





Landscape
Irrigation Water Management
Challenges and Techniques

WASHINGTON STATE UNIVERSITY
EXTENSION

irrigation scheduler mobile

Soil Water Dashboard

Field:

N Pod Pasture, 2014; Grass (Pasture)

This Morning's Soil Water Deficit:	0.9 in. or 5.4 hrs
Today's Irrigation:	0.00 hrs
I Irrigated Today: ☐	hrs

Save

Green is good. Crops increasingly stressed below green.

Dashboard

Daily Budget Table

Soil Water Chart

More Charts


WATERMARK
199


SN:83147


100
FEDERAL RESERVE NOTE
AE 77665544 B
E5
THE UNITED STATES OF AMERICA
100
AE 77665544 B
THIS NOTE IS LEGAL TENDER FOR ALL DEBTS, PUBLIC AND PRIVATE
SERIES 1996
100
FRANKLIN
100
ONE HUNDRED DOLLARS


AUTO
SET CLOCK
START TIME
HOW LONG
HOW OFTEN
OFF


ESP-LX MODULAR

What information do you have?


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100
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Benefits

of water management


We live in a desert.
Irrigation Uses *A LOT* of Water.

Benefits


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SERIES 1996
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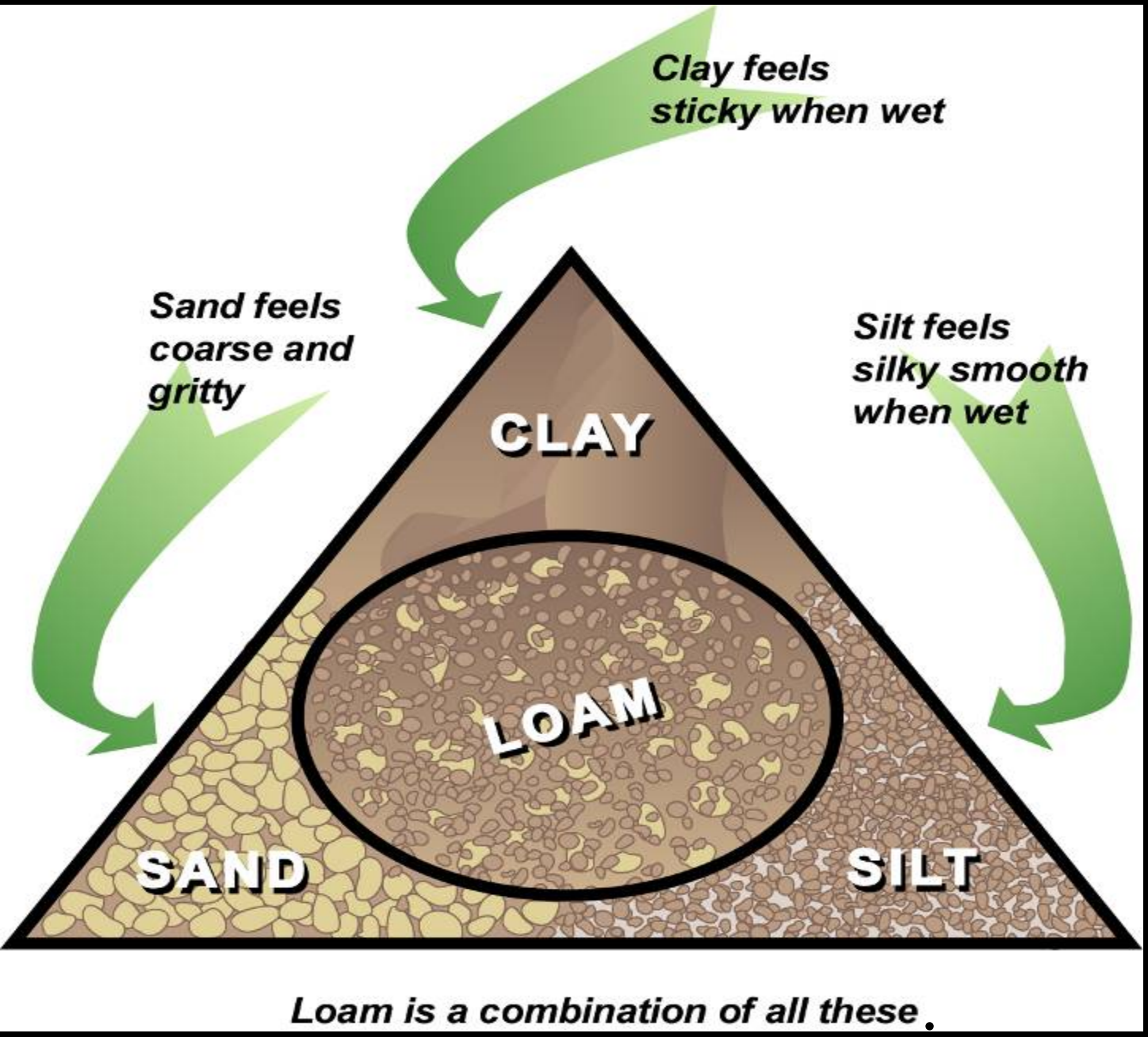
ONE HUNDRED DOLLARS

