



# Western Kansas Agriculture

*Focus on water use and how it  
matters to you*

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Asst. Professor/Extension Water Resource Engineer  
K-State Southwest Research –Extension Center  
Garden City, KS



**THERE IS BEAUTY  
IN BEING DRY**



# My Background: Philippine Agriculture

Avg. Annual Rainfall = 7 ft. ( $\pm 5$  ft.)



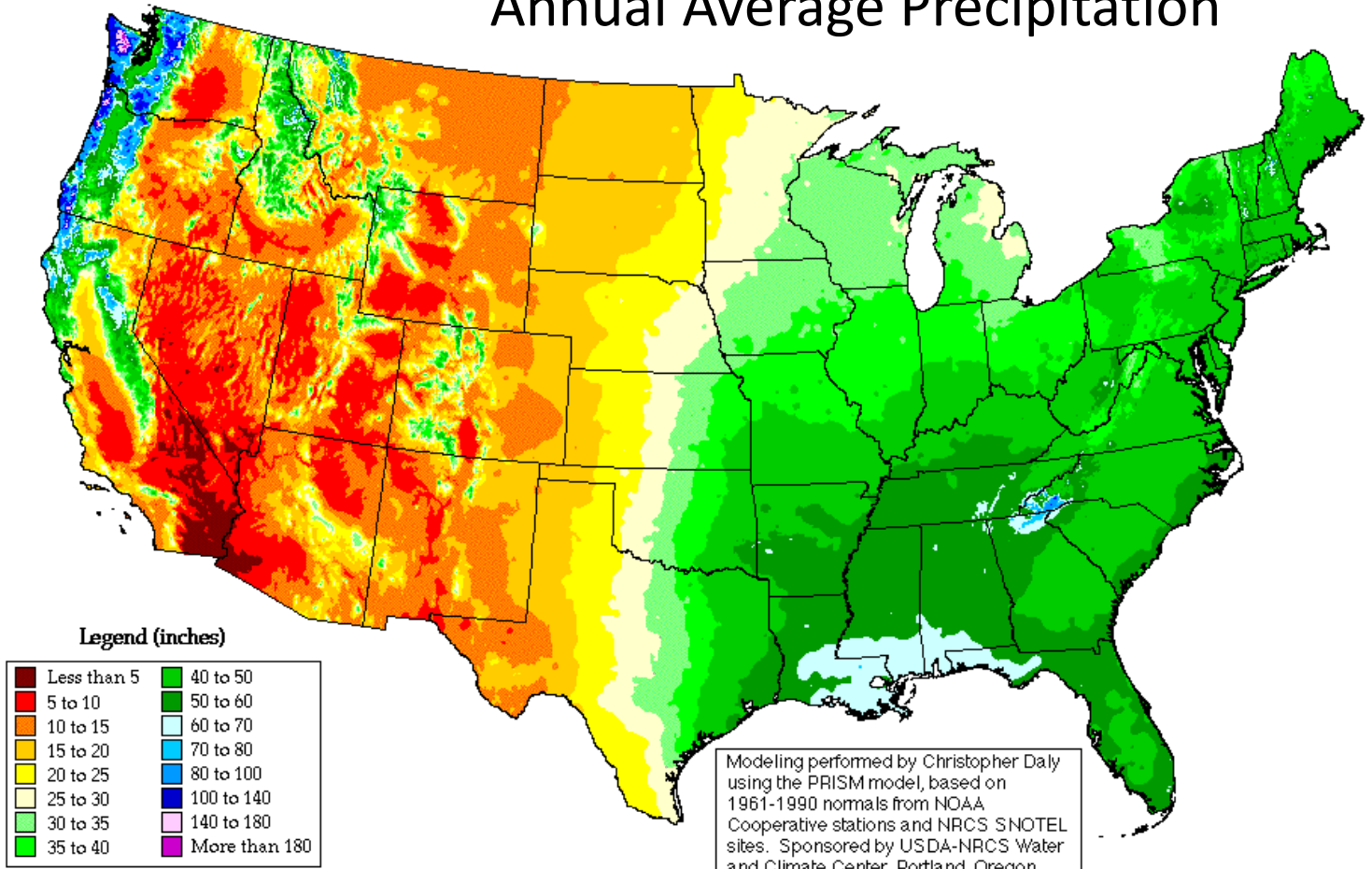


# Western Kansas Agriculture

Avg. Annual Rainfall = 18 in ( $\pm 5$ in)



