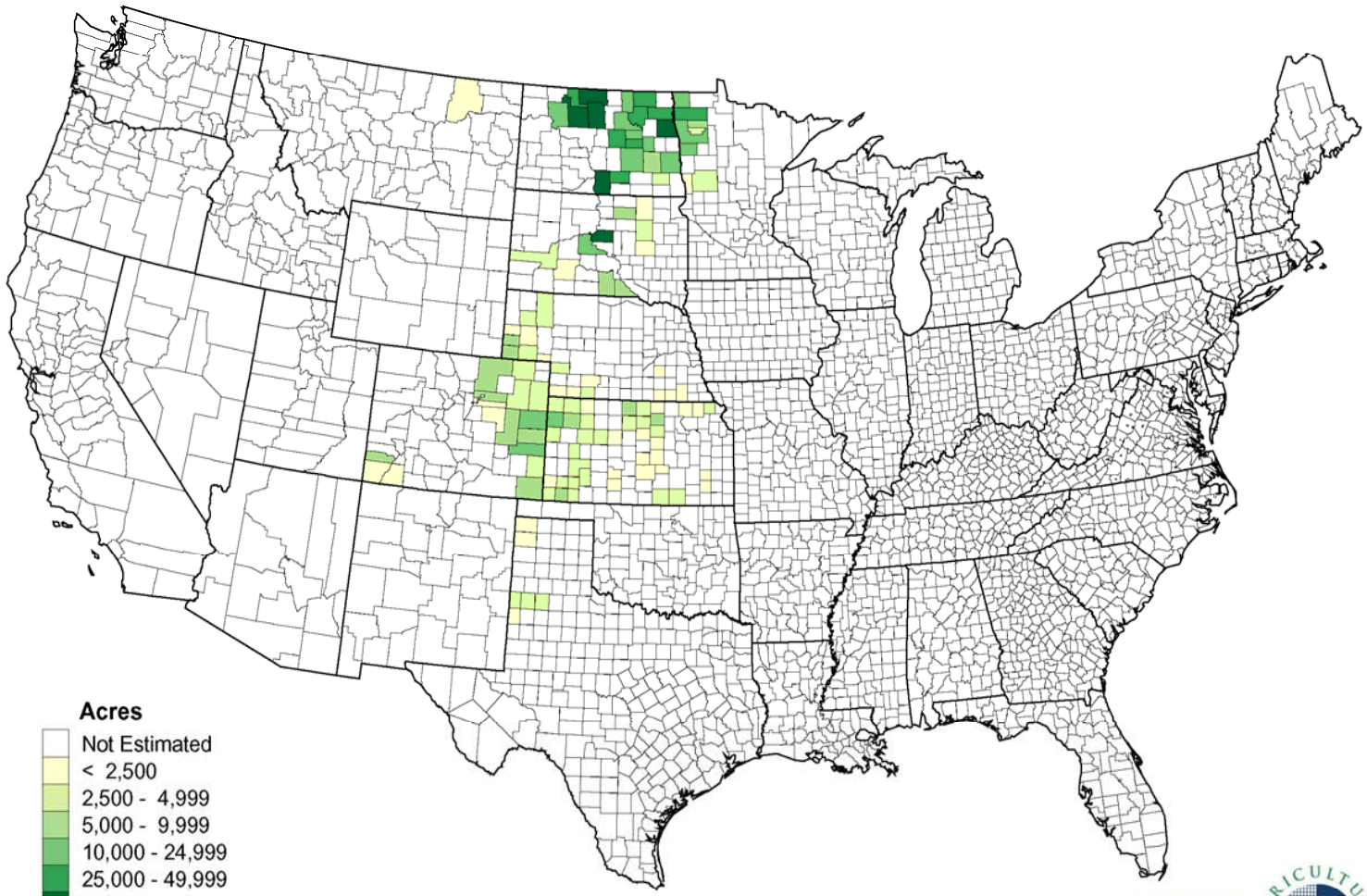
Sunflower canopy and yield formation with deficit irrigation in U.S. central High Plains

Rob Aiken and Freddie Lamm,

Northwest Research—Extension Center

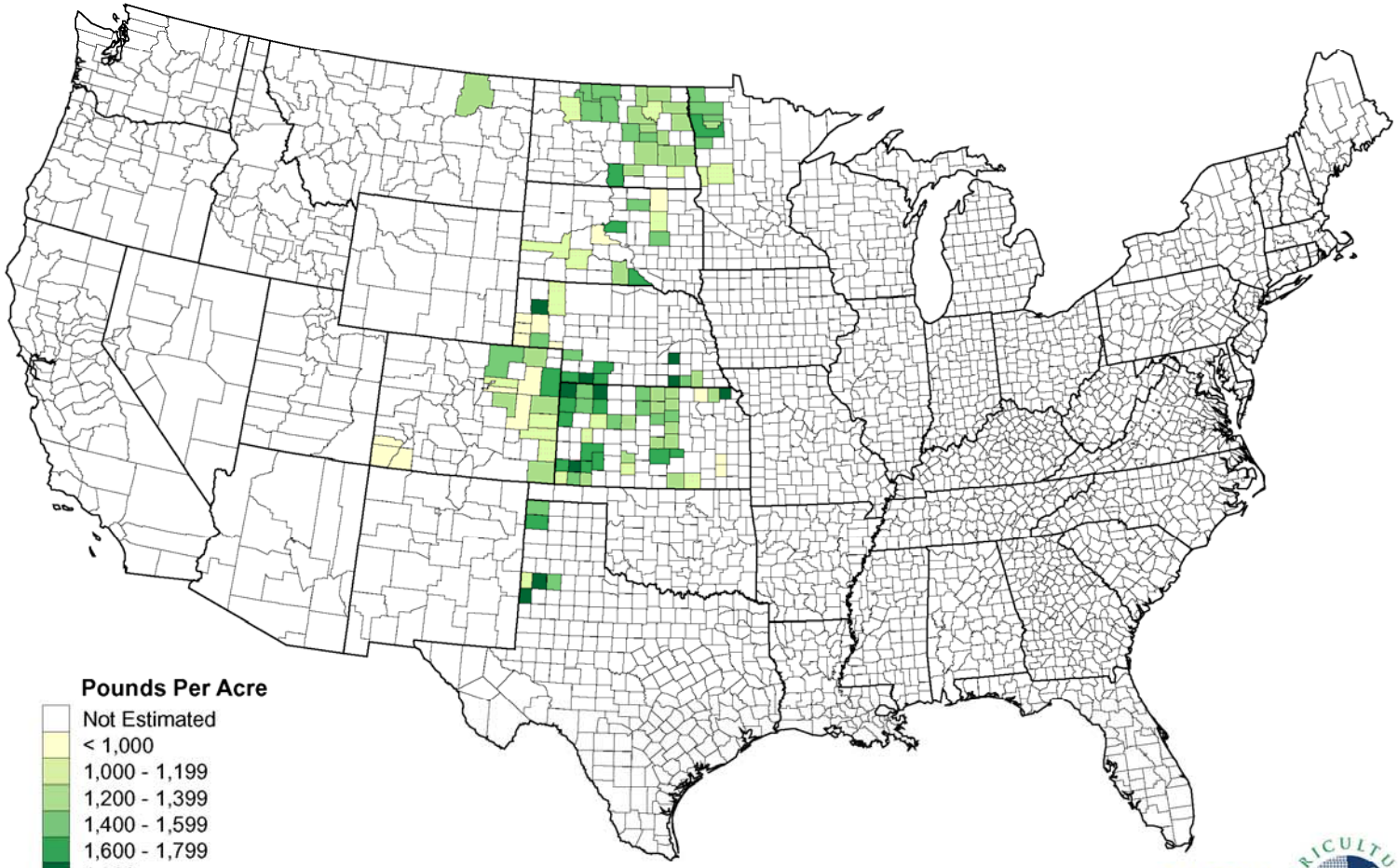
Sunflower 2007
Planted Acres by County
for Selected States