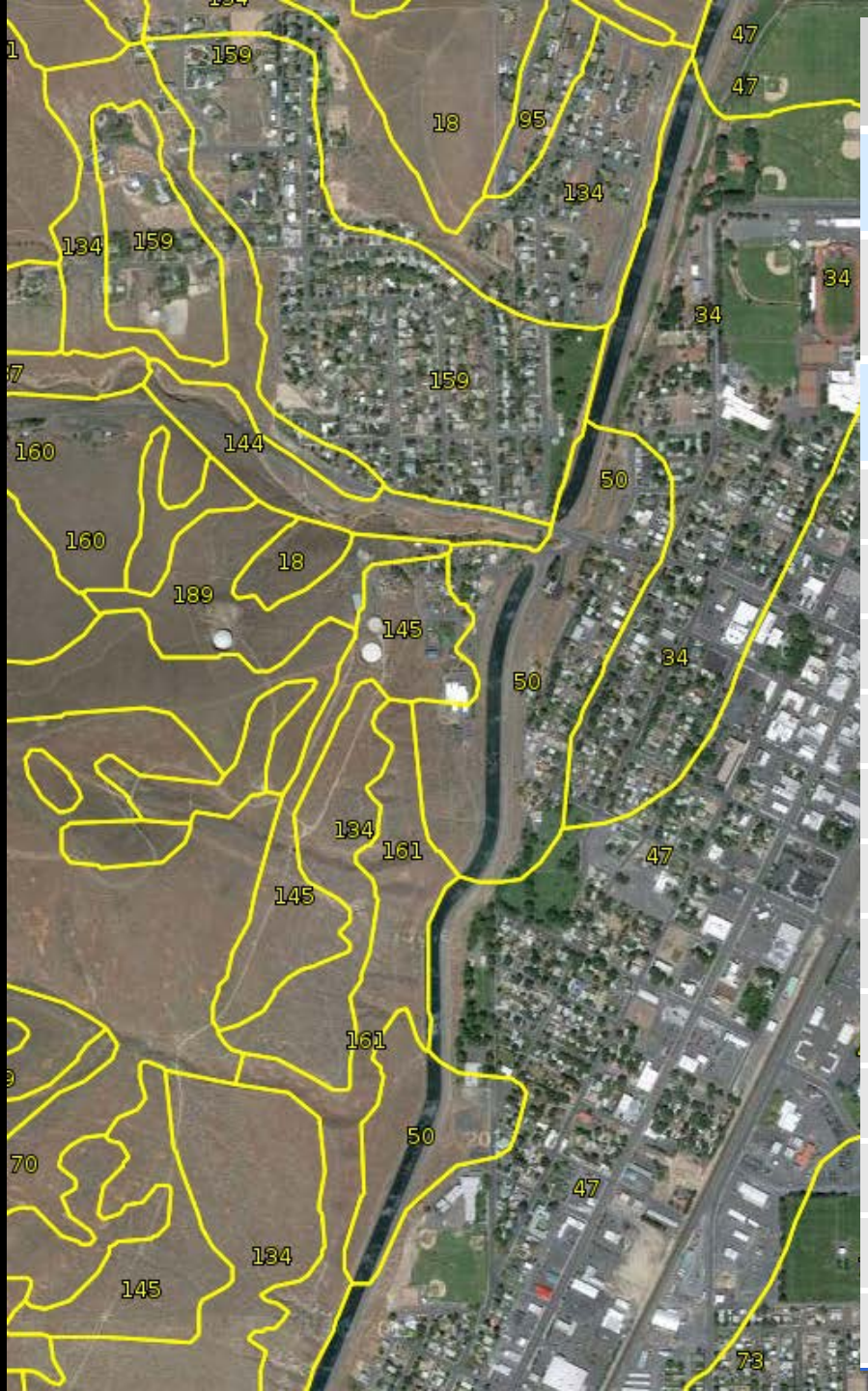
Soil-Water-Plant relationships


Soil



Soil texture

How does it feel in your hand?



Map Unit Name: ***Cleman very fine sandy loam*** Symbol: ***34***

▲ Map Unit Composition

100% - ***Cleman***
Geomorphic Position: *alluvial flats*

▲ Map Unit Data

Map Unit Key: *68807*

Type: *Consociation* ?

Farmland Class: *Prime farmland if irrigated*

Available Water Storage (0-100cm): *14.14 cm*

Max Flood Freq: *None*

Drainage Class (Dominant Condition): *Well drained* ?

Drainage Class (Wettest Component): *Well drained* ?

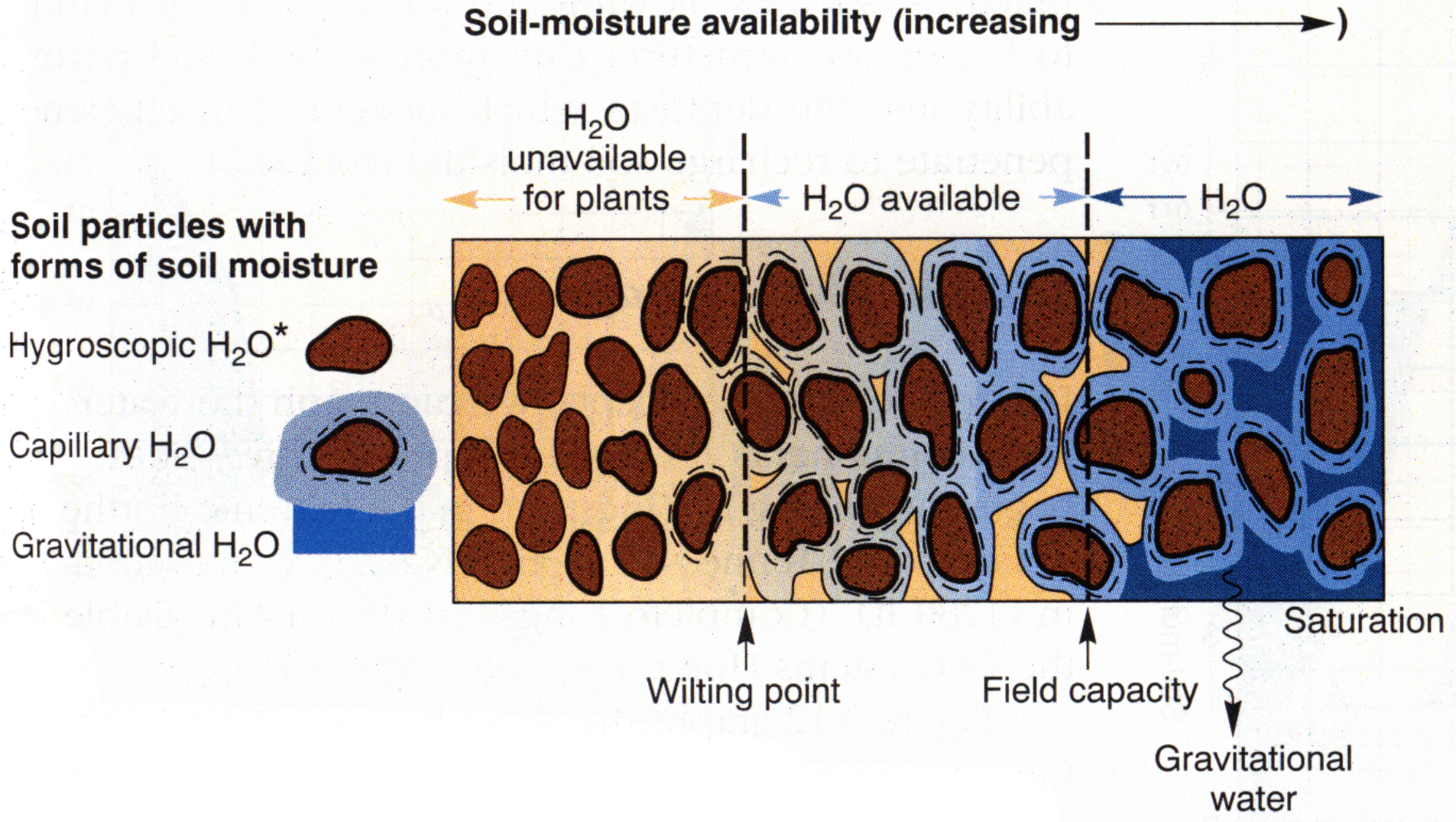
Proportion of Hydric Soils: *0%* ?

