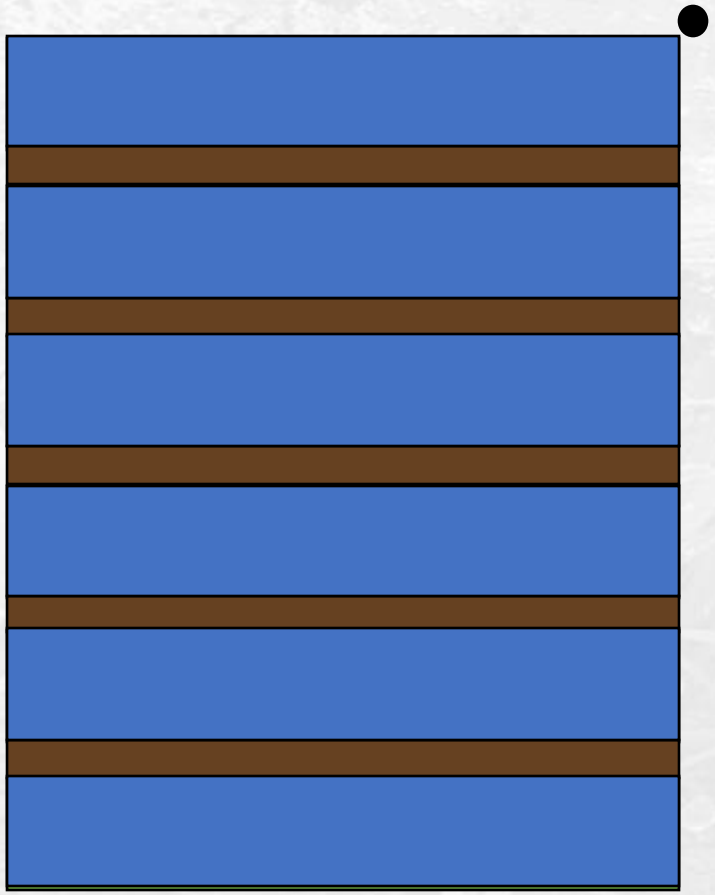
Life After the Flood: An Automated, Low-Water-Use Rice Production System

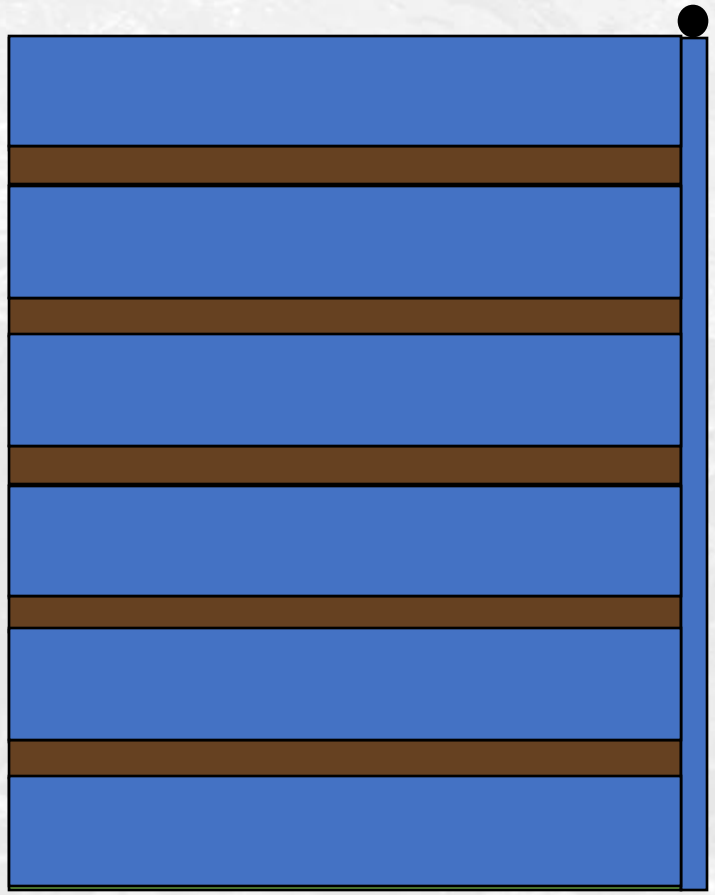
Graham Oakley*, Dave Spencer, Drew Gholson, Jason Krutz

