

A young corn plant is the central focus, growing in a field. The soil is dark and appears moist, with a layer of straw mulch around the base of the plant. The corn leaves are green and show some signs of stress, with some yellowing and wilting at the tips. The background is filled with more straw and soil, suggesting a field setting.

# Limited Water Options For Tough Times

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# Water Management:

- **How crops respond to water**
  - **Water Management/Losses**
- **Water Use of crops**
  - **Timing**
- **Cropping Systems Management**
  - **Tillage**
  - **Water Management**

# Crop Response to Water:

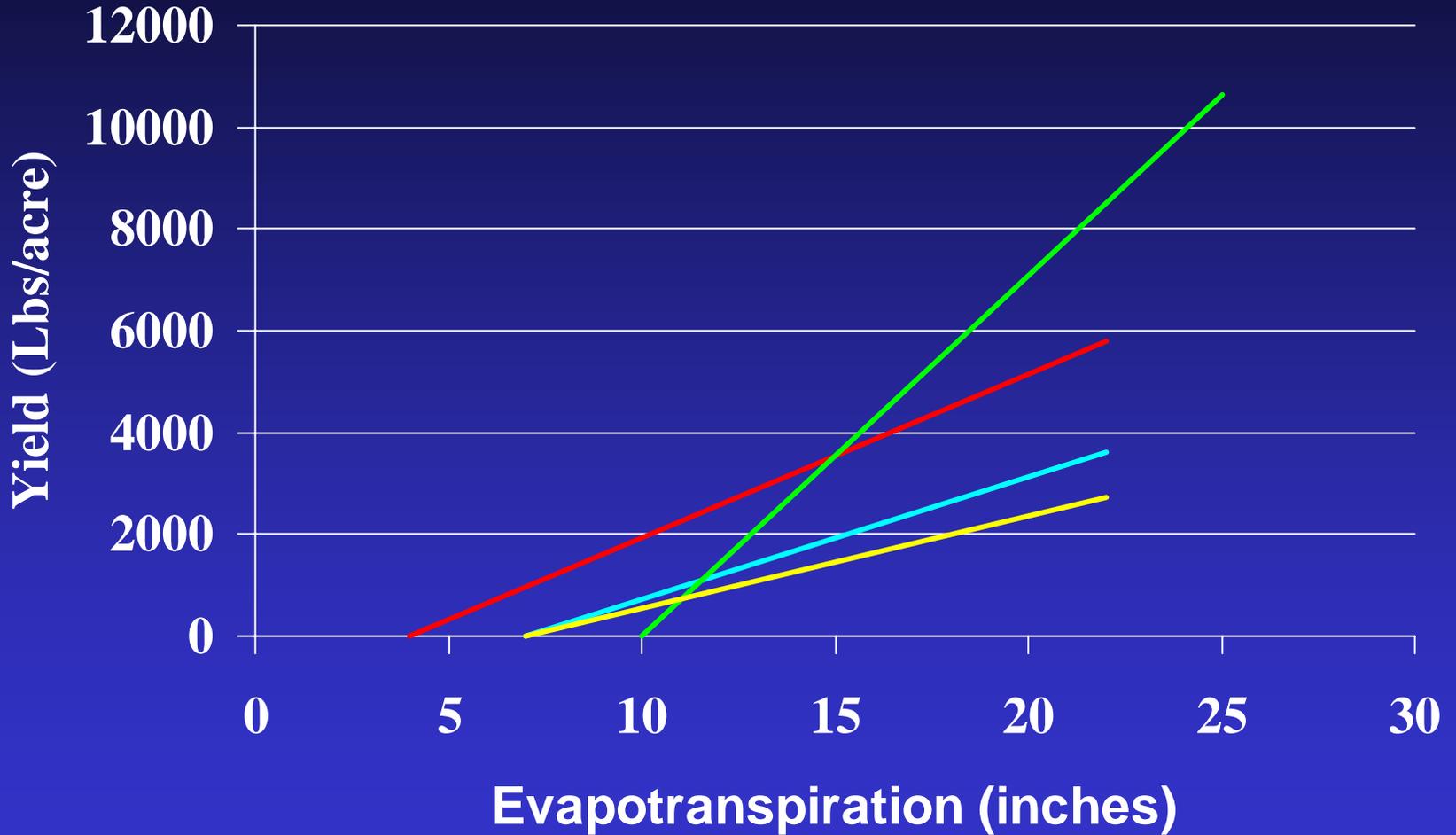
**Crop yields have a linear response to ET  
Not to Irrigation**

