

Predictive Accuracy of Alfalfa Fall Dormancy Assessed in Field Density Sward Plots

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Funding: USDA-NIFA-ARFP Grant Number 2014-70005-22552

What is Fall Dormancy?

- Differential growth in the fall expressed in response to changing day length
- Correlated with many important traits:
 - Spring vigor
 - Post-harvest vigor
 - Winter hardiness
 - Forage quality
- Response is consistent across environments



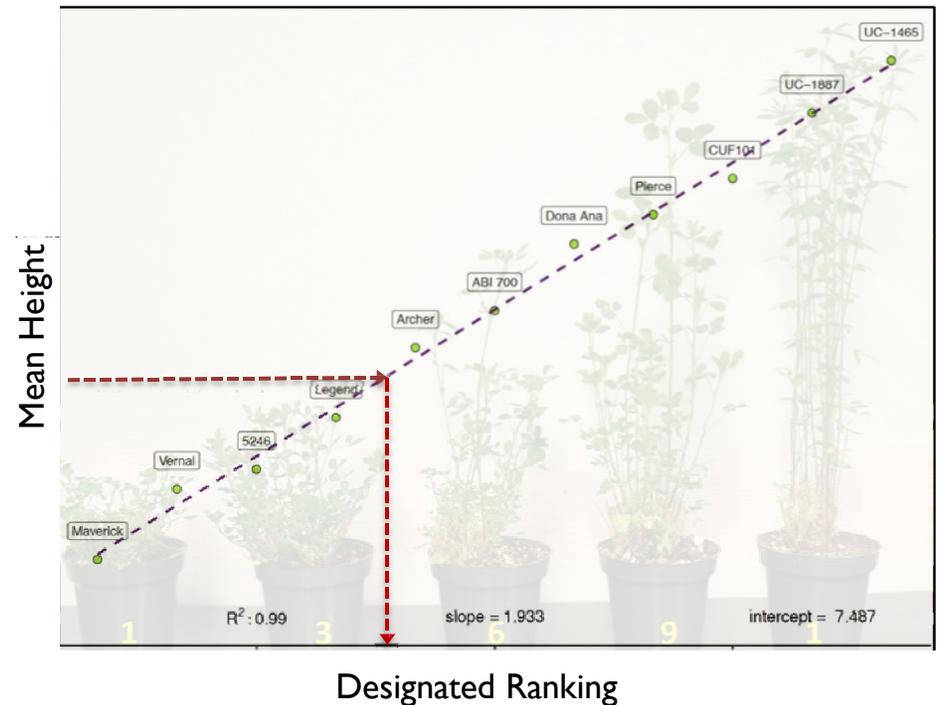
How is Fall Dormancy Measured?

- Spaced Plant Nurseries
- 1 foot spacing
- 4 reps, ~25 plants/rep
- 6 loc-years
- Individual plant height measured after fall cutting
- Can be transplanted or direct seeded
- Data are transformed to remove heterogeneity



Fall Dormancy Rating (FDR)

- Regression trained with standard checks
- Used to predict FDR
- Fall Dormancy Class (FDC) is FDR rounded to the nearest integer
- FDR has a negative relationship with dormancy expression level
- Lower FDR = Shorter Plants



Drawbacks of the Standard Test

- Nurseries are established solely for Fall Dormancy testing
- Laborious:
 - Hand transplant
 - Measure individual plants
- Spaced plant nurseries do not represent field conditions
- Longer, decumbent stems may be classified as lower FDR



Our Proposal: Sward Trial FD ratings!

We hypothesized that dormancy rating measured in the nursery is an accurate predictor of fall dormancy expression in the field

