



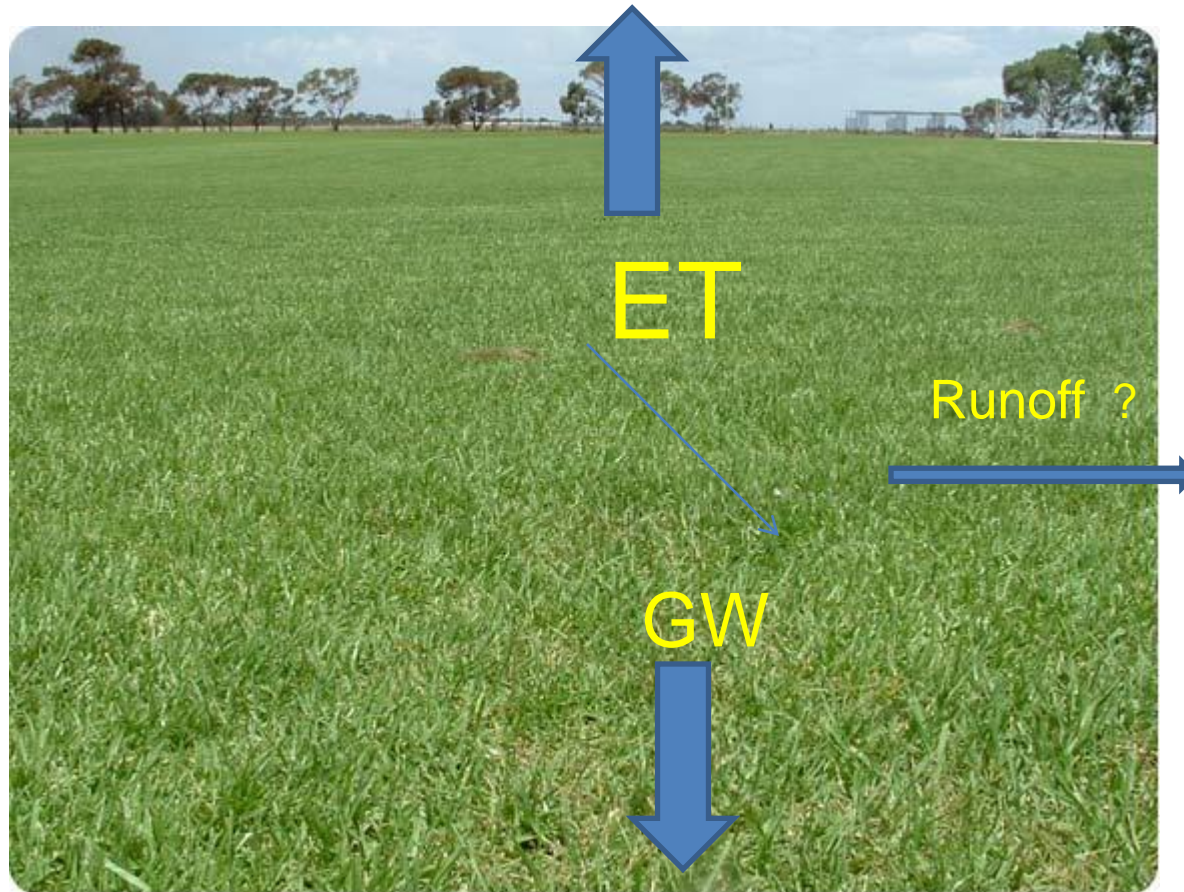
Wells, Pumps Etc...

Irrigation Scheduling

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What happens to irrigation water ?