Photo Credit: Graham Oakley, 2023

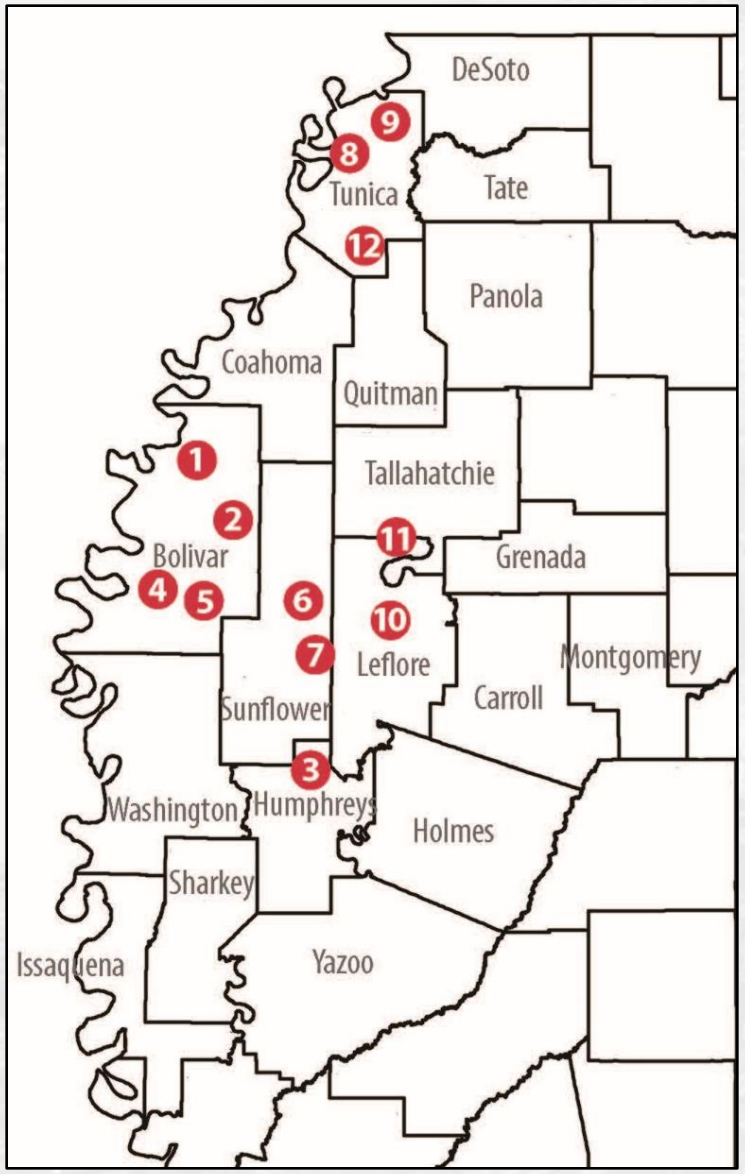
Cascade

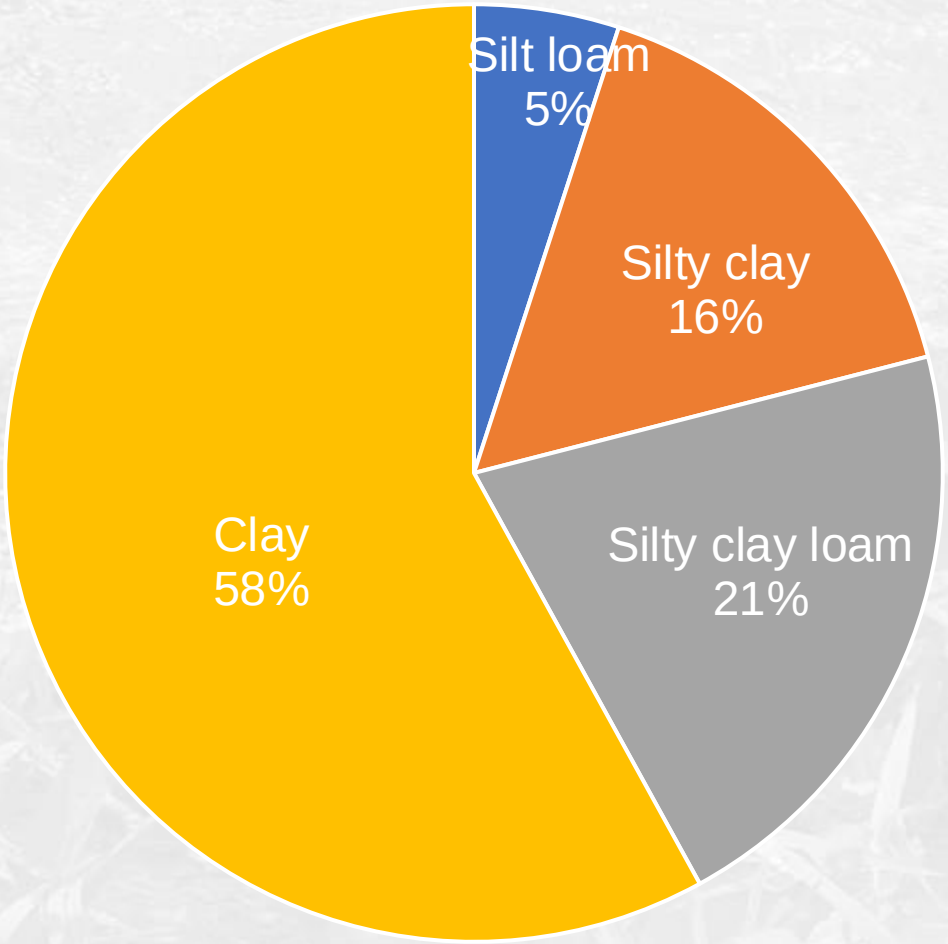


MIRI



Alternate Wetting and Drying – On-Farm

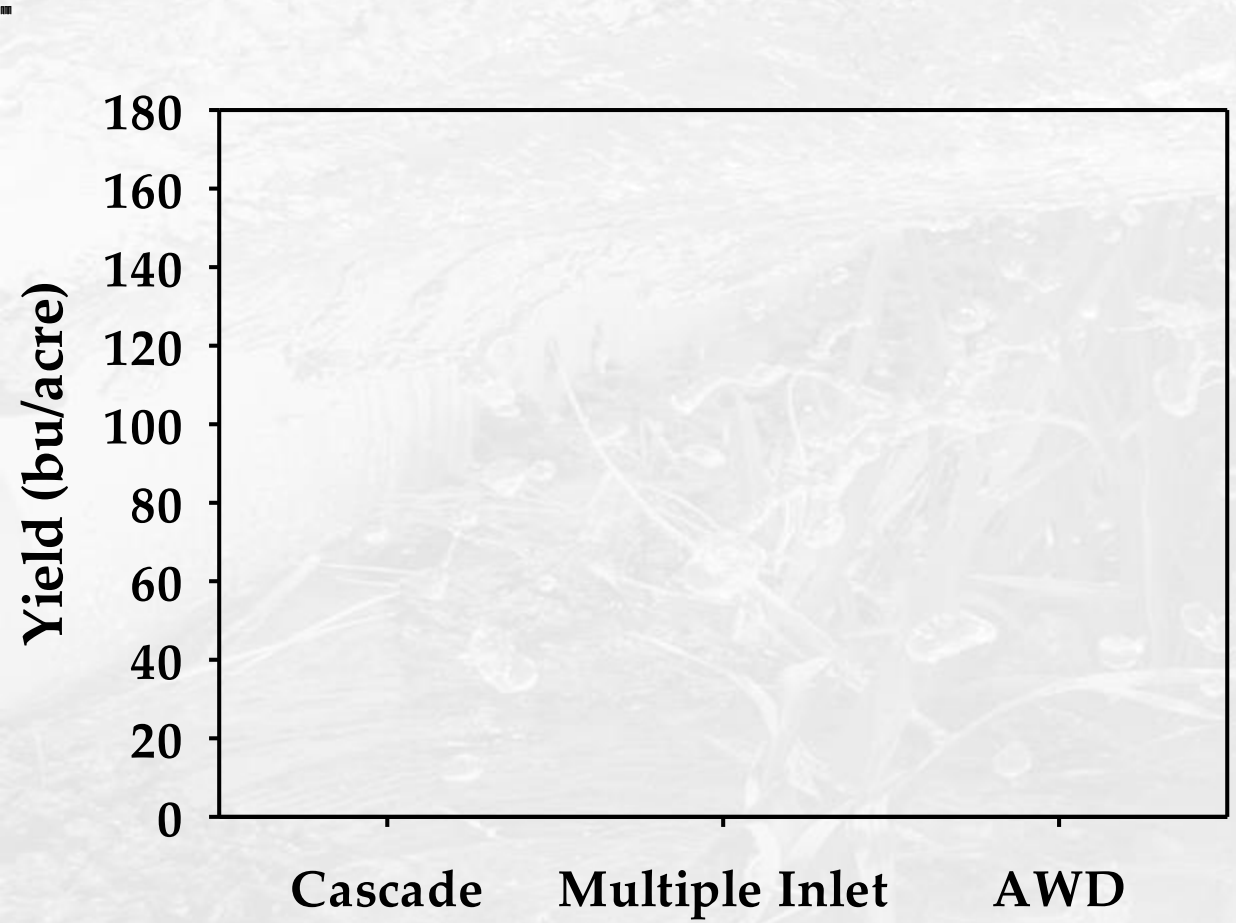


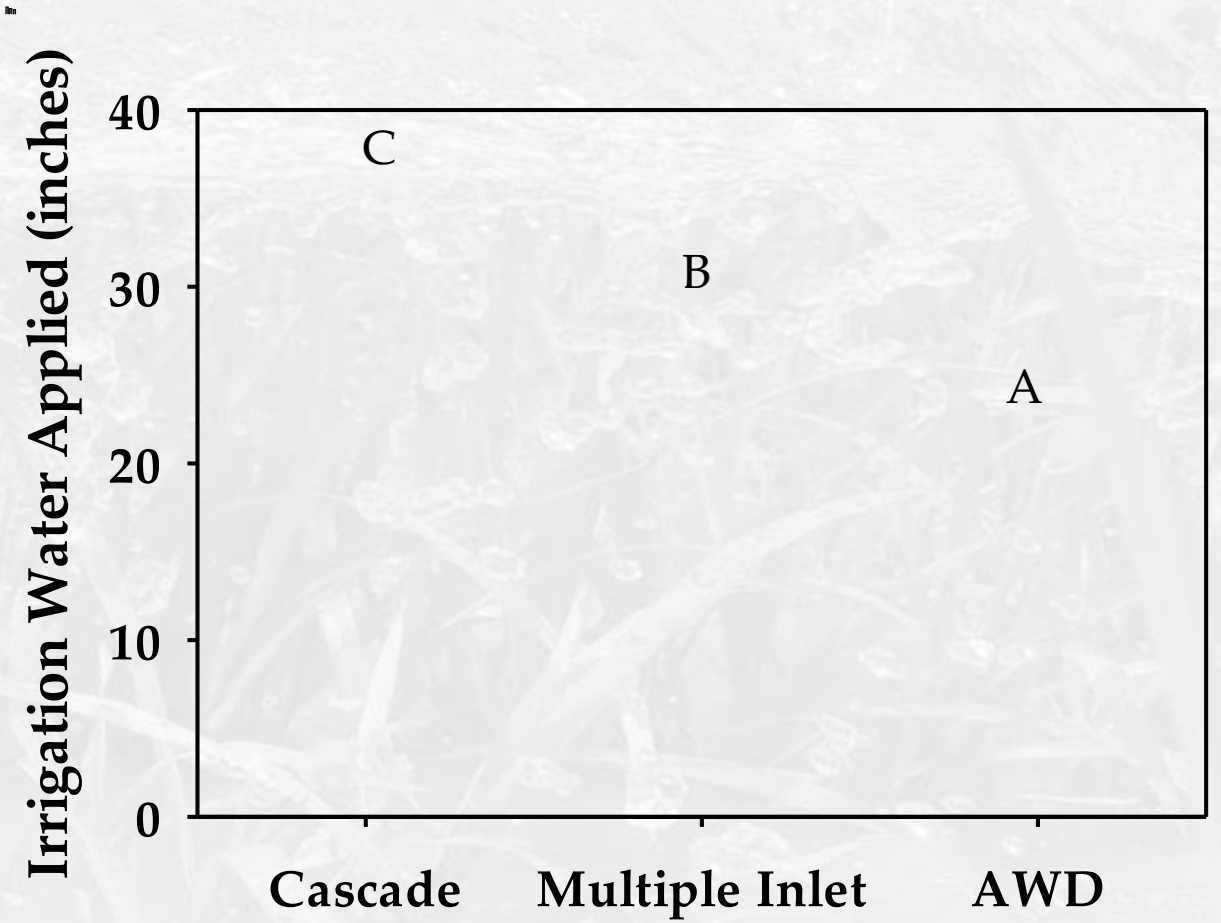


3 fields per location

- Straight levee, cascade flooded
- Straight levee, multiple inlet irrigation
- Straight levee, multiple inlet with AWD

