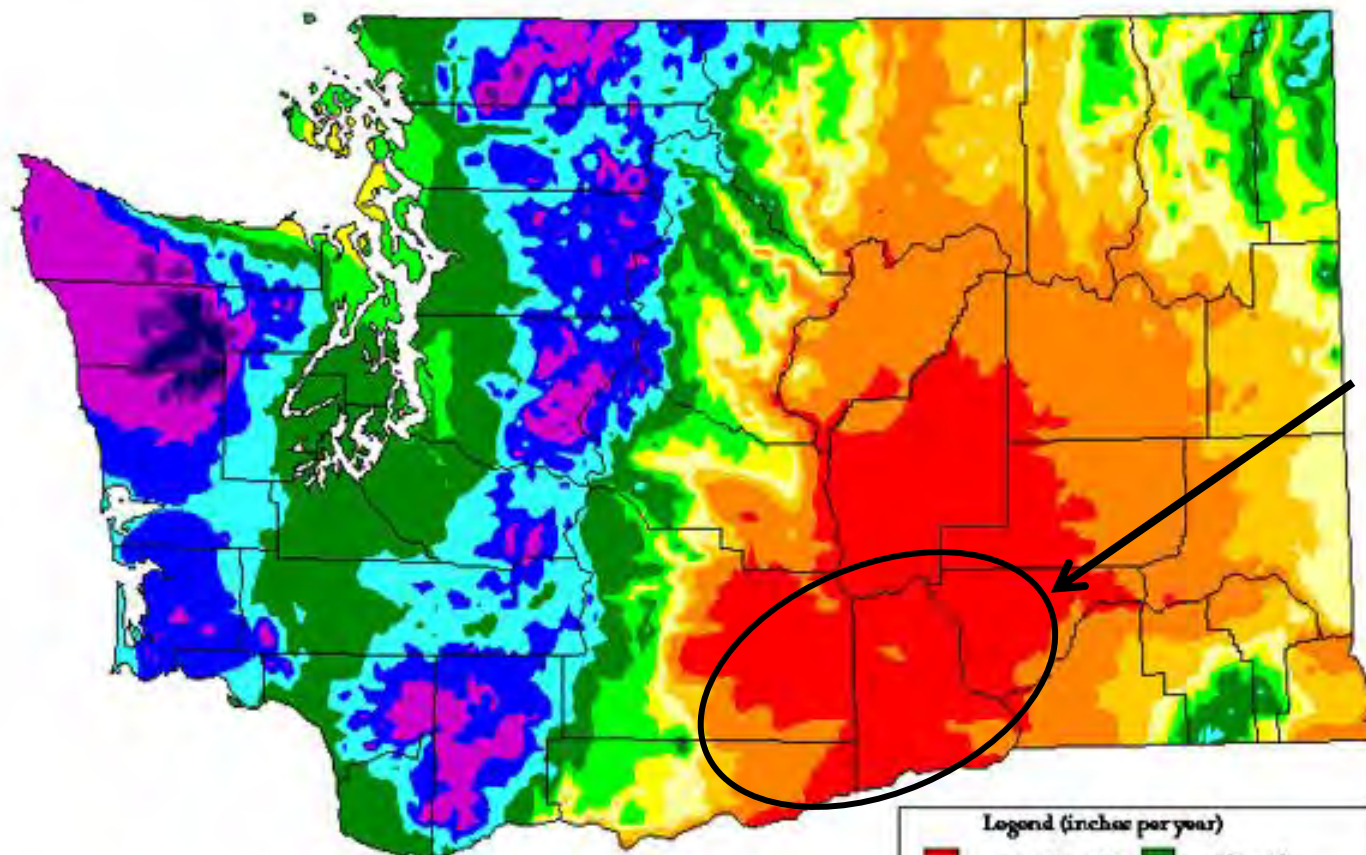


# **Peach Irrigation During the Dry Seasons**

***Hemant Gohil, Ph.D.***

*Gloucester County Agricultural Agent  
Co-operative Extension of Rutgers University*