**Irrigation helps increase ET but  
losses of water occur**

**Leaching**

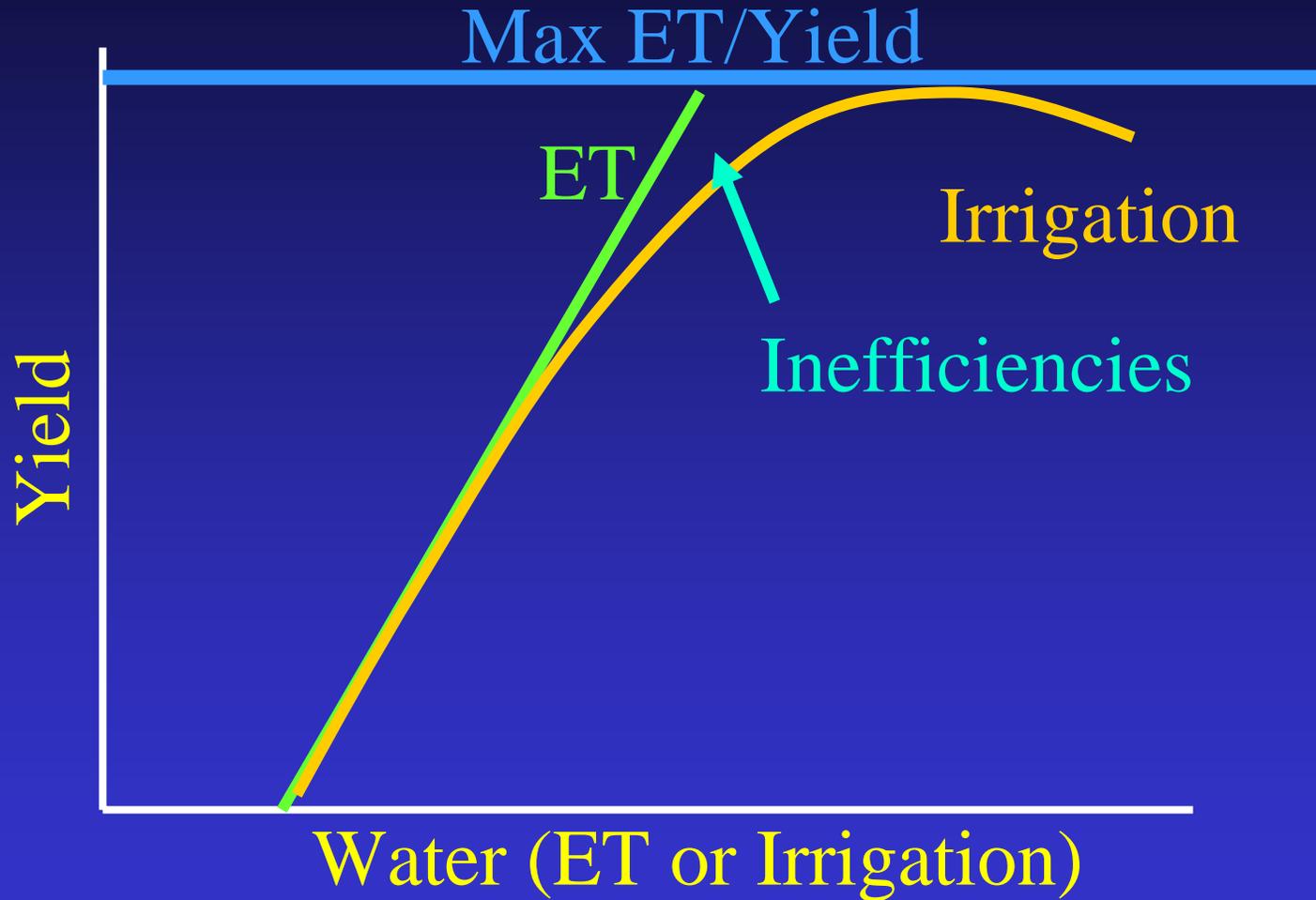
**Runoff**

# Yield vs Evapotranspiration



— Wheat — Soybean — Corn — Sunflower

