

Introduction

Fusarium crown rot

- Disease of the crown and stem of winter and spring wheat that can be caused by a combination of *Fusarium culmorum* and *Fusarium pseudograminearum*.
- Associated with wheat production in semi-arid areas worldwide, specifically drought areas which exacerbate disease symptoms.
- Management relies on cultural practices providing **incomplete control**.
- Prevalent in the Pacific Northwest region of Washington, Idaho, and Oregon, and **suppresses wheat yield by up to 9.5% annually**.

Objective

- Identify extreme performers that are significantly different than susceptible checks.
- Evaluate the screening method for repeatability and power.

Hypotheses

- A broad range of differential responses will be observed.
- Experiment repeatability and power will be low due to the high variability of fusarium trials.

Discussion of Results

- Data exhibited a narrow range of differential responses trending towards resistance.
- Treatment effect for 3 of the 5 trials was not significant. Block effect was significant for all 5 trials, suggesting that disease is highly influenced by environment.
- Significant differences occurred between the very best and worse performers.
- Treatments UC1742, WB-1035CL+, LWW10-1026, LNR10-0551, and SY_OVATION performed significantly better than the susceptible checks of respective nurseries.
- Repeatability for Soft Winter Variety Trial and Hard Spring Variety Trial were both over 30%, but less than 10% for all other trials suggesting that high variability exist within the experiment.

Conclusions

Recommendations for future experiments:

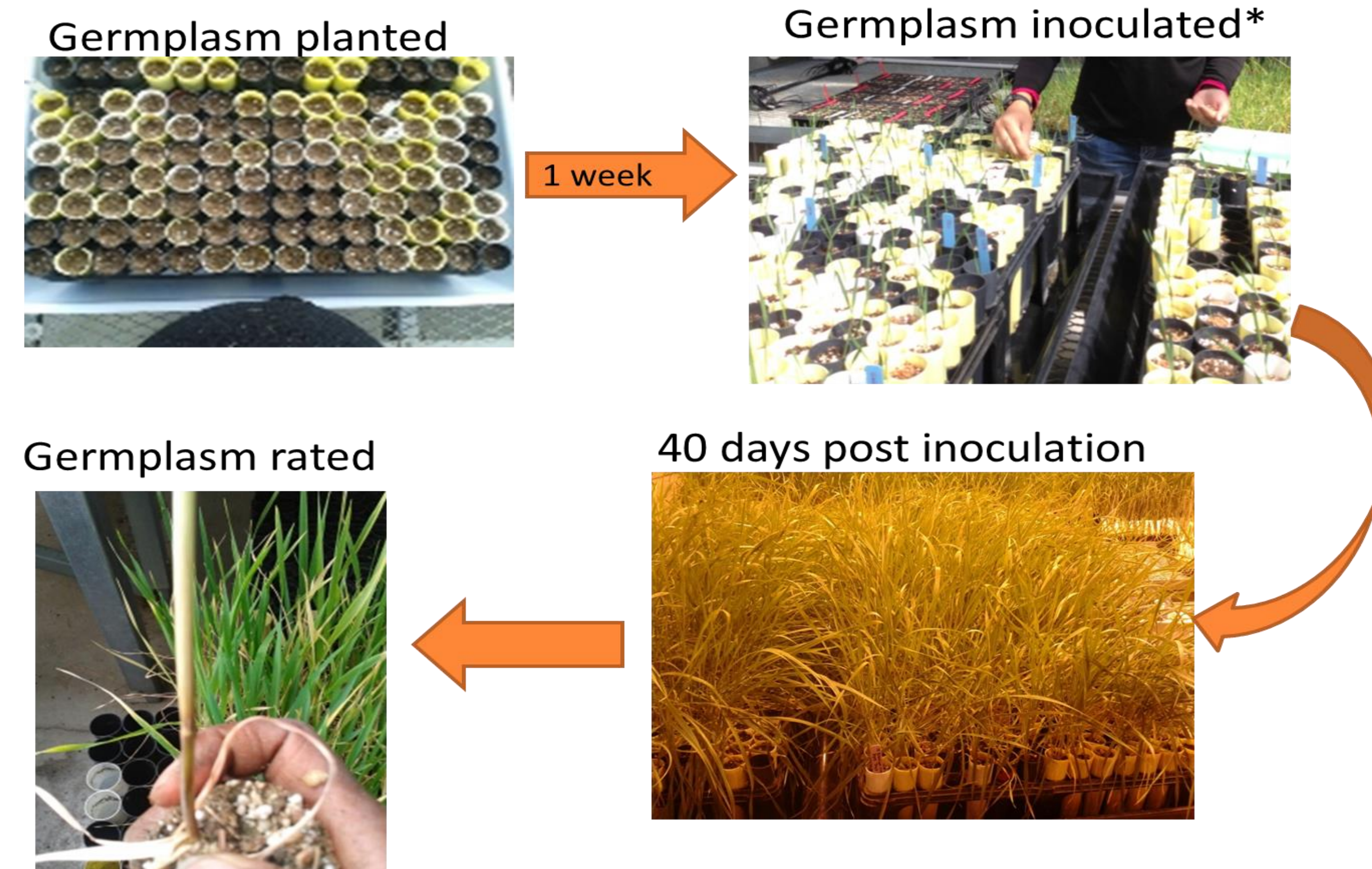
- Increase experimental repeatability
 - Water stress plants during greenhouse screening to exacerbate disease pressure and achieve a broader response range.
 - Perform greenhouse screening in a more controlled environment, such as growth chamber.
- Increase experimental power with a high sample size.
- Cross resistant sources to result in better responding germplasm.

