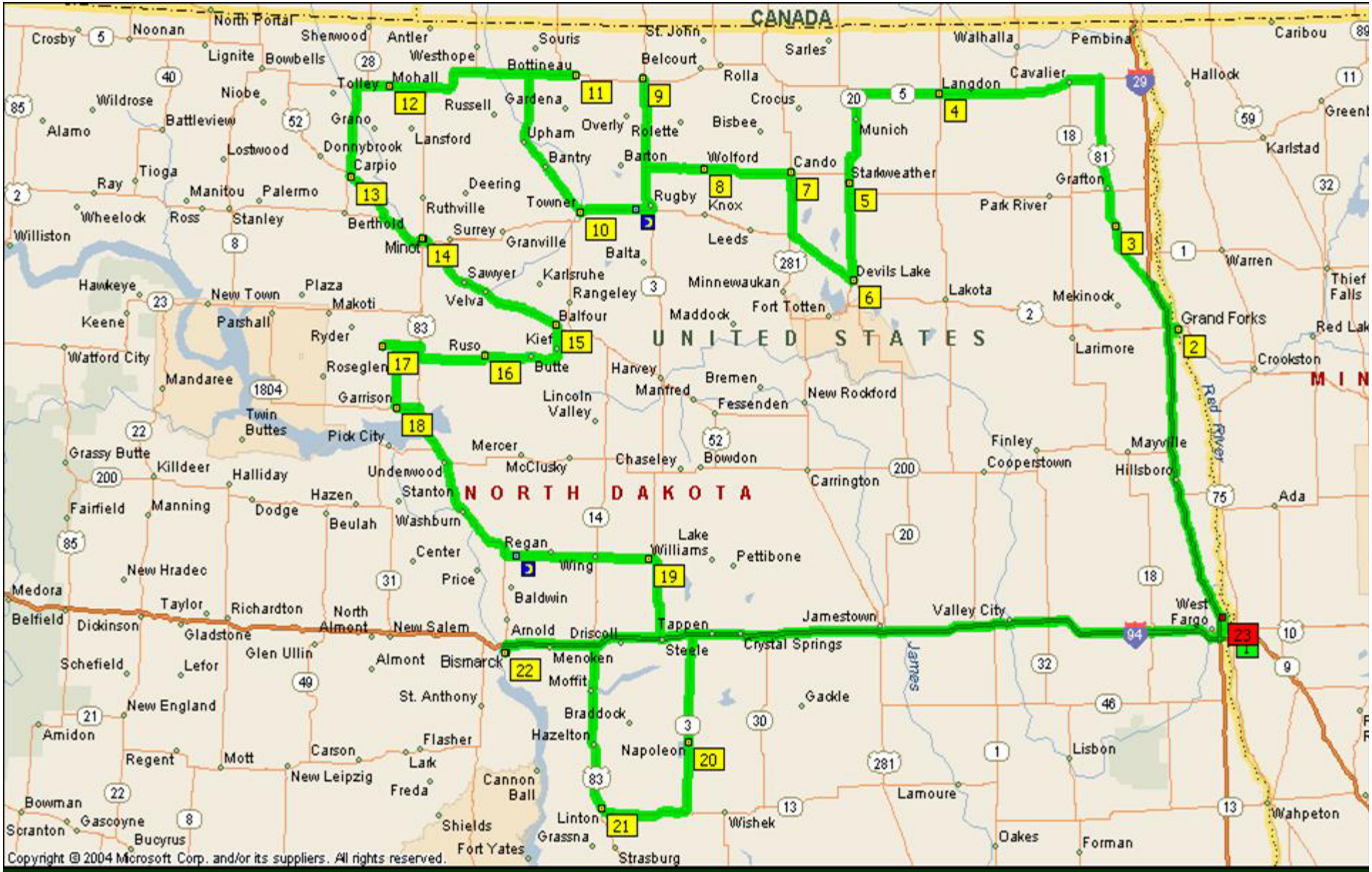
- Summer of 2011

  -Evaluate pathogen diversity for field derived single pustule (clonal) isolates

  -Samples from ND, NE, and SD

  -Analyze both phenotypically (differentials) and genetically (molecular markers)

