

# Cropland Management During a Drought

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# Resilience and Diversity are Key

- Irrigation is the only way to eliminate the impacts of drought
  - Yet, it can't overcome the excessive heat that can accompany drought
- Severe drought will result in crop failure regardless of management
- Management that increases the resilience and diversity of your system can reduce the impacts of moderate drought

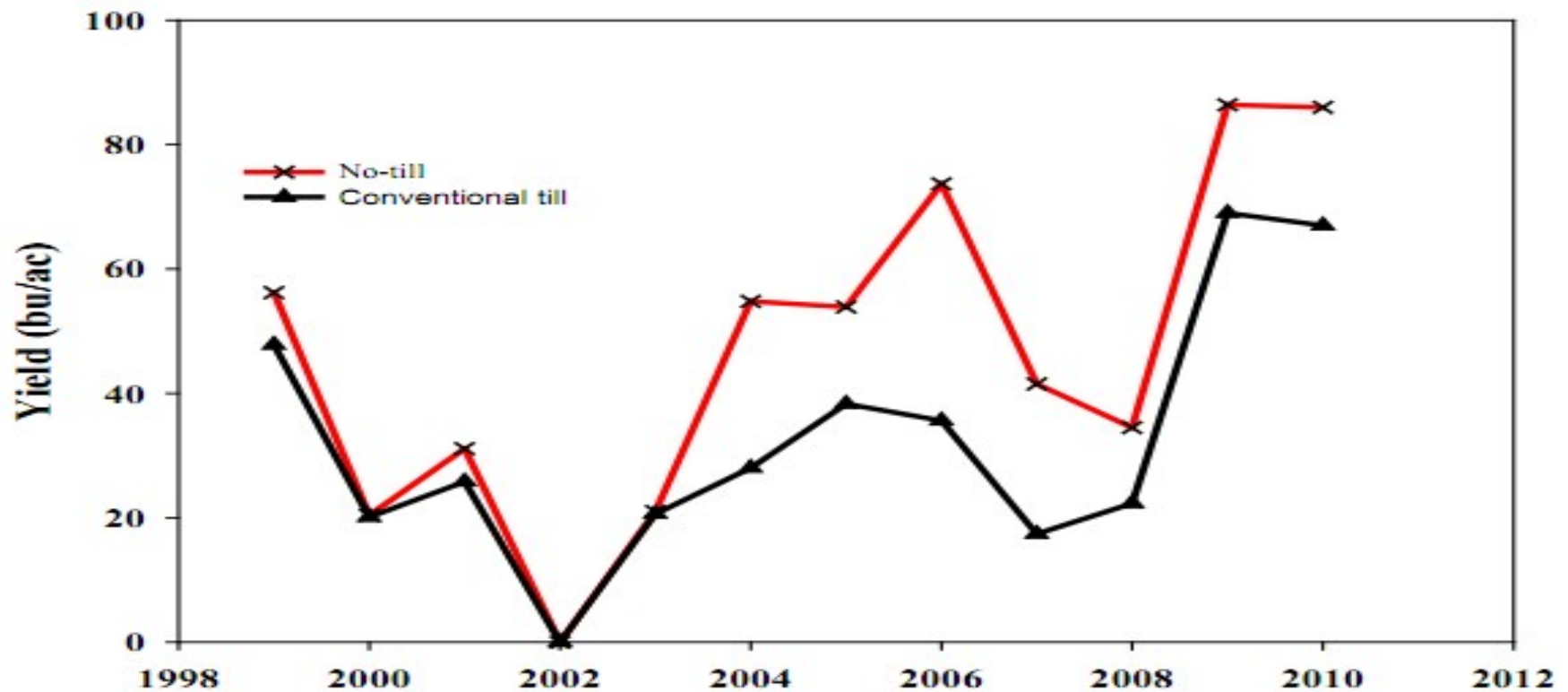
# Increasing Resilience of your Cropland System

- It's all about increasing the capture, storage and utilization of soil water
- Can be a very complex puzzle to solve
- There are a few basic principles that we can keep in mind