# Annual precipitation in Washington State

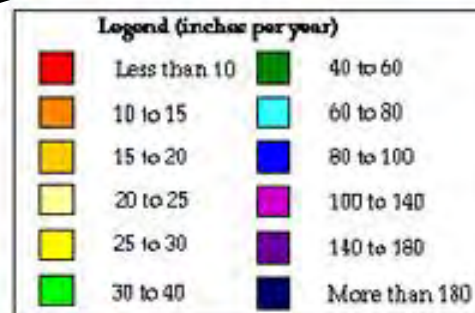


The largest and  
premium  
quality apple  
growing region

Average Annual Precipitation

Washington

Period: 1961-1990 Units: inches



# Water affects peach tree and fruit development

- Greater wood structure, potential fruitfulness and fruit sizing
- Replenishing the water lost due to ET
- Fruit gains up to 70% of their final volume during the last 30 days on the tree.
- Less water during this stage of development means smaller fruits and loss in size is irreversible

When to Irrigate  
(depends on water stress)



How much to Irrigate  
(soil type, irrigation system, age of tree)



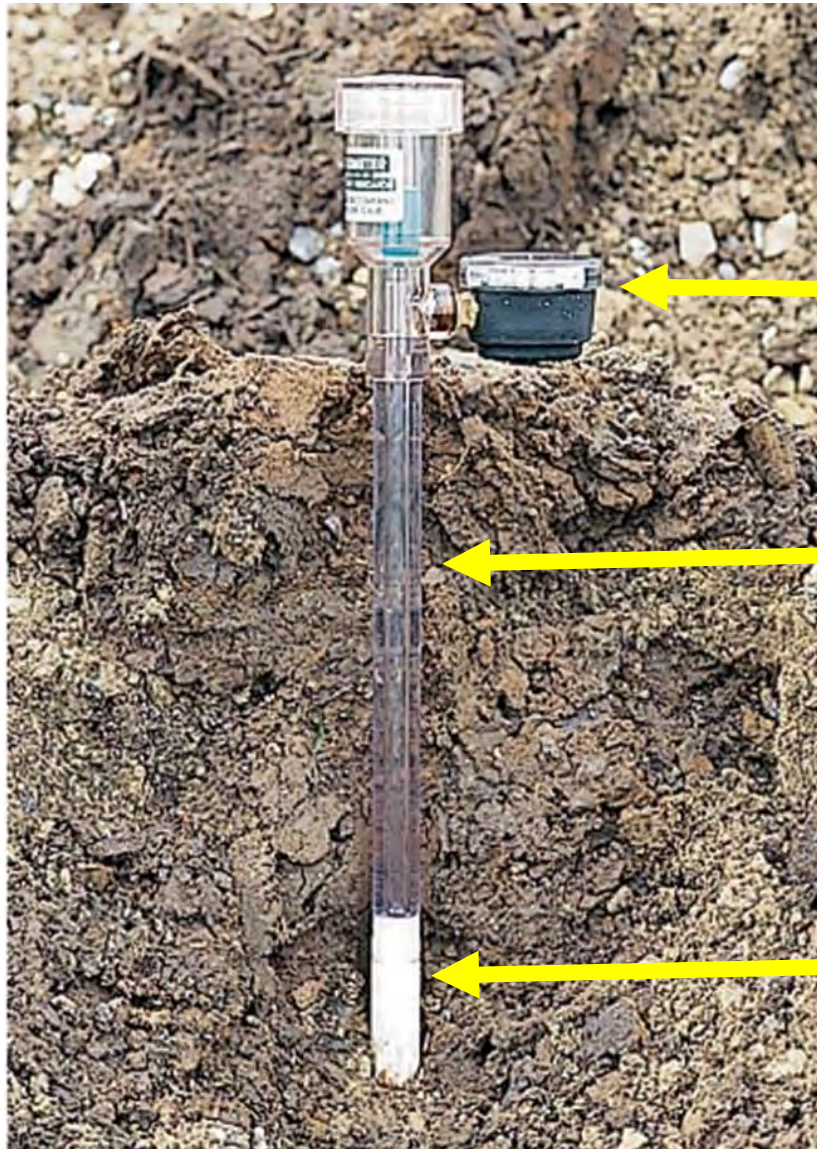
How long to Irrigate  
(irrigation system and soil type)