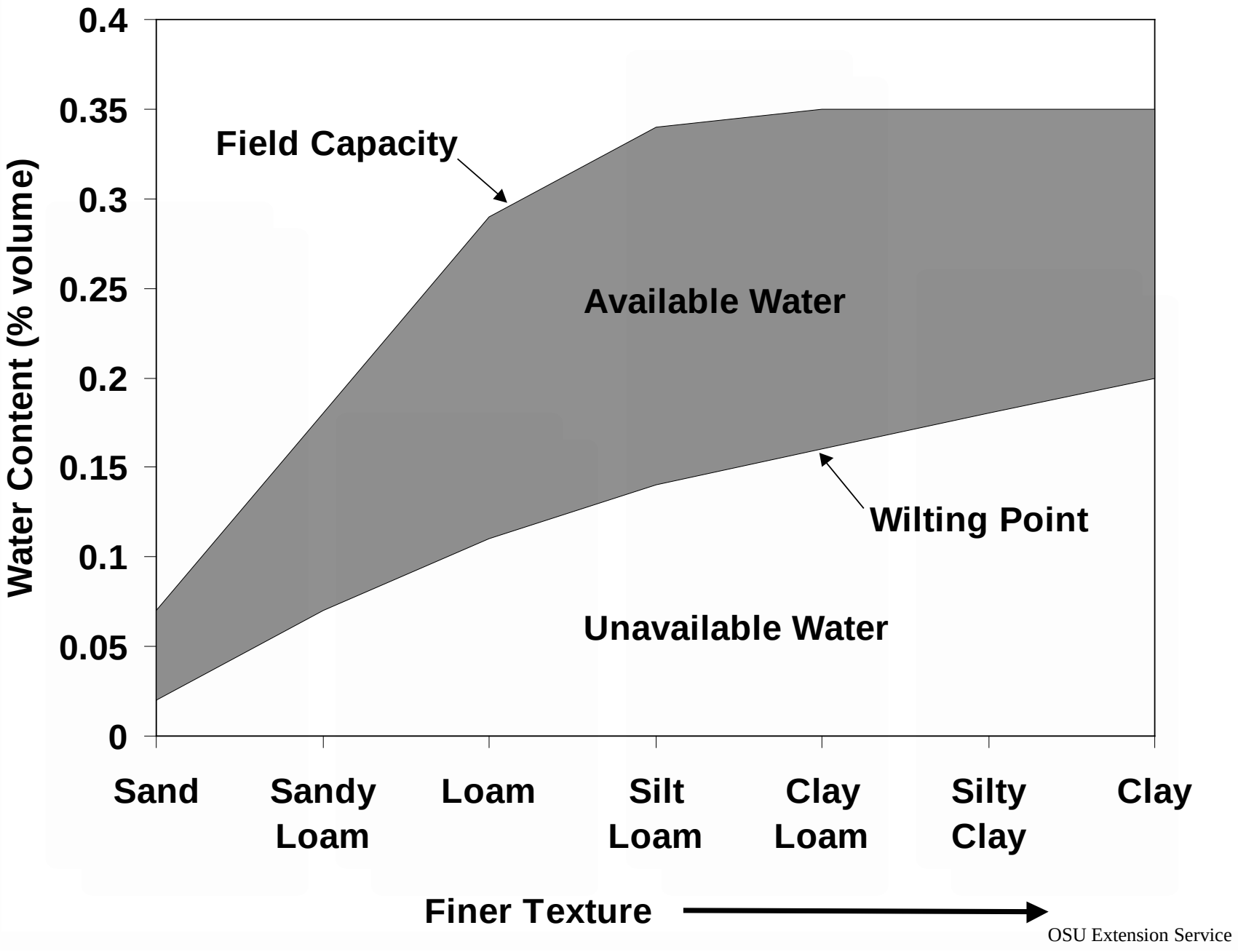
Min. Water Table Depth (Annual): *n/a*

Min. Water Table Depth (April-June): *n/a*

Min. Bedrock Depth: *n/a*

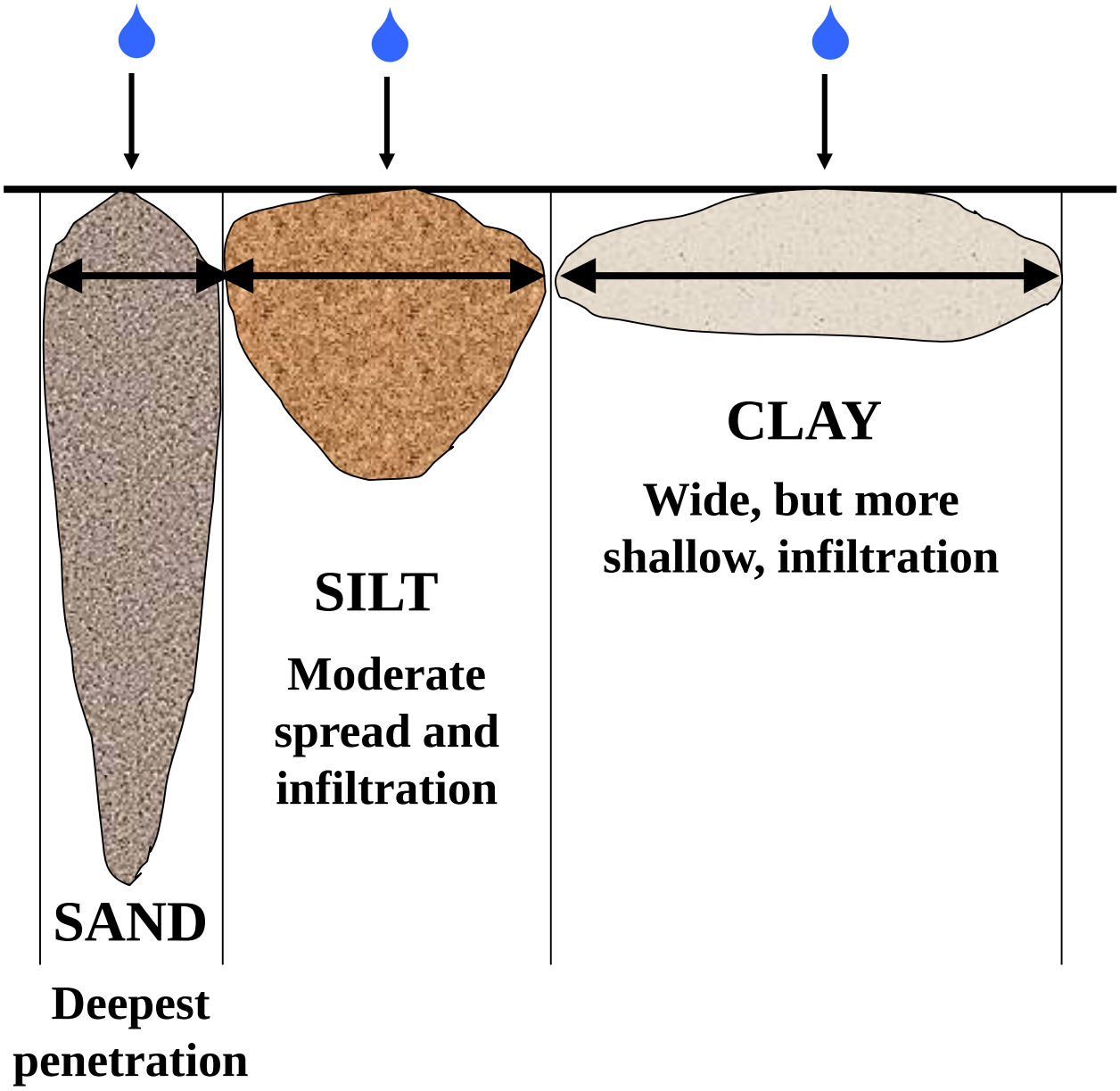
Survey Metadata: *wa025 [NRCS Export: Sep 14 2015]*


Soil-moisture availability (increasing →)
H2O unavailable for plants
H2O available
H2O
Soil particles with forms of soil moisture
Hygroscopic H2O*
Capillary H2O
Gravitational H2O
Saturation
Wilting point
Field capacity
Gravitational water