Alternate Wetting and Drying – On-Farm

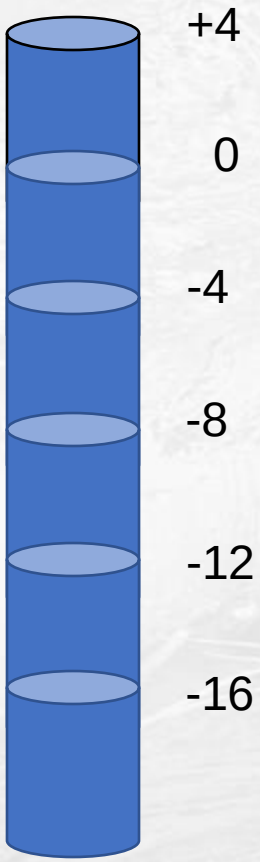




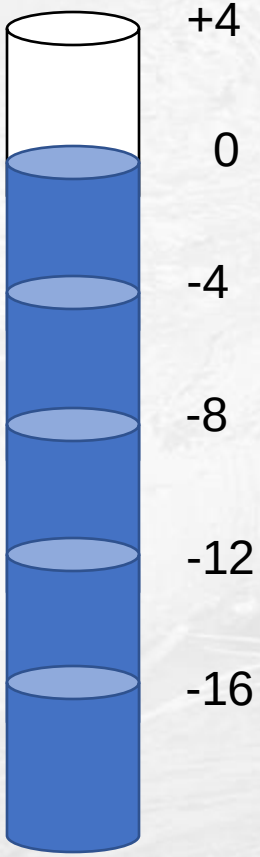
Alternate Wetting and Drying – On-Farm

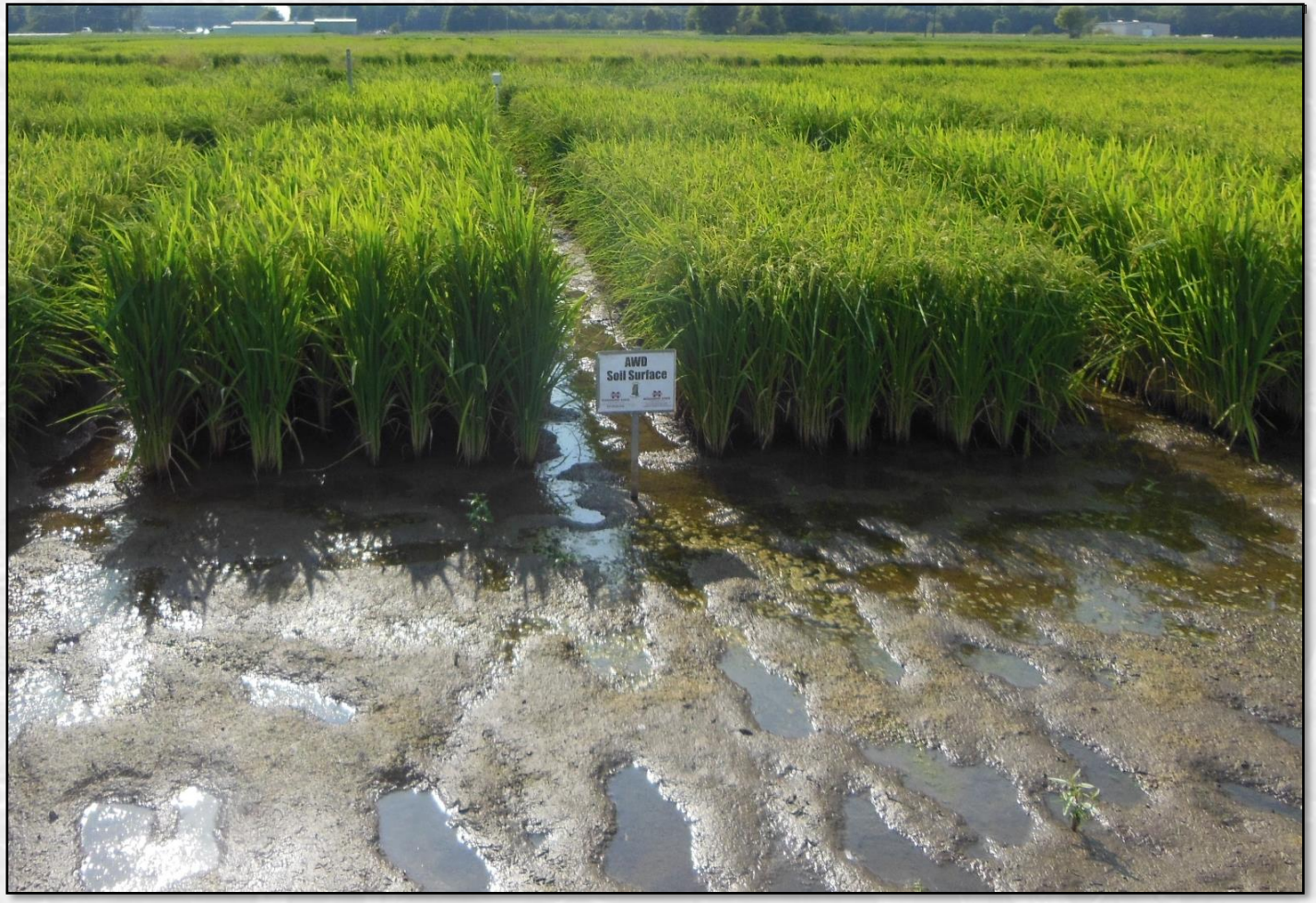
- Multiple Inlet and AWD > Cascade
- As diesel prices increase and well depth increases, AWD > Multiple Inlet