# Approaches to estimate water stress

- Feel and appearance based
- Soil based (e.g. Tensiometer, resistance)
- Plant based (e.g. Pressure chamber)
- Irrigation model based (e.g. NEWA)



# Soil Tensiometer indicates water status from the soil's point of view

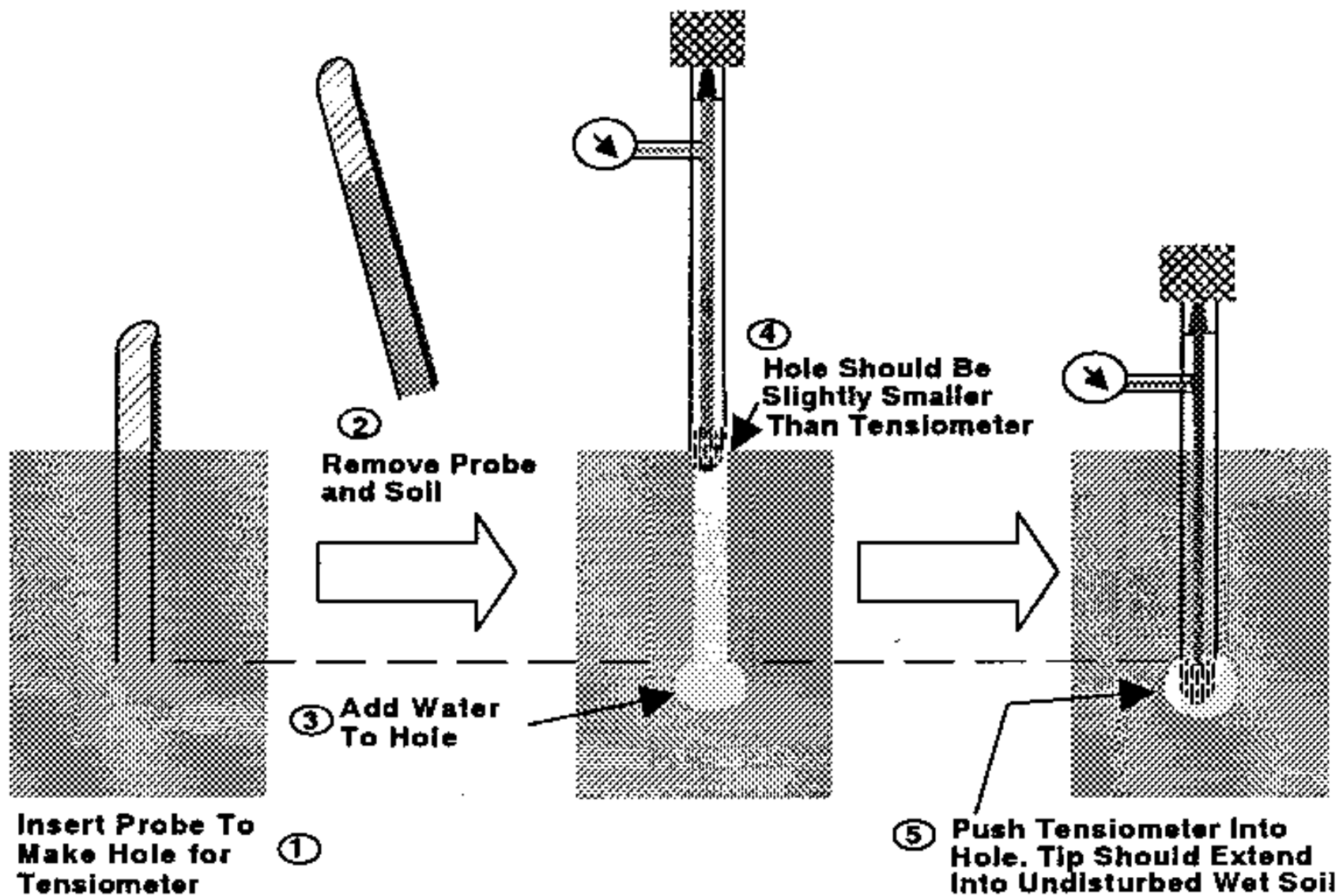


Vacuum gauge

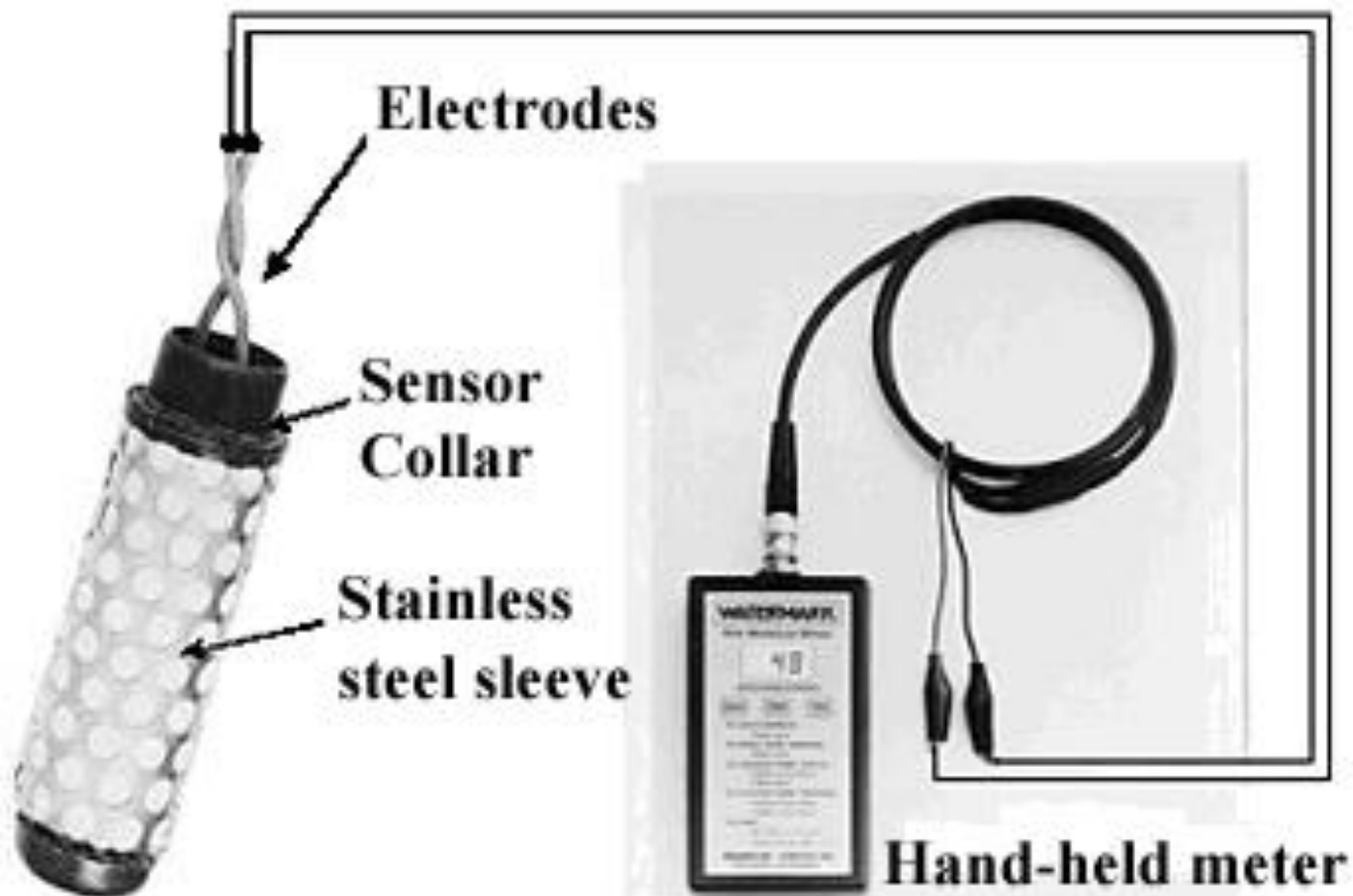
Plexiglass tube

Porous ceramic tip

# Installation of Tensiometer



# Electrical resistance blocks





# Soil sensor reading and their meanings

Reading (centibars)	Soil water status	Interpretation
0-10    *Cbr	Saturated	No Stress. Water should be drained.
10-20    Cbr	Field capacity	No Stress. No Irrigation needed.
30-70    Cbr	Limited	Mild-moderate stress. Irrigate depending on soil type.
>70    Cbr	Too dry soil	High-severe stress. Irrigate to Field Capacity.

# Begin Irrigation at 50% moisture depletion

Soil Type	Apprx. centibars reading at 50% moisture depletion
Sand	20 Cbar
Loamy Sand	25 Cbar
Sandy Loam	40 Cbar
Loam	65 Cbar
Silt Loam	90 Cbar