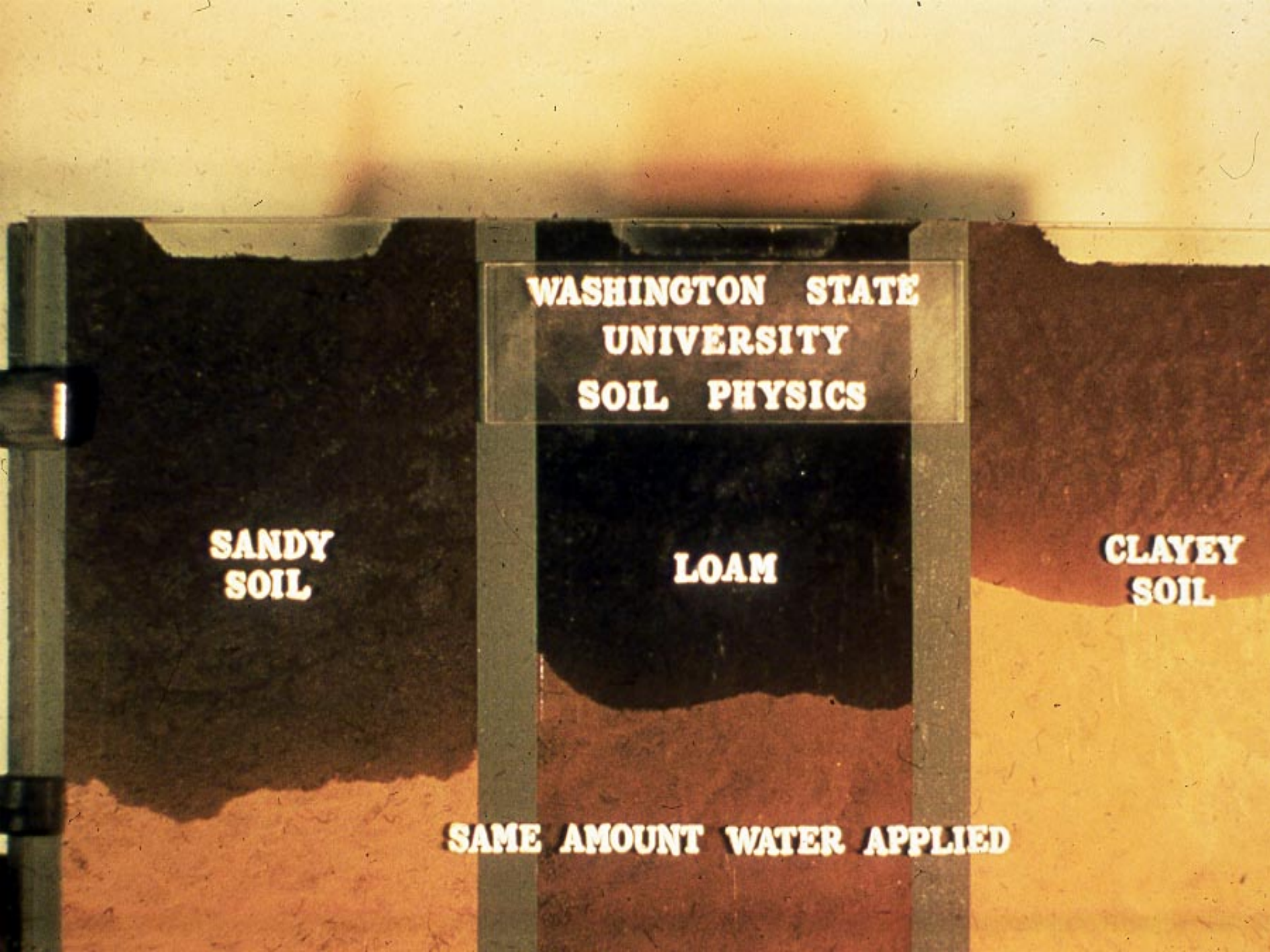


OSU Extension Service

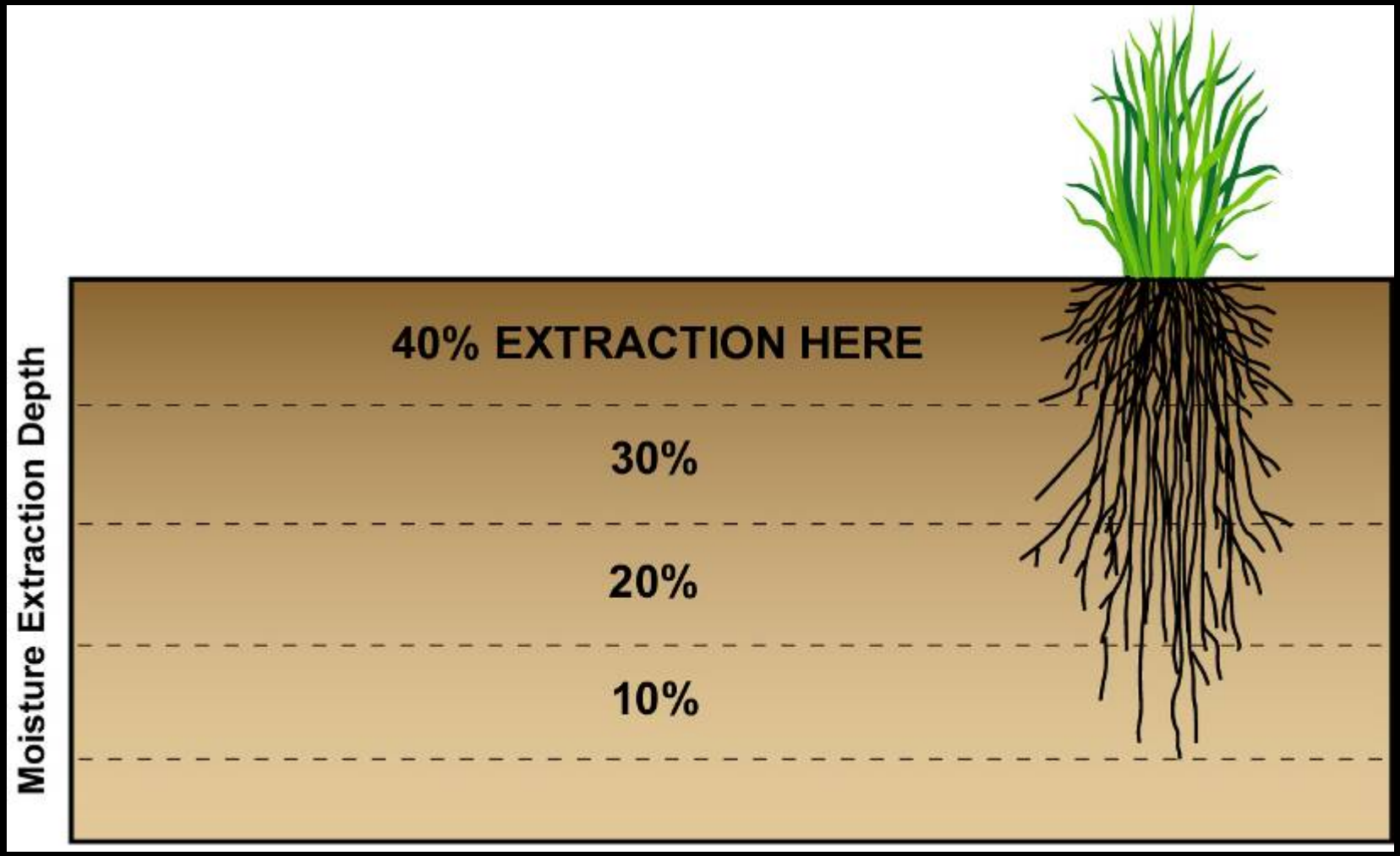
Textural Classes	Available Water Capacity in Inches/Foot of Depth
Coarse Sands	0.25 - 0.75
Fine Sands	0.75 - 1.00
Loamy Sands	1.10 - 1.20
Sandy Loams	1.25 - 1.40
Fine Sandy Loam	1.50 - 2.00
Silt Loams	2.00 - 2.50
Silty Clay Loams	1.80 - 2.00
Silty Clay	1.50 - 1.70
Clay	1.20 - 1.50