U.S. Department of Agriculture, National Agricultural Statistics Service

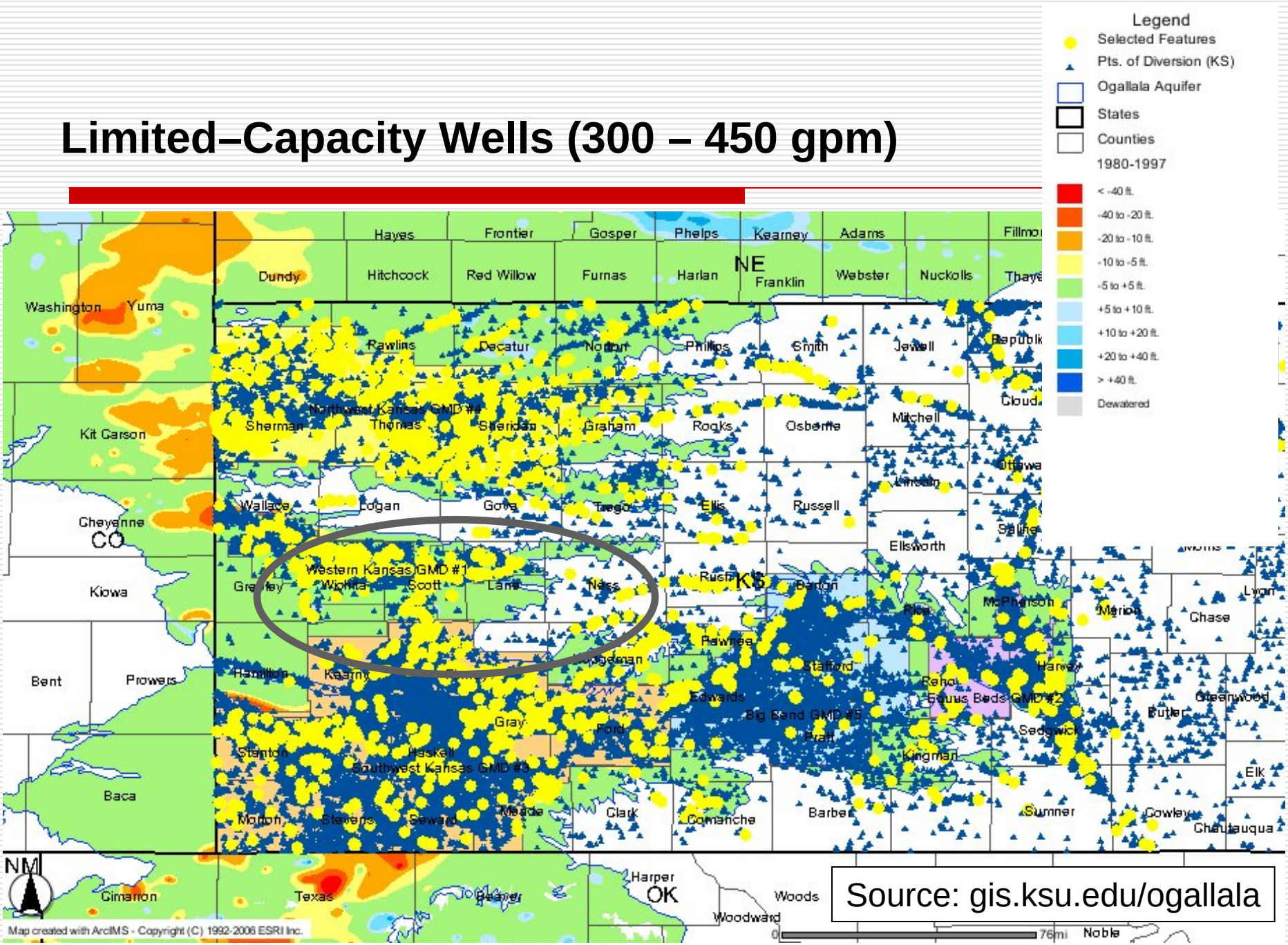
USDA AGRICULTURE COUNTS NASS

Sunflower 2007
Yield Per Harvested Acre by County
