

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

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# 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



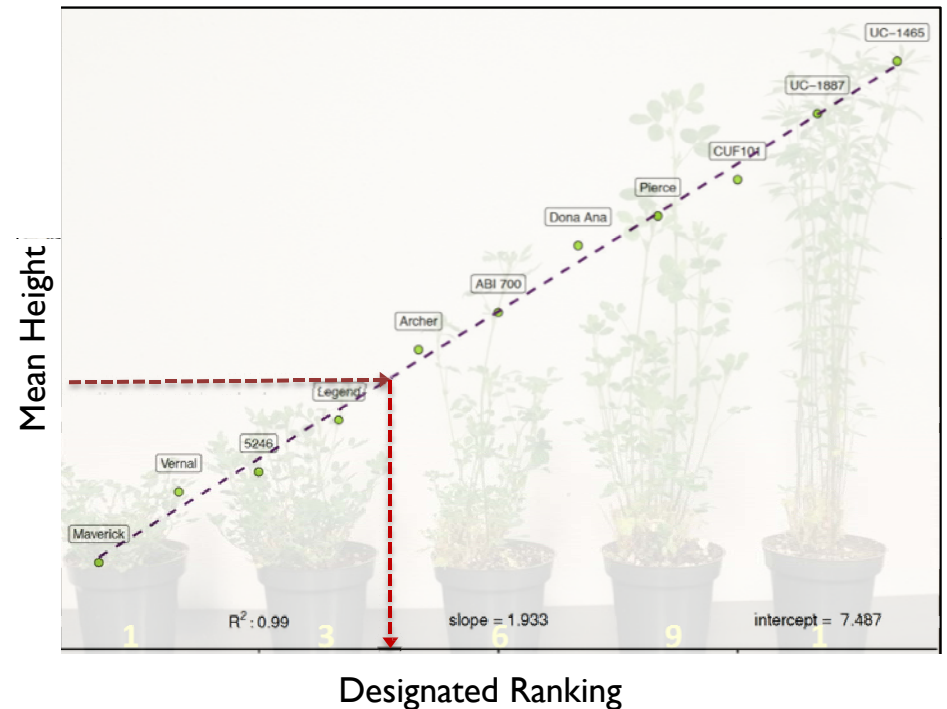
# How is Fall Dormancy Measured?