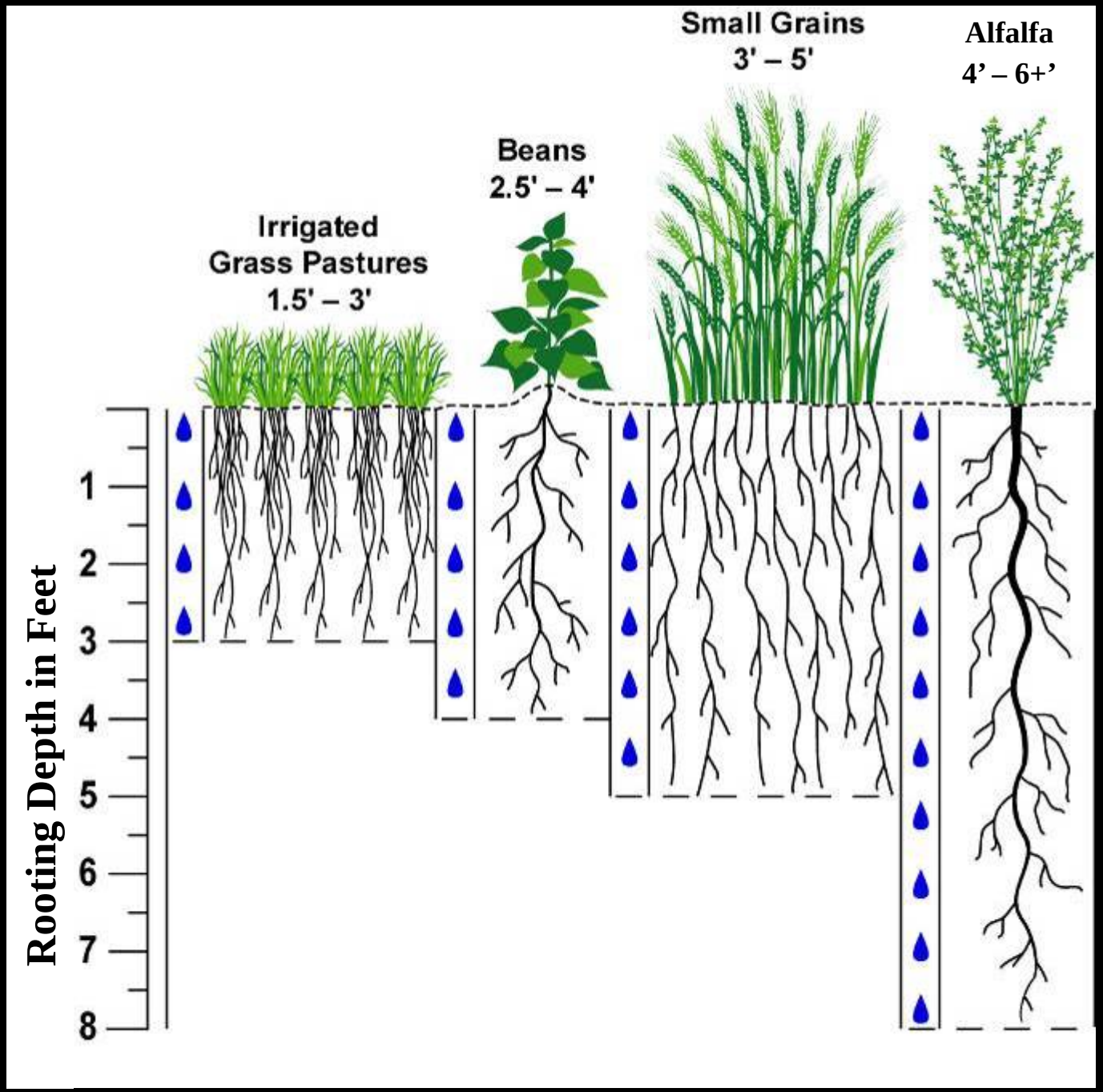


Water spreads differently in different soil textures


WASHINGTON STATE
UNIVERSITY
SOIL PHYSICS
SANDY
SOIL
LOAM
CLAYEY
SOIL
SAME AMOUNT WATER APPLIED

Where do plants get their water from in the root zone?