# Yield vs Water Relationship





# **Management Strategies**

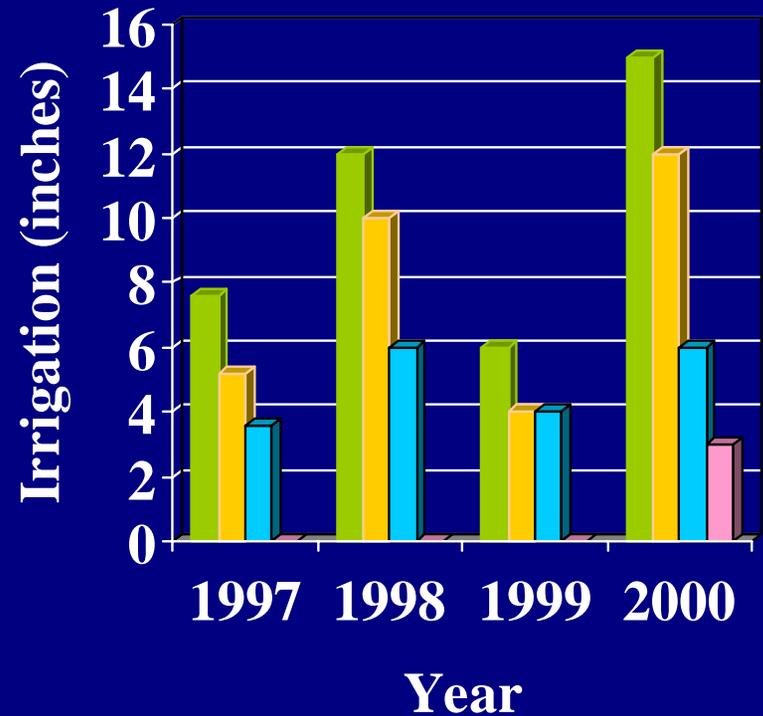
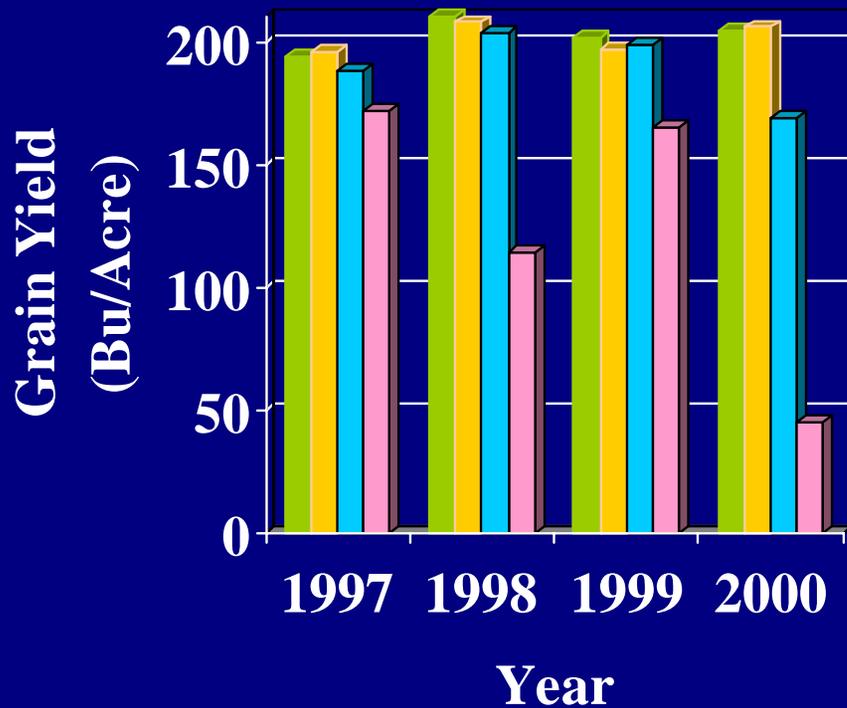
Research from Colorado, Nebraska  
and Kansas