- 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

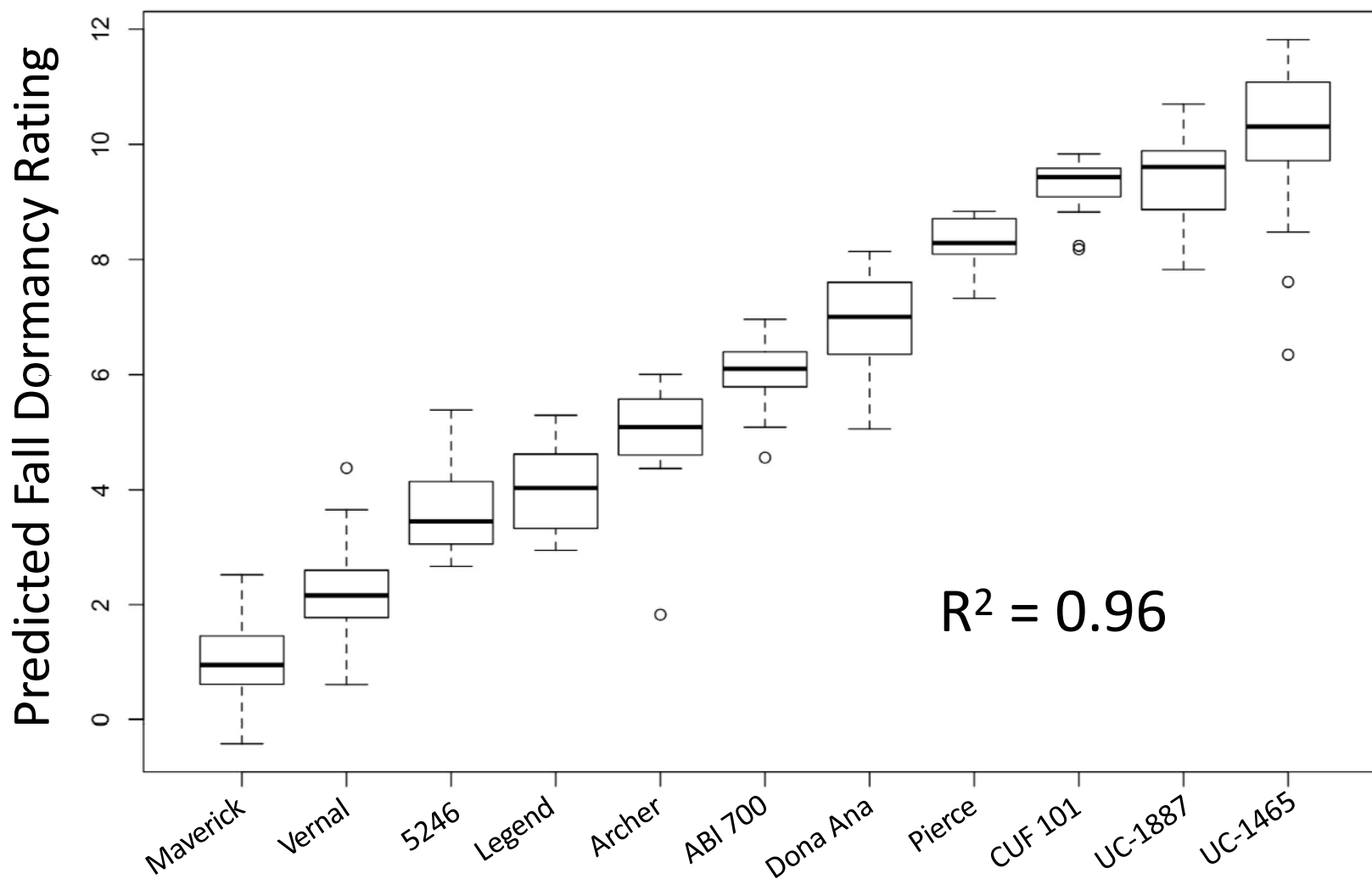
- Important to understand fall dormancy expression in field environment
- Possibility to combine FD testing with yield trials
- Prior work at NMSU in 1988 by Dr. Pete Reisen showed promise