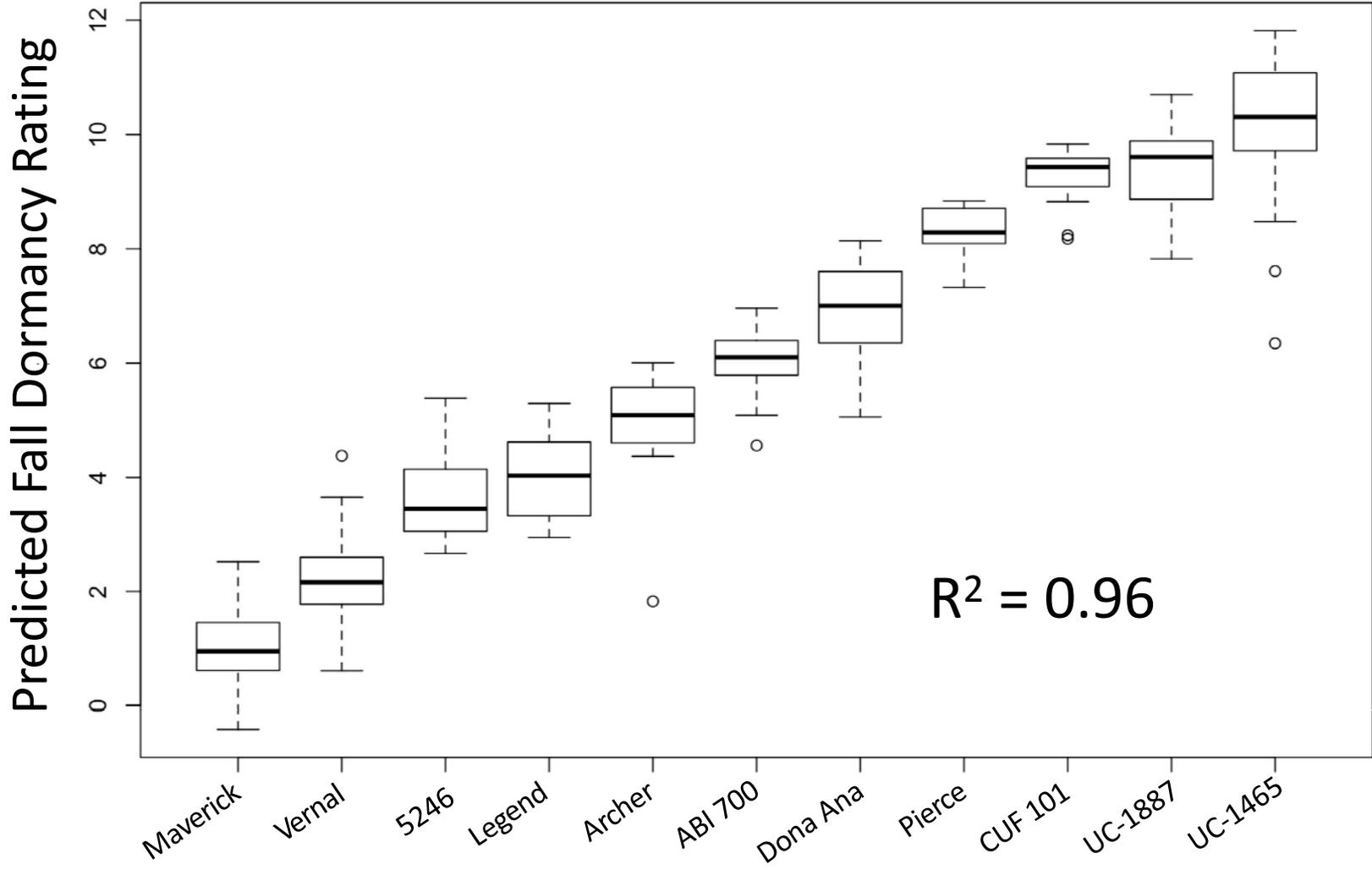
- Important to understand fall dormancy expression in field environment
- Possibility to combine FD testing with yield trials
- Prior work at NMSU in 1988 by Dr. Pete Reisen showed promise