Reduce water applied during  
vegetative growth stage

Reduce water applied with little or no  
yield loss under normal conditions

# North Platte

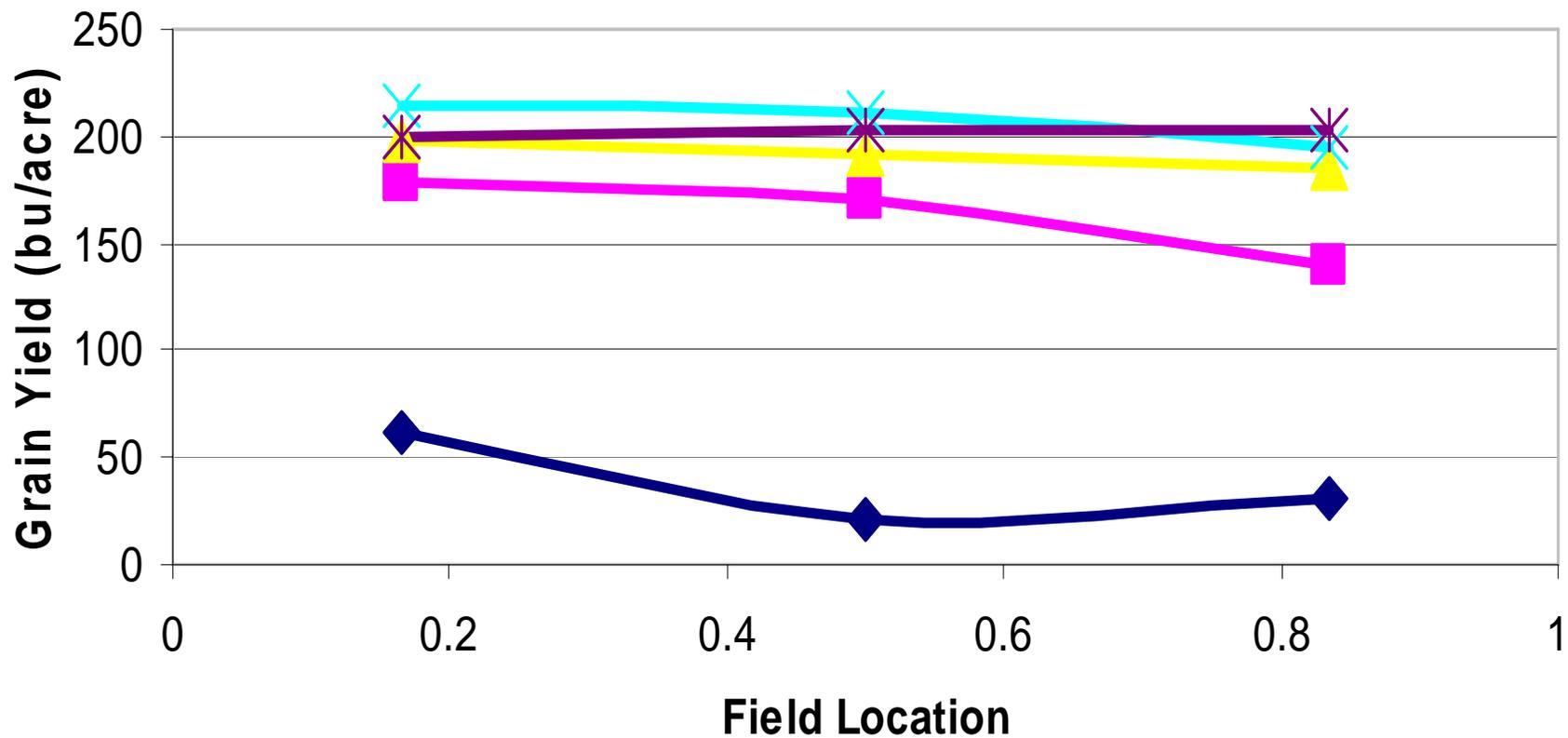
## Silt Loam



**BMP**                      **Late Initiation**  