## Test Method

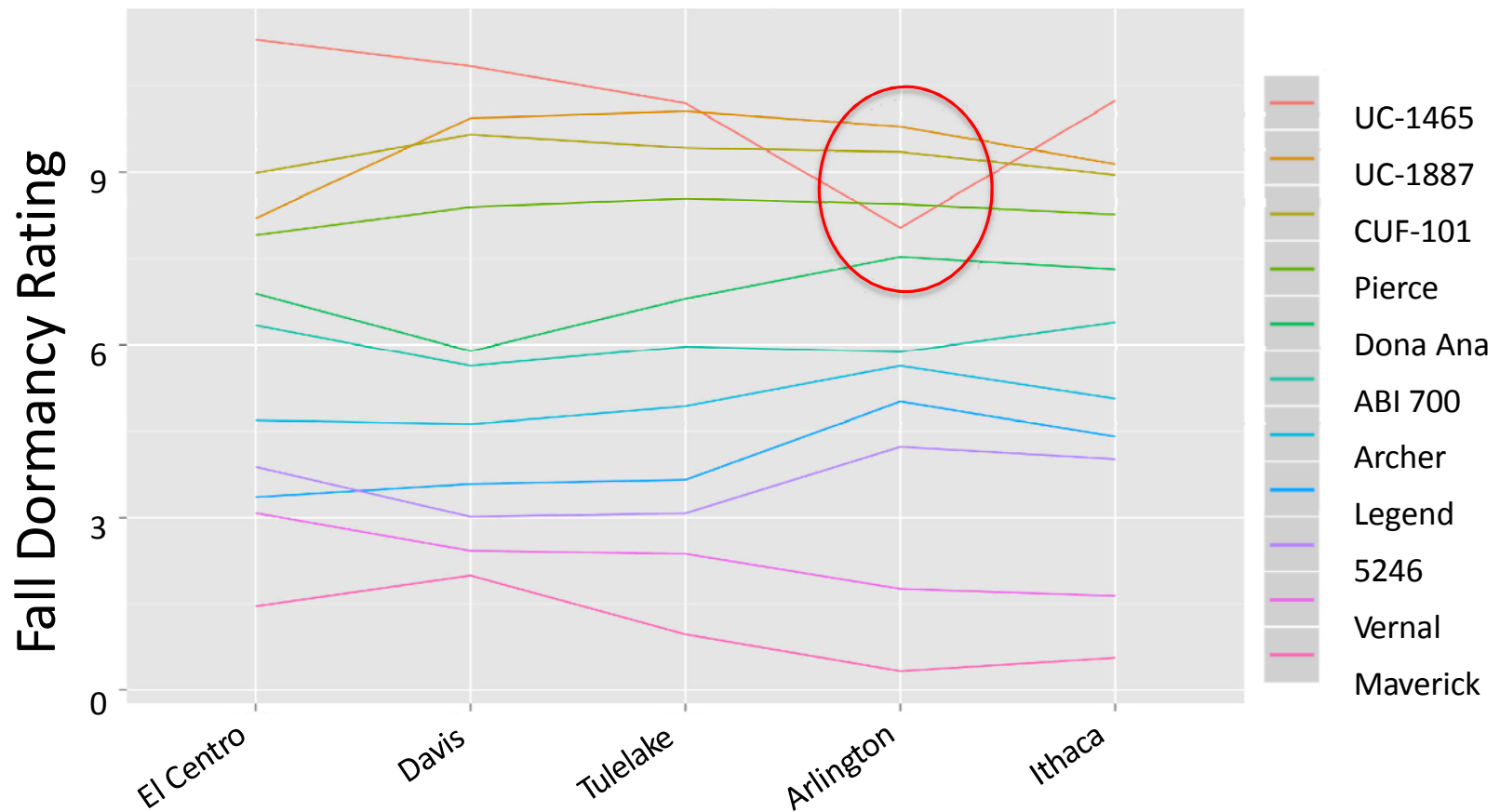
- Spaced plant nursery and sward plots established
- 5 locations – range of latitude and longitude
- Locations represent major growing regions
- Trials consist of 20 varieties, including 11 FD checks