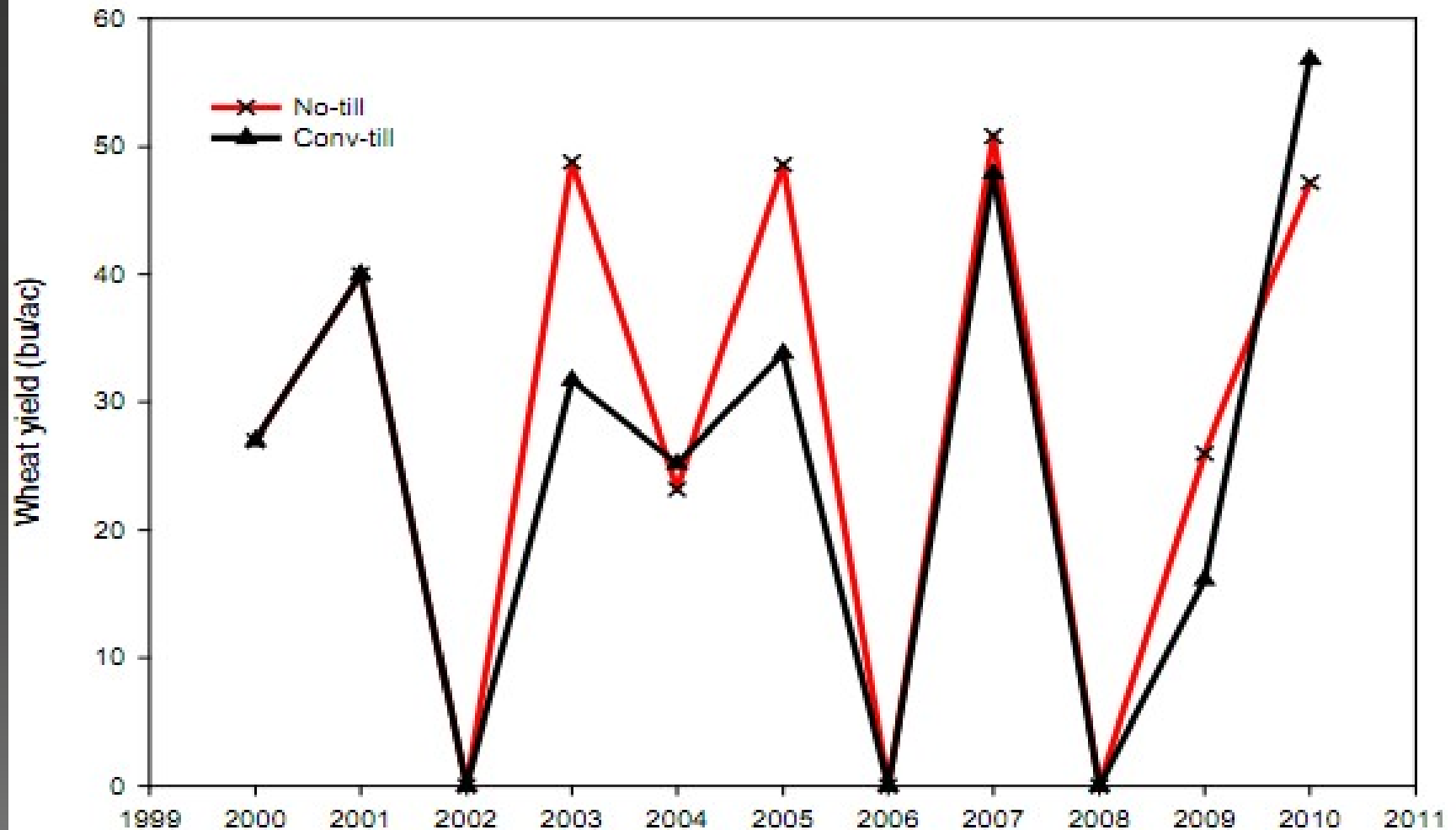
# Soil Management to limit the impacts of moderate drought

- Continuous No-till can limit the impacts of moderate drought.
  - Reduces rate of evaporative water losses
    - Crop residues reduce the rate of evaporation
  - This is important during the early part of the growing season.
    - Canopy closure reduces this affect
  - Summer crops generally respond more consistently to no-till than winter crops
  - But wheat can respond depending on rainfall patterns