# Continental US Annual Average Precipitation



Legend (inches)

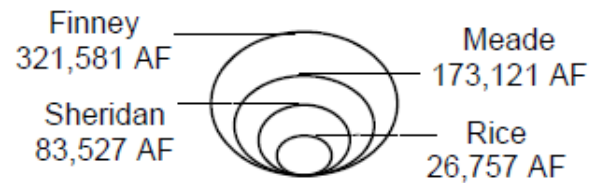
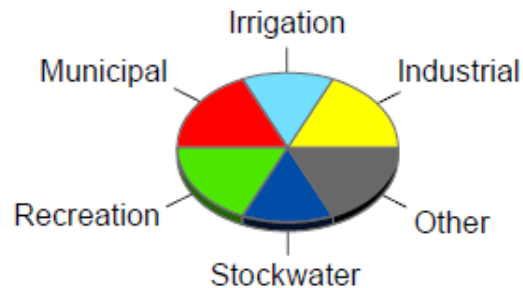
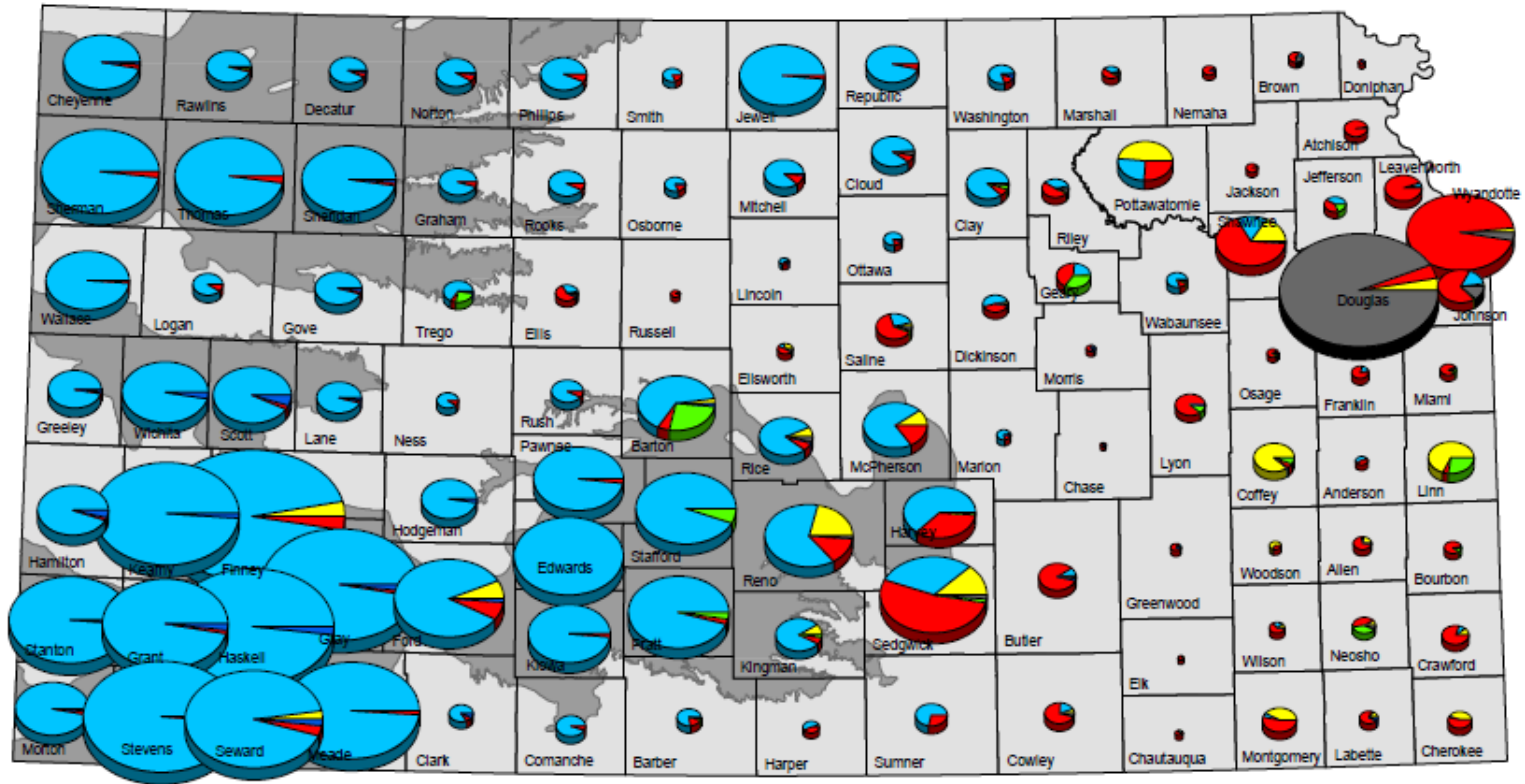
Less than 5	40 to 50
5 to 10	50 to 60
10 to 15	60 to 70
15 to 20	70 to 80
20 to 25	80 to 100
25 to 30	100 to 140
30 to 35	140 to 180
35 to 40	More than 180