**Allocation**              **Dryland**

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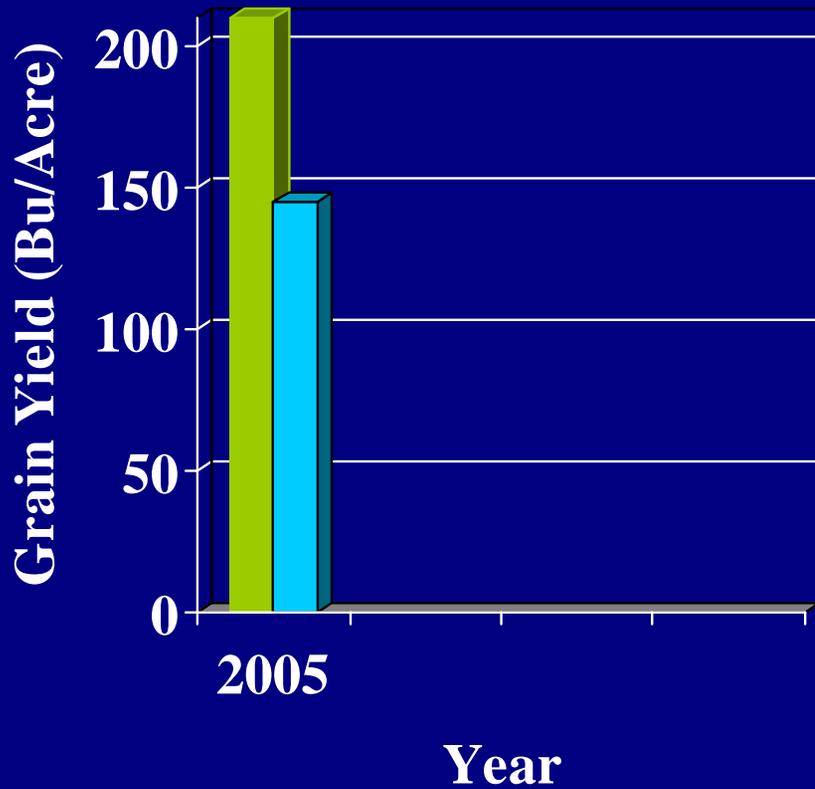
## Irrigated Yield by Position



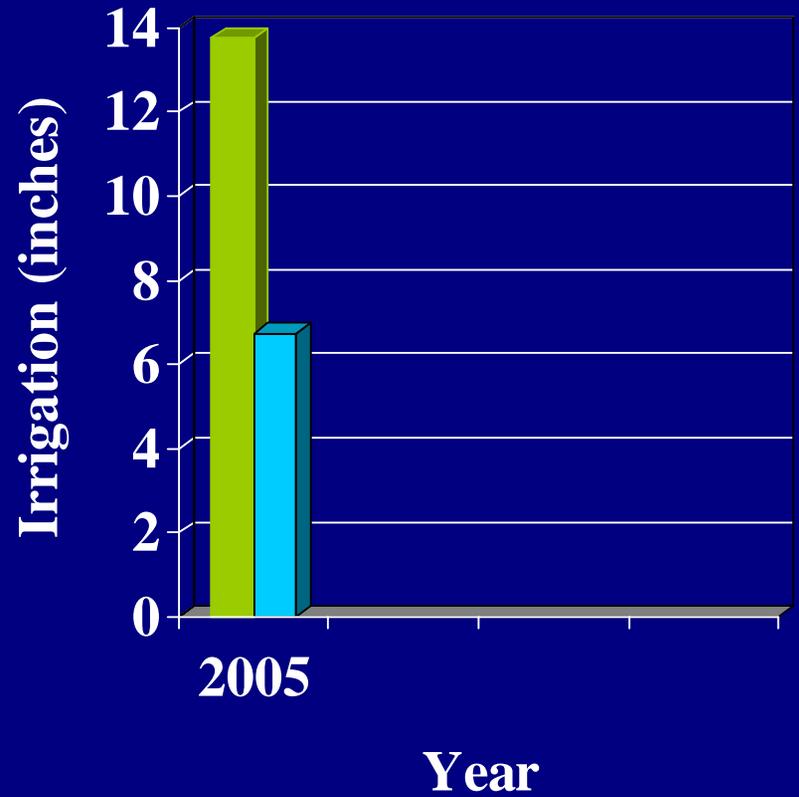
◆ Dryland    ■ 6 inch    ▲ 10 inch    ✕ Late    \* Full