for Selected States



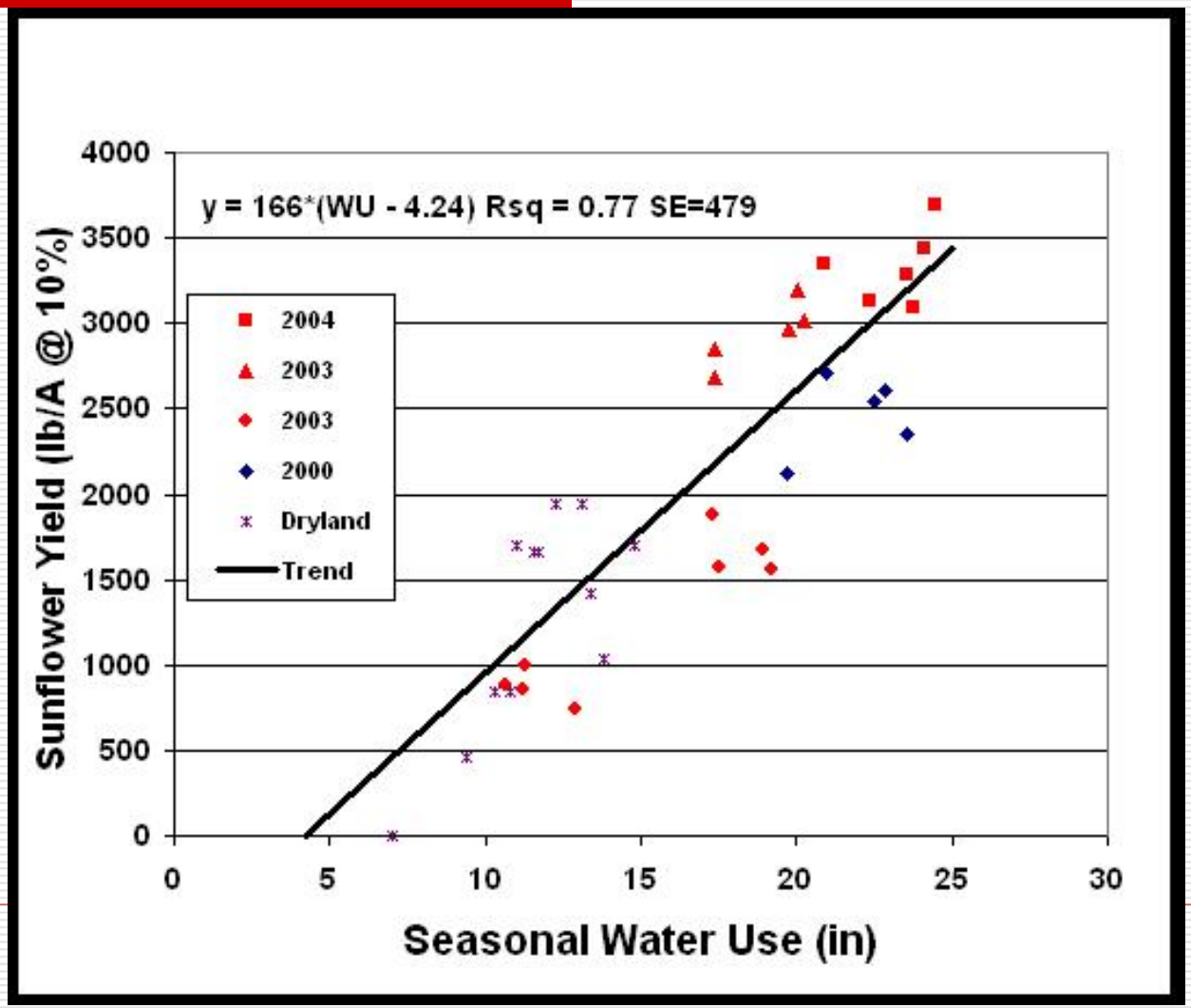
U.S. Department of Agriculture, National Agricultural Statistics Service

Limited–Capacity Wells (300 – 450 gpm)