Test Method

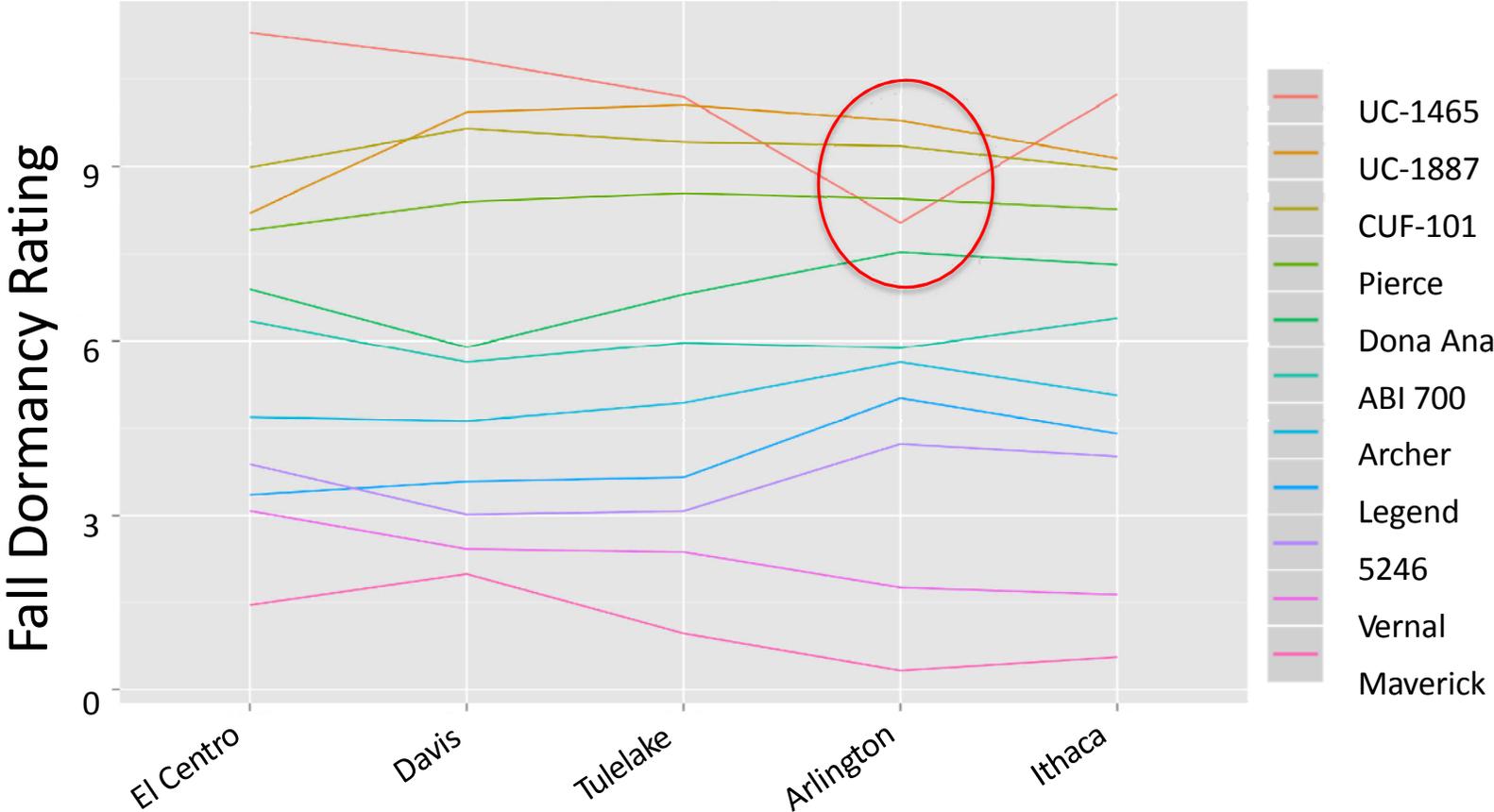
- Spaced plant nursery and sward plots established
- 5 locations – range of latitude and longitude
- Locations represent major growing regions
- Trials consist of 20 varieties, including 11 FD checks