# Fort Collins

## Clay Loam (pivot)



■ BMP ■ Allocation

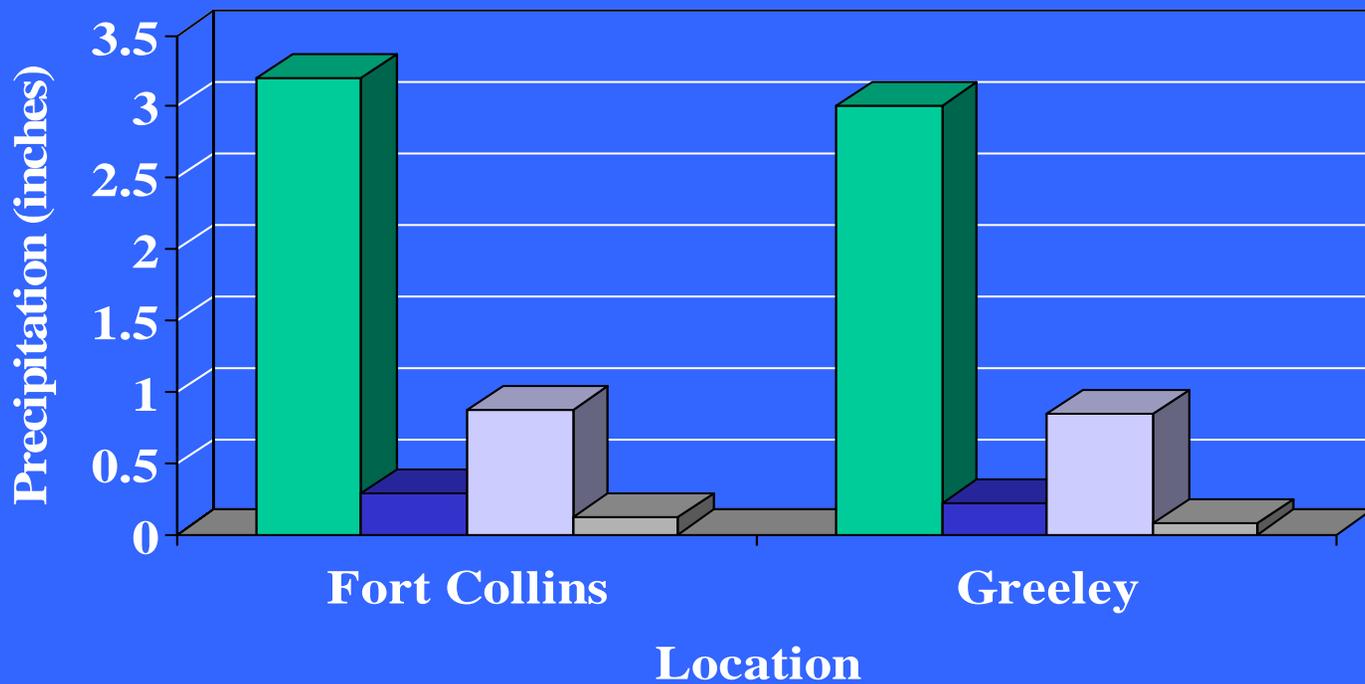


■ BMP ■ Allocation

# Fort Collins

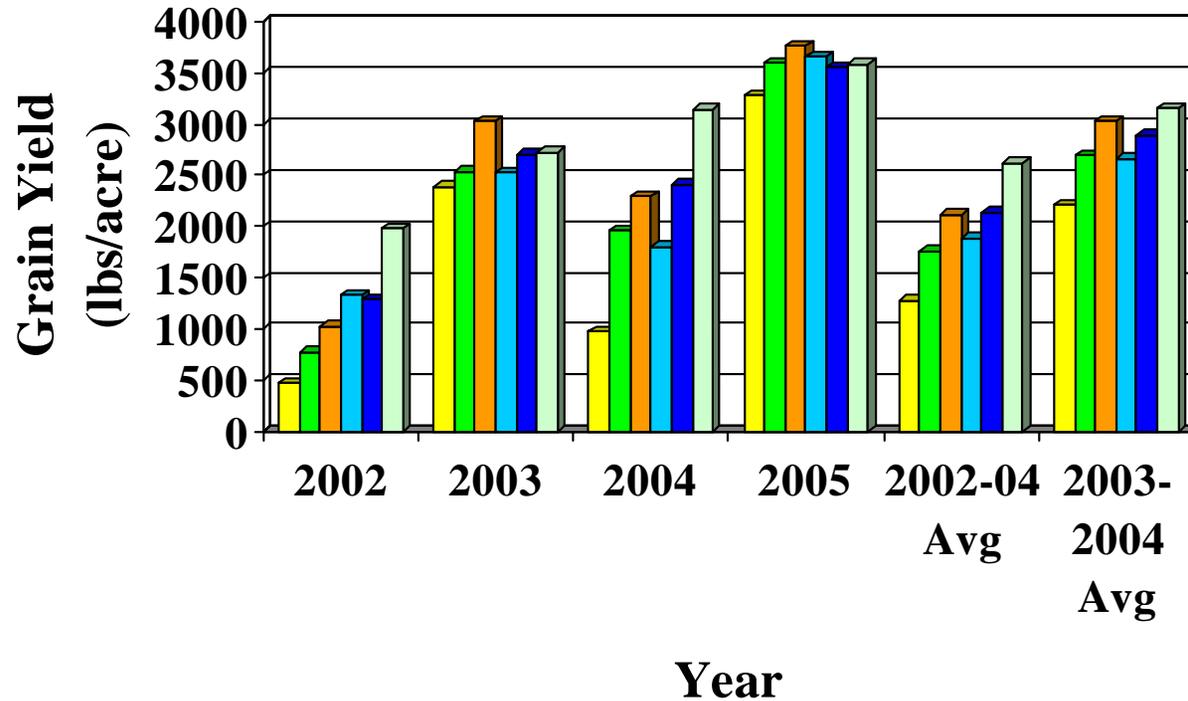