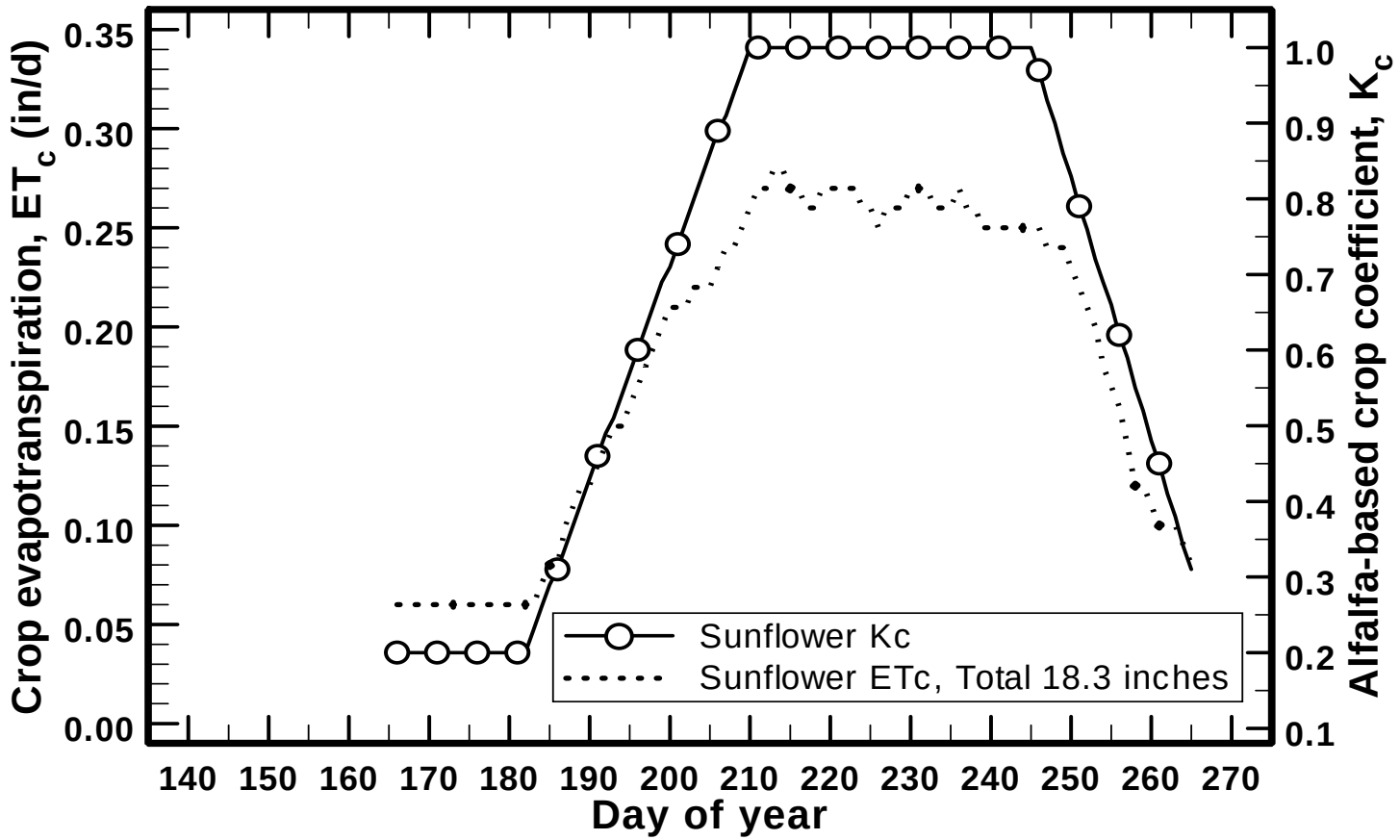


Source: gis.ksu.edu/ogallala

Sunflower yield response to water



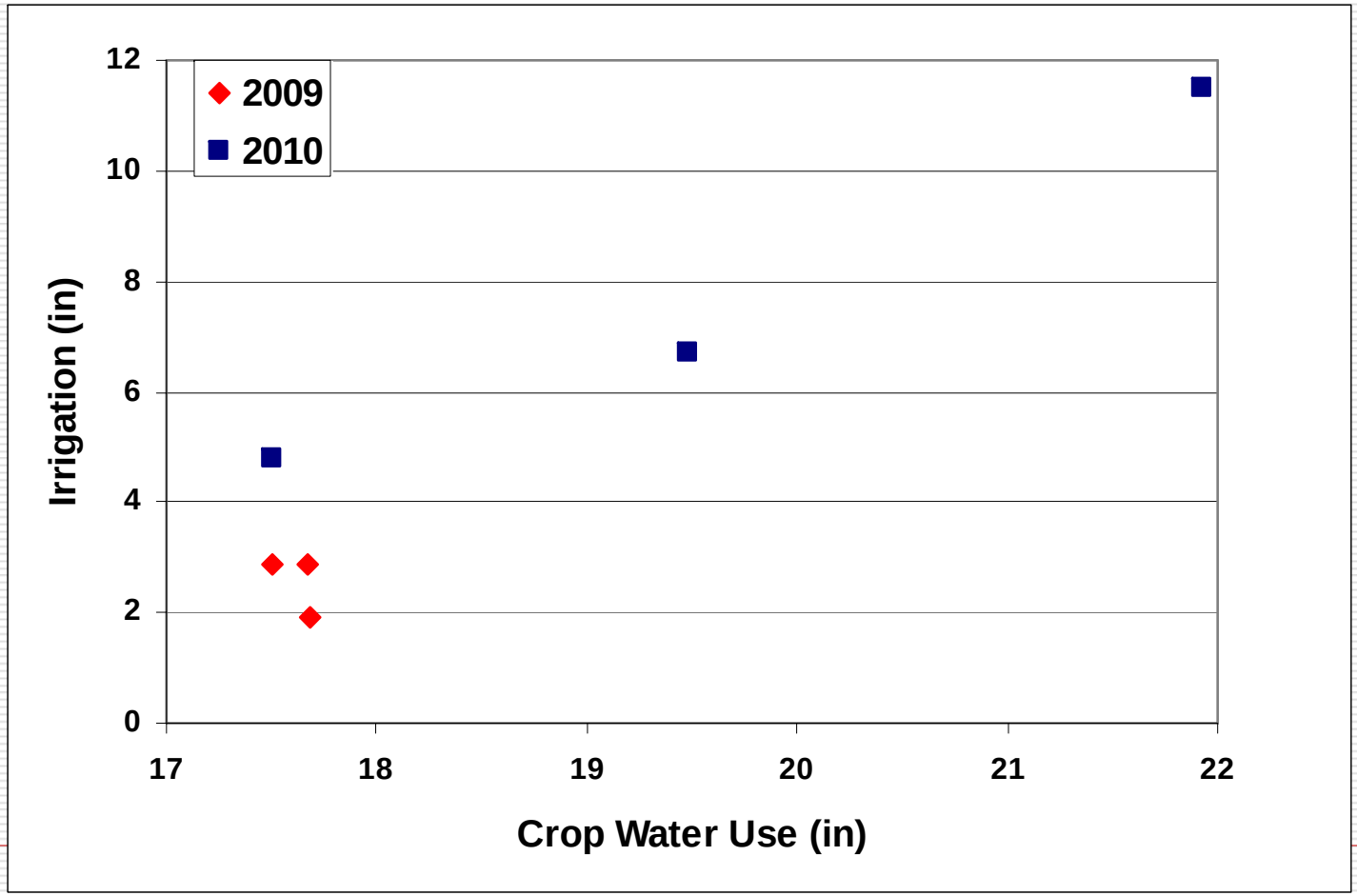
Sunflower water use



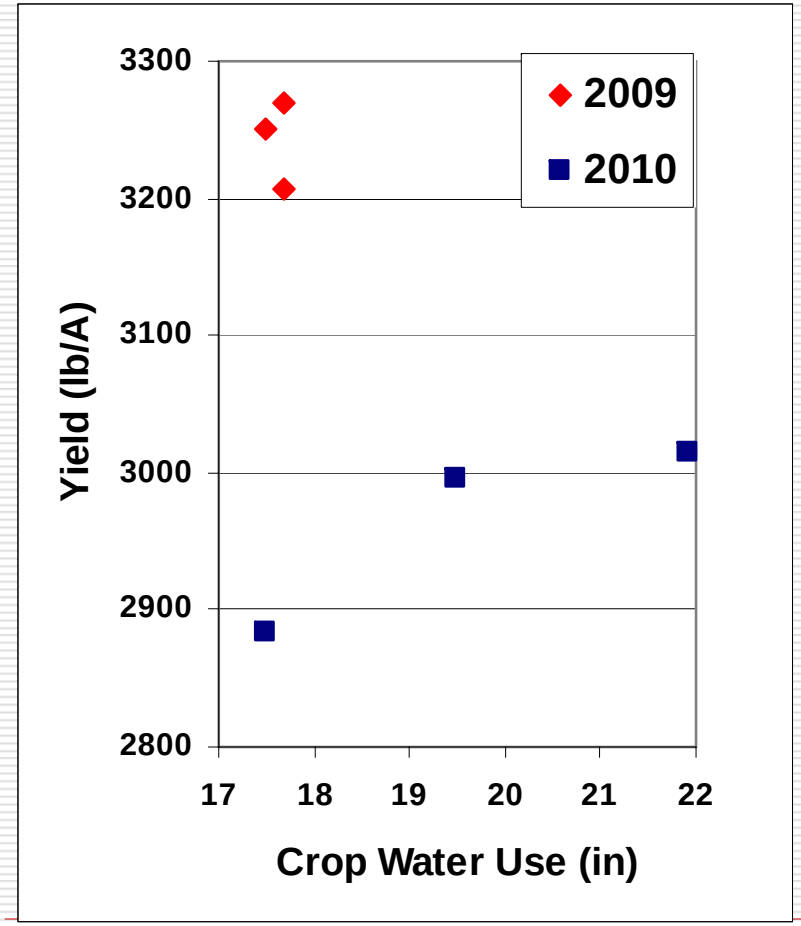
Deficit Irrigation Study

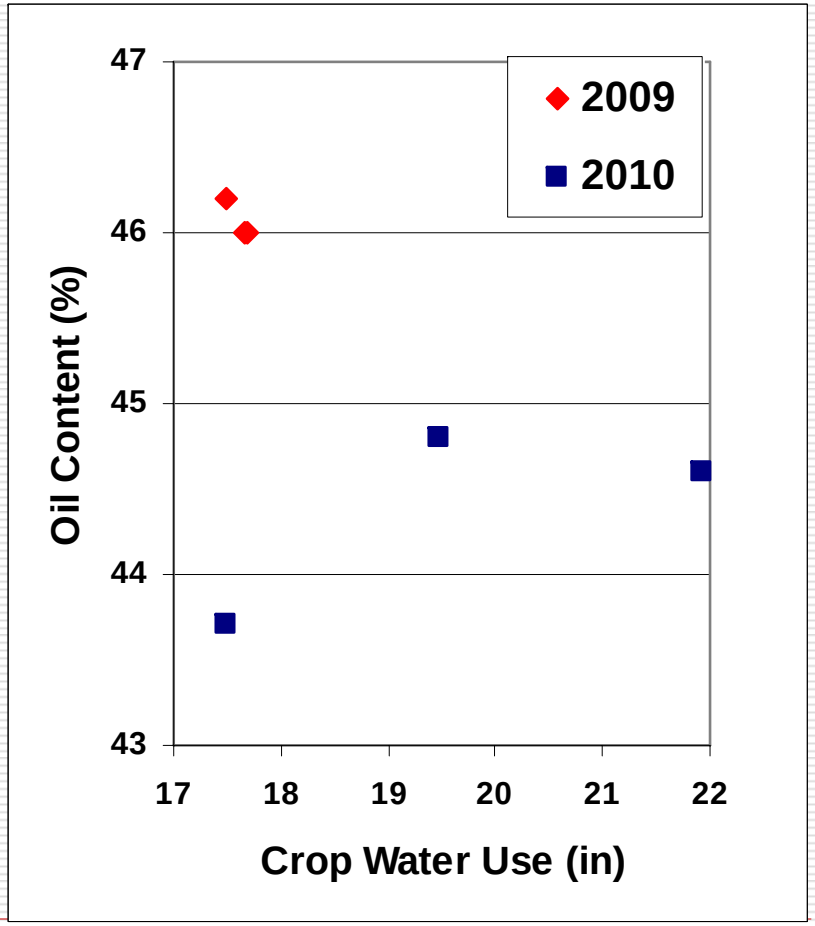
- Pre-season
  - 0”, 5”
- Start
  - 6/1, 6/15
- Irrigation Capacity
  - 1”/4 days
  - 1”/8 days
  - 1”/12 days
- Population
  - 18K, 23K, 28K
- Irrigation schedule to replace crop ET
- Triumph S671
- June 18 planting
- Fertility to supplement 3000 lb/A yield goal
- Excellent pre-emergent weed control