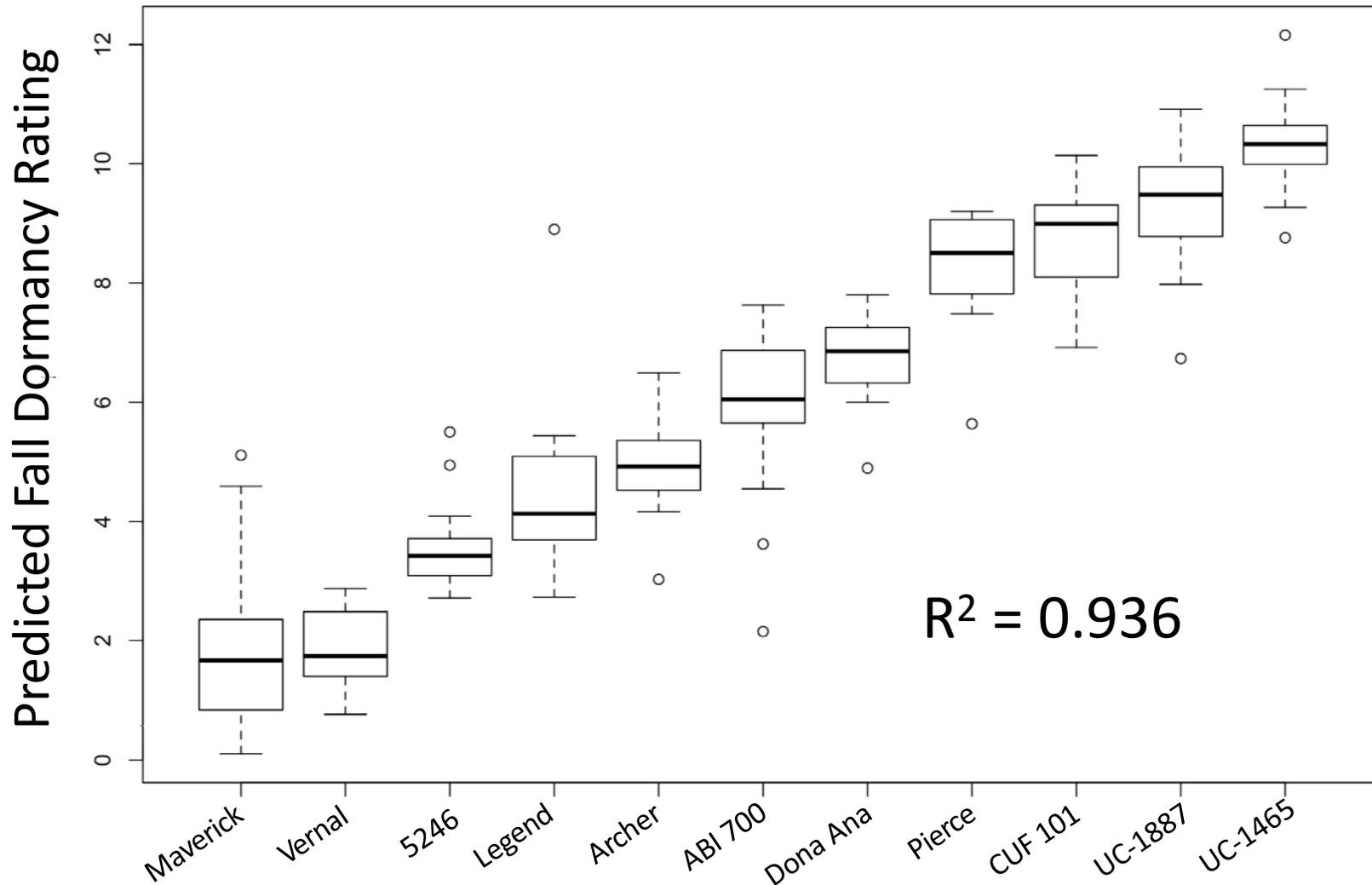
Spaced Plant Dormancy Rating Shows Expected Trend