Period: 1961-1990

Modeling performed by Christopher Daly using the PRISM model, based on 1961-1990 normals from NOAA Cooperative stations and NRCS SNOTEL sites. Sponsored by USDA-NRCS Water and Climate Center, Portland, Oregon.

Oregon Climate Service  
George Taylor, State Climatologist  
(541) 737-5705

# Average Annual Reported Water Used, by County, 1995 to 2012





# 8 Counties

- Produce 1/3 (\$6.3B) of the State's agriculture revenue



# We need water to drink + more



Lifehacker.com



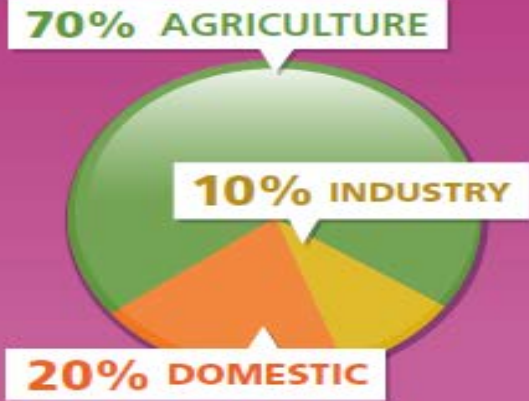
**7 BILLION**  
PEOPLE TO FEED TODAY

**9 BILLION**  
IN 2050

= 60% more food needed

+19% increase of agricultural water consumption  
(including both rainfed and irrigated) by 2050

GLOBAL WATER WITHDRAWALS



EVERY DAY 1 PERSON

DRINKS



**2-4**

LITRES  
OF WATER

EATS



**2000-  
5000**

LITRES OF VIRTUAL WATER  
EMBEDDED IN FOOD

ALL WE EAT NEEDS WATER TO GROW

1 APPLE

**70**  
litres

18 gal.



150G OF BEEF

STEAK  
**2025**  
litres

535 gal.



100G OF

VEGETABLES  
**20**  
litres

5 gal.



1 SLICE

OF BREAD  
**40**  
litres

11 gal.



# There is beauty in being dry

## MORE

- Growing degree days
- Opportunity to work on the field
- YIELD
- Irrigation water needed

## LESS

- Leaching and runoff of nutrients
- Pests and diseases
- Weed pressure
- Spoilage