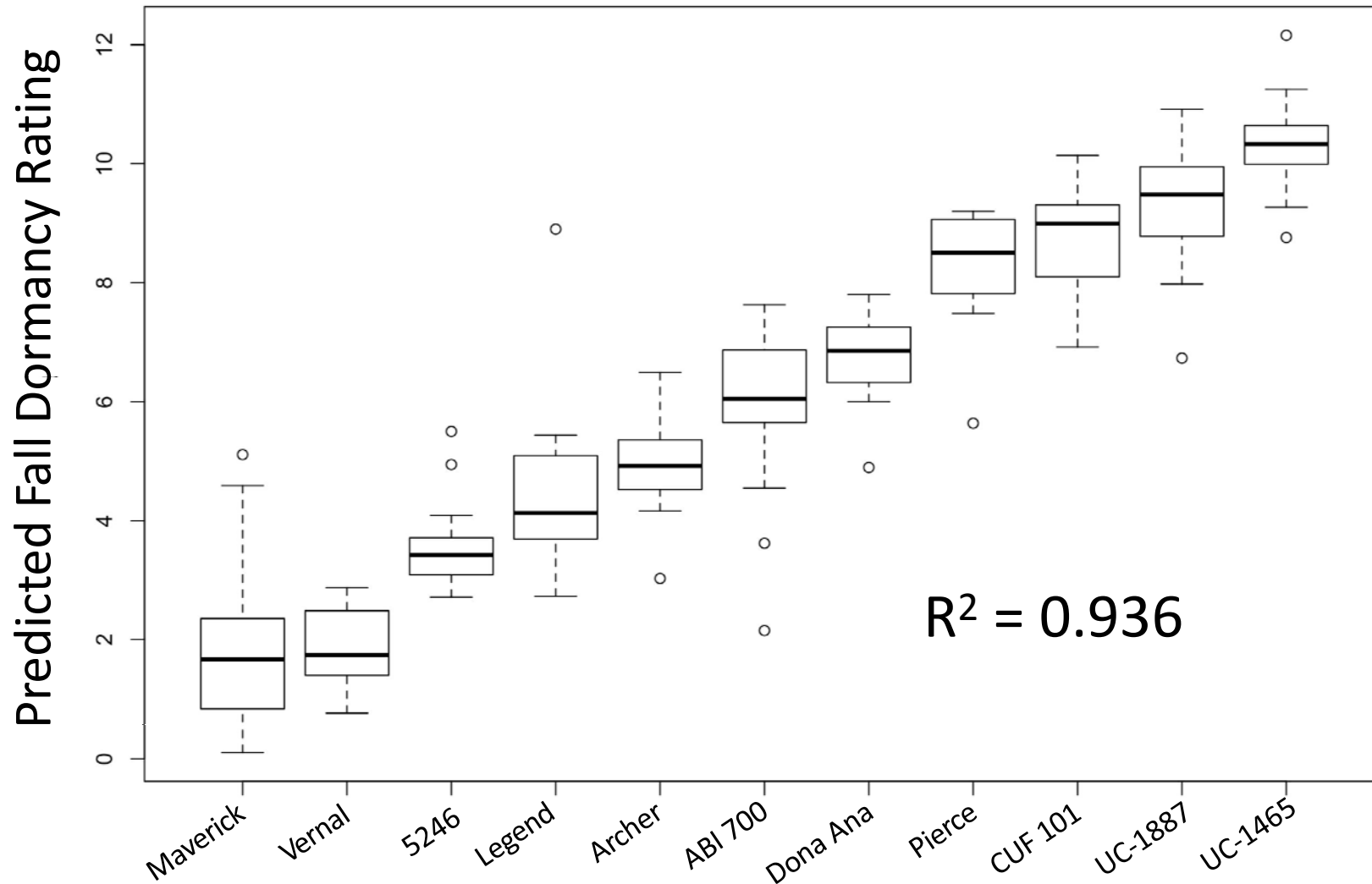
## Spaced Plant Dormancy Rating Shows Expected Trend