Maximizing Beneficial Use

1- Design Factors

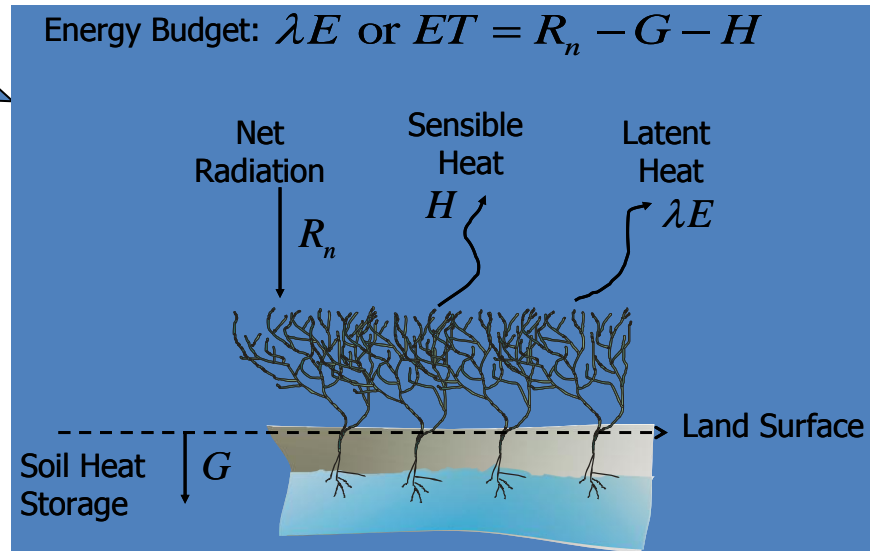
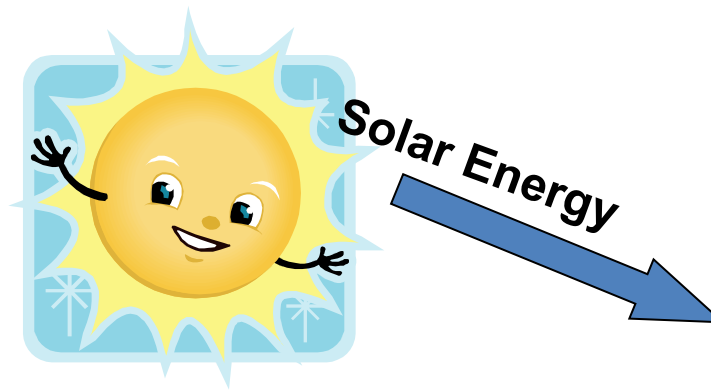
Land leveling, length of run, Soil,
discharge rate, irrigation system...

2- Management factors

Irrigation Scheduling; when, how much?

Crop water Use

Evaporation+Transpiration (ET)