## Clay Loam (pivot)

### 2005 Precipitation



■ June ■ July ■ August ■ September

## Irrigated Oil Sunflower Yields



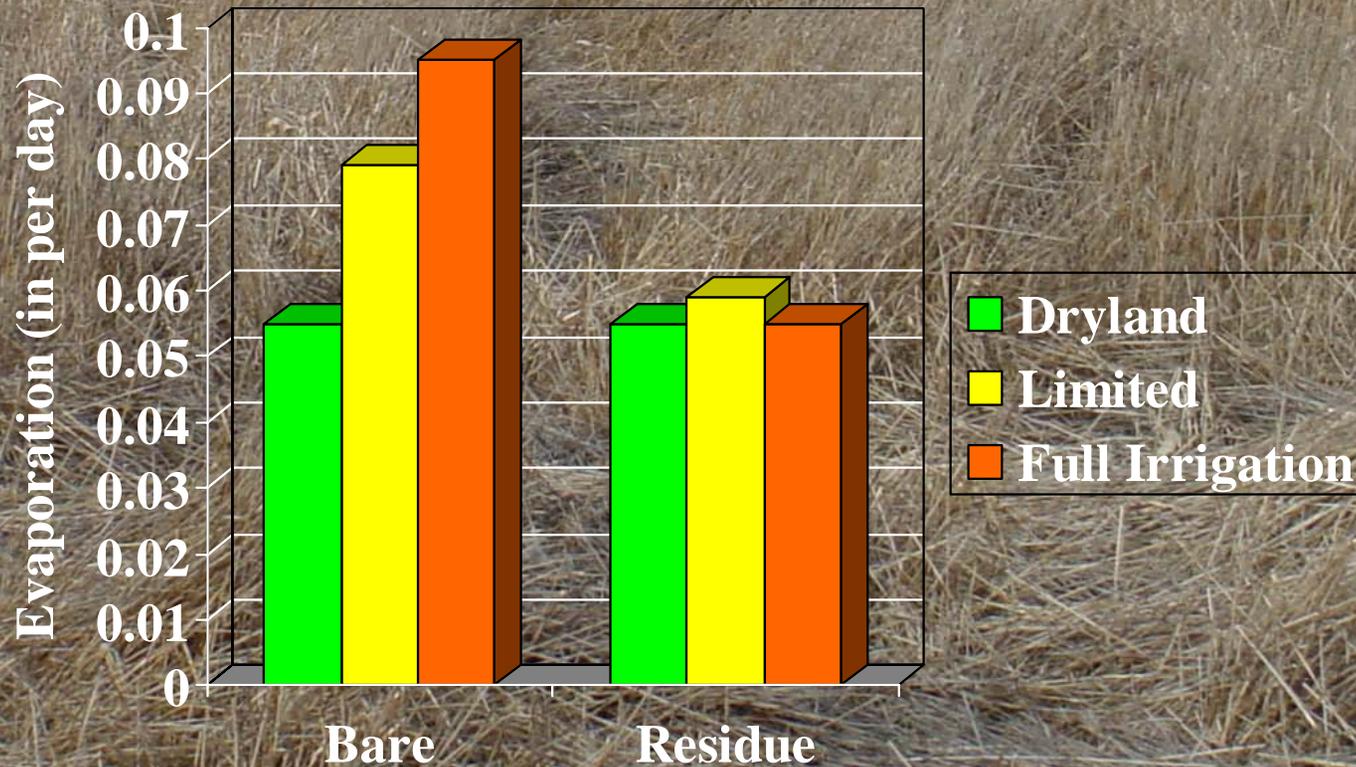
Dryland
  R6-R7
  R4-R5
  R1-R3
  R1-R5
  Full Water