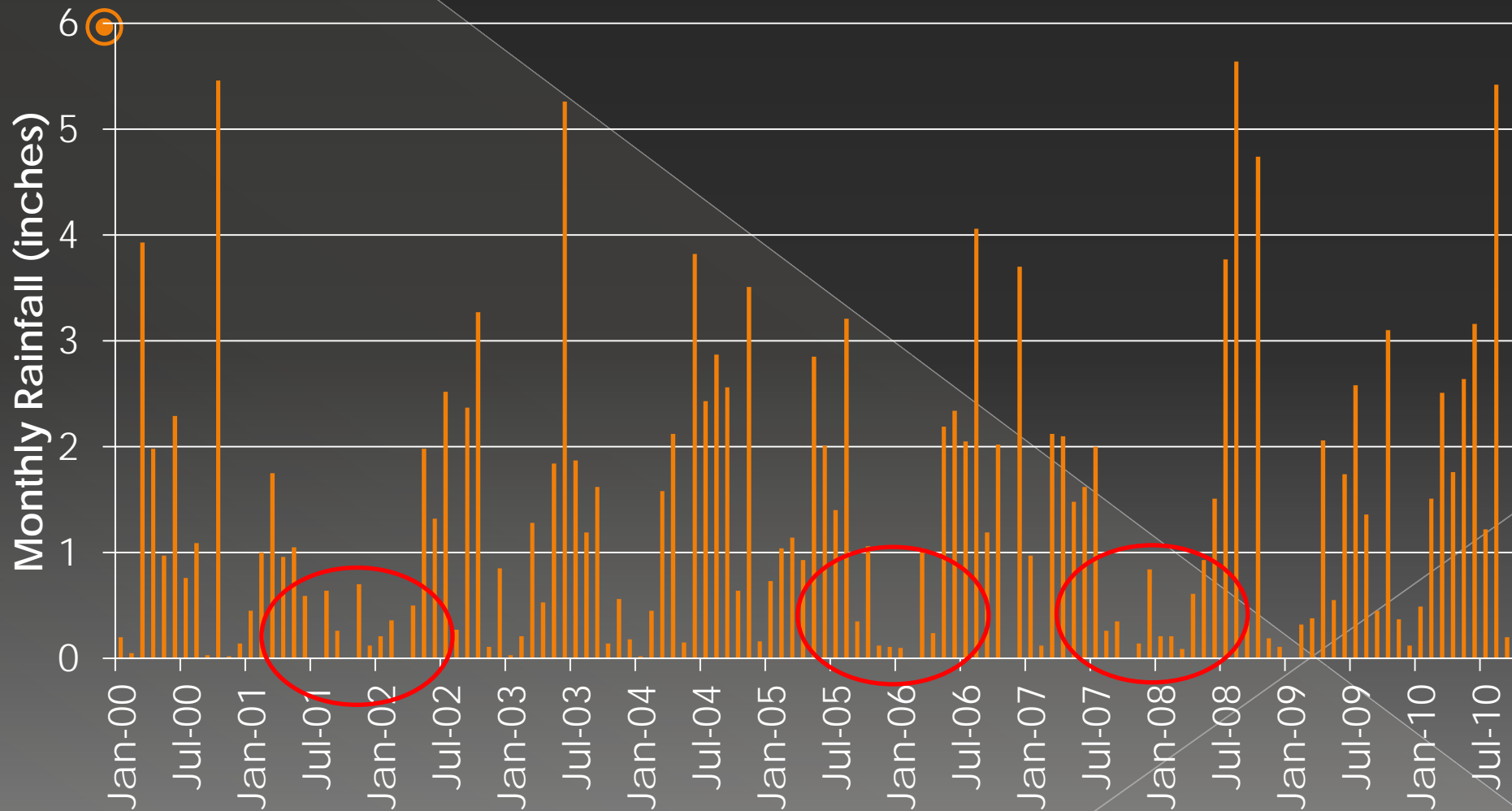
# Long-Term Sorghum Yields in Goodwell



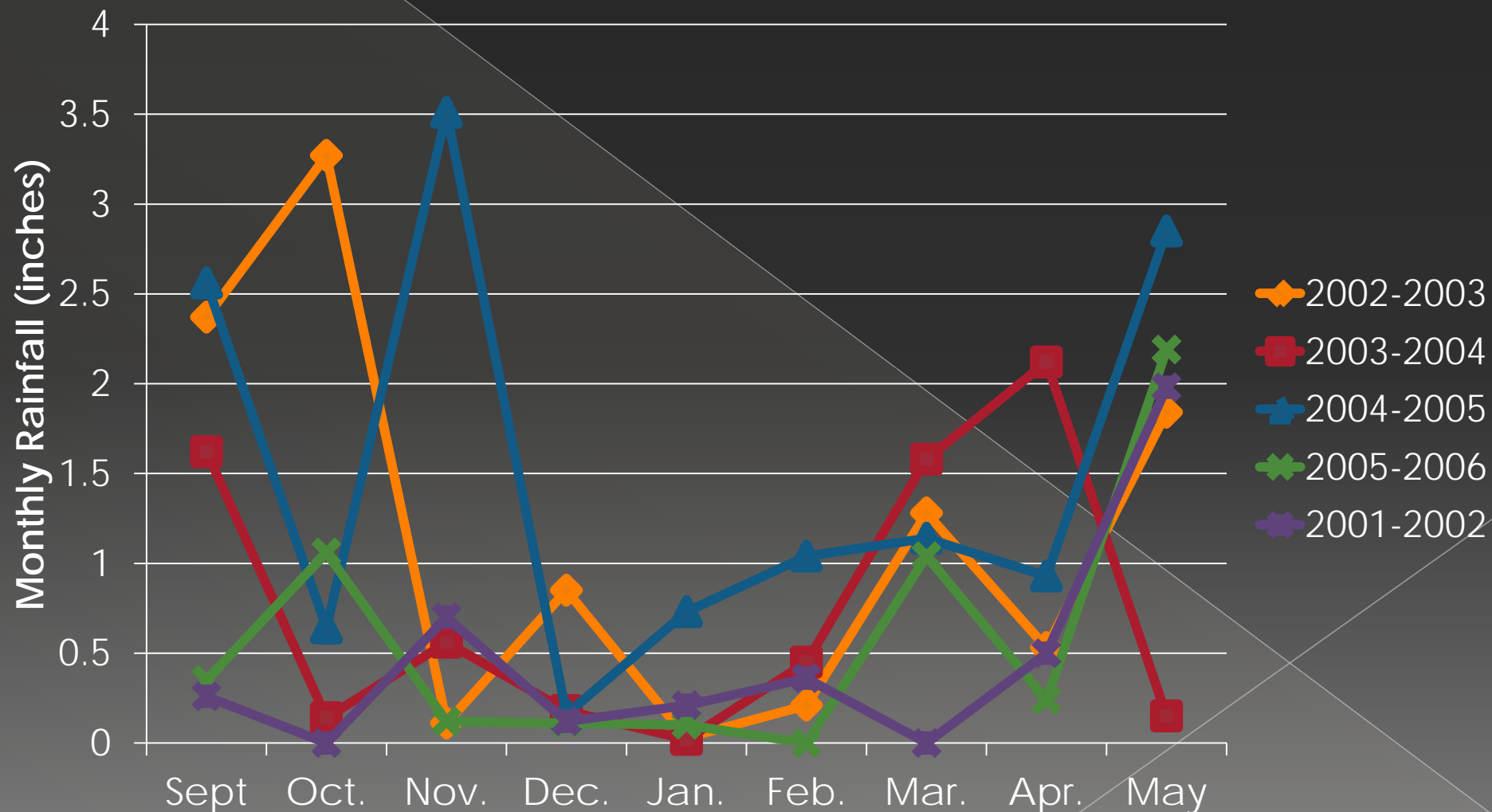
# Long-Term Wheat Yields in Goodwell



# Rainfall in Goodwell (2000-2010)



# No-till Wheat yields were elevated when Fall rains were dominate





# Impact of No-till on Drought Recovery

- No-till management can also aid in the recovery from drought.
- No-till decreases runoff and increases infiltration
  - Provides more rapid recovery of soil moisture

# Impact of Tillage on Runoff

Table 3: Water runoff when applied to no-till, disked and disked soil with straw cover

Time (mins.)	No-till	Disked	Disked/Straw
	--- Runoff inches/hour ---		
15	Started	Started	
18	---		
20	0.8		
25	2.1	3.0	Started
30	2.4	3.5	0.4
40	2.4	3.5	2.4