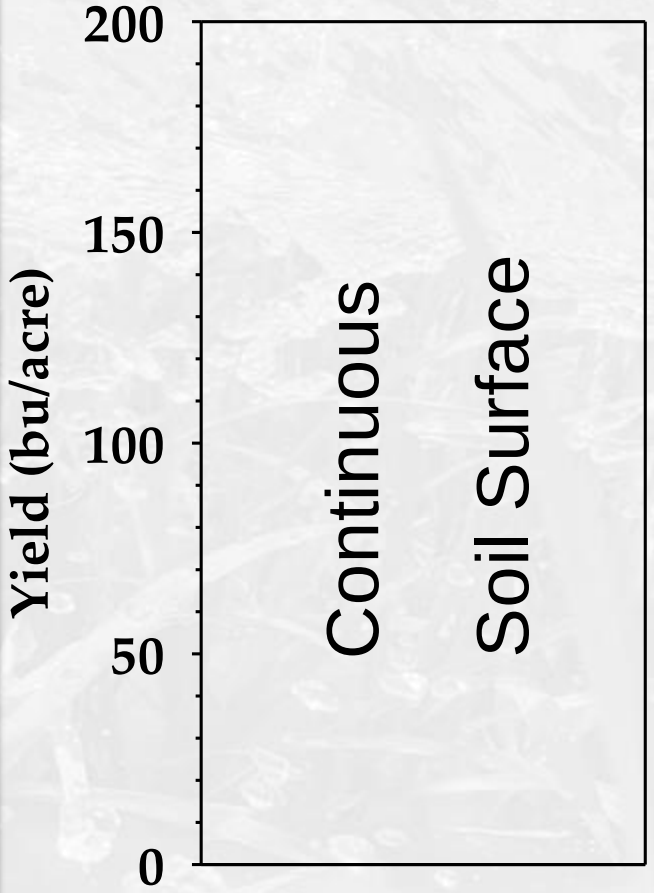
Alternate Wetting and Drying



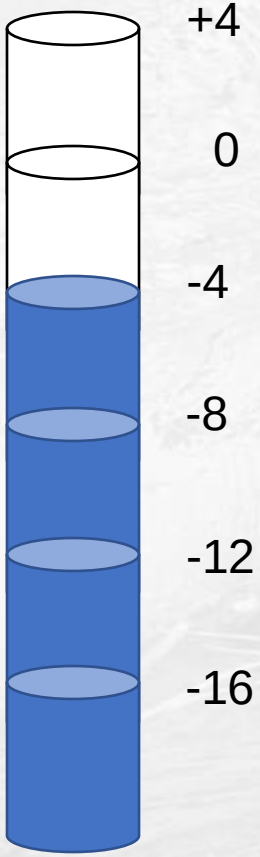
Alternate Wetting and Drying

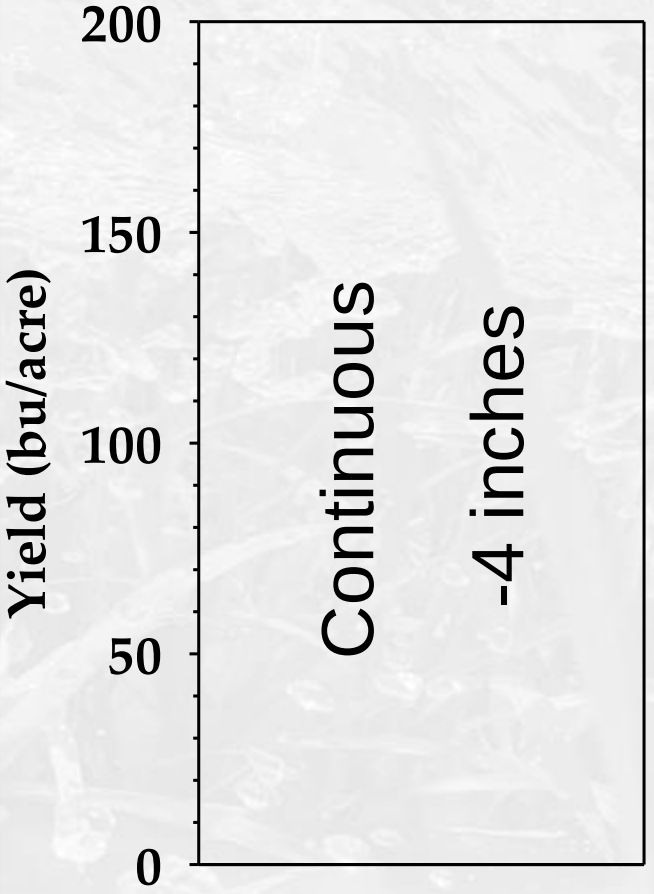




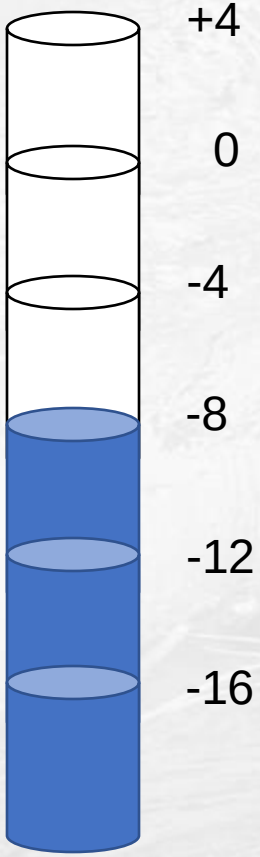


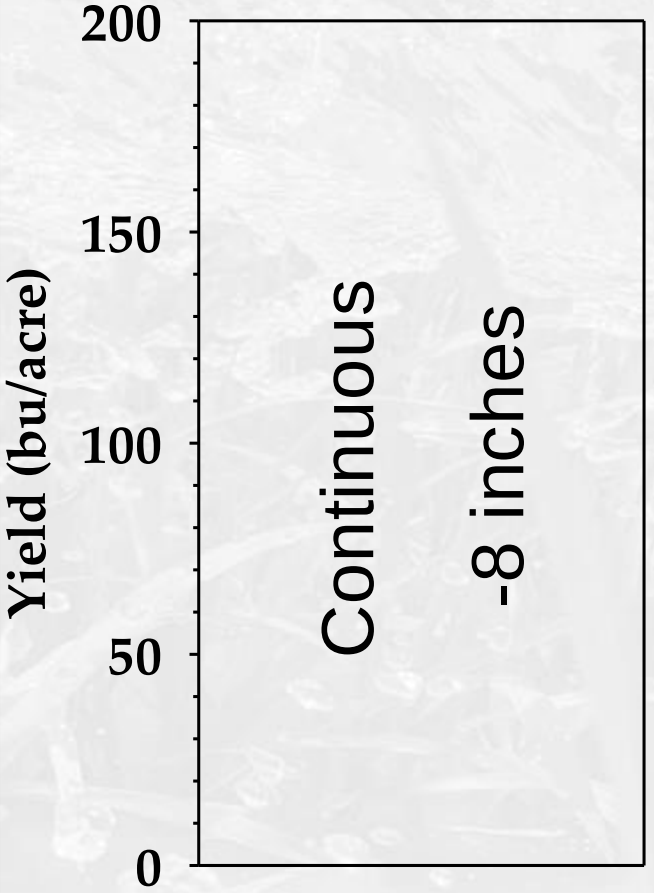