Materials and Methods

A. Germplasm

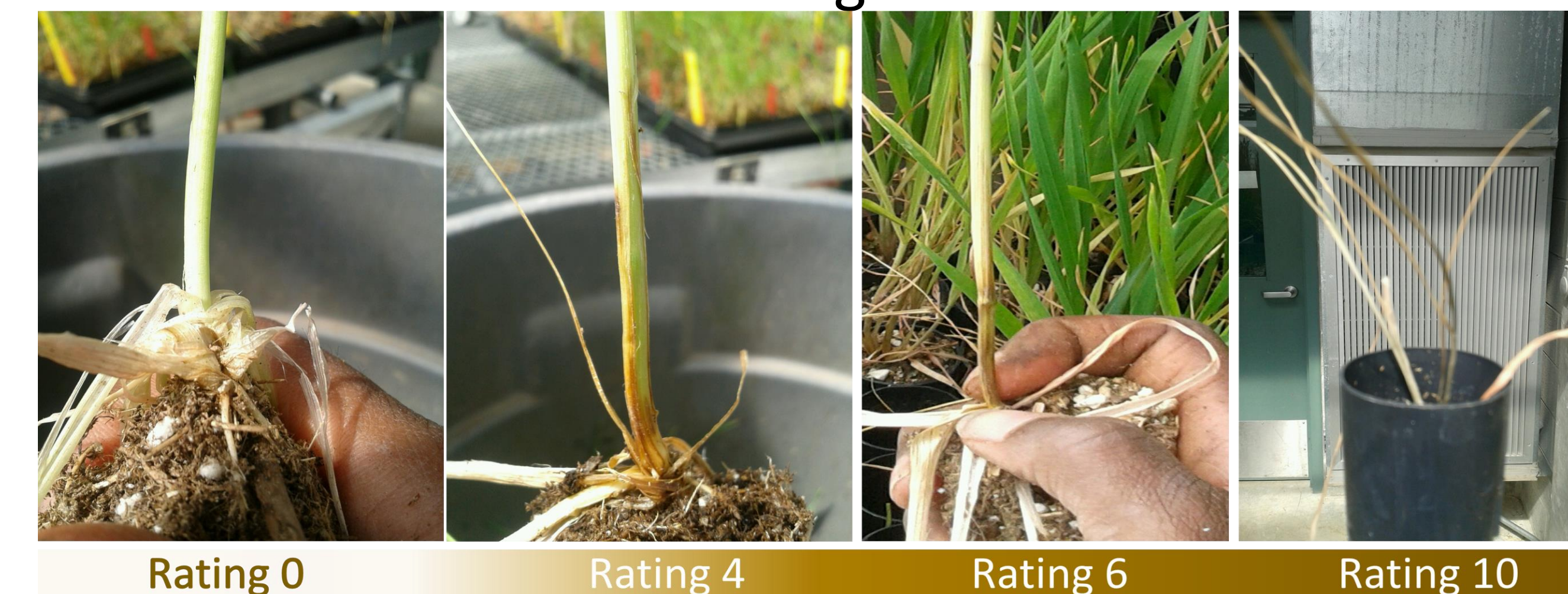
A total of five trials were evaluated from the winter and spring wheat genotypes of the 2013 WSU Extension Cereal Variety Trials and Western Regional Comparative Trials.

B. Greenhouse Screening



*One gram of a blend of five *F. culmorum* isolates on colonized seed.