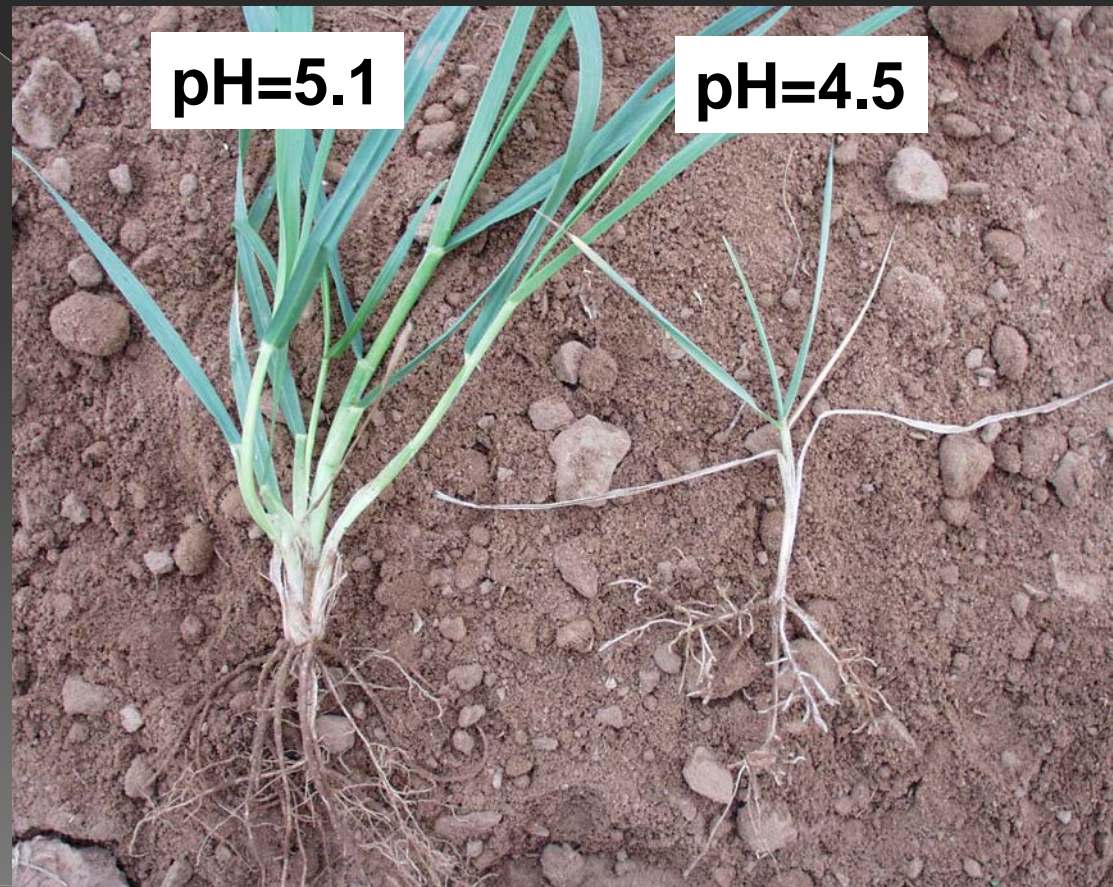
Notice how affective straw can be to increase infiltration

# Soil pH Management can Improve Drought Tolerance

- Low soil pH (<5.5) will result in excess Aluminum in soil solution
- Soluble Aluminum has many negative affects
  - Root Pruning
  - Decrease Availability of Cations
    - Ca, Mg, K, etc.
  - Decrease Availability of phosphorus

# Root Pruning in low pH Soils

- Stunts Fall forage production
- Can decrease subsoil moisture utilization











- Use of acid tolerant varieties and banding P can reduce these affects but lime is the only cure!

# Dual Purpose Wheat Management and Drought

- ◉ Grazing is one way to diversify cropland management in OK
- ◉ However, there are a few things to keep in mind.
  - First: Early planting (Sept.) increases fall water use regardless of grazing
  - Second: Grazing causes additional stress on grain crop but is offset by gains in beef.
  - Third: if you plant wheat early graze in order to utilize water