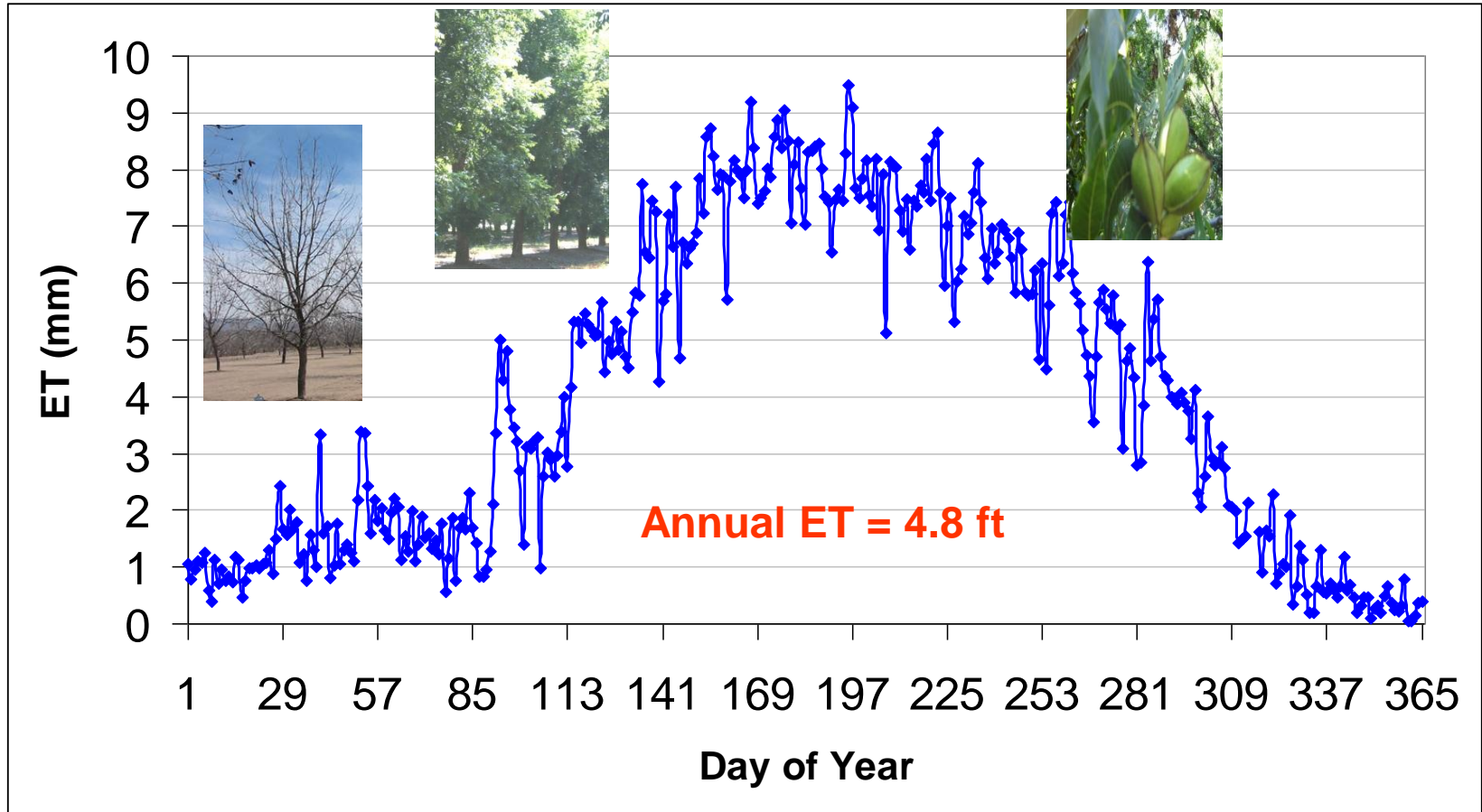
How do we calculate ET?

$$ET = K_c * ET_{sz}$$

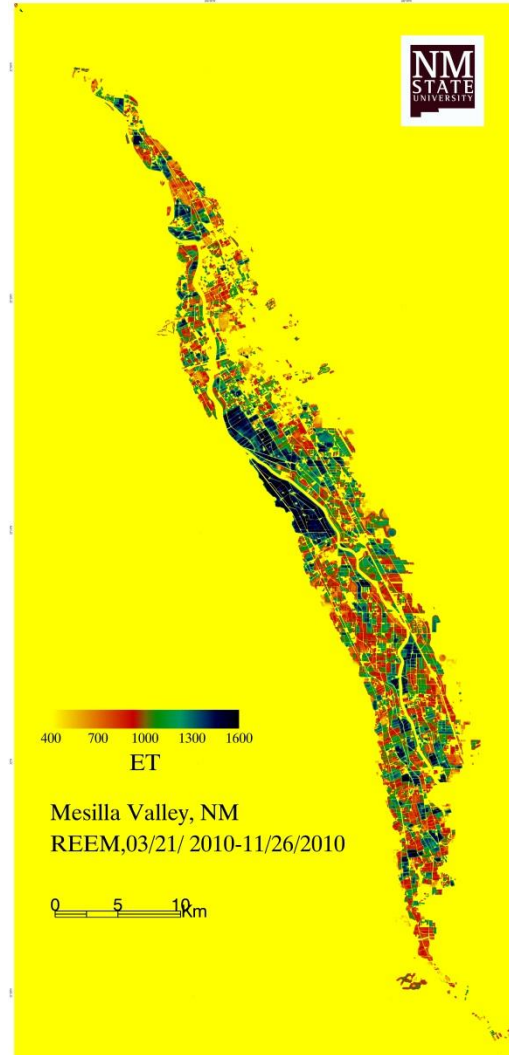
K_c = Crop coefficient (crop factor)

ET_{sz} = Climate factor

How does ET change with time?