# Challenges to soil based sensors

- Manual, requires regular visits
- Regular maintenance (Tensiometer)
  - Purging the air bubble
  - Maintain the water level
  - Organic growth in the tube
  - Interpretation of number
- Annual replacement (resistance block)

# Use advanced soil sensors



newer Tensiometer with  
data logger



newer resistance  
sensors with data logger

# Pressure Chambers indicate water stress from plants point of view



pressure bomb



Pump-up chambers





# Stem Water Potential values and their meaning

## Leaf Water Potential

## Interpretation

less than -10 Bars	no stress
-10 to -12 Bars	mild stress
-12 to -14 Bars	moderate stress
-14 to -16 Bars	high stress
above -16 Bars	severe stress



Need transportation for pressure chamber..



# How much to Irrigate in dry season?

- Irrigation amount depends on environmental factors, spacing, stage of growth and an age of a peach tree.

Mature = 30-45 Gallon/tree/day

3 Year = 10-20

4 Year = 20-30

2 Year = 7-10

1 Year = 2- 5

- Monitoring the weather



## Cornell Apple ET Model

State:

New Jersey ▼

Weather station:

Elk Township ▼

Select Date:

07/12/2016

Map

Results

More info

### Apple ET Model for Elk Township

Change green tip date or tree density and click "Calculate" to recalculate results. Changing "Age of Orchard" will automatically recalculate table.

Green tip date	In row spacing	Between row spacing	Trees per acre	Age of orchard	Water balance
3/1/2016	20 feet	20 feet	109	Mature ▼	

### Apple Evapotranspiration Model Results

Date	Orchard ET (gallons)		Rainfall		Irrigation	Water Balance (gallons/acre)	
	per tree	per acre	inches	gallons/acre	gallons/acre	Daily	Cumulative
Jul 5	21.8	2381	0.12	2281	0	-100	-100
Jul 6	43.5	4743	0.00	0	0	-4743	-4843
Jul 7	36.9	4026	0.00	0	0	-4026	-8869
Jul 8	37.1	4049	0.00	0	0	-4049	-12918
Jul 9	7.0	759	0.04	760	0	1	-12917
Jul 10	22.3	2433	0.00	0	0	-2433	-15350
Jul 11	37.9	4128	0.00	0	0	-4128	-19479
Jul 12	39.0	4256	0.00	0	0	-4256	-23734

The water use by fruit trees is amazingly similar between tree fruit species – University of California ANR