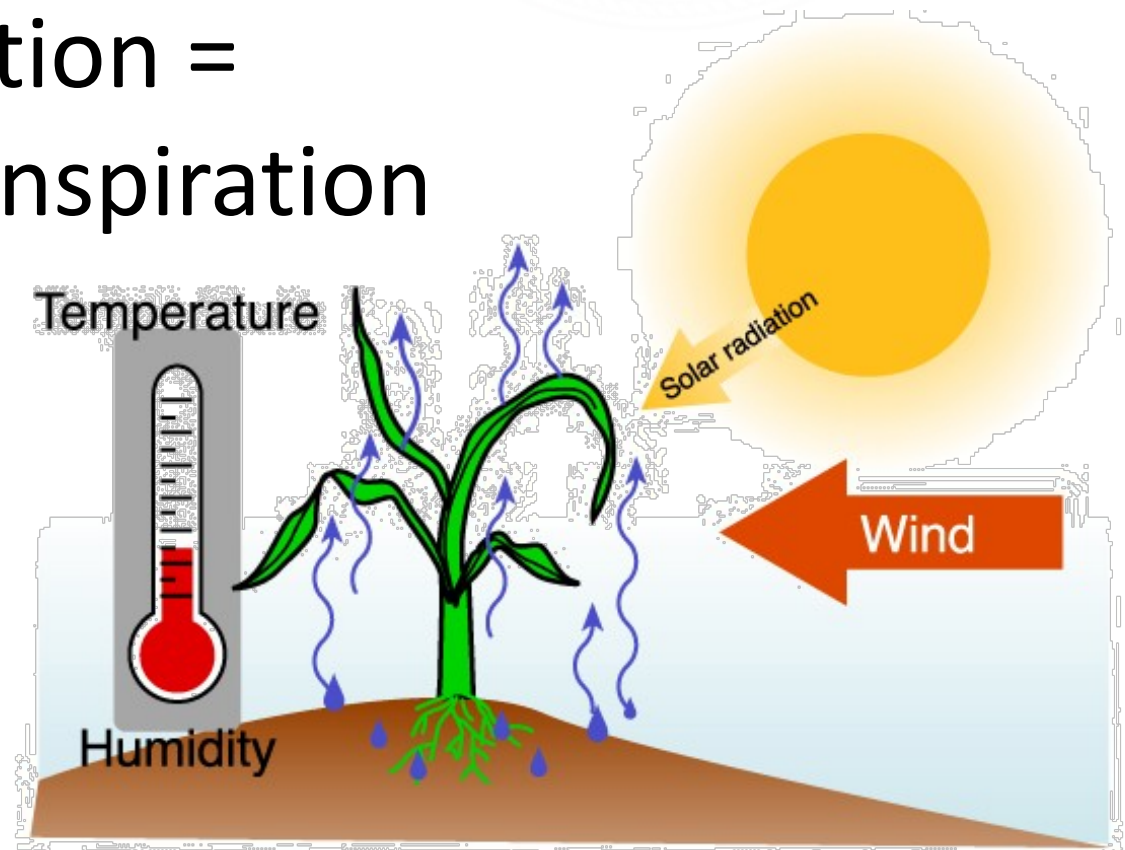


# Why irrigate?



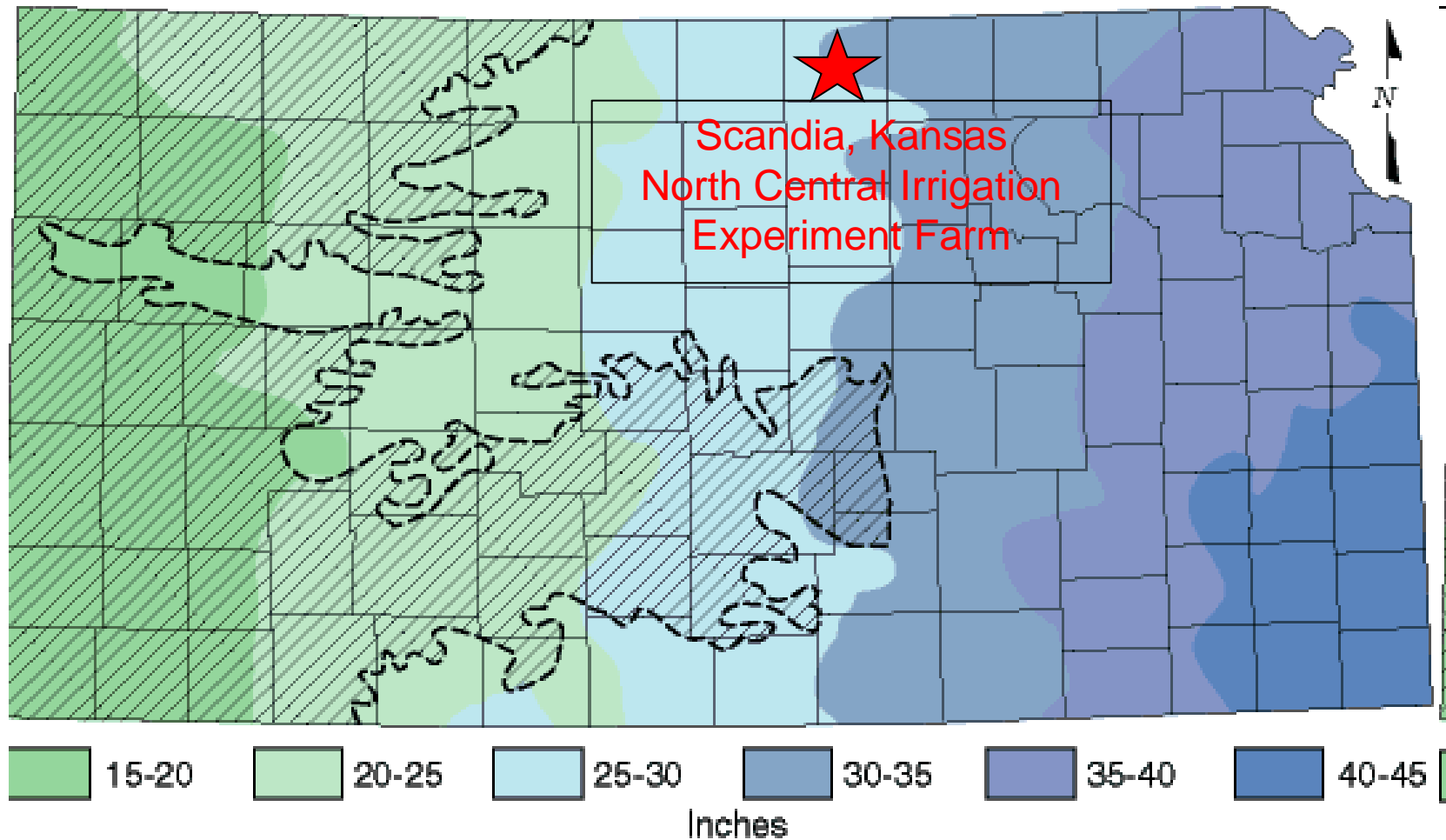
# Evapotranspiration = Evaporation + Transpiration

