

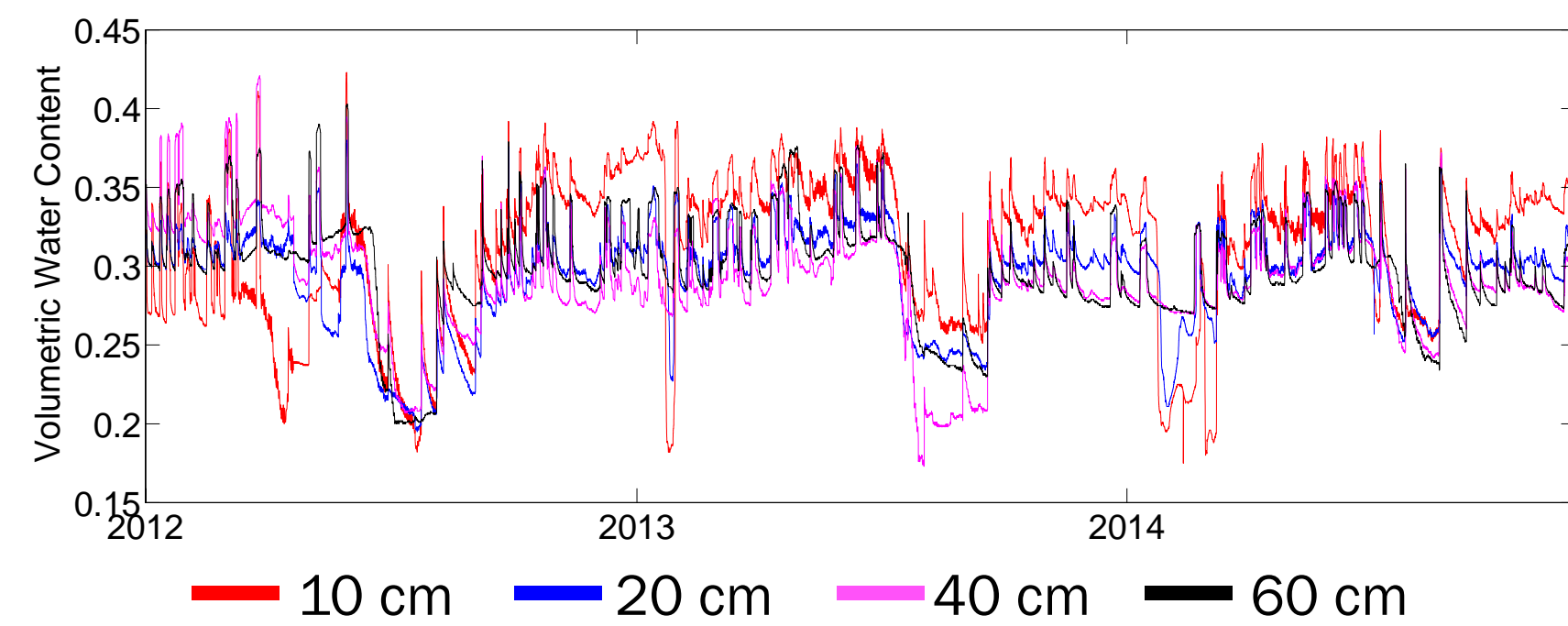
Yield impact of drainage water management based on soil moisture

Caroline Hughes¹, Laura Bowling¹, Jane Frankenberger¹, Jeff Strock², Lu Zhang², Norm Fausey³, Lindsay Pease⁴, Matt Helmers⁵, Linda Schott⁵, Eileen Kladvik¹

1. Purdue University; 2. University of Minnesota; 3. USDA-ARS; 4. The Ohio State University; 5. Iowa State University

Introduction

We are monitoring soil moisture at four field sites with controlled drainage. Data is logged automatically and analyzed at hourly resolution.