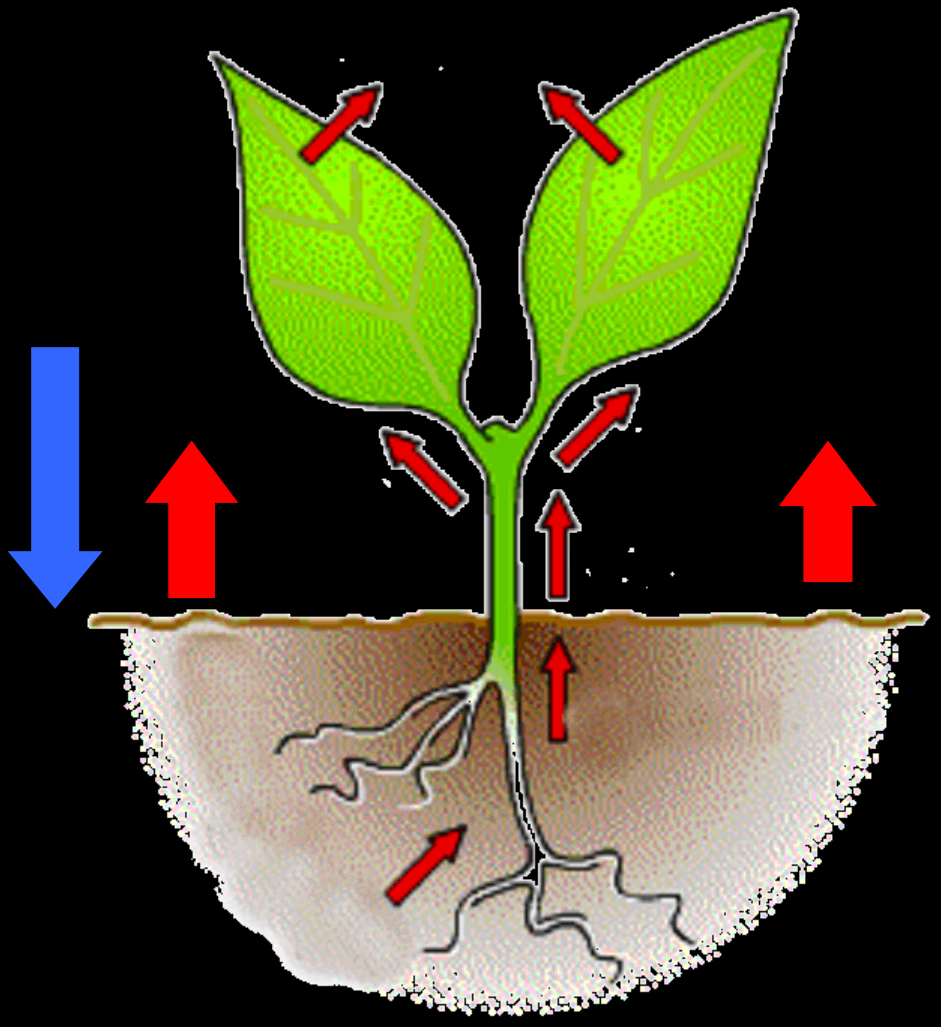
Plant rooting depths vary

PLANT FEEDER ROOT DEPTHS*

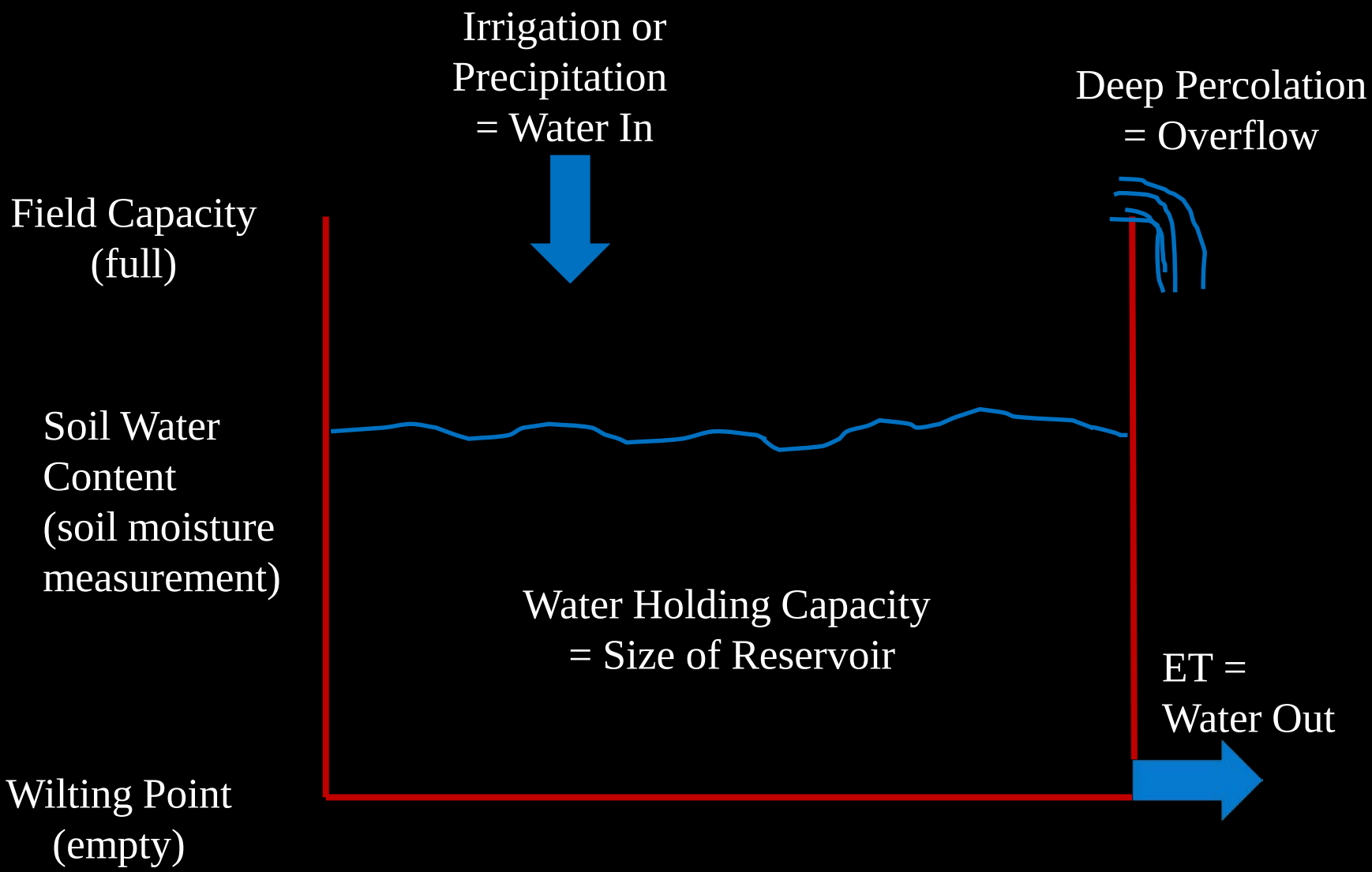
CROP	FEEDER ROOT DEPTH	CROP	FEEDER ROOT DEPTH
ALFALFA	3 to 6 feet	NUTS	3 to 6 feet
BEANS	2 feet	ONIONS	1 1/2 feet
BEETS	2 to 3 feet	ORCHARD	3 to 5 feet
BERRIES (Cane)	3 feet	PASTURE (Grasses)	1 1/2 feet
CABBAGE	1 1/2 to 3 feet	PASTURE (w/Clover)	2 feet
CARROTS	"1 1/2" to 2 feet	PEANUTS	2 feet
CORN	2 1/2 feet	PEAS	2 1/2 feet
COTTON	4 feet	POTATOES	2 feet
CUCUMBERS	1 1/2 feet	SOY BEANS	2 feet
GRAIN	2 to 2 1/2 feet	STRAWBERRIES	1 to 1 1/2 feet
GRAIN, SORGHUM	2 1/2 feet	SWEET POTATOES	3 feet
GRAPES	3 to 6 feet	TOBACCO	2 1/2 feet
LETTUCE	1 foot	TOMATOES	3 to 4 feet
MELONS	2 1/2 to 3 feet		

*Majority of Feeder Roots

ET



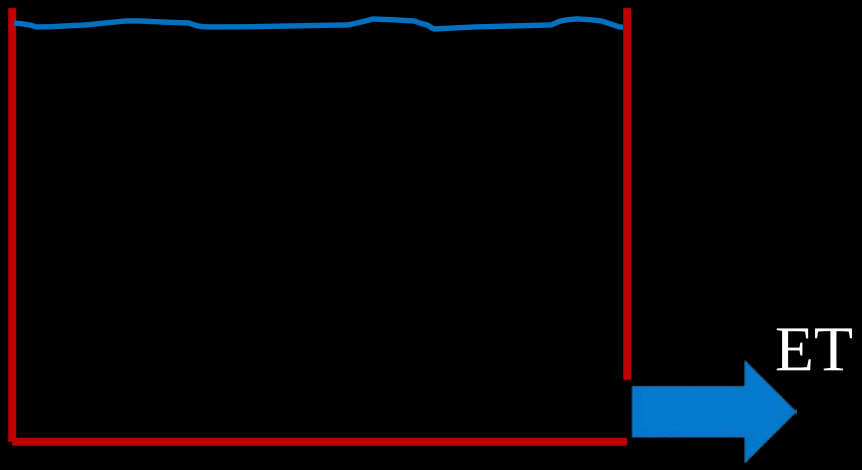
Soil is a Water & Nutrient Reservoir



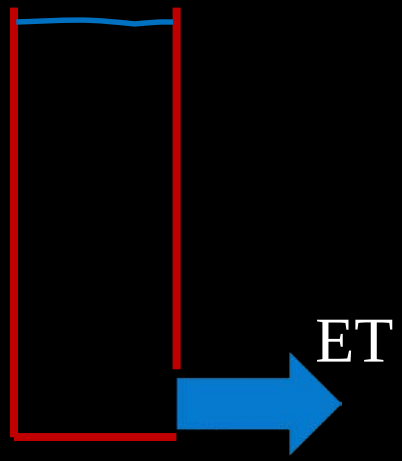
How much water can you store?

How much water can it hold? When will it be empty?

