Agricultural Outlook Forum
U.S. Department of Agriculture

Presented: February 23-24, 2012

Adapting to Increasing Variability: Climate Change and Agriculture

Jerry Hatfield

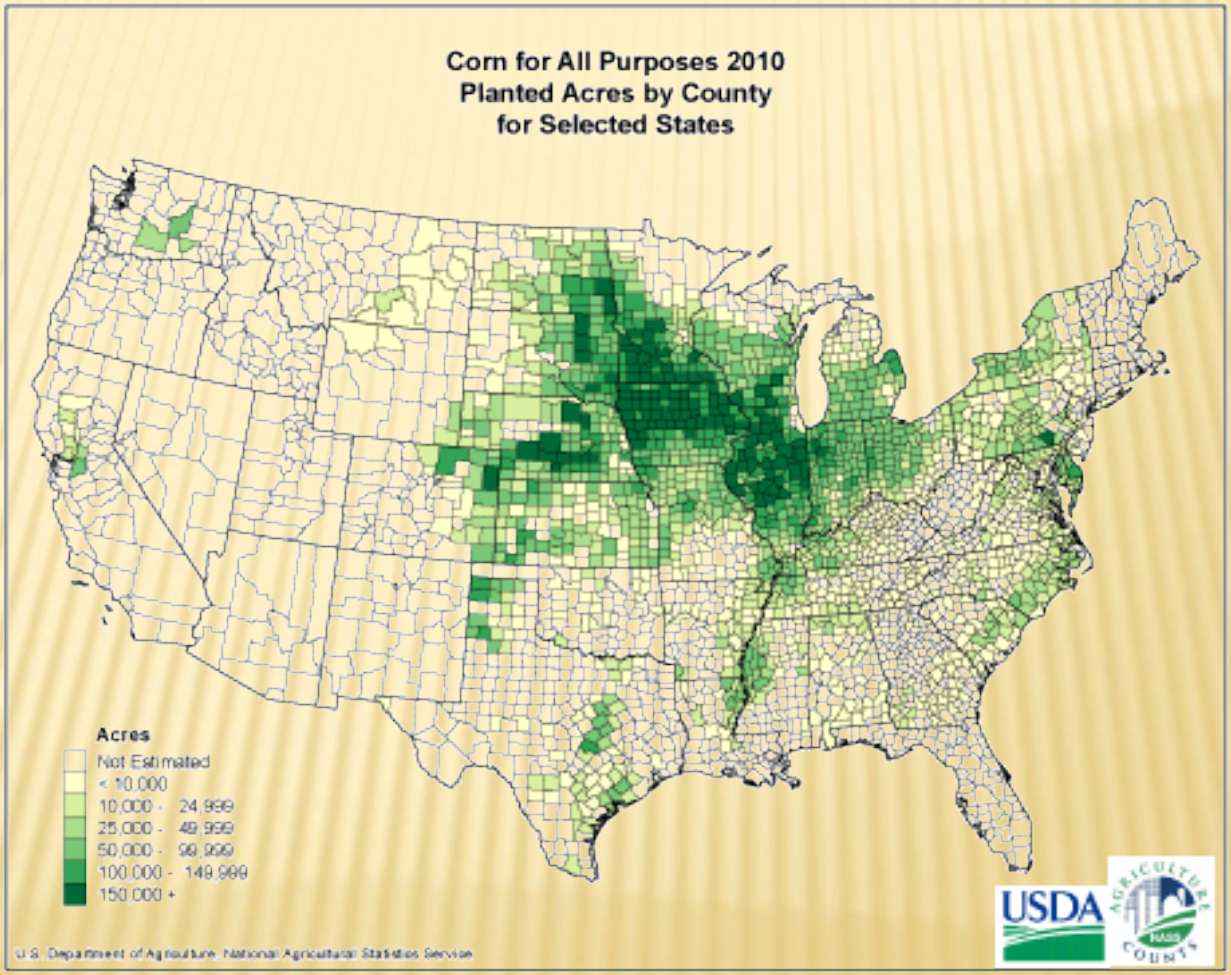
Adapting to Increasing Variability

CLIMATE CHANGE AND AGRICULTURE

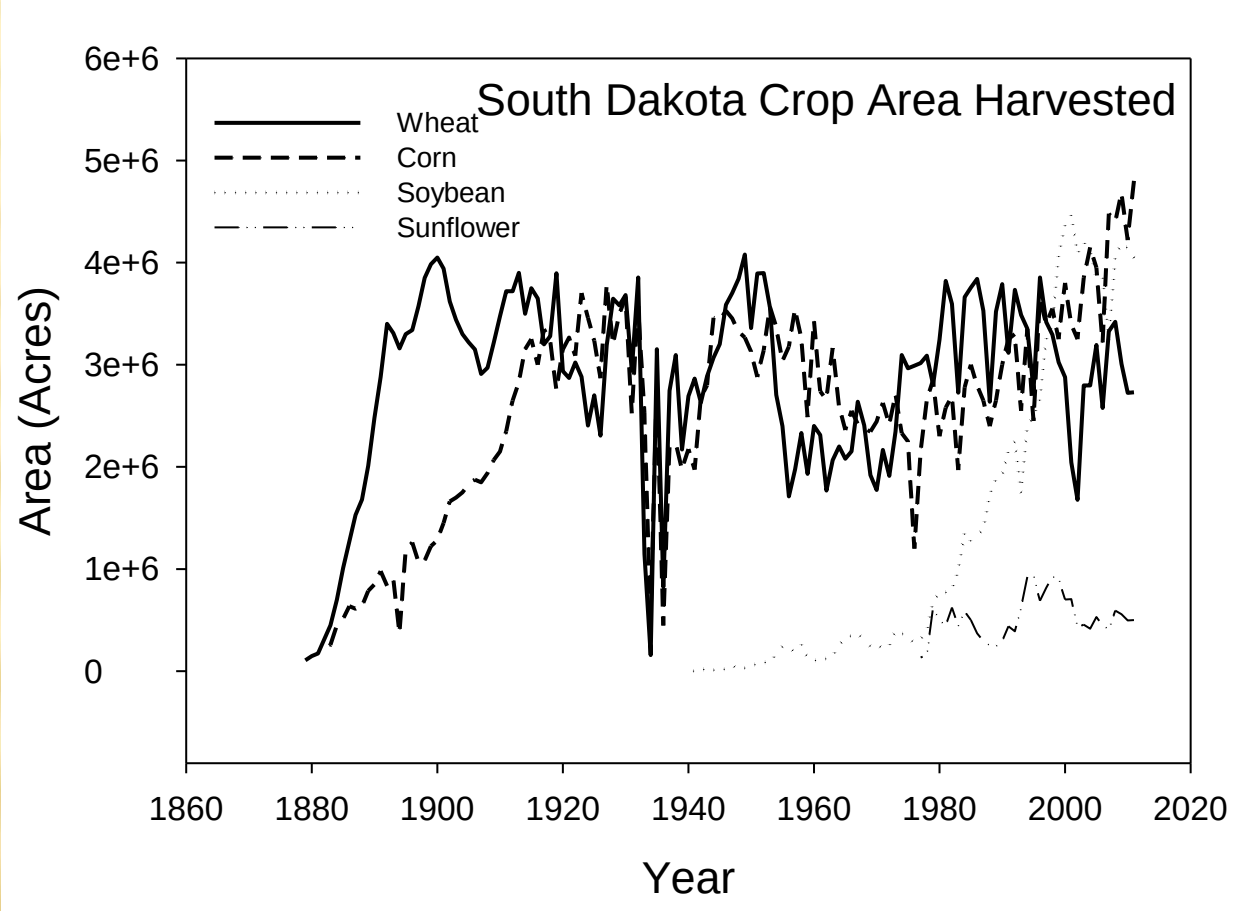
AGRICULTURAL ADAPTATION

- Longer season cultivars
- Supply irrigation water
- Drain soil to reduce water logging
- Larger planting equipment
- Modify housing for animals
- Provide alternative water sources for animals
- Perennial crops-modify pruning, fruit load
- Specialty crops- modify environment to protect against extremes (temperature, wind)