Alternate Wetting and Drying



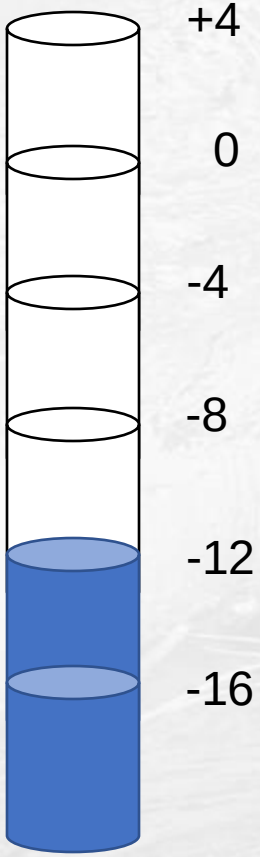


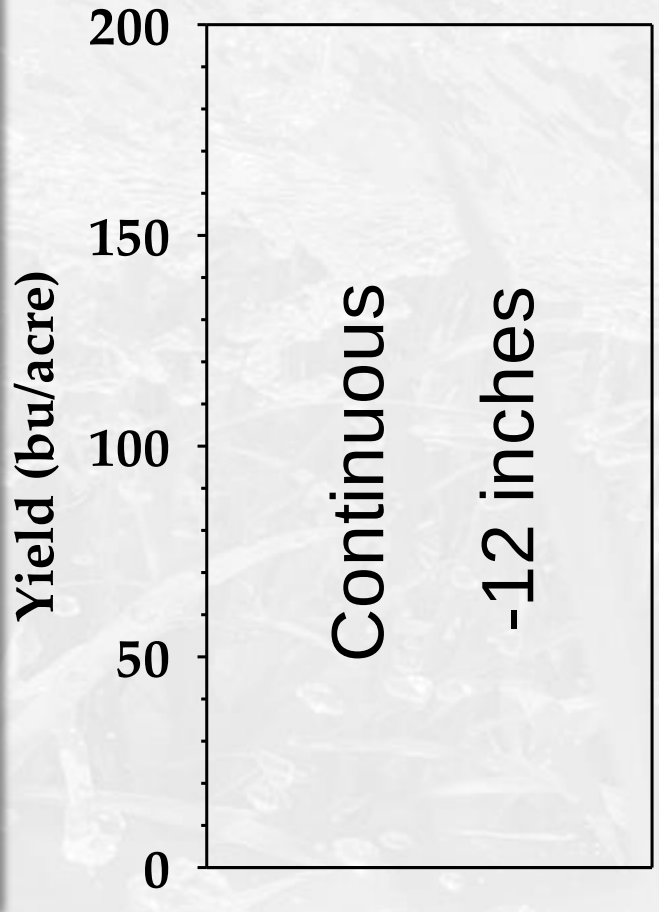
Alternate Wetting and Drying



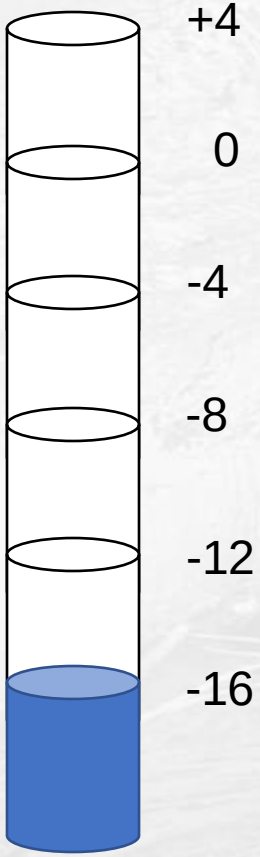


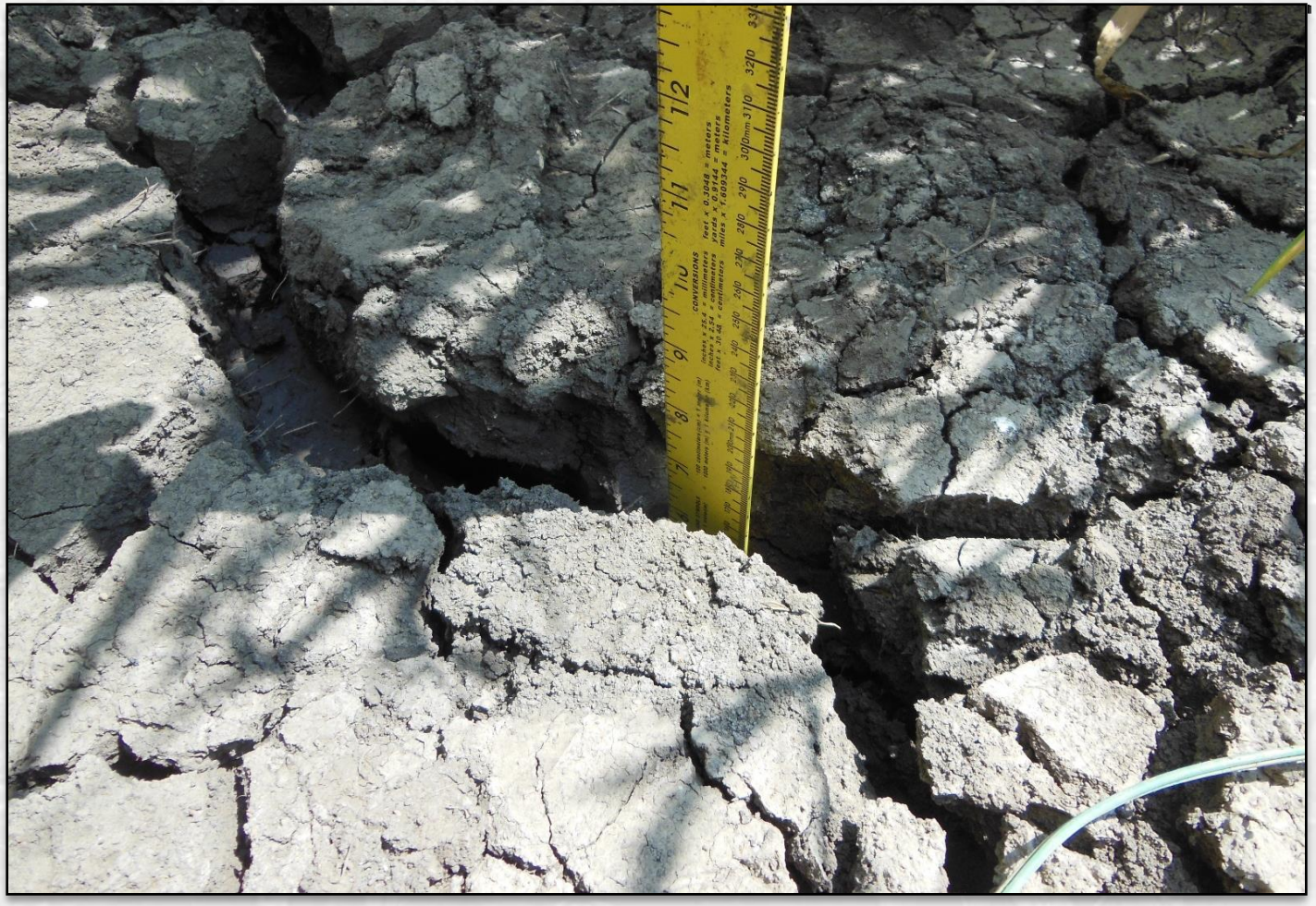
Alternate Wetting and Drying