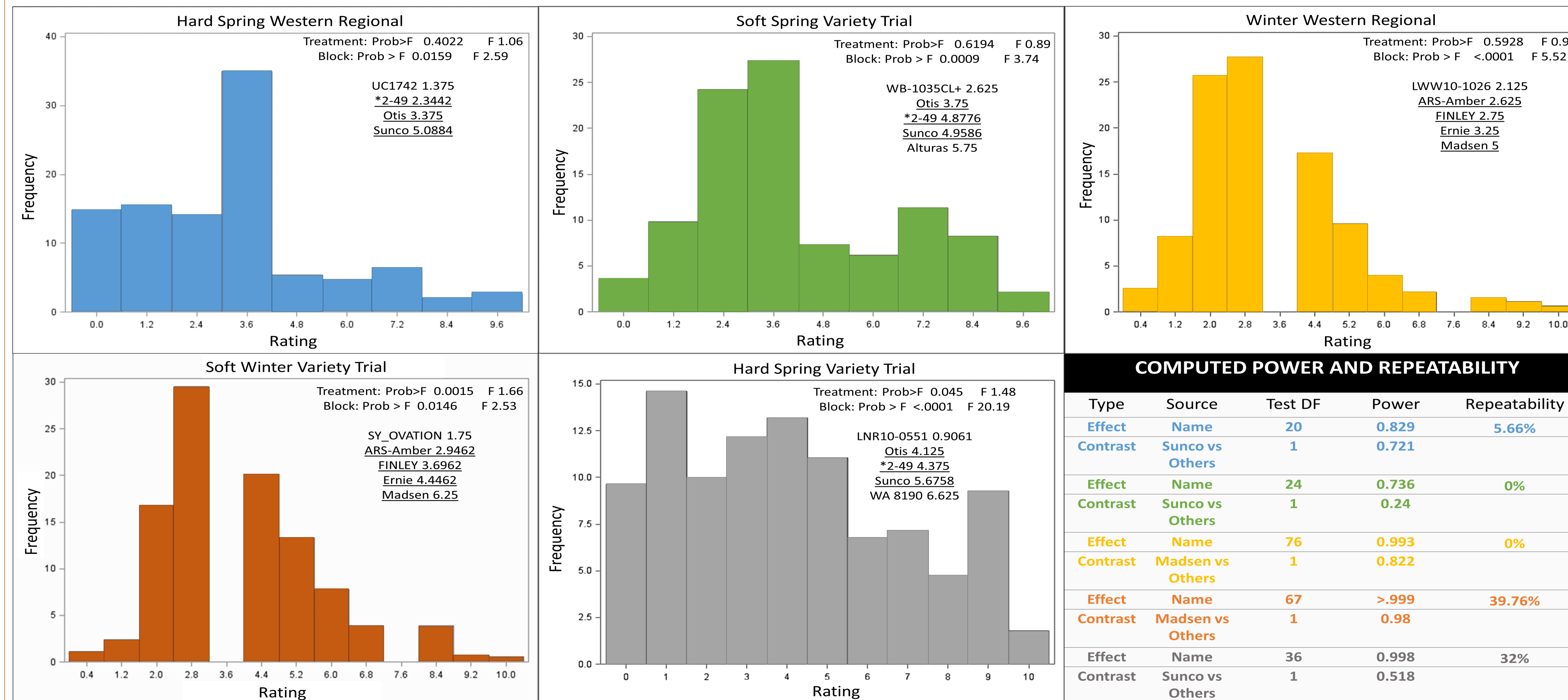
C. Rating



D. Statistical Analyses

- All statistical analyses were performed using SAS Software*
- Distribution of data was obtained using Proc Univariate
- Proc Mixed used to determine experimental significance
- Power analysis performed using Proc GLMPower with single degree of freedom contrasts
- Experimental variability and repeatability calculated

Results



Histograms demonstrate rating frequencies of respective nurseries, summary statistics and extreme performers as compared to resistant and susceptible checks.

References:

- The data analysis for this poster was generated using SAS software. Copyright © 2016SAS Institute Inc. SAS and all other SAS Institute Inc. product or service names are registered trademarks or trademarks of SAS Institute Inc., Cary, NC, USA. Poole, G. J., Smiley, R. W., Paulitz, T. C., Walker, C. A., Carter, A. H., See, D. R., Garland-Campbell, K. 2012. Identification of quantitative trait loci (QTL) for resistance to Fusarium crown rot (*Fusarium pseudograminearum*) in multiple assay environments in the Pacific Northwestern US. Theor Appl Genet 125: 91–107.
- Smiley, R.W., Gourlie, J. A., Easley, S. A., Patterson, L.-M., and Whittaker, R.G. 2005c. Crop damage estimates for crown rot of wheat and barley in the Pacific Northwest. Plant Dis. 89:595-604.

Acknowledgments

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