Table 1: Example of duration of irrigation in peach and apple orchard during the peak of the season

Age	Water requirement	Spacing	Hours based on emitters flow rate		Micro sprinkler flow rate
	Gallons Per Tree		1.0 GPH <b>x 4*</b>	2 GPH <b>x 4</b>	10 GPH <b>x 1</b>
Mature	30 - 40 G	20' x 20'	8 - 10	4 - 5	3 - 4
4	20 - 30 G		5 - 8	3 - 4	2 - 3
3	10 - 20 G		3 - 5	2 - 3	2 - 1
2	7 - 10 G		2 - 3	1 - 2	0.5 - 1
1	2 - 4 G		1 - 2	0.5 - 1	0.3 - 0.5
Mature	10 - 12 G	6' x 12'	1.0 GPH <b>x 2</b>	2 GPH <b>x 2</b>	5 GPH <b>x 1</b>
4	8 - 10 G		5 - 6	3 - 4	2 - 3
3	6 - 7 G		4 - 5	2 - 3	1.5 - 2
2	2 - 3 G		3 - 4	1 - 2	1 - 1.5
1	1 - 2 G		1 - 2	0.5 - 1	0.5
			0.5 - 1	0.5	0.5

\* Number of emitters

Application rates should be based on soil type

Soil Type	Maxi application rates to avoid run-off or deep percolation loses.
Sand	1.0"/hour
Loamy Sand	0.7"/hour
Sandy Loam	0.5"/hour
Loam	0.4"/hour
Silt Loam	0.3"/hour

# Know you soil profile

soilweb

All

Shopping

News

Maps

Videos

About 88,400 results (0.43 seconds)

SoilWeb: An Online Soil Survey Browser

<https://casoilresource.lawr.ucdavis.edu/gmap/>

Welcome. This interactive map allows you to explore throughout most of the U.S. It is compatible with sma

California Soil Resource Lab :: SoilWeb

<https://casoilresource.lawr.ucdavis.edu/soilweb->

SoilWeb products can be used to access USDA-NCSS the United States. Please choose an interface to Soil

Web Soil Survey - Home

<https://websoilsurvey.nrcs.usda.gov/>

The Natural Resources Conservation Service is the F American people to conserve and sustain natural ...

Soils · Official Soil Series Descriptions · Geospatial D

SoilWeb for the iPhone on the App Store

<https://itunes.apple.com/us/app/soilweb-for-the->

★★★★★

Rating: 3 - 40 reviews - Free - iOS

Jun 14, 2010 - GPS based, real-time access to USDA- This application retrieves graphical summaries of soil

SoilWeb - Android Apps on Google Play

<https://play.google.com/store/apps/details?id=c>

★★★★★

Rating: 4 - 166 votes - Free

GPS based, real-time access to USDA-NRCS soil surv application retrieves graphical summaries of soil type

Menu

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Map Settings

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HbmB

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Map Unit Name: **Aura sandy loam, 2 to 5 percent slopes** Symbol: **AugB**

Component Name: **Aura**

Component Key: 12162437

[Soil Data Explorer](#) | [Series Extent Explorer](#)

[Official Series Description](#)

Soil Profiles

Typical Profile

Org. Matter

Clay

Sand ? >

Ksat

pH

Kr Factor

EC

SAR

CaCO<sub>3</sub>

Gypsum

CEC @ pH7

Linear Ext.

Depth (cm)

0

50

100

150

200

250

300

350

400

450

500

550

600

650

700

750

800

850

900

950

1000

0

20

40

60

80

100

Sand (%)

View Source Data

Soil Taxonomy

Land Classification

Hydraulic and Erosion Ratings

Soil Suitability Ratings

# Follow soil moisture conservation practices in dry season

- Fertilize lightly
- Shoot thin heavily
- Reduce weed growth and active cover crop
- Check the efficiency of irrigation systems

# Thanks

**Dr. Daniel Ward.**