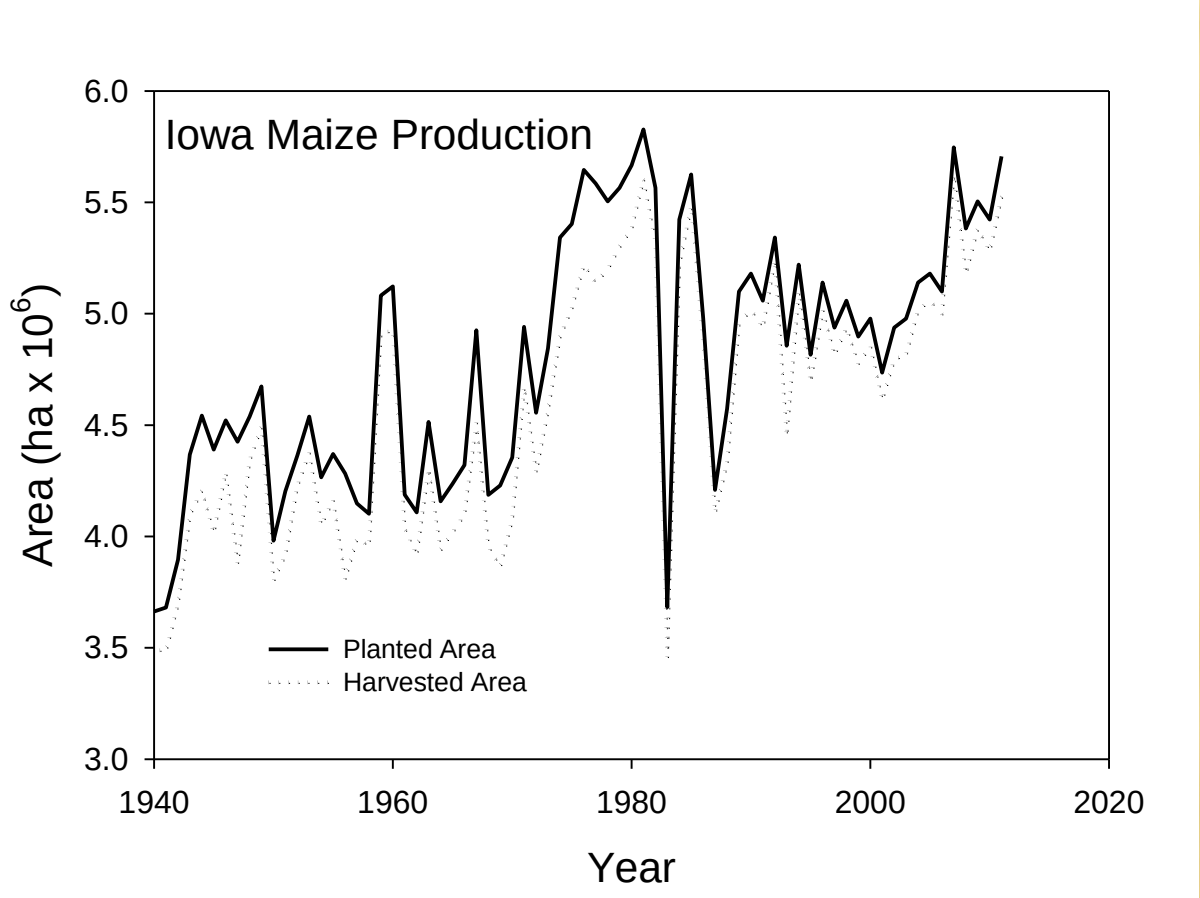
US CORN PRODUCTION



SOUTH DAKOTA CROP DISTRIBUTION

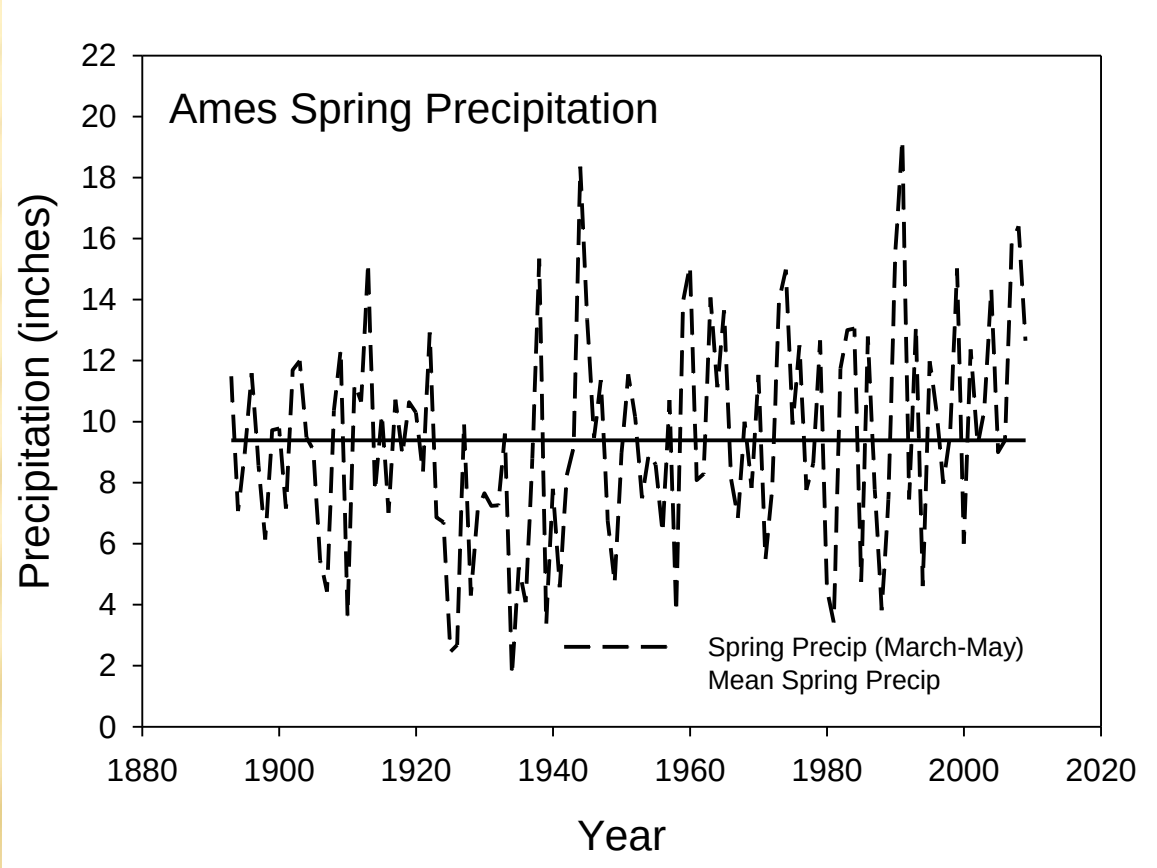