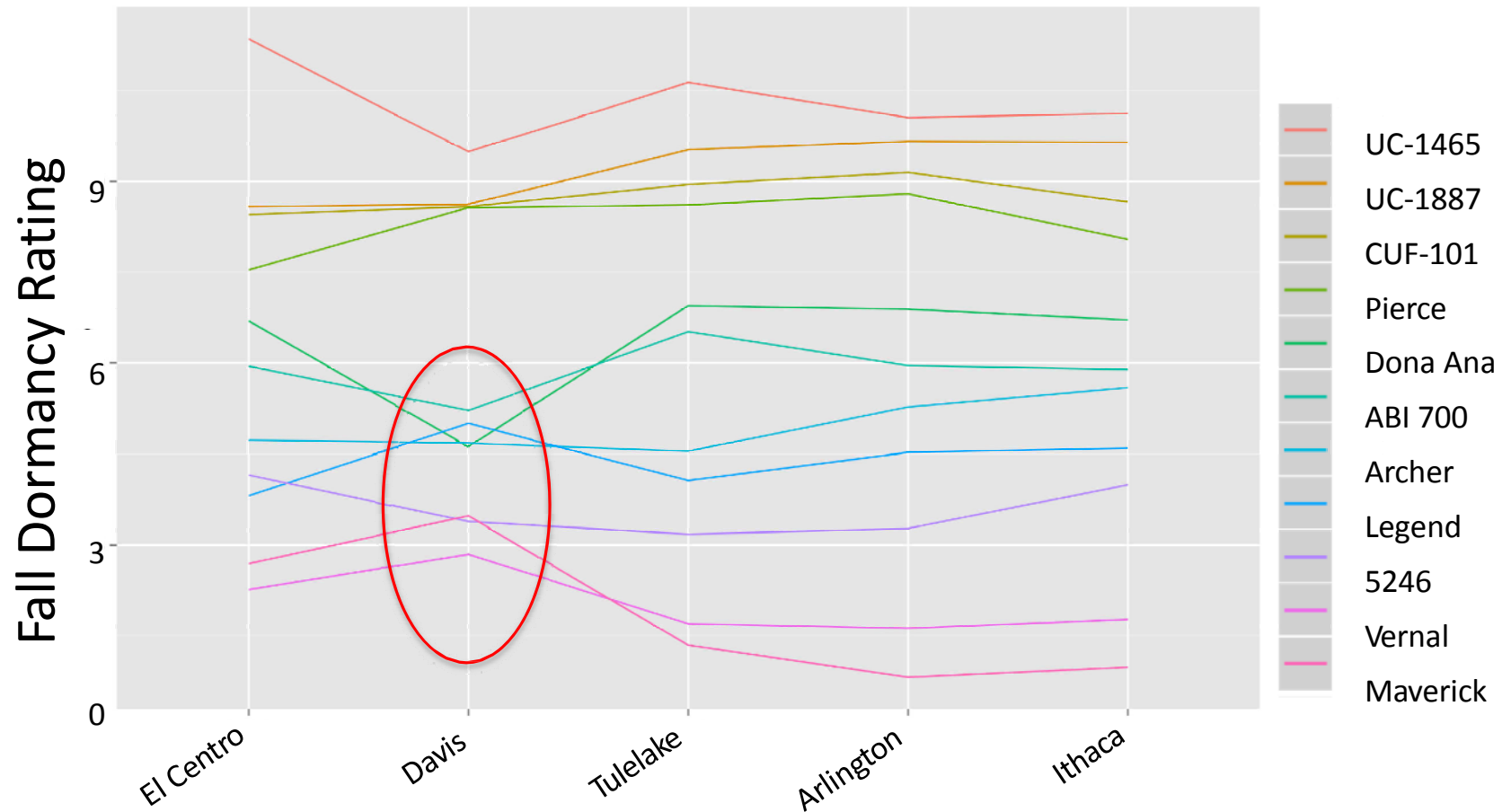
# Spaced Plant Dormancy Rating Shows Little Interaction Across Locations