Irrigation Capacity and Water Use

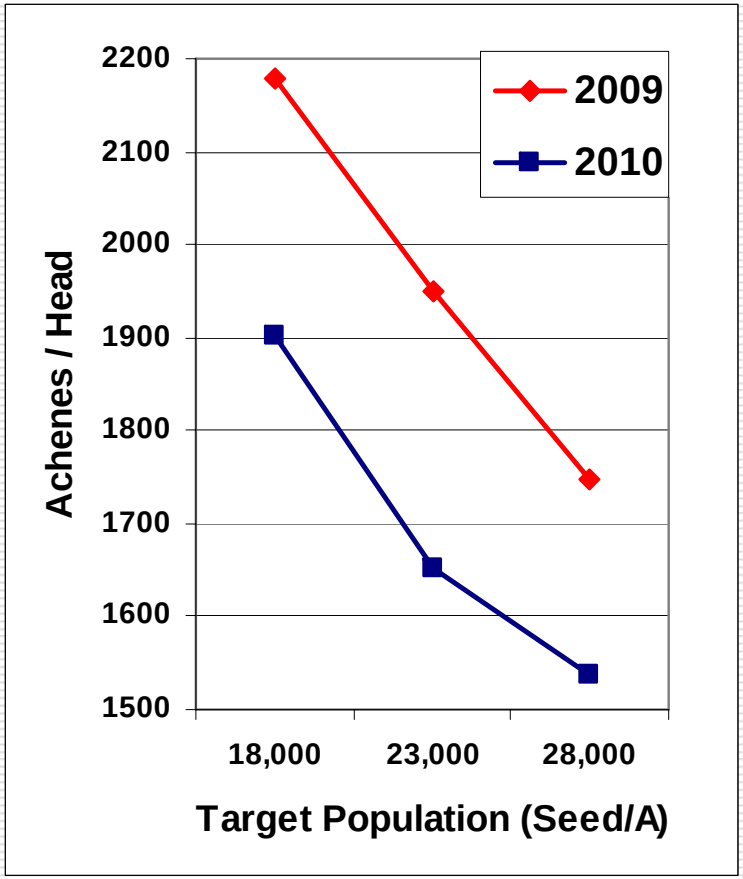


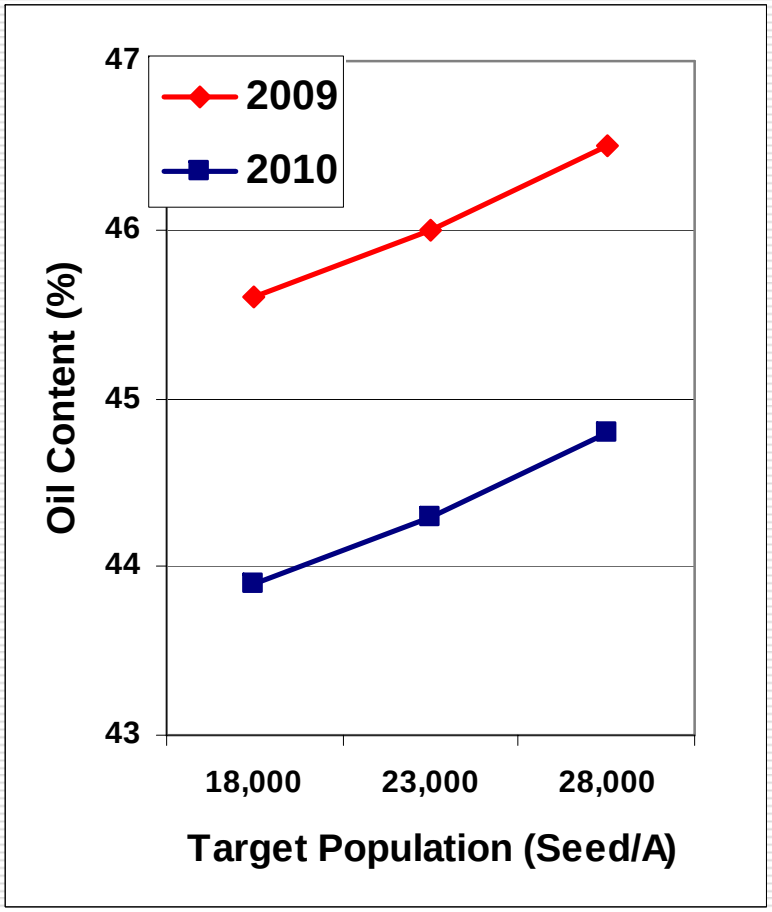
Irrigation Capacity and Oilseed Yield



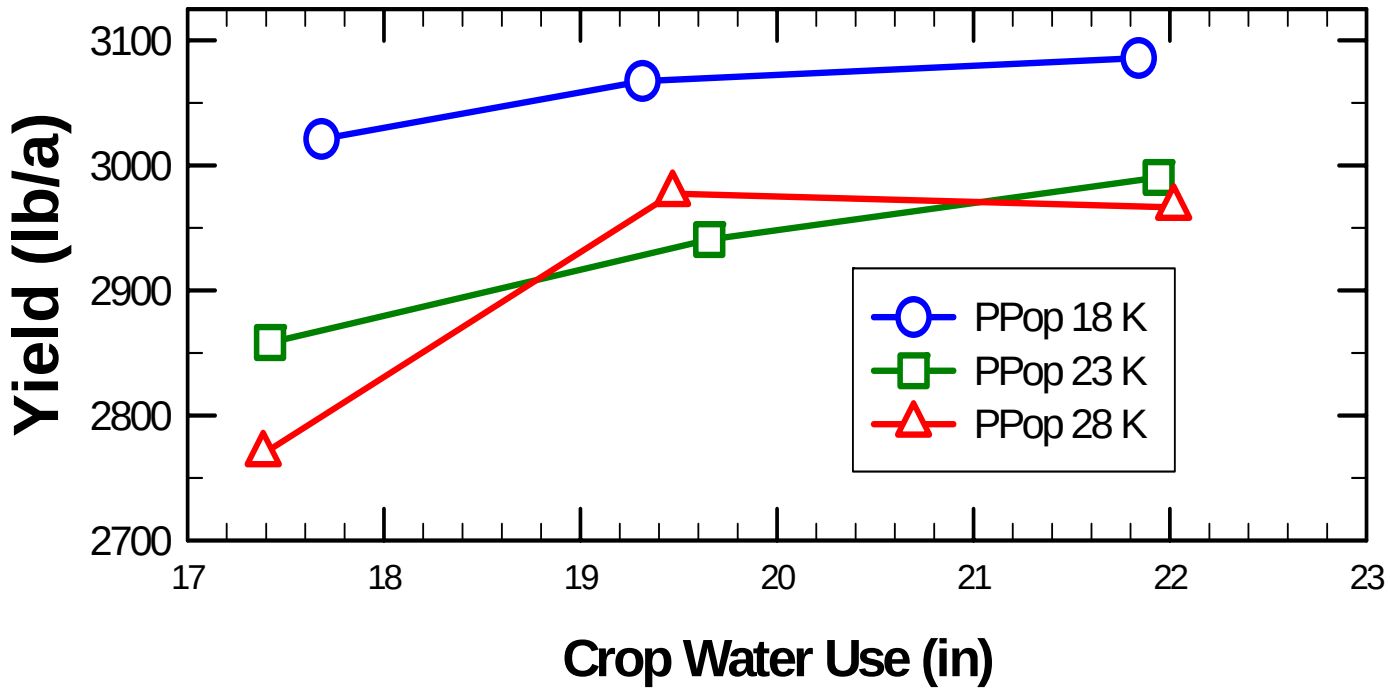


Population and Yield Components

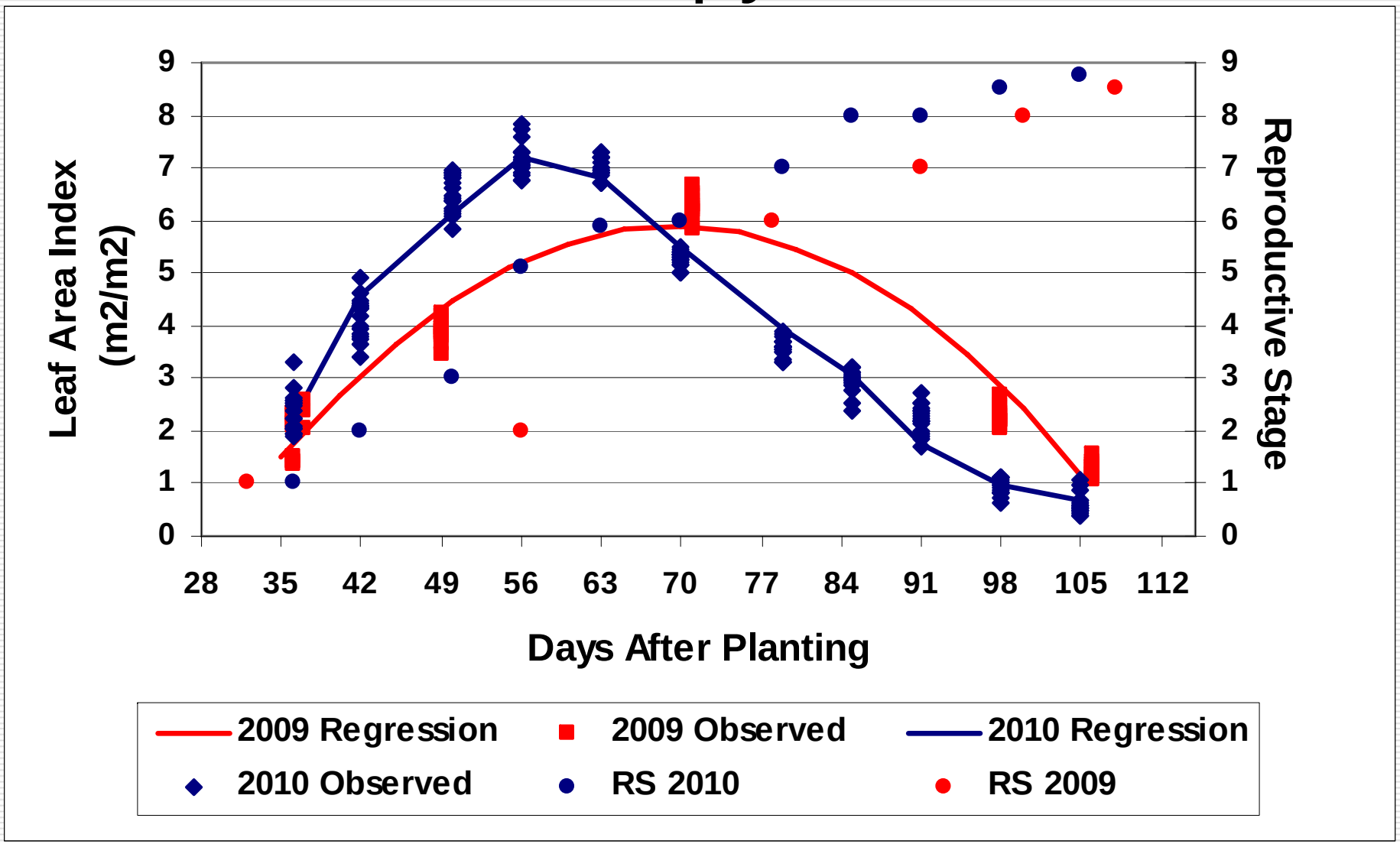




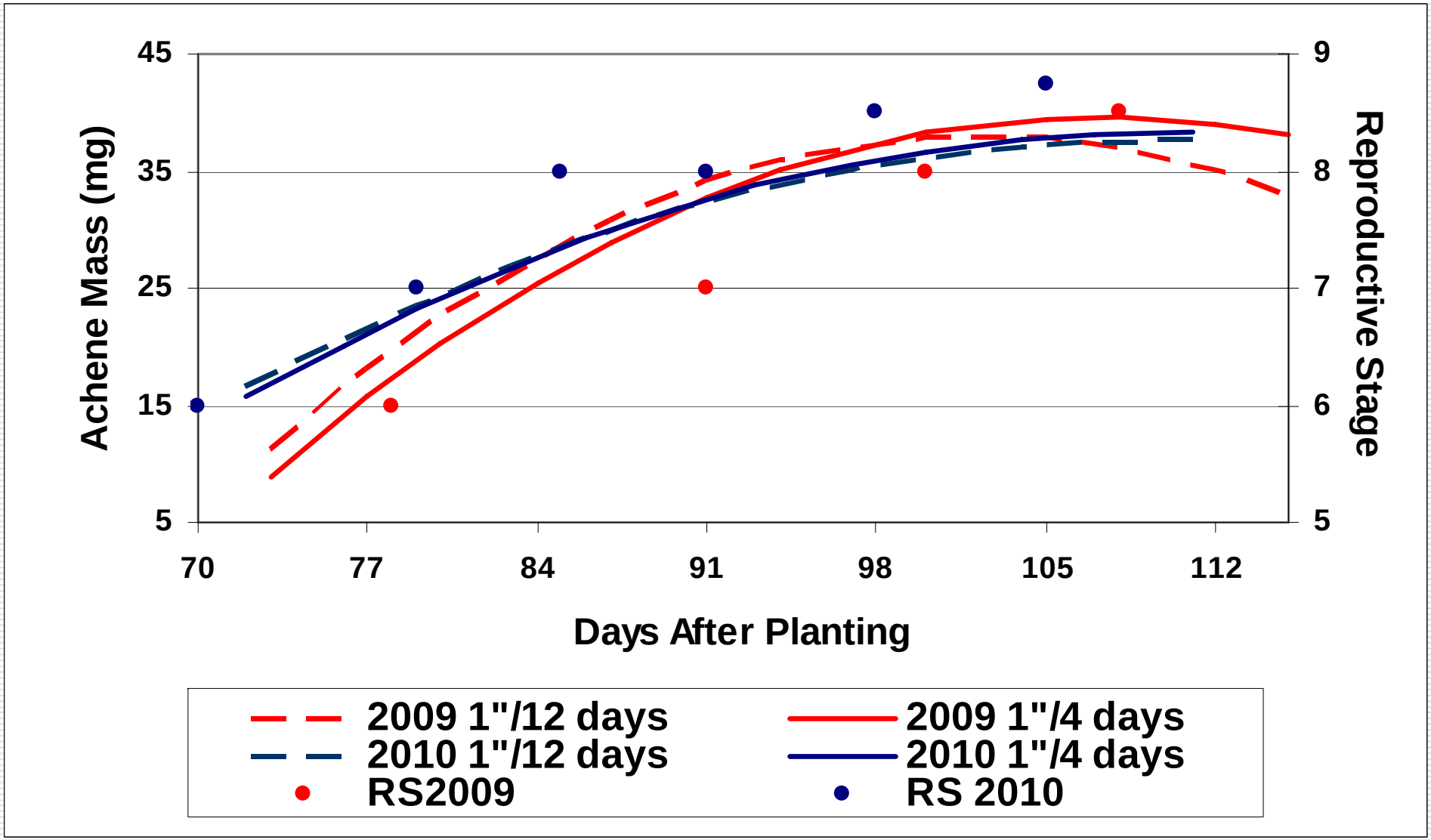
Population and Water Productivity



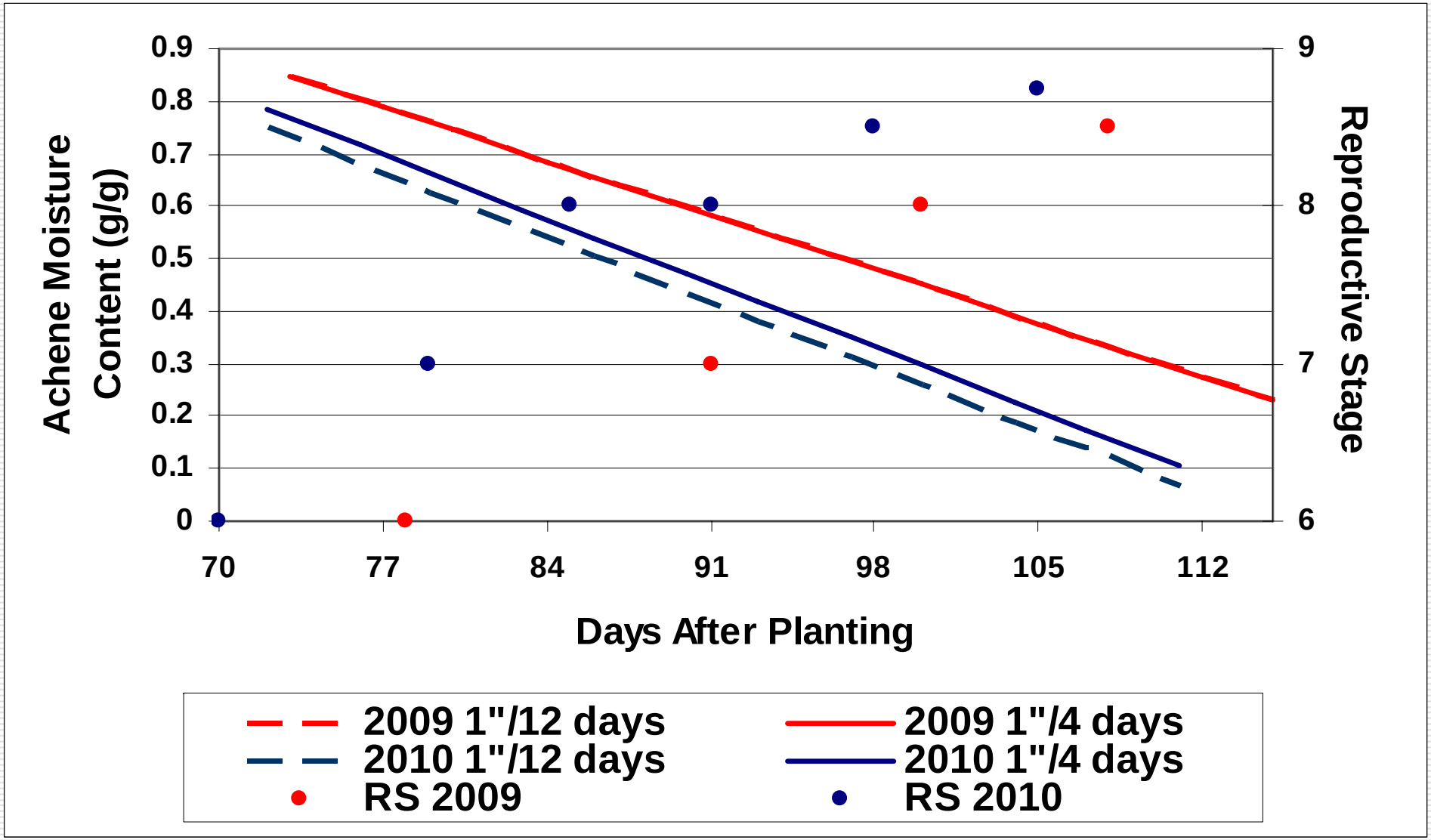
Sunflower Canopy Formation



Achene Fill Rate



Achene Moisture Content



Summary

- Good productivity (2900 – 3200 lb/A) with moderate water use (17.5” – 20”)
- Oil % increased with available water, cooler growing conditions, increased planting rate
- Canopy near-maximum during flowering, incomplete during late seed fill (R8)
- Seed fill rate of 0.9 – 1.2 mg/day during R6 – R8 reproductive stages, with linear decline in seed moisture

Acknowledgement

This research was funded by

- National Sunflower Association
- Kansas Agricultural Experiment Station
- Ogallala Aquifer Program,
  a consortium among USDA-Agricultural Research Service, Kansas State University, Texas AgriLife Research, Texas AgriLife Extension Service, Texas Tech University, and West Texas A&M University.