IMPROVED AGRONOMIC SYSTEMS

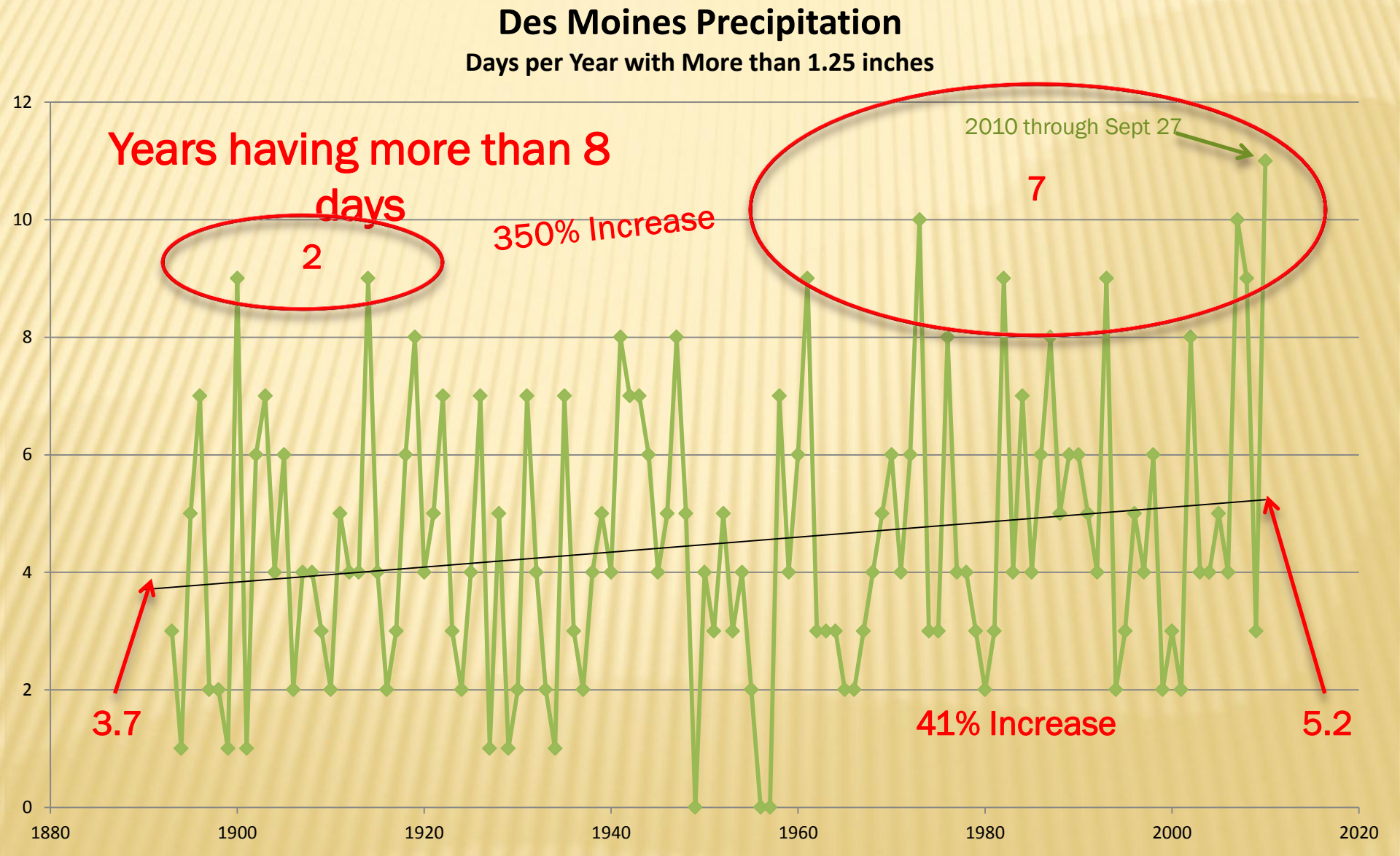


SOIL EROSION

SPRING PRECIPITATION (AMES)