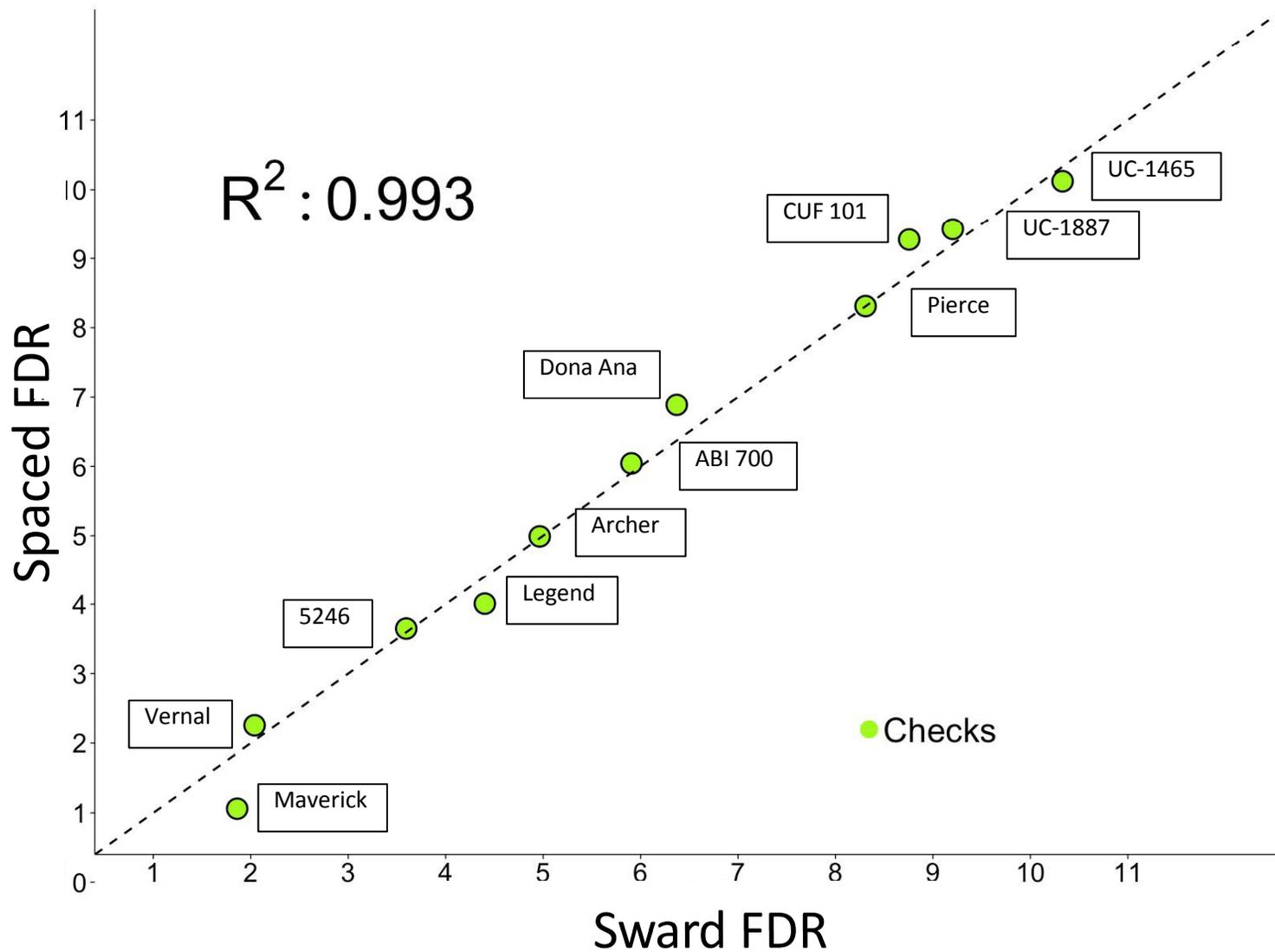
Spaced Plant Dormancy Rating Shows Little Interaction Across Locations