95-98% of  
water use  
is for  
cooling



- Evapotranspiration (ET) is an energy driven process.
- ET increases with temperature, solar radiation and wind.
- ET decreases with increasing humidity.

# Kansas Precipitation



**K**Figure 3. Normal annual precipitation (1961 - 1990) in Kansas. The area west of the dashed line shows the extent of the High Plains aquifer in Kansas (from Goodin et al., 1995).

# Why Irrigate?

Improve yield, stabilize yield, improve quality, improve economy, etc.

<b>Time of Irrigation</b> Study at Scandia Exp. Farm	<b>1991 Yield Bu/Ac</b>	<b>1980-1991 Bu/Ac</b>	<b>1991 Irrigation Date</b>
No Irrigation	<b>3</b>	<b>56</b>	None
Tassel	<b>124</b>	<b>141</b>	7/8
Tassel + 1 week	148	159	7/8, 7/15
Tassel + 1 + 2 week	155	164	7/8, 7/15, 7/25
65% depletion	159	172	7/1, 7/23



# Moving Towards Better Systems



What is the largest (acreage) irrigated crop in the US?



3X than Corn with an area larger than Mississippi



1940: One Kansas farmer feeds 19 people



*Photo from the Kansas Historical Society*

**Now:  
One Kansas farmer feeds >155 people**



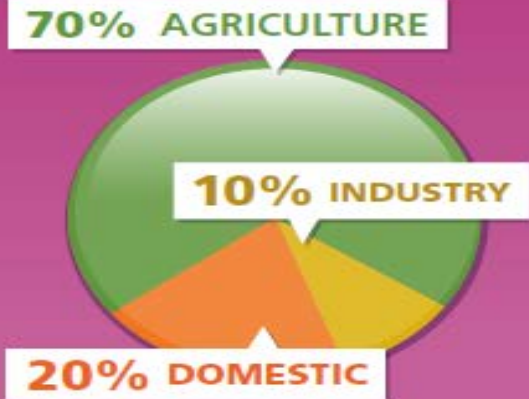
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We don't need to look far to make a difference...



On our plate



At home



In our yard

# ACTION ITEMS

Conserve Raw and  
Virtual Water

Adopt Relevant  
Technologies and  
Management Strategies

Education

Education

Education





**THANK YOU**

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