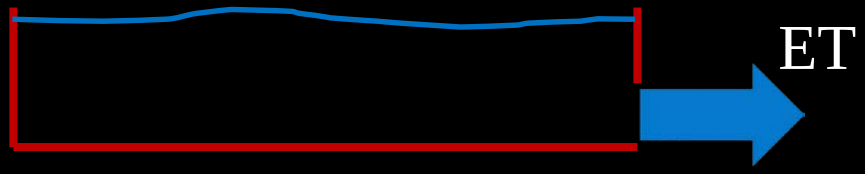
Deep Silt



Deep Sand



Shallow Silt

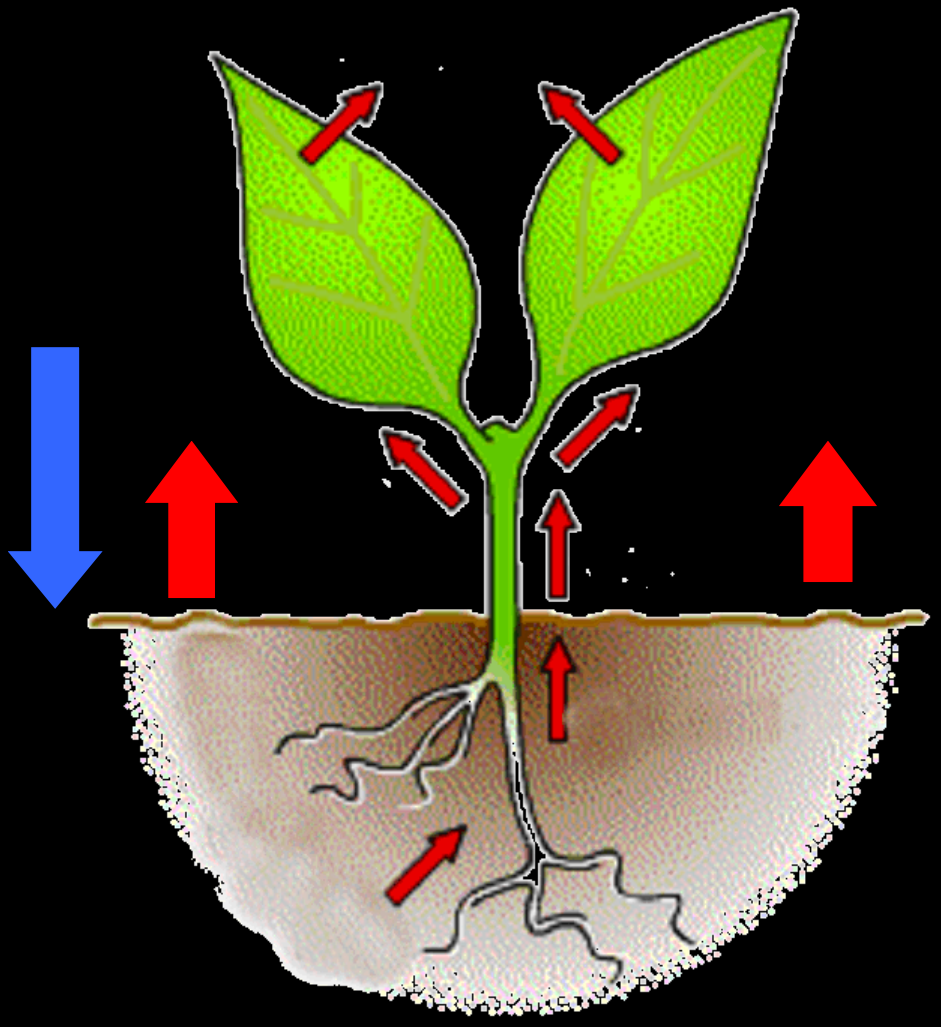


Shallow Sand

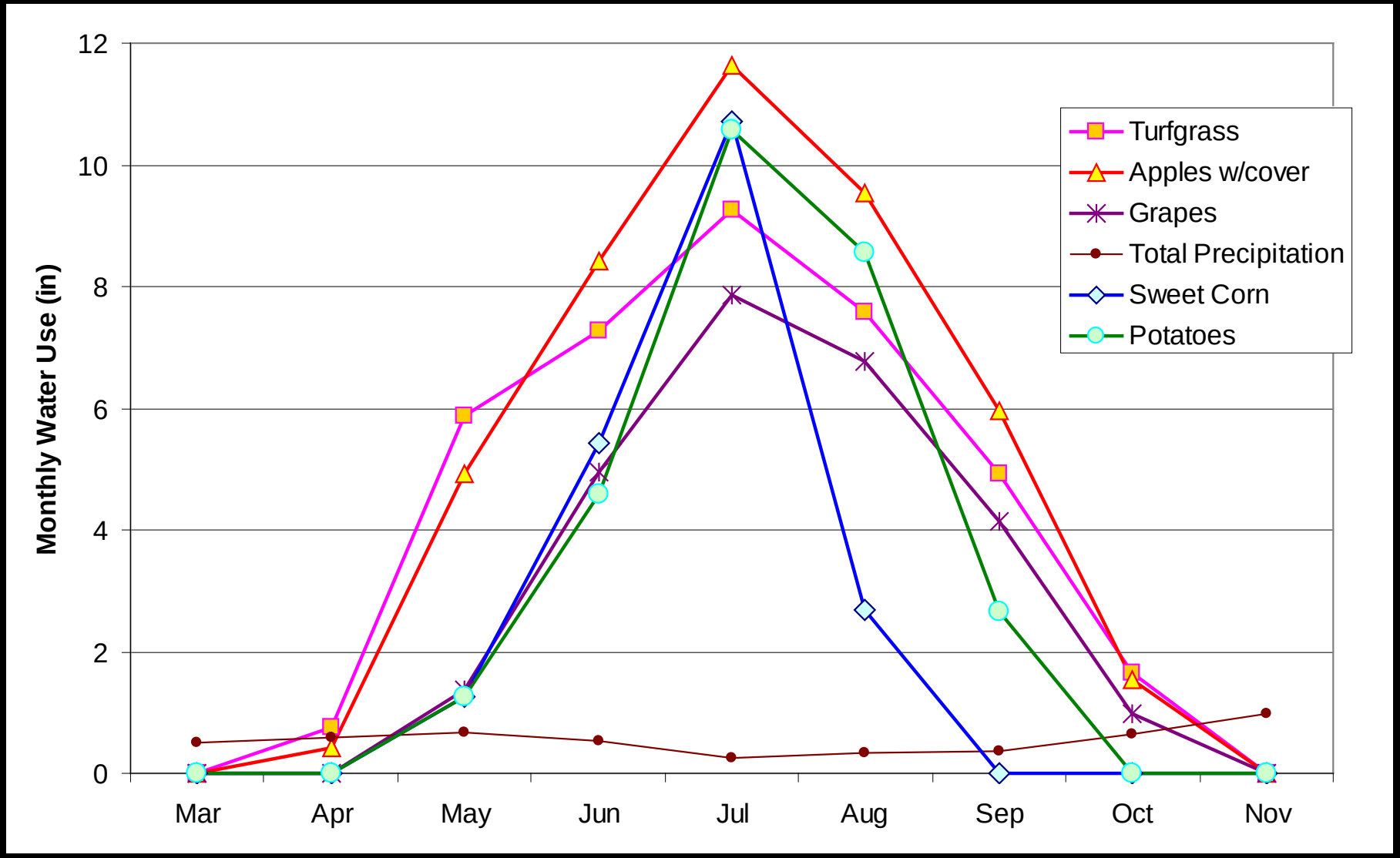
Water use

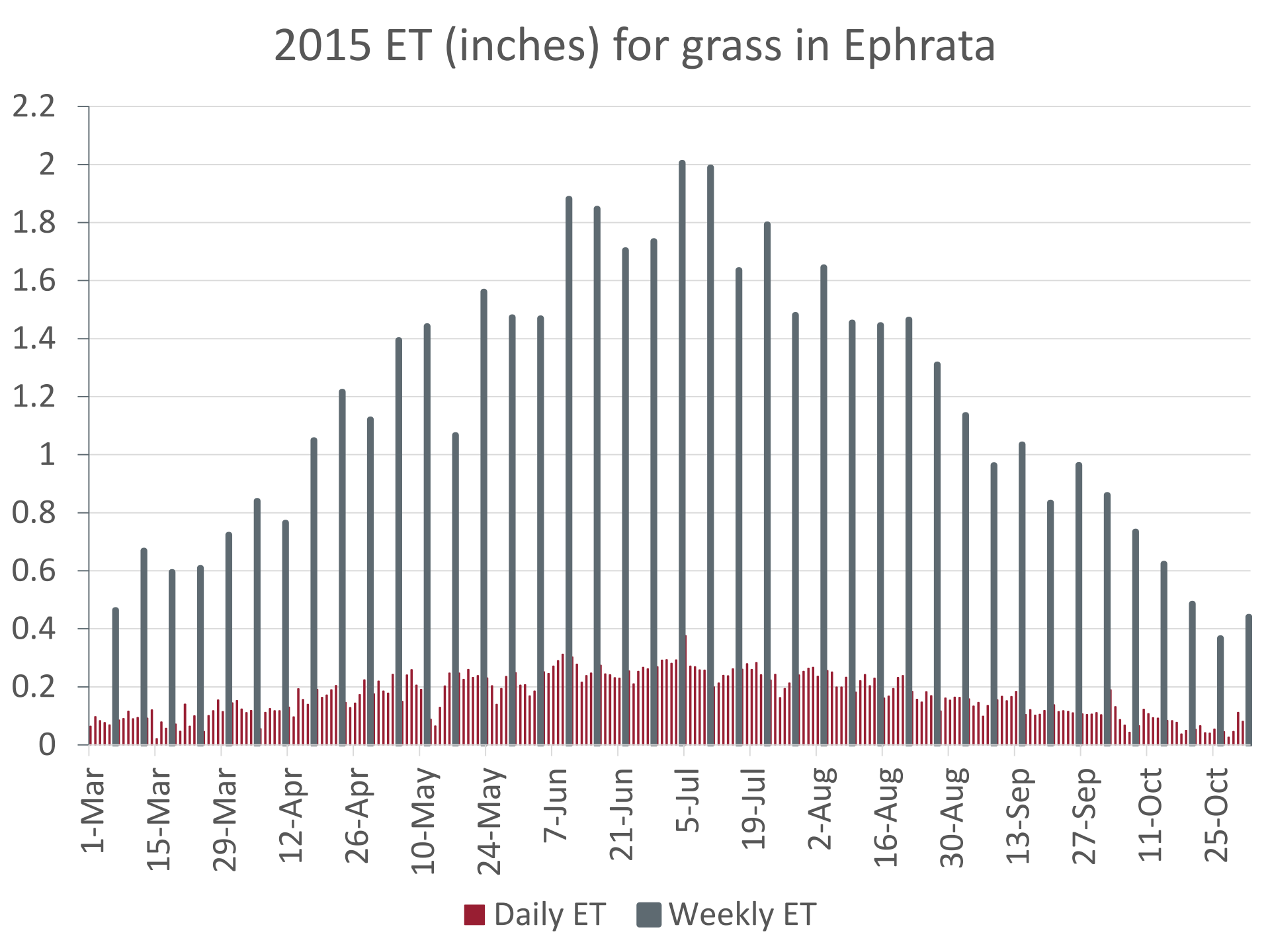
by your landscape

ET



Plant Water Use




2015 ET (inches) for grass in Ephrata
2.2
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
1-Mar
15-Mar
29-Mar
12-Apr
26-Apr
10-May
24-May
7-Jun
21-Jun
5-Jul
19-Jul
2-Aug
16-Aug
30-Aug
13-Sep
27-Sep
11-Oct
25-Oct
Daily ET
Weekly ET

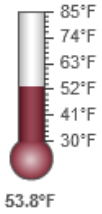
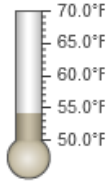
Weather.wsu.edu

Weather Dashboard

Select Station | Switch to Metric | Remove Ephrata

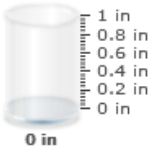
Ephrata

Ephrata, Grant County

Air Temperature, Windchill & Dewpoint		April 15, 2016 10:30 Wind Direction & Speed		8" Soil Temperature & Evapotranspiration	