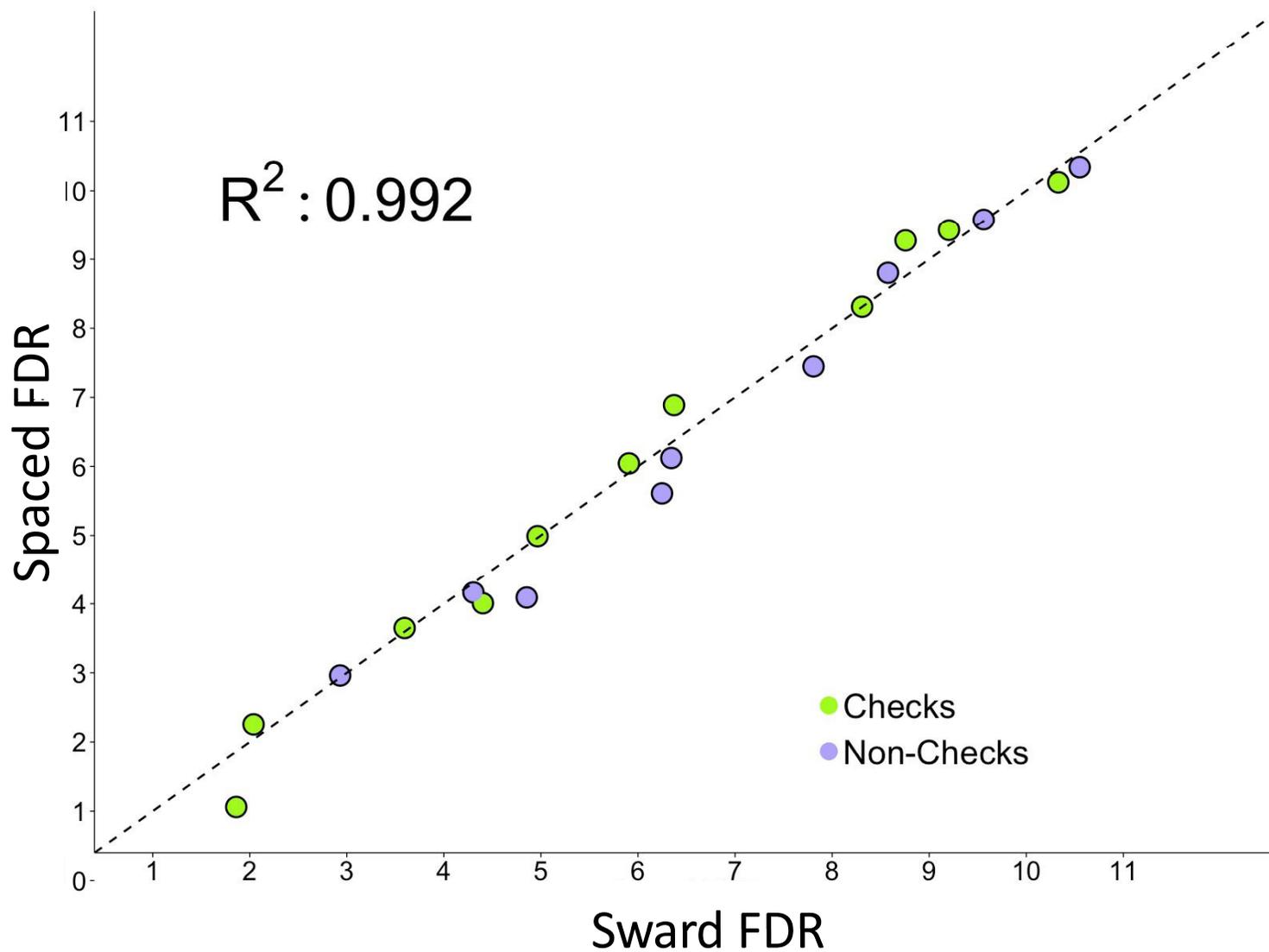
Sward Plot Dormancy Rating Also Shows Expected Trend