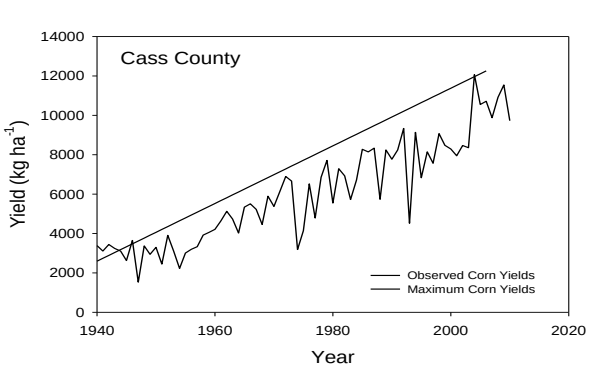


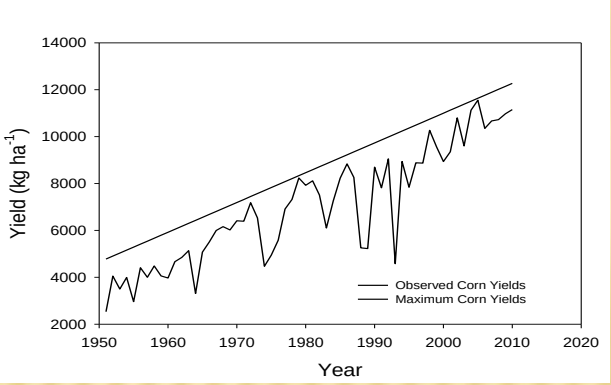
INCREASED SUBSURFACE DRAINAGE

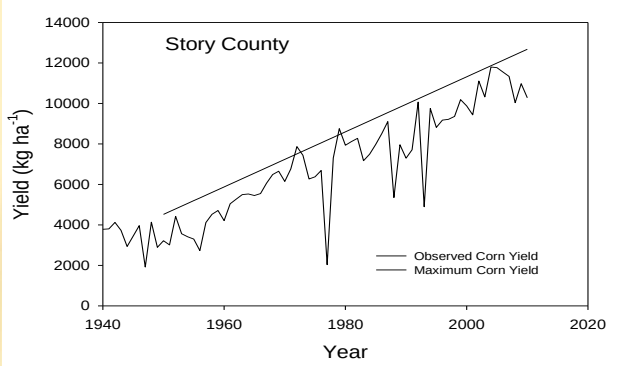

Des Moines Precipitation
Days per Year with More than 1.25 inches
Years having more than 8 days
2
350% Increase
2010 through Sept 27
7
3.7
41% Increase
5.2
12
10
8
6
4
2
0
1880
1900
1920
1940
1960
1980
2000
2020