Example of volumetric water content measurements

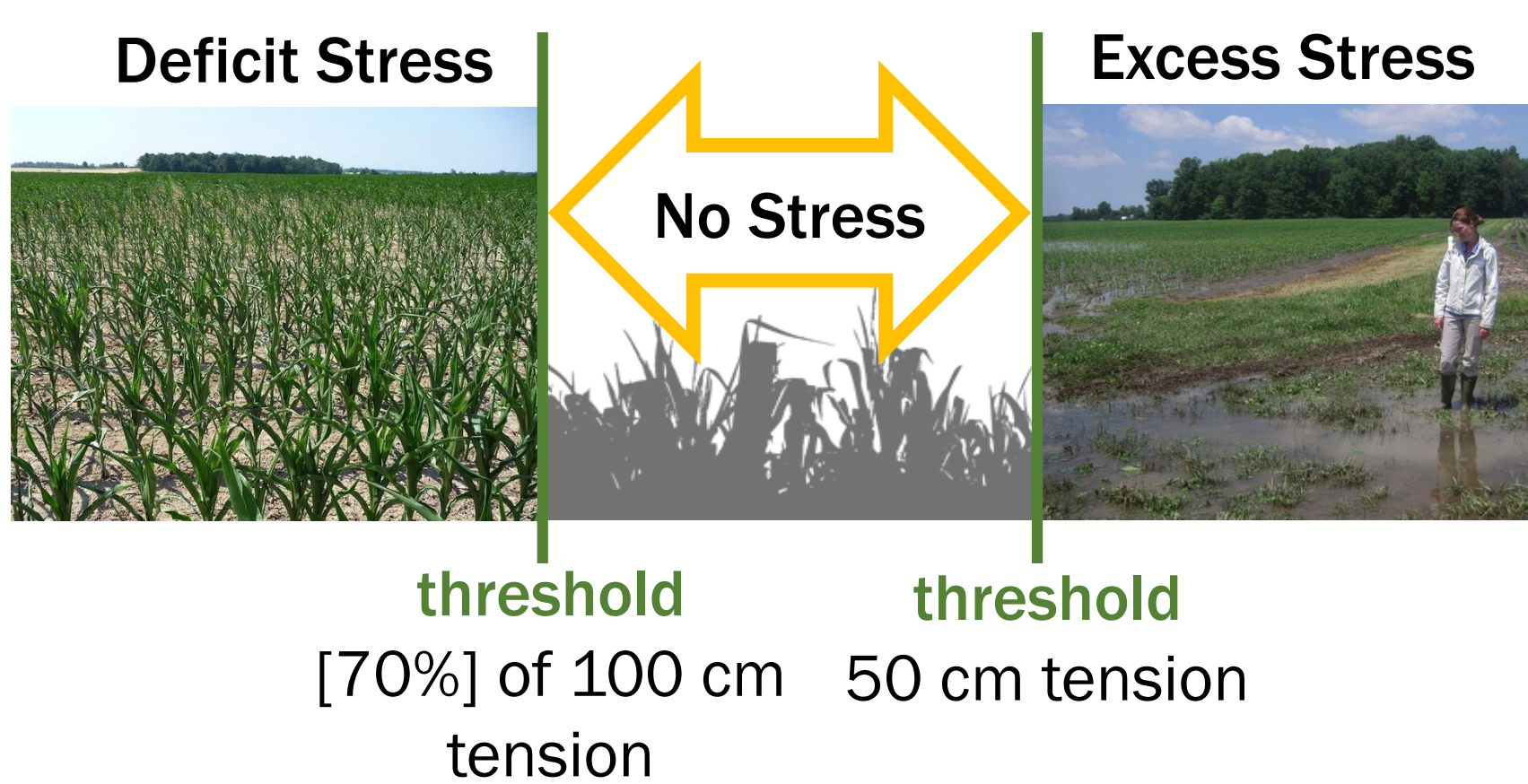


We are researching the potential for yield benefits of controlled drainage. Our questions are:

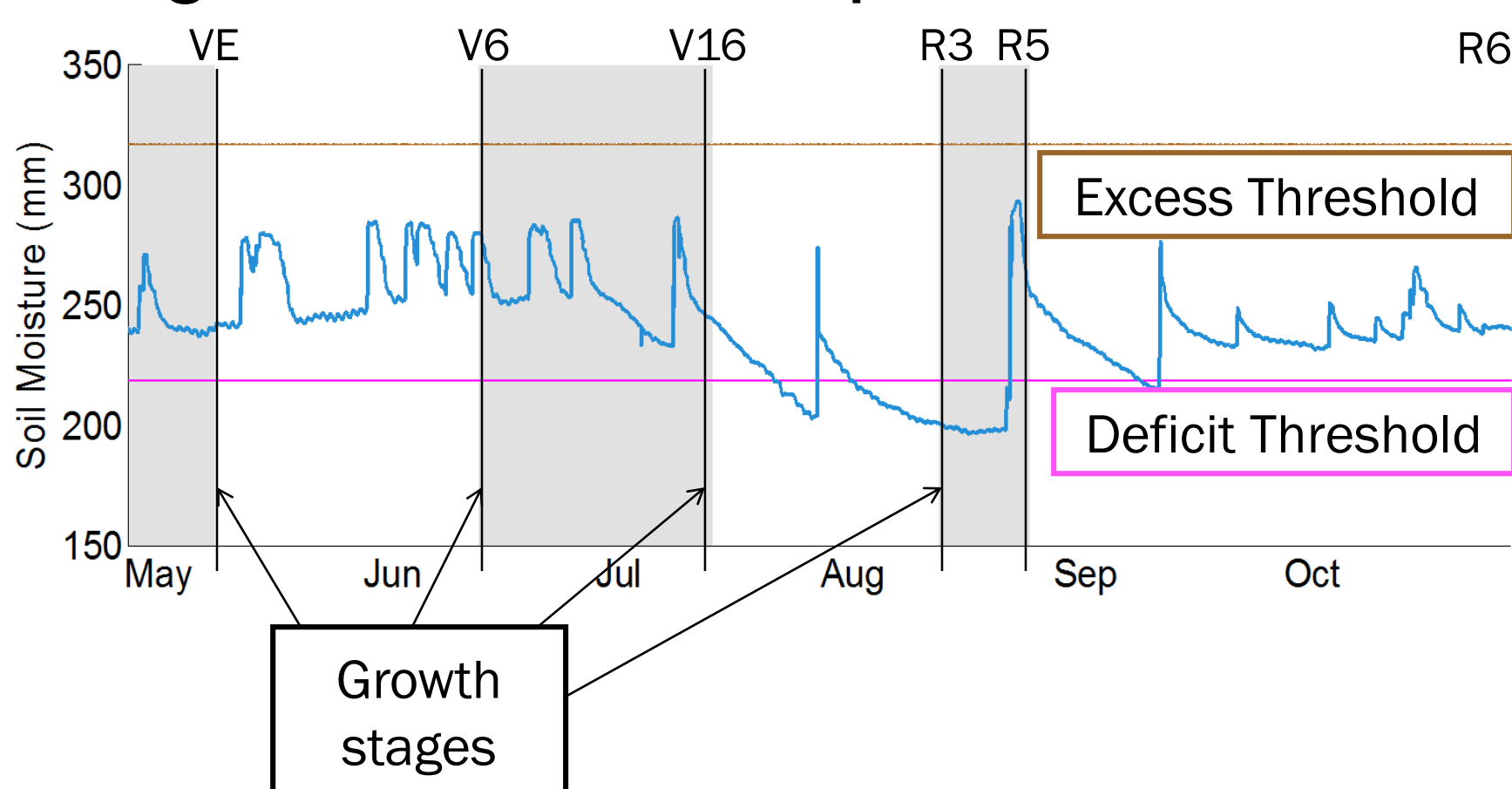
- What metrics of soil moisture stress are related to corn yield?
- Does drainage water management improve yield by reducing moisture stress?

Analytical Procedure

We defined thresholds for soil moisture stress based on the water retention curve.