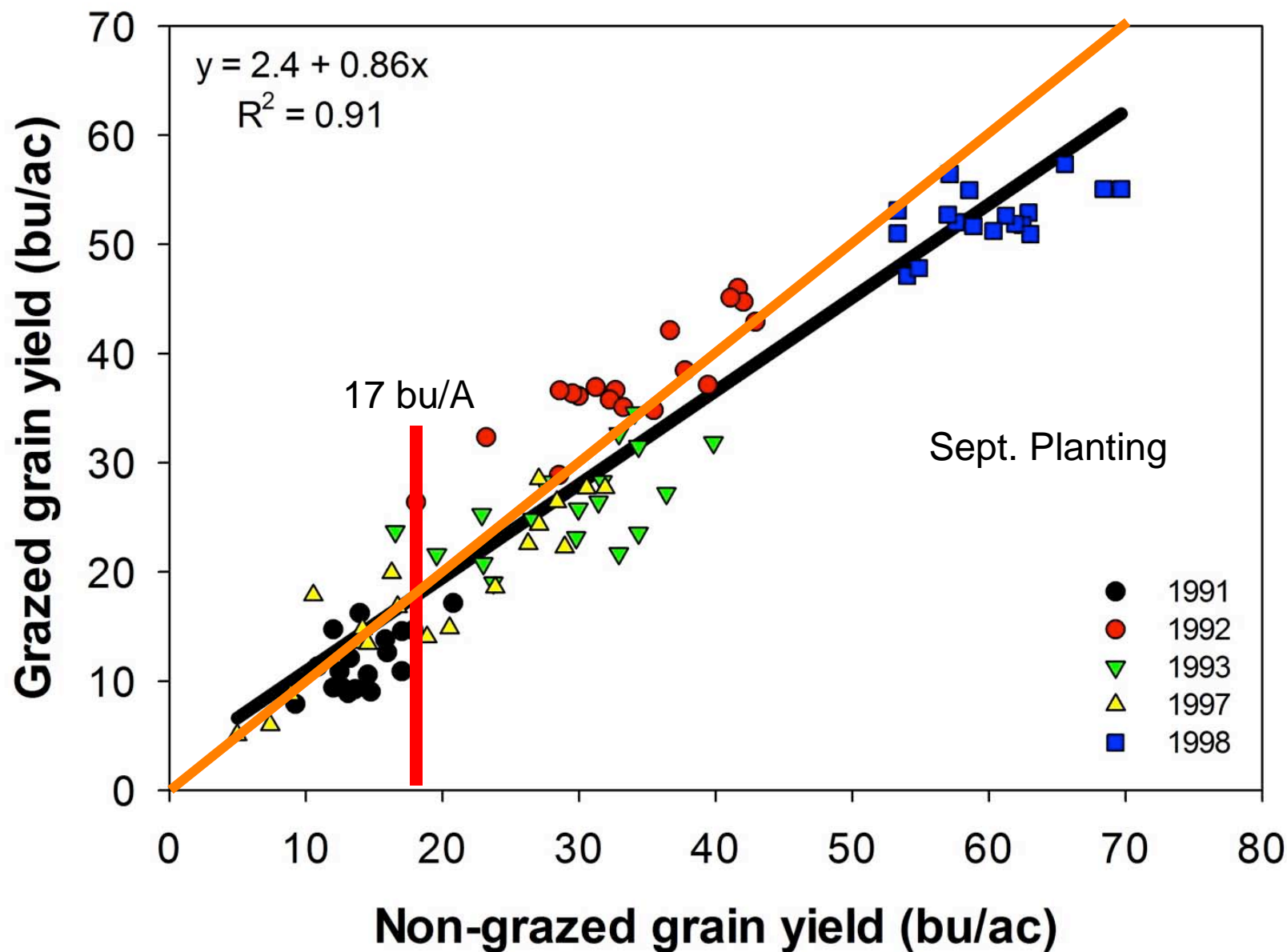


# Recent Evaluation of Variety Trial Data

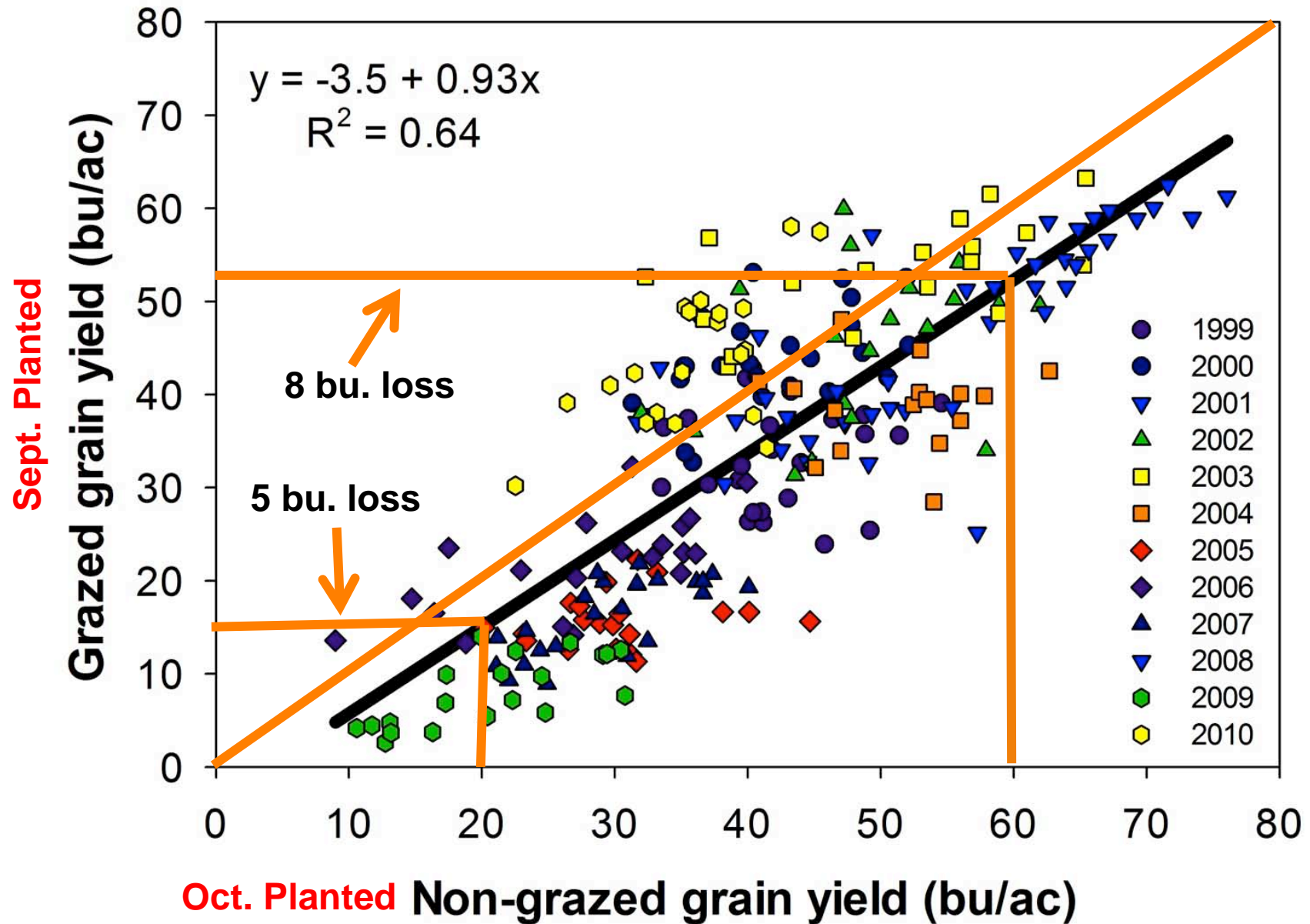
- Variety Trials at the Wheat Pasture Research Unit in Marshal, OK
  - Two variety tests each year with 20 – 25 varieties per year
  - 1991 – 1998 grazed and non-grazed plots sown early September
  - 1999 – 2009 grazed plots sown early September
  - 1999 – 2009 non-grazed plots sown mid October



# 1991 – 1998 Results



# 1999 – 2010 Results



# Data Summary

- If sown at the same time, grazing reduced yield an average of 7%
  - But can support yield in low yielding year
- If systems are compared, the dual-purpose yields were an average of 14% less
- 7% penalty for grazing + 7% penalty for early planting = 14% total
- Grazing increased test weight by 1%



# Wrap up

- Management can only increase cropland “Tolerance” to drought
- It can not prevent the effects of excessive drought.
- Conservation tillage, in particular no-till, can improve drought tolerance
- Maintaining proper pH ( $>5.5$ ) improves root growth and water extraction.
- Planting date is an important consideration
  - Early planted wheat should be grazed to take advantage of increased water use.

# Questions

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