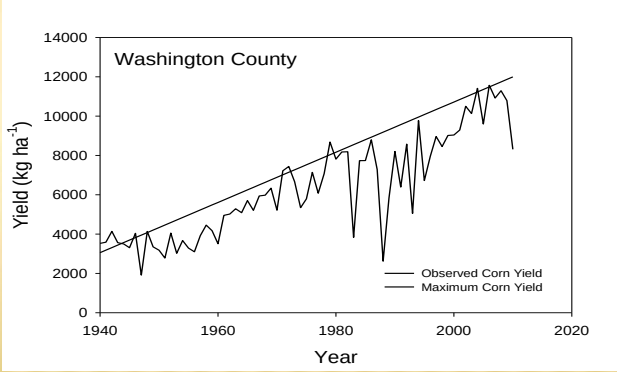
CONSERVATION TILLAGE

IOWA COUNTY YIELDS

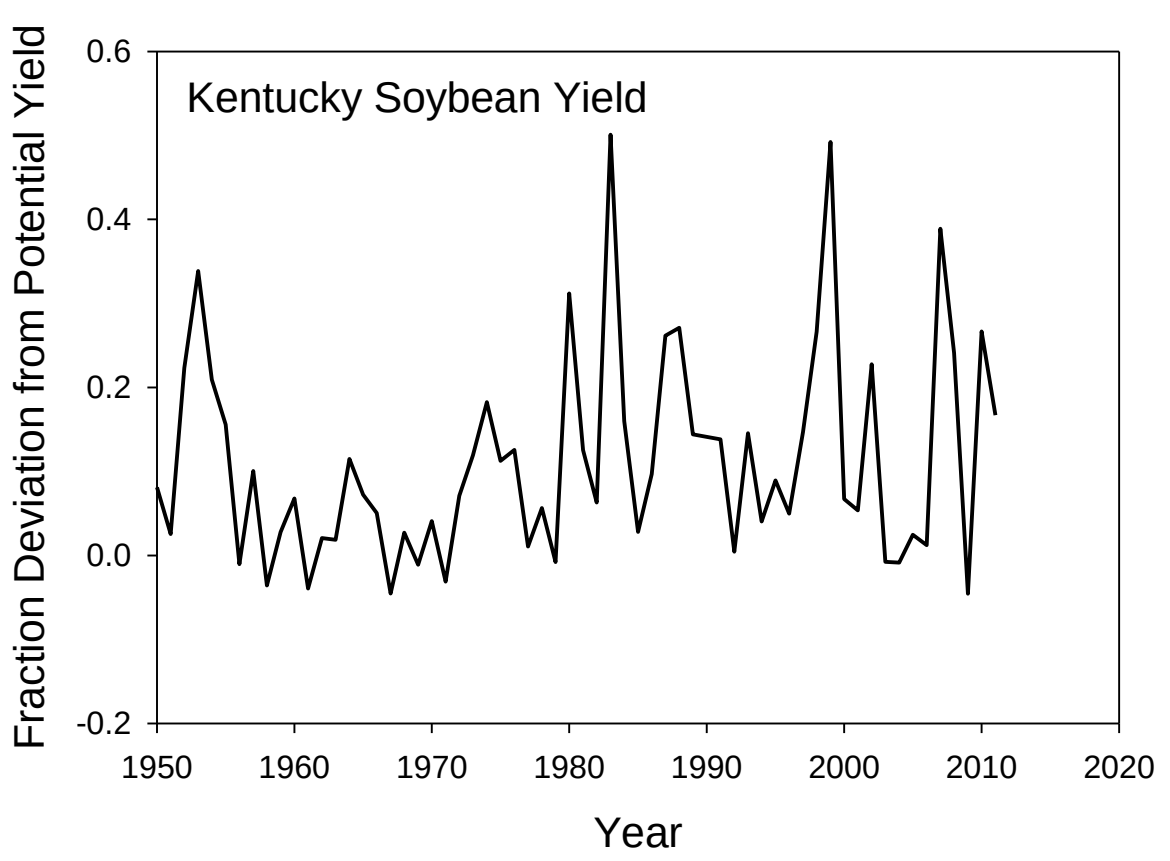




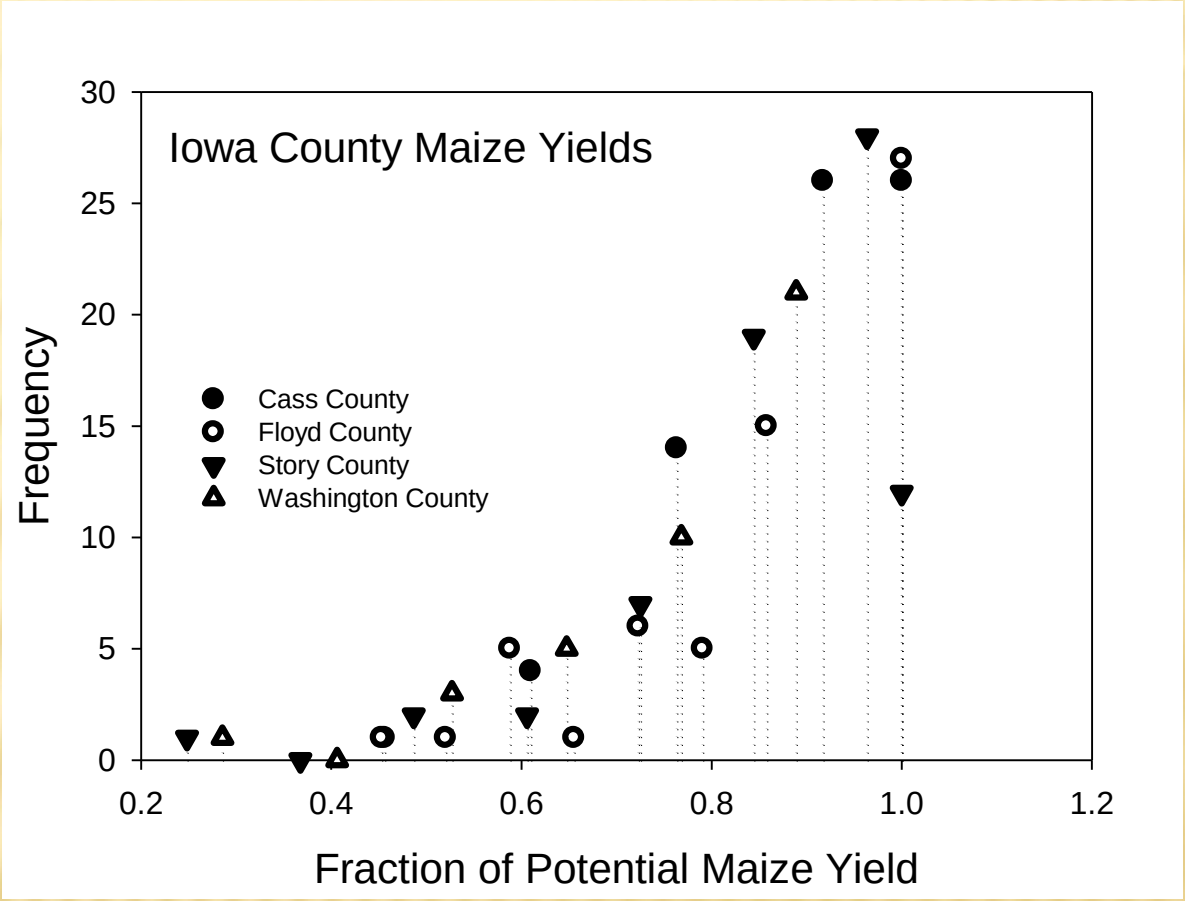




SOYBEAN YIELD DEVIATIONS



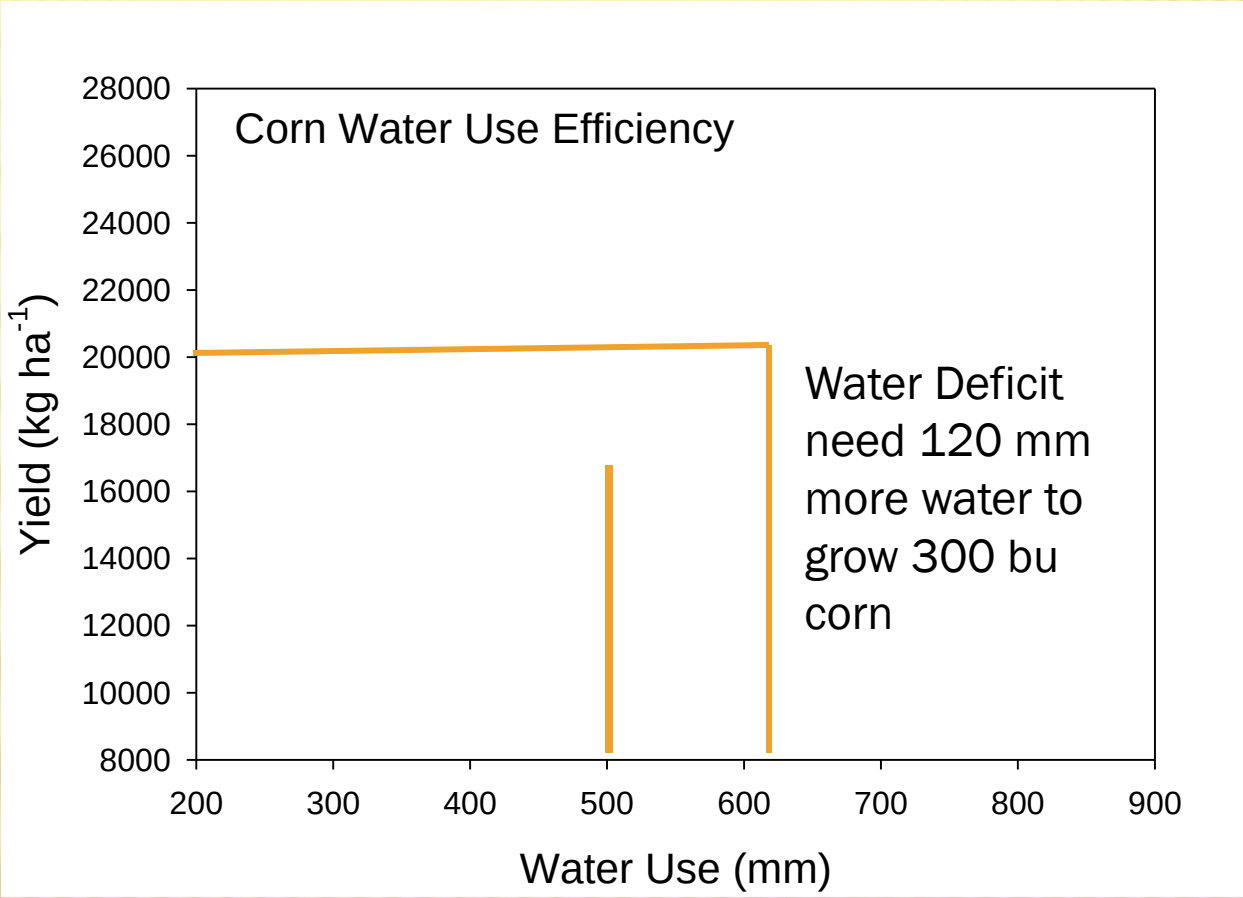
VARIATION IN YIELDS



The majority of the yield losses due to the weather are short-term stresses

IRRIGATION

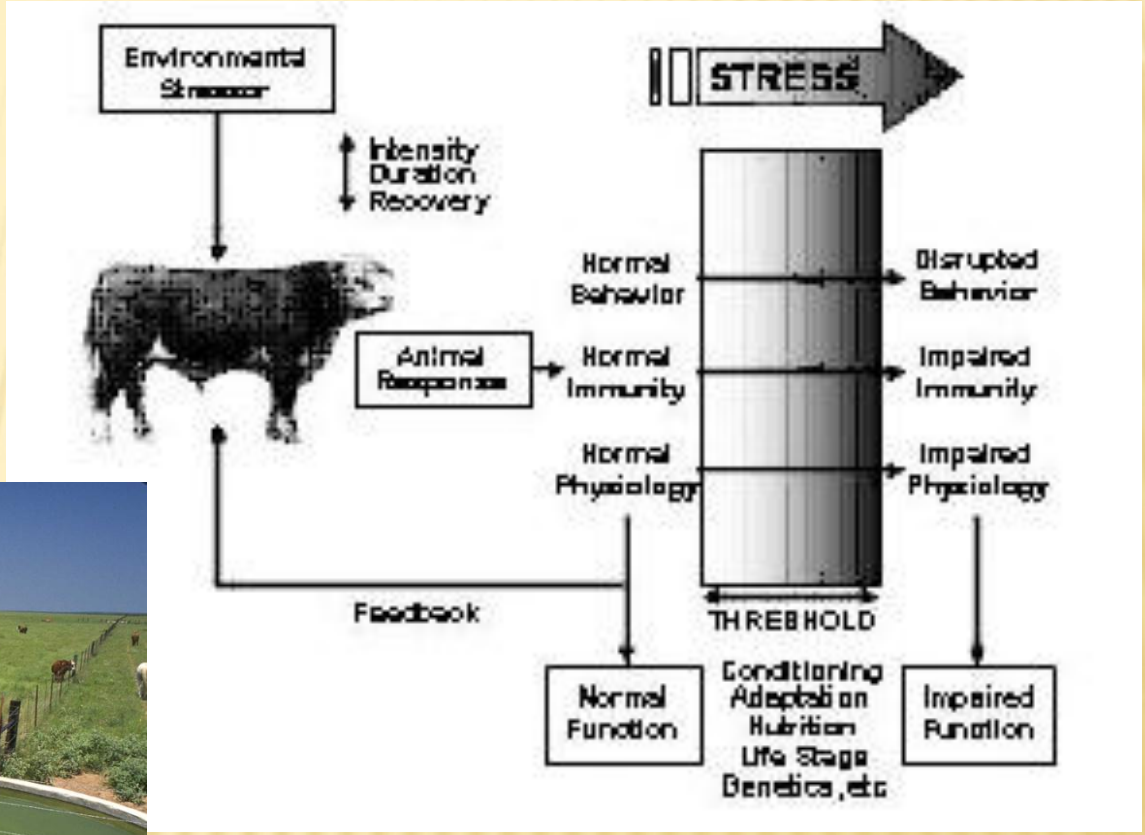
WATER REQUIREMENTS



ADAPTATION STRATEGIES

- Role of proper soil management has been overlooked as a reservoir of water to meet plant needs
- Adaptive strategies will have to ensure that soil is a foundational piece of the process

TEMPERATURE RESPONSE IN ANIMALS



PRACTICES

- Changes in crop rotations
- Changes in water management (irrigation and drainage)
- Changes in fertilizer management
- Changes in crop management
- Changes in animal management
- Ultimately we are going to have to quantify G x E x M interactions to develop effective adaptive strategies

AGRICULTURAL ADAPTATION

- Agriculture has adapted to climate change and will continue to adapt
- Practices will have to cope with larger extremes in temperature and precipitation