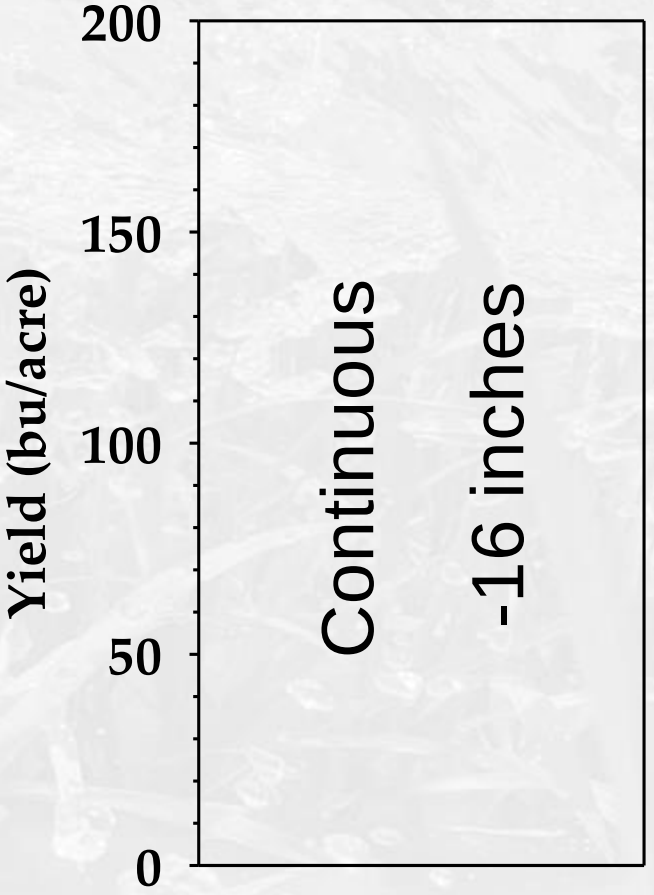




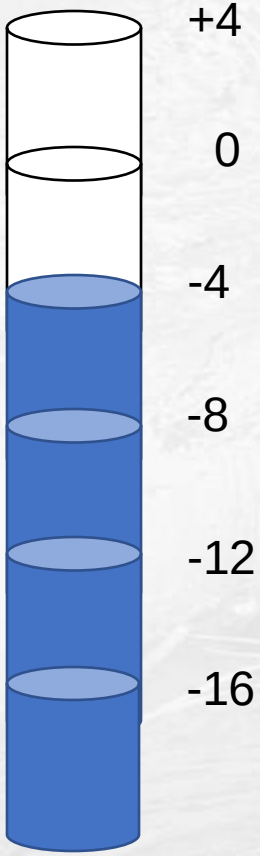
Alternate Wetting and Drying

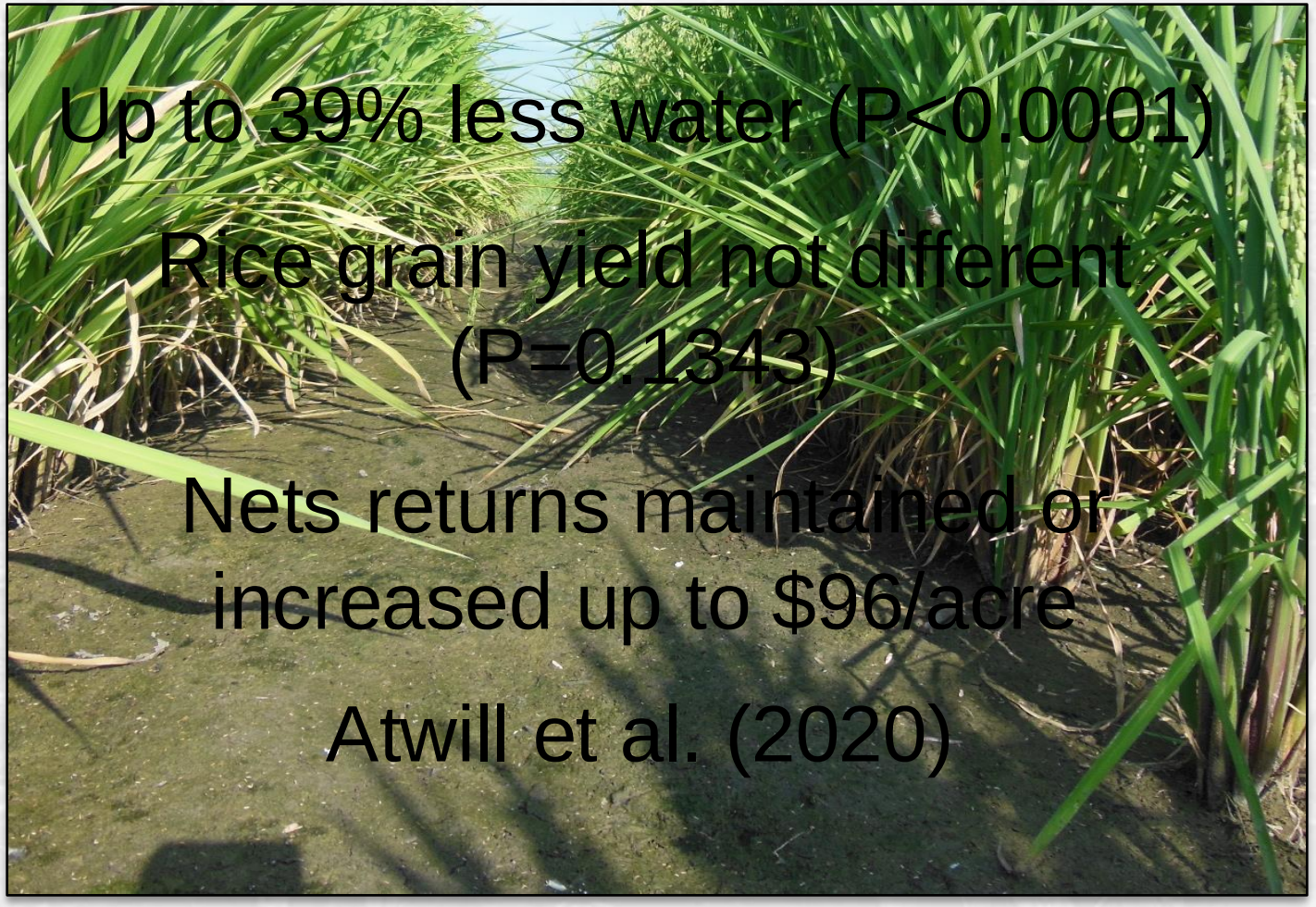


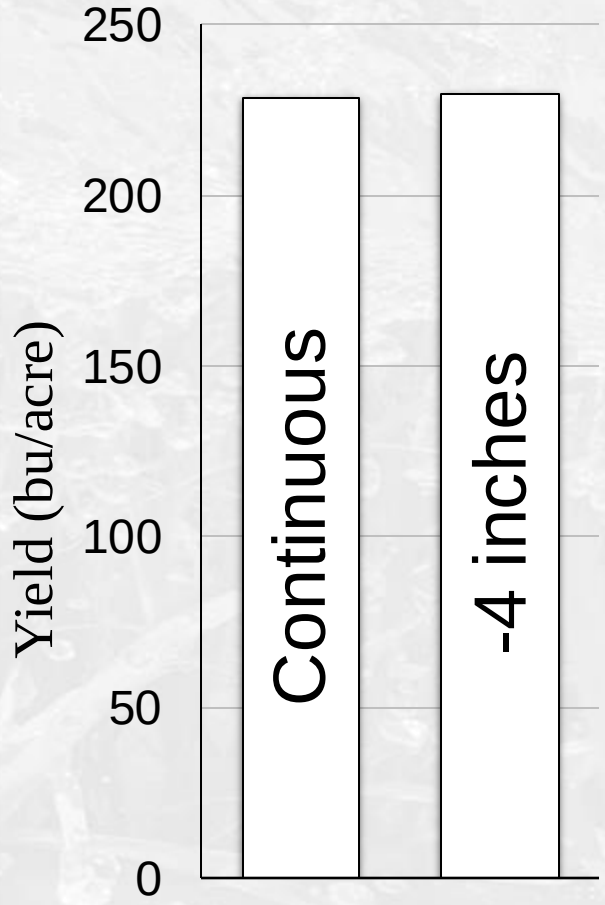




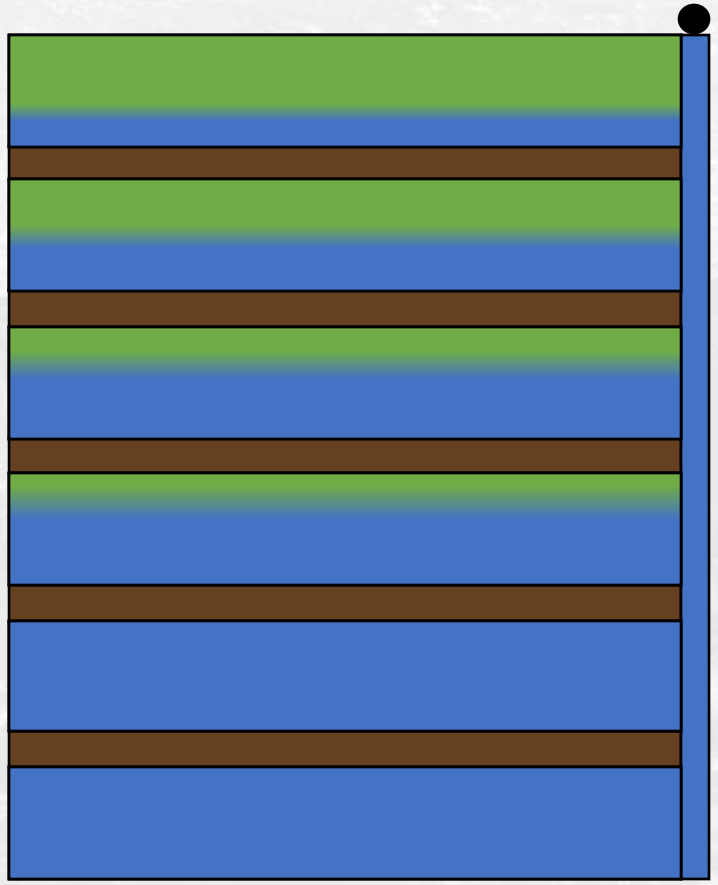
Alternate Wetting and Drying