# Residue Management



# Management Strategies

## ▪ Reduce Evaporation Losses



# The Economic Question?

- What do you want?
  - Maximum Yield?
  - Maximum Return?

# Management Strategies

- Reduce irrigated acreage
  - Irrigate a portion of land
  - Remainder in dryland production
    - produce at a level of profitable returns
- Reduce irrigation to entire field
- Rotate with lower crop water use crops
  - irrigate all crops with varying amounts
  - Sunflowers, corn, soybean, winter wheat, dry beans, sugar beets

# *Water Management*

When limited on water quantity

Save water for critical time periods

Reproductive growth stage

Most crops can withstand some stress during the vegetative growth stage

# Limited Allocation

## Greeley, CO

Effective Precip.                      7.4 inches  
Irrigation Efficiency                      90%

	ET	Net Irrigation	Gross Irrigation
Corn	24.7 In.	17.4 In.	19.3 In.
Winter Wheat	16.4 In.	9.0 In.	10.0 In.
Dry Beans	18.4 In.	11.0 In.	12.2 In.

# Limited Allocation

- Choices to be made:
- 11.4 Inch Allocation
  - Grow 59% of corn acres – full water
    - normal yields on less acres
  - Grow 100% of corn acres – 59% of water
    - normal acres with reduced yield (70+% of max)
  - Grow 15% of acres to corn and 85% to wheat
    - normal yields on both with all acres

# Limited Allocation

- **Harvest wheat as forage**
  - Reduce ET by approximately 5 inches
  - Reduce net irrigation by 4 inches
  - Reduce gross irrigation by 4.5 inches
- **Pivot Irrigation**
  - Grow corn on 42% of acres and forage on 58%
  - Grow corn on 66% of acres and forage on 17% and dry beans on 17%

# Limited Allocation

- **Furrow Irrigation**
  - **Not as many options**
  - **Allocation of 13.9 inches**
  - **Full irrigation of corn on 39% of acres**
  - **Limit water applications to all acres**
  - **Choose other grain crops or forages with one or two crops.**

# Limited Allocation

- **Furrow Irrigation**
  - **Management Options**
- **Pack furrows**
  - **Improve advance time**
- **Alternate row irrigation**
  - **Improve efficiency**
- **Do not allow adequate soak at the end of furrows**
  - **Full to limited water applications**

# Limited Allocation

- **Management Options**
  - Treat acres like dryland with additional moisture that you control
- **Reduce input costs**
  - Reduce populations
  - Less or no tillage
  - Adjust fertilizer to yield potential
  - Proper choice of varieties
- **Control weeds**
  - They steal water from the crop

# ISSUES

- **Crop Insurance**
  - **Currently no option for limited irrigation.**
- **Water allocations**
  - **With limited irrigation, irrigation efficiencies usually improve.**
- **Must withstand crops looking less vigorous.**
- **More research down the road.**

