

# **Applications of remote sensing and crop modeling in high-throughput plant phenotyping and climate-resilient cropping systems**

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# Motivation

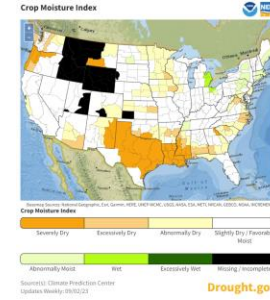
## Major issues & challenges



Water limitation & Ogallala Aquifer



Cotton dominated cropping system



Climate change-rainfall, temperature

## How to solve ???



Water recharge



Natural/fallowing

+



Irrigation



Cultivar, inputs



Cropping system

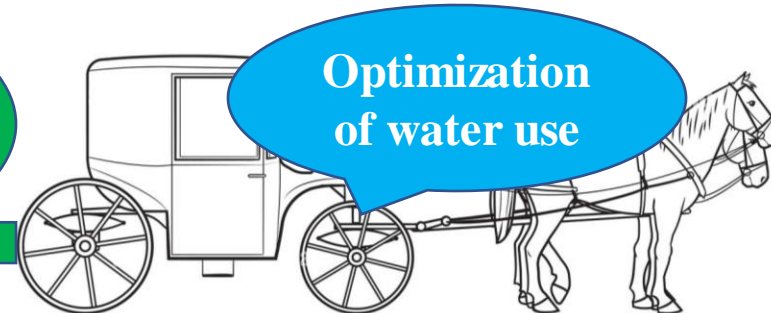
Natural ways

Adaptation strategies

## Research design

Adoption of climate resilient cropping system

Optimization of water use



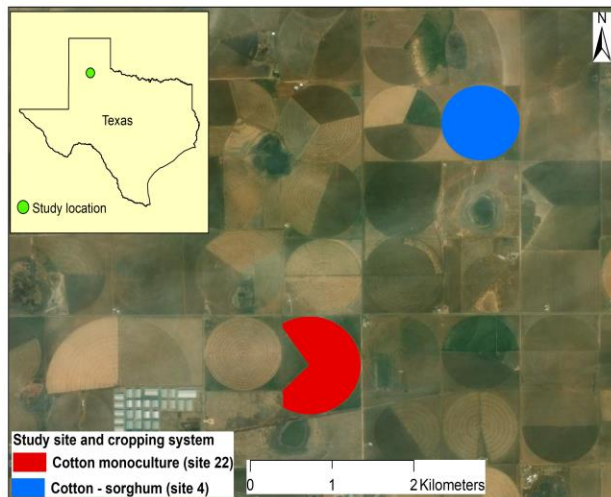
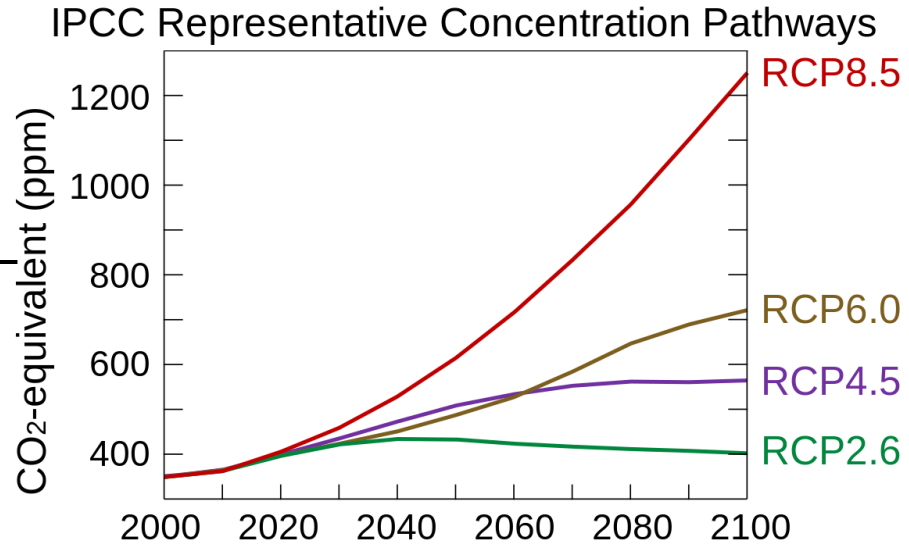
The overall goal of my research is to identify and assess sustainable and profitable climate resilient cropping system using crop model and precision agriculture technology

## 1. Identification and assessment of climate resilient cropping system

- ✓ Cotton monoculture
- ✓ Cotton fallow
- ✓ Cotton corn
- ✓ Cotton sorghum
- ✓ Cotton wheat

Testing different climate change scenario

Output – WUE, amount of water used and yield



Key message:

- ✓ Tested only two cropping system (cotton monoculture and cotton sorghum rotation , cotton sorghum rotation has increased yield with higher WUE than cotton monoculture (2011-2015)

## *2. Predicting within-field cotton yield variability using DSSAT for decision support in precision agriculture*

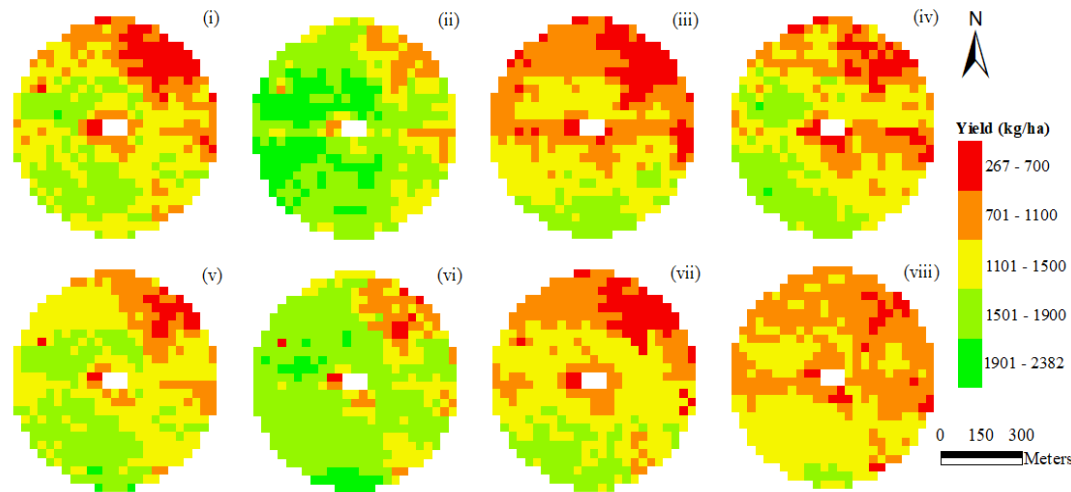


Fig. Spatiotemporal variations in cotton yield near Olton county, Texas (top row: measured, bottom row: simulated cotton yield in 2000, 2001, 2002, and 2003)

### **Key message:**

- ✓ Water holding capacity of soil is major spatial yield variability creating factor.
- ✓ Optimize water using site specific irrigation management

### *3. High-throughput cotton maturity phenotyping using unmanned aerial systems*



Key message:

- ✓ Helps to distinguish the maturity group (Early, mid and late) of cotton in hundredths of breeding lines efficiently