Alternate Wetting and Drying (AWD)



Internet-of-things

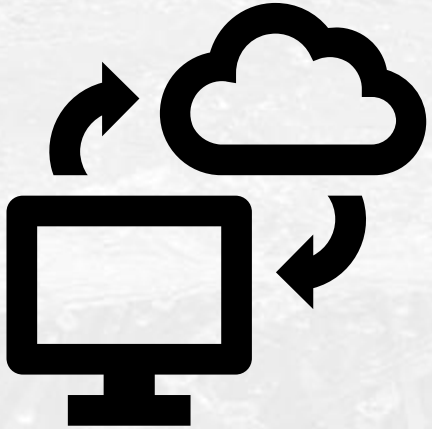


Photo Credit: Graham Oakley, 2023

AWD

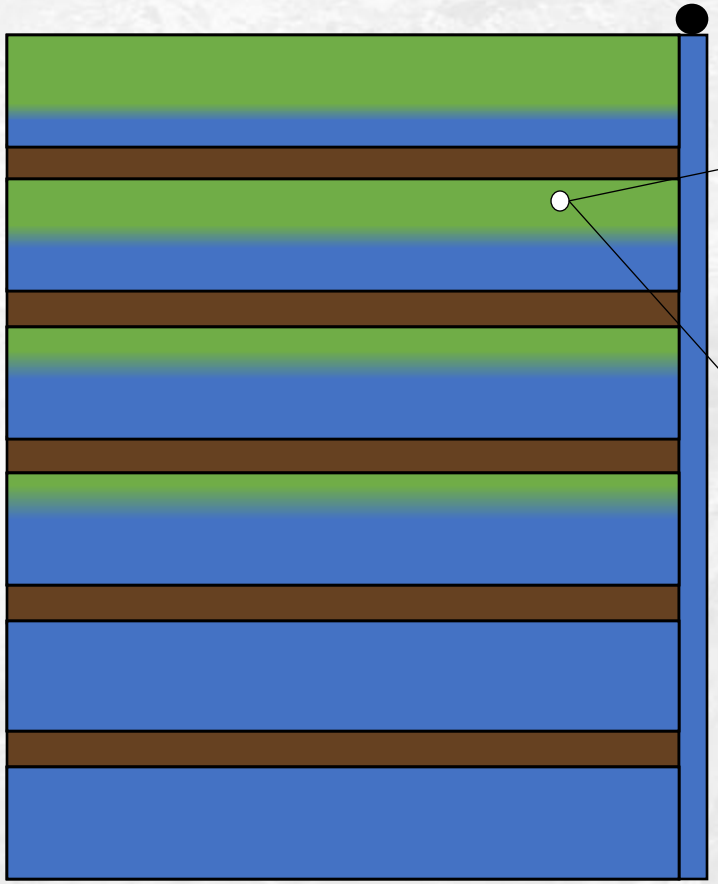
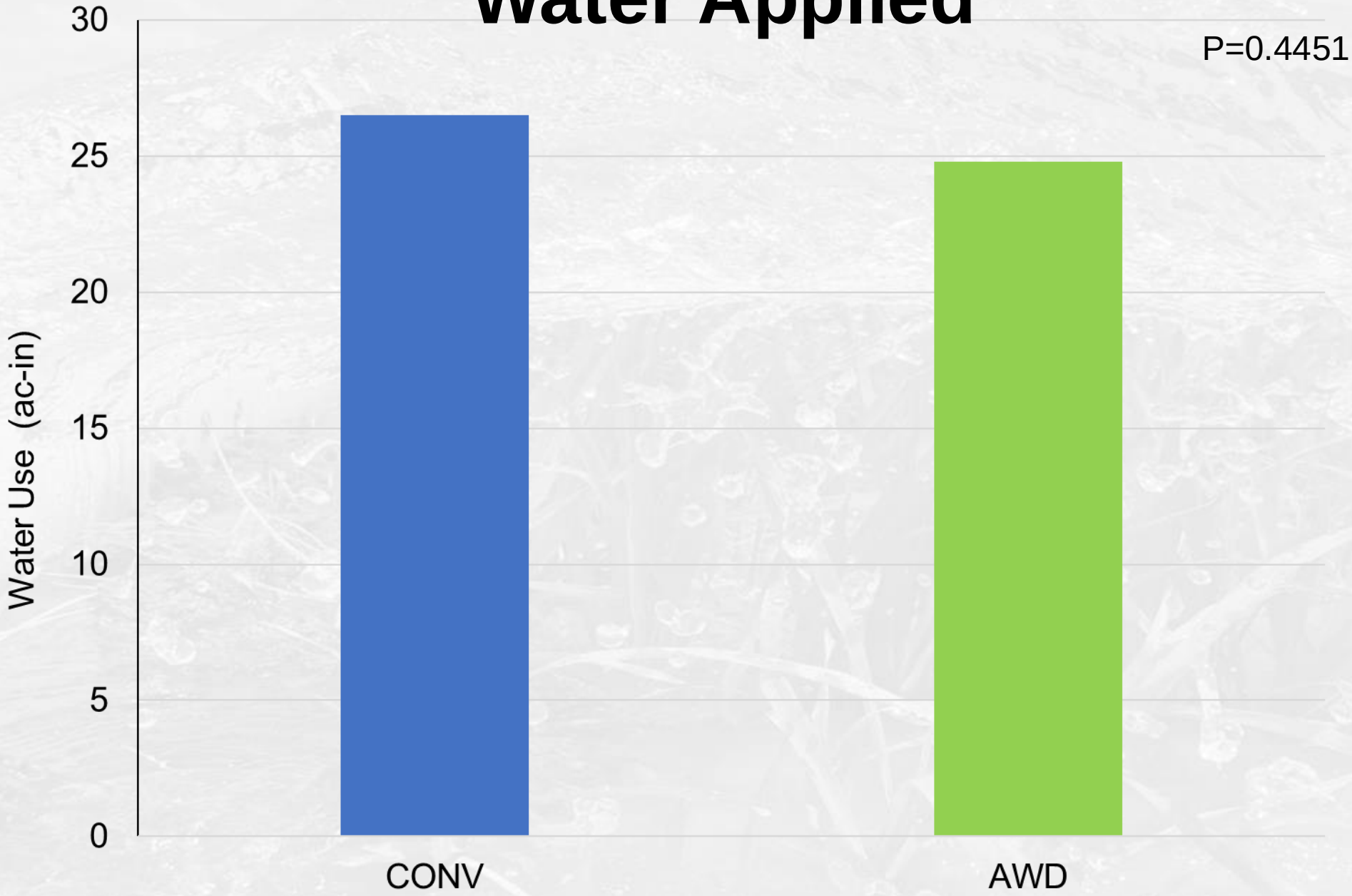
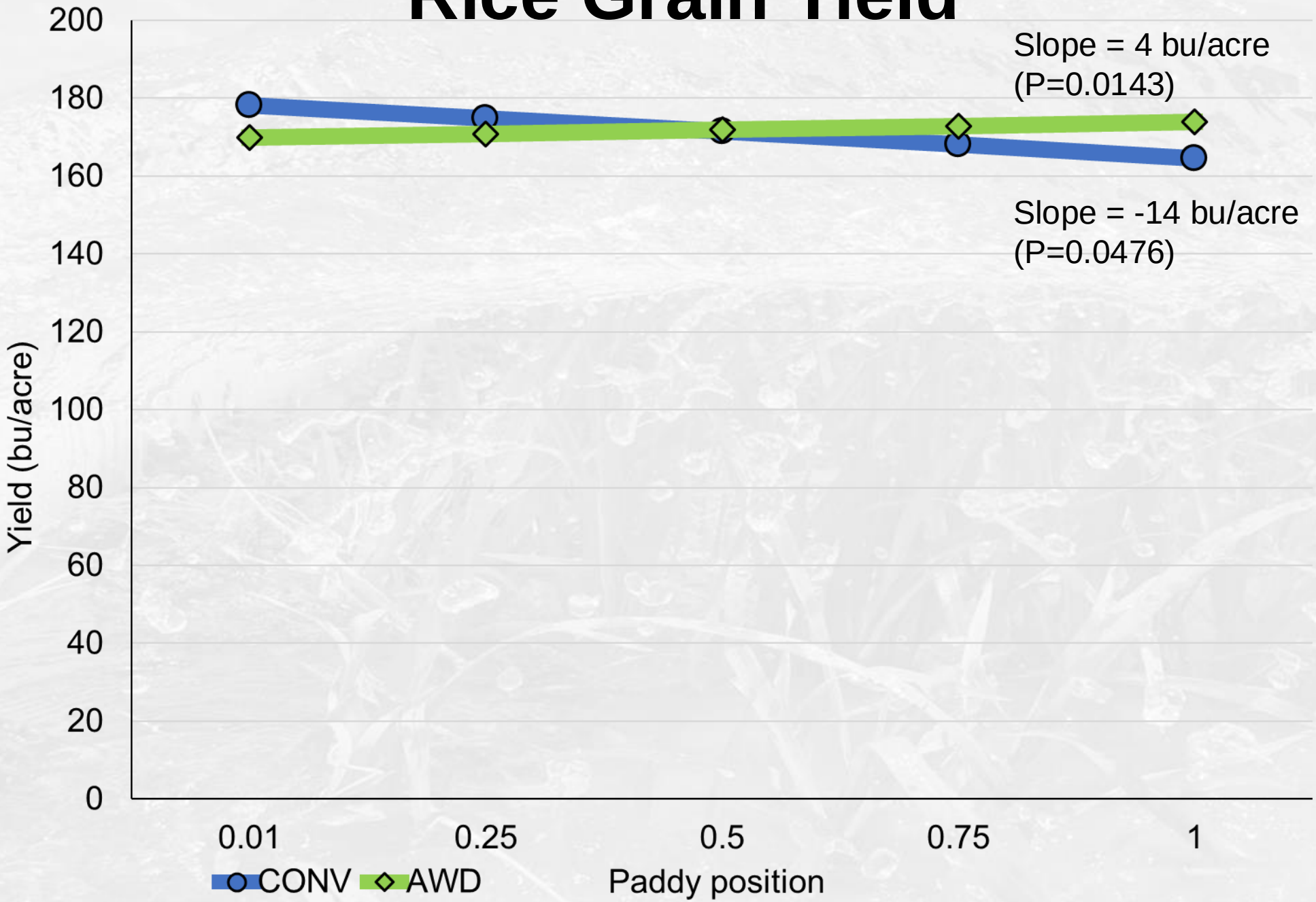