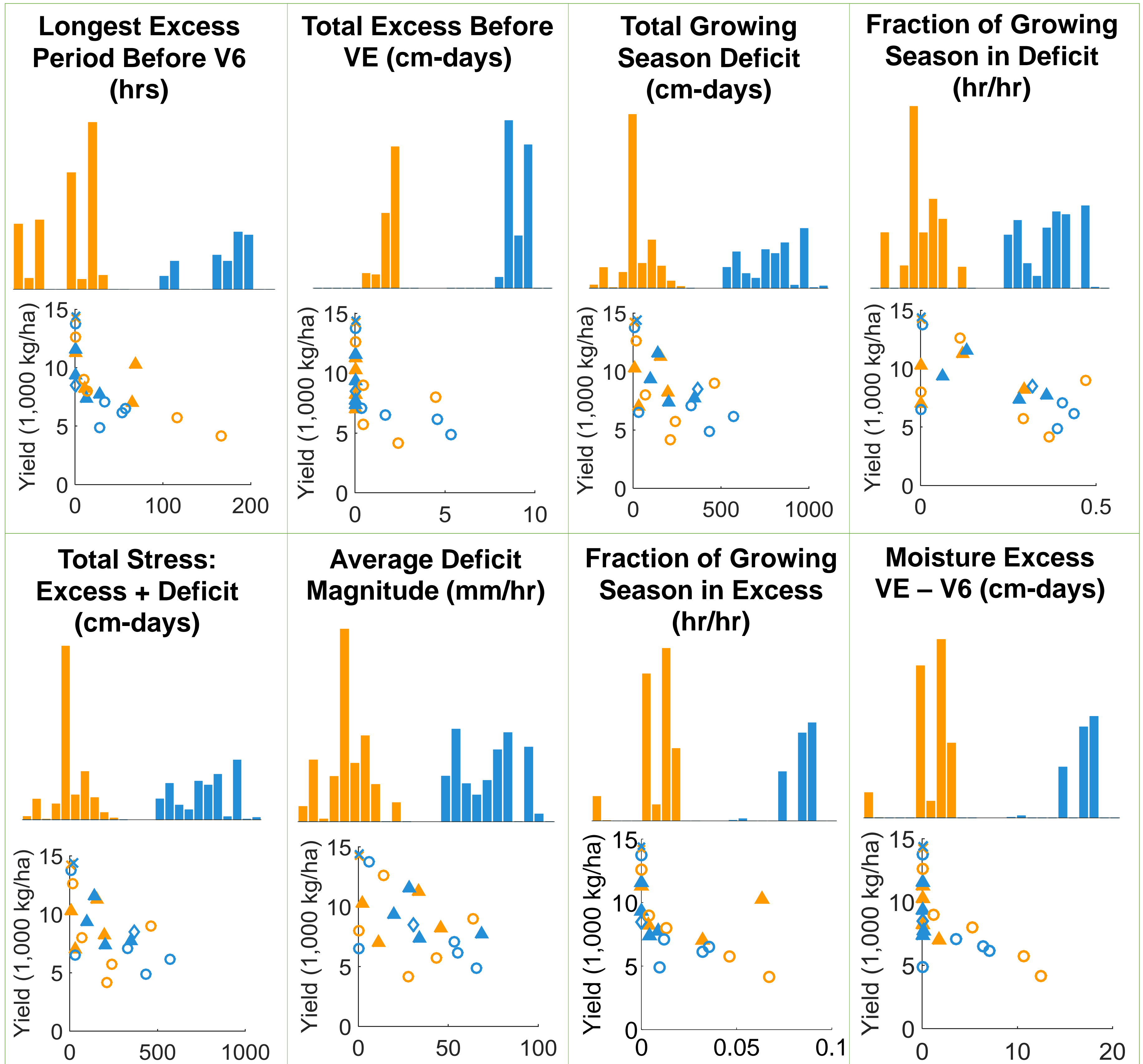


Stress metrics include time and magnitude of stress at each growth stage of the corn crop.

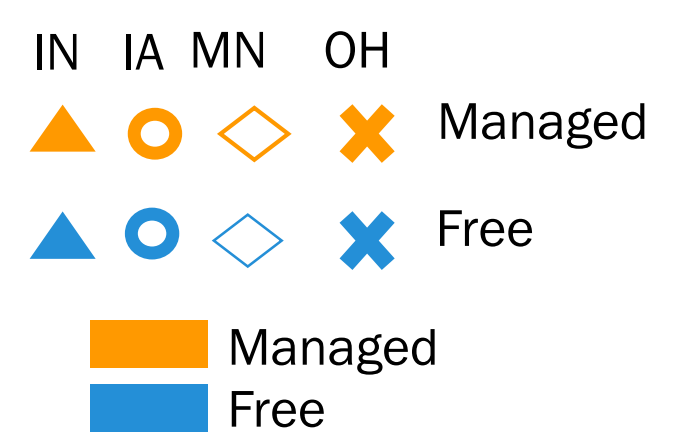


Results and Discussion

Bar graphs of eight example metrics show the amount of stress at each site and a comparison between groups of free and managed sites.



Yields show correlation with stress. However, no significant difference was found in stress levels between managed and free-draining sites.



Conclusions

Soil moisture stress is related to yield when measured with deficit, excess, and combination metrics.

The lack of difference in stress levels between free and managed drainage can help explain why no difference in yield has been observed.

Recommendations

Drainage management should aim to limit moisture excess. Continuing to collect soil moisture data can result in a better understanding of potential yield benefits of drainage water management.

Acknowledgements

Thank you to Jeff Boyer, farm manager at DPAC, and Daryl Herzmann, database manager.