  -Able to postulate resistance genes

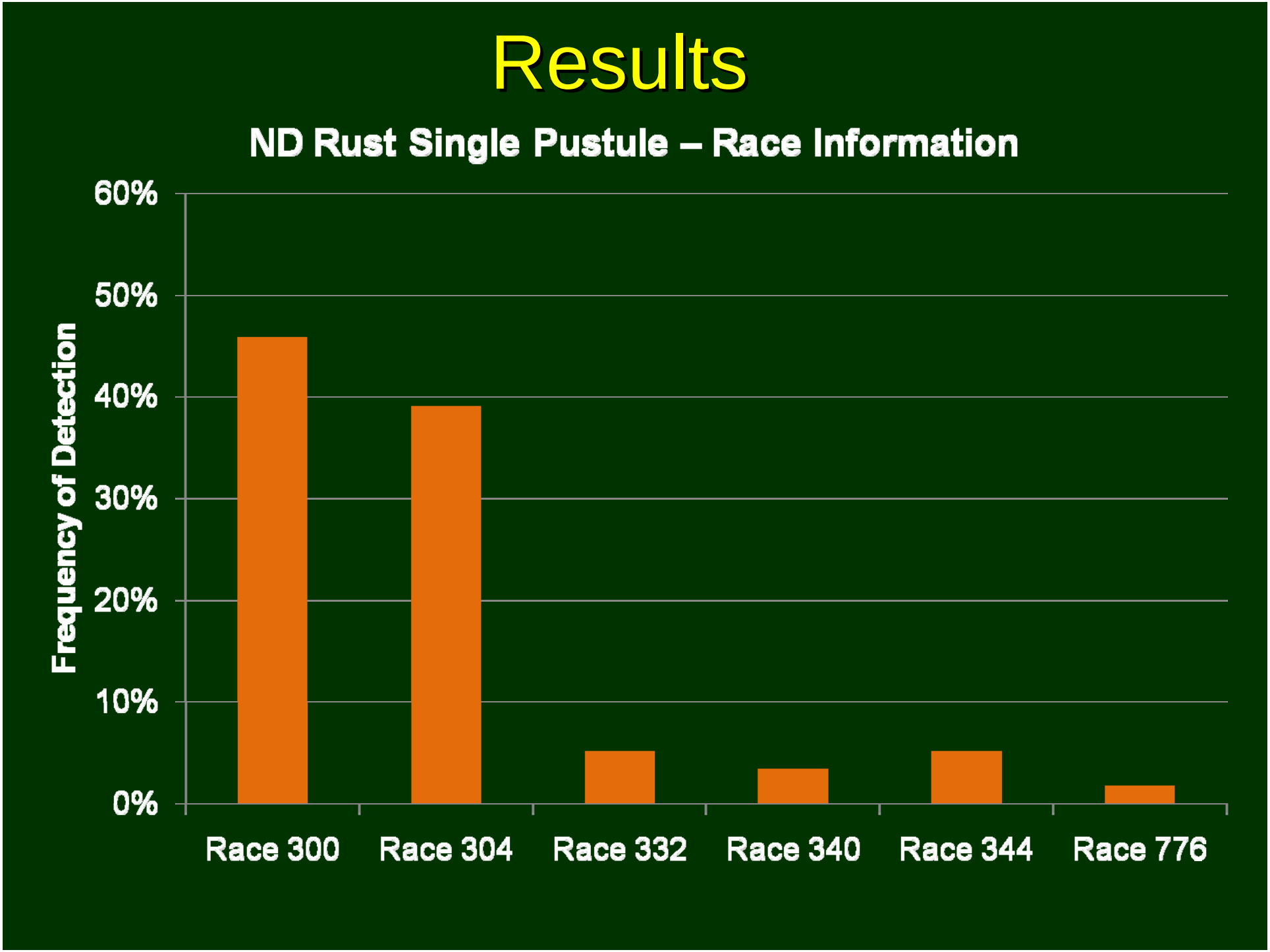


- ND survey trip conducted 8/22-8/25
- Survey route covered ~1100 miles

Materials and Methods

- 315 field derived single pustule isolates collected
- 2-3 single pustule isolates processed from each collection site
- Virulence phenotypes determined on a set of nine differentials
- 60 out of 107 ND sp isolates have been processed

Results


ND Rust Single Pustule – Race Information
Frequency of Detection
60%
50%
40%
30%
20%
10%
0%
Race 300
Race 304
Race 332
Race 340
Race 344
Race 776

Summary and Discussion

- Races 300 and 304 most predominant
- Six races detected
- More than one race can occur in a field
- Additional 2011 isolates from NE and SD will be processed
- Compare 2011 isolates with pre-2008 isolates
- Once virulence phenotypes are completed, molecular work will begin

My Time-Line

- NSA supported Ph.D graduate student since summer of 2009
- Past the half-way mark!
- Expected graduation date = Spring of 2013

Acknowledgements

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