ET Calculated from Remote Sensing



ET of mature pecan

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Kc			0.39	0.59	0.87	1.02	1.04	1.24	1.26	0.84	0.39	
ETsz			5.37	7.6	9.0	9.48	8.57	7.74	6.05	4.63	2.77	
ET (in)			2.1	4.5	7.8	9.6	8.9	9.6	7.6	3.9	1.0	

For young pecans

$$ET(in) = (ETm) * (0.6f_c + 0.48)$$

ETm = ET of mature pecan, previous table

fc = Fractional cover

Example

Young pecan orchard, 40% ground cover

Month: July

ET_m (from Table) = 8.9 inches

Your ET (in) = $(8.9) * (0.6 * 0.4 + 0.48) = 6.40$ In

Alfalfa ET

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Kc			---	0.8	0.80	0.8	0.8	0.8	0.8	0.80	0.8	
ETsz			5.37	7.6	9.0	9.48	8.57	7.74	6.05	4.63	2.77	
ET (in)			4.3	6.0	7.2	7.58	6.8	6.2	4.8	3.7	2.2	

The soil is the reservoir



During irrigation
saturation



After irrigation
Field capacity



$1/8-1/4$

$3/4$

Before irrigation

How Often Should we Irrigate?

The irrigation interval is a function of;

- Soil
- Root depth
- ET

Soil is the reservoir for water

- Water is stored within the root zone

Crop	Root Depth, ft
Alfalfa	3-10
Cotton	3-4
Pecan	3-4
Onion	1.5
Corn	3-4
Chile	2
Potato	1.5

Measure the field capacity one day after irrigation

- Field capacity (FC)



$$FC = 1.2 * (\text{soil moisture in percentage}) * (\text{Root depth})$$

Example

- Crop: Alfalfa
- Root Depth: 4 ft
- Soil Moisture the day after: 0.40

$$FC = 1.2(0.40)(4) = 1.92 \text{ ft} = 23 \text{ inches}$$

Useable Water (Readily Available Water, RAW)

RAW = $1/8$ to $1/4$ of field capacity

In the above example:

RAW = $23/4 = 5.8$ inches

NRCS soil maps

<http://websoilsurvey.nrcs.usda.gov/app/HomePage.htm>

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS

[The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the profile. Entries under "Wind erodibility group" apply only to the surface layer. Absence of indicates that data were not available or were not estimated]

Soil name and map symbol	Depth	Clay <2mm	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors	
								K	T
	In	Pot	In/hr	In/in	pH	Mmhos/cm			
Ad----- Adelino	0-10	20-35	0.2-2.0	0.15-0.20	7.9-8.4	<2	Moderate-----	0.28	5
	10-28	20-35	0.6-2.0	0.14-0.18	7.9-9.0	<2	Moderate-----	0.43	
	28-60	15-25	0.6-6.0	0.11-0.16	7.9-9.0	<2	Low-----	0.43	
Ae----- Adelino	0-5	20-35	0.2-2.0	0.15-0.20	7.9-8.4	<2	Moderate-----	0.28	5
	5-27	20-35	0.6-2.0	0.14-0.18	7.9-9.0	<2	Moderate-----	0.43	
	27-60	15-25	0.6-6.0	0.11-0.16	7.9-9.0	<2	Low-----	0.43	
AF*:									
Aftaden-----	0-2	4-14	6.0-20	0.06-0.08	6.6-7.3	<2	Low-----	0.17	1
	2-18	8-18	2.0-6.0	0.08-0.13	6.6-7.8	<2	Low-----	0.24	
	18	---	---	---	---	---	-----	---	
Rock outcrop.									
Onite-----	0-5	5-10	6.0-20	0.06-0.10	7.4-7.8	<2	Low-----	0.17	5
	5-18	10-15	2.0-6.0	0.07-0.12	7.4-8.4	<2	Low-----	0.24	
	18-60	5-15	2.0-20	0.06-0.12	7.9-8.4	<2	Low-----	0.24	



Thank You

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