Photo Credit: Graham Oakley, 2023

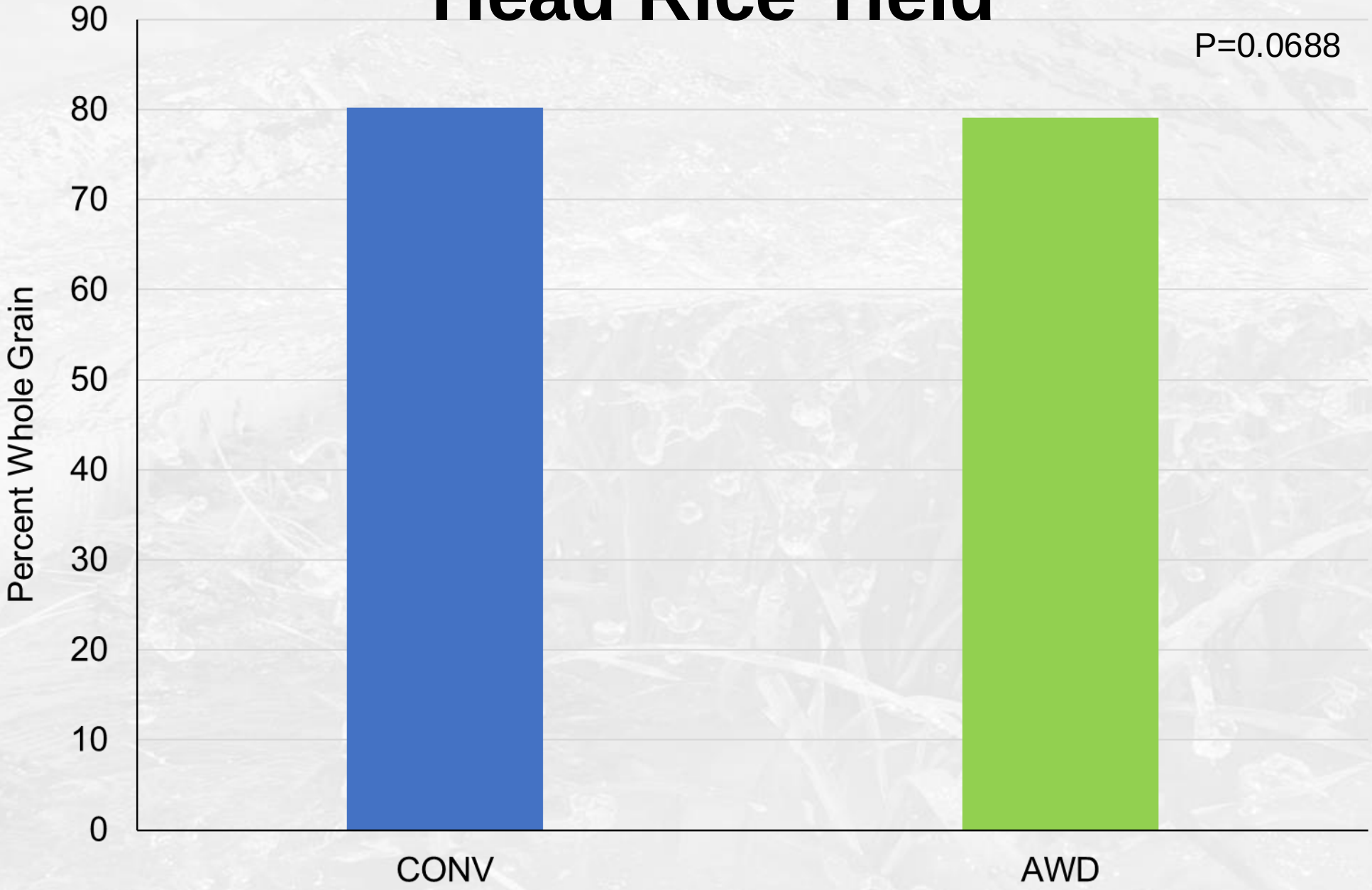
Water Applied



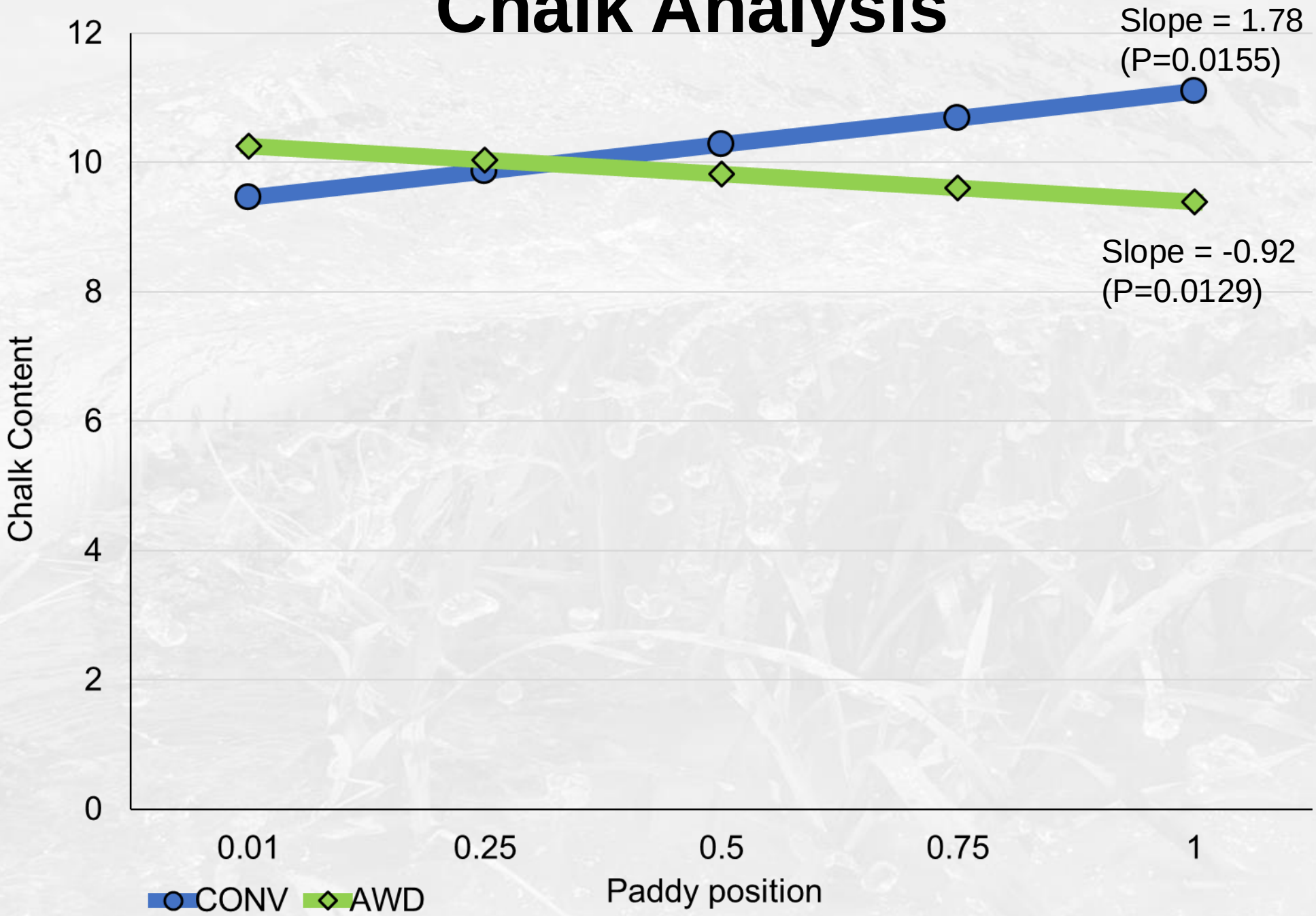
Rice Grain Yield



Head Rice Yield



Chalk Analysis



AWD maintained yield and grain quality; however did not reduce water used.

- Water Use
  - AWD was not different from Conventional Flood
- Grain Yield
  - No difference between AWD and Conventional Flood
- Percent Whole Grain
  - No difference between AWD and Conventional
- Chalk content
  - AWD decreased, Conv increased across field

Automating the AWD process is not immune from issues

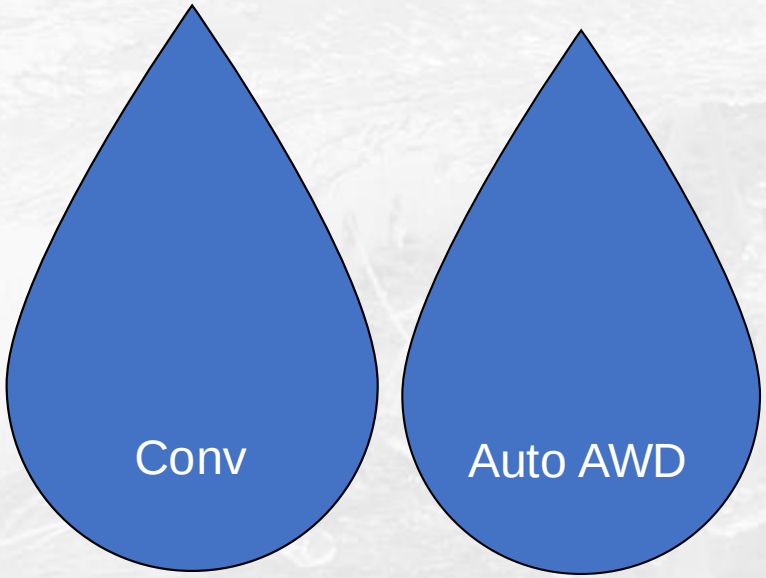
Photo Credit: Graham Oakley, 2024

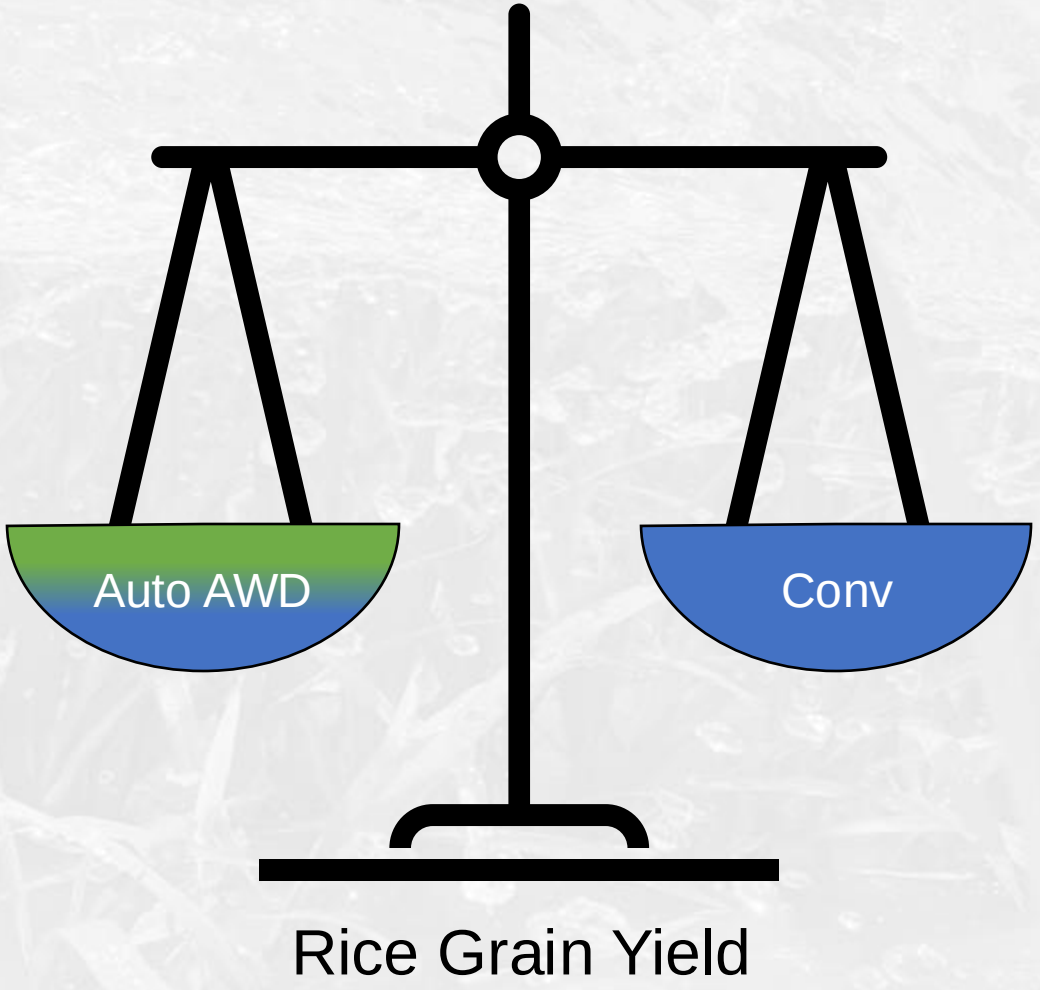
Future Research

- Continue experiment on large scale in MS & AR
- Determine economic viability of coupling automated, IoT-irrigation technologies with AWD water management for environments common to midsouth rice production

Photo Credit: Graham Oakley, 2024

Automating AWD maintains rice grain yield and uses similar volume of irrigation water.





Graham Oakley
MWRRI
graham.oakley@msstate.edu