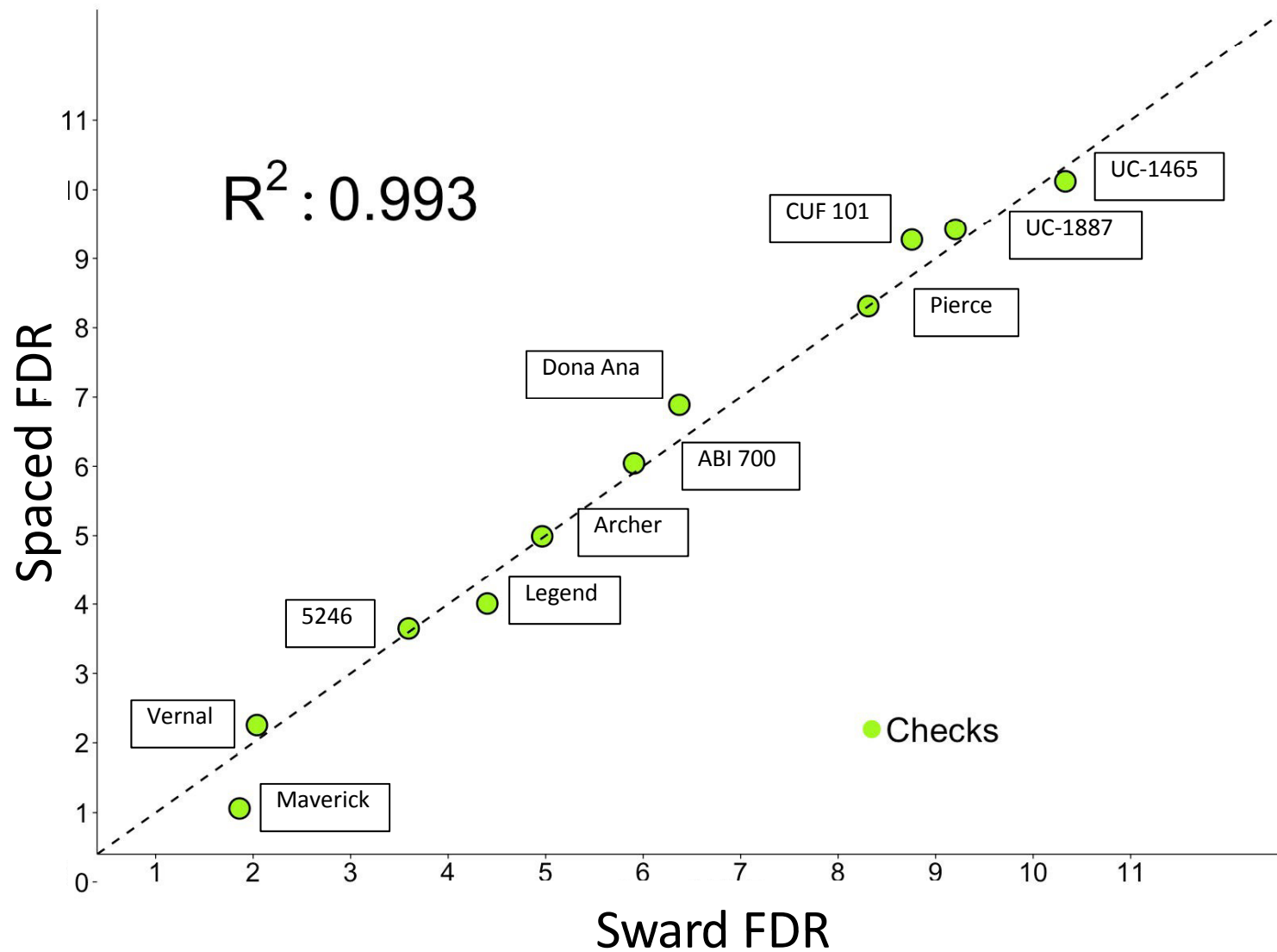
## Sward Plot Dormancy Rating Also Shows Expected Trend