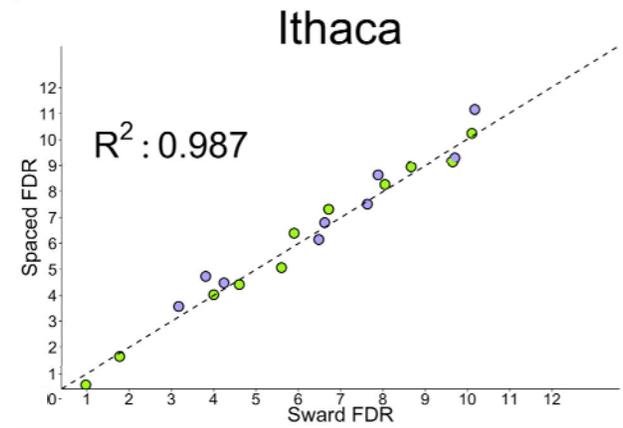
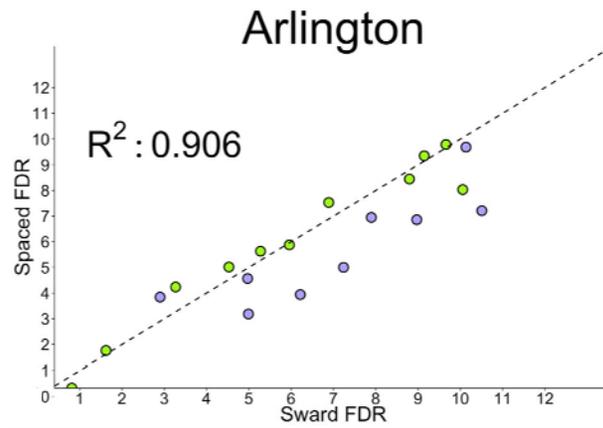
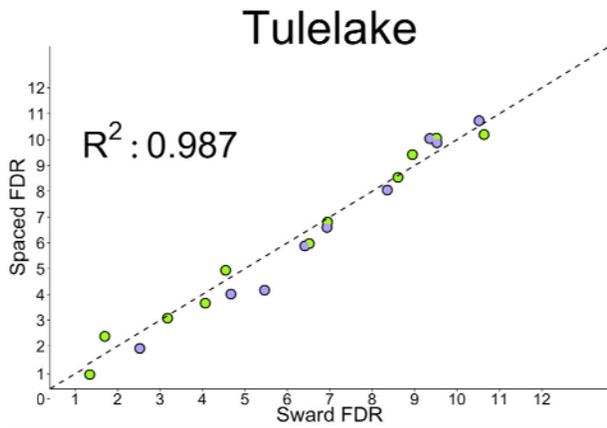
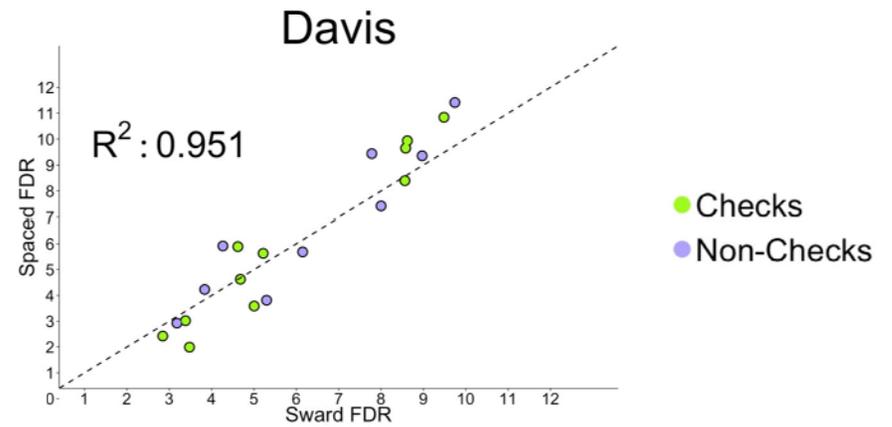
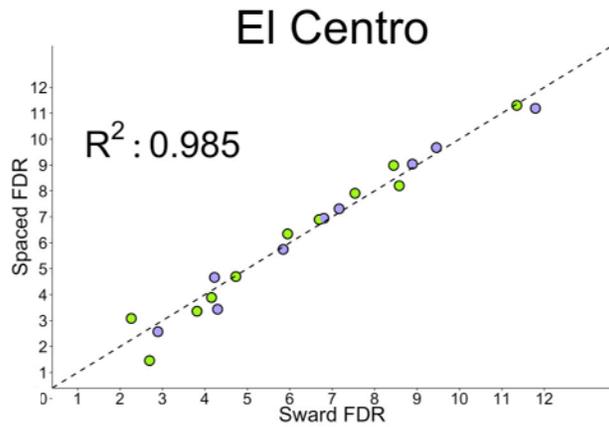


High Correlation Between Sward and Spaced FDR



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Implications and Future Work

- FDR in sward and spaced plant environments are highly correlated
- Possibility to combine with yield trials
 - Decrease labor, land needs
- Evaluate possibility of a sward based standard test
- Standard Check seed supply would need to increase
- Possibility to use UAV based High-Throughput Phenotyping
 - Spaced plant yield trials require LiDAR for accurate individual plant measurement



Thank you!



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