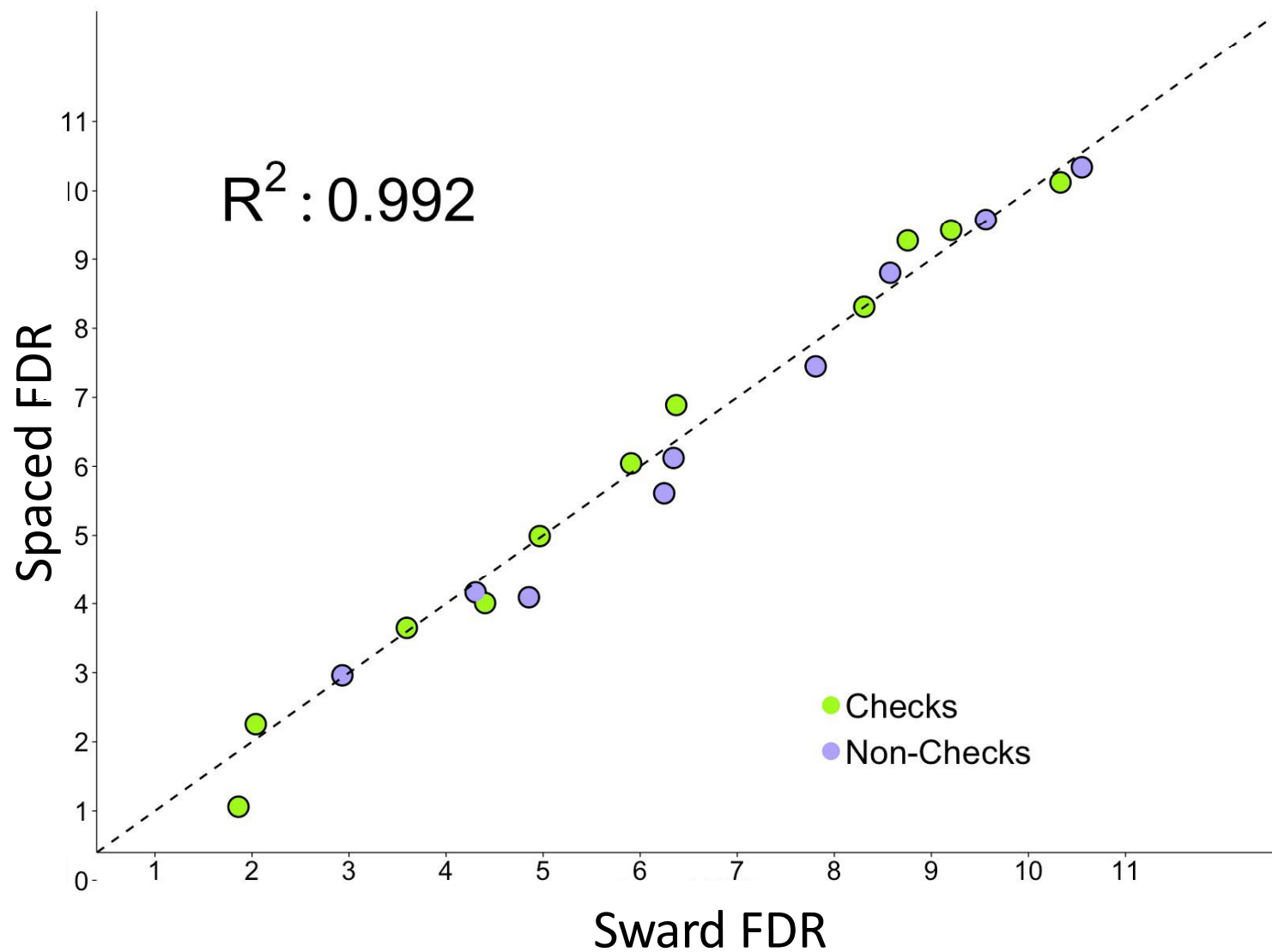
## Sward Plot Dormancy Rating Shows Minor Interactions Across Locations

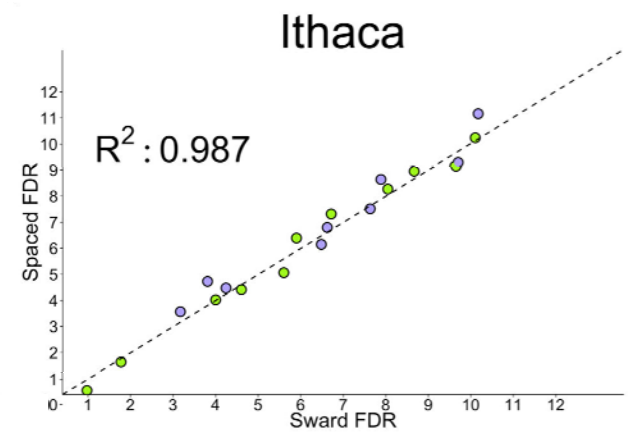
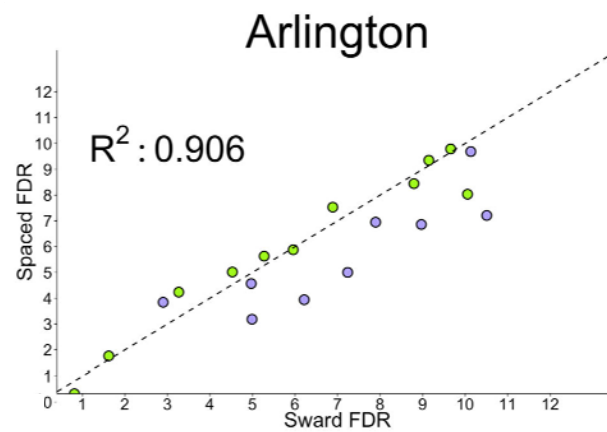
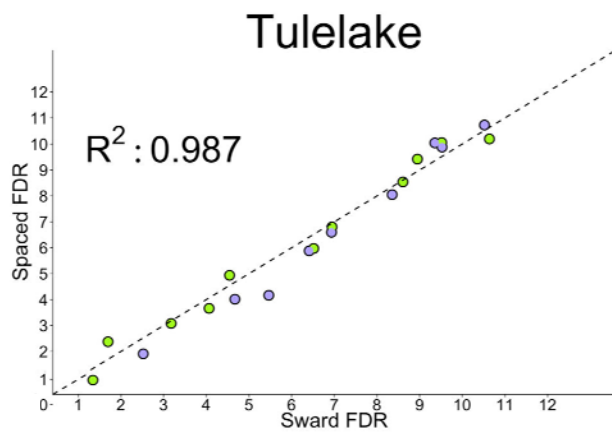
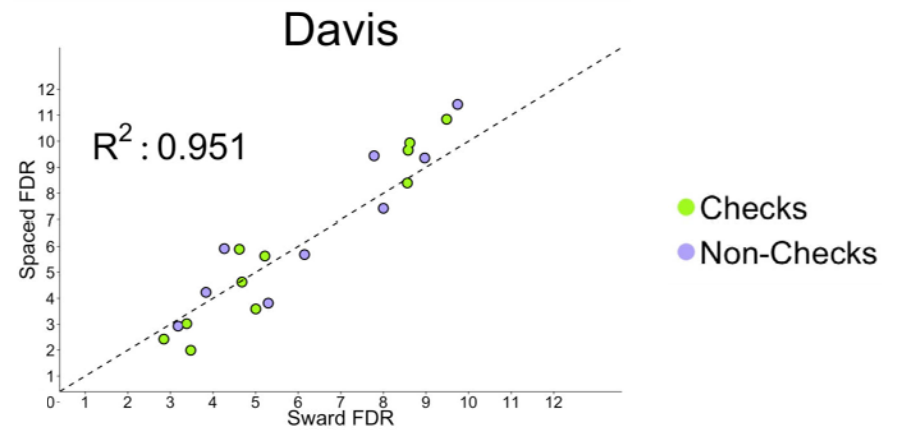
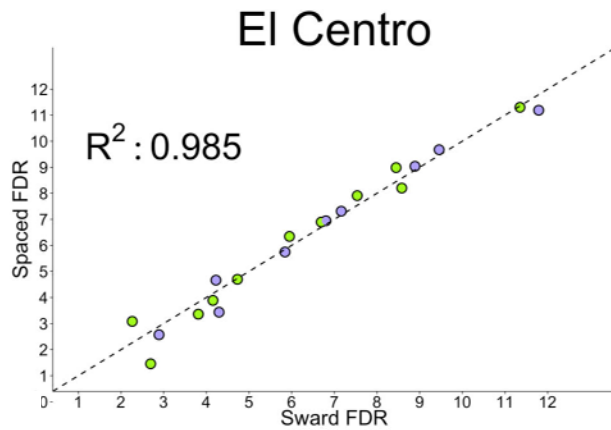


# High Correlation Between Sward and Spaced FDR



## High Correlation Between Sward and Spaced FDR





# 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!