	53.8°F↑ 10:30		South-southeast wind		54.3°F↓ 10:30
60-Min Avg:	52.2°F↑	15-Min Avg:	2.3 mph↓	24 Hours Ago:	56.9°F↓
24 Hours Ago:	49.2°F	60-Min Avg:	3.0 mph↑	Apr 2016 Avg:	59.4°F
		Apr 15 Avg*:	1.2 mph↓		
15-Min Windchill:	53.8°F↑	Apr 14 Avg:	3.5 mph	Apr 15 ETr*:	0.04 in↓
60-Min Windchill:	52.2°F	15-Min Gust:	5.3 mph↓	Apr 14 ETr:	0.12 in
		60-Min Gust:	7.1 mph↔		
15-Min Dewpoint:	37.7°F↓	Apr 15 Gust*:	7.1 mph↓	Apr 15 ETo*:	0.03 in↓
60-Min Dewpoint:	38.4°F	Apr 14 Gust:	14.6 mph	Apr 14 ETo:	0.10 in

	Apr 15*	Apr 14	Apr 2016*
Max	53.8°F↓	59.3°F↓	81.8°F
Time	10:30	16:15	Apr 08 17:30
Min	35.8°F↓	41.6°F↑	32.7°F
Time	06:15	08:15	Apr 06 06:30
Range	18.0°F	17.7°F	49.1°F

Rainfall

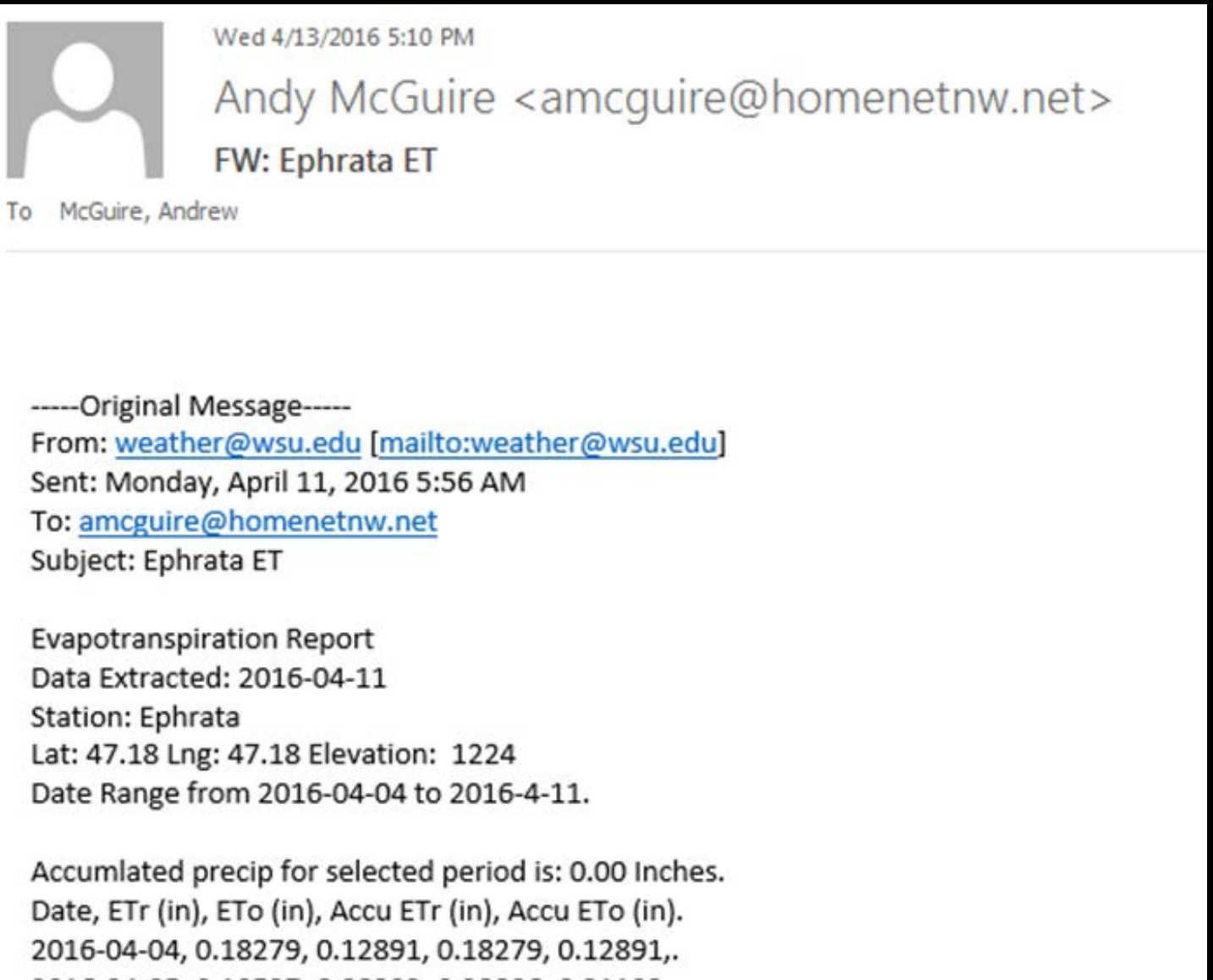


15-Min:	0.00 in↔
60-Min:	0.00 in↔
Apr 15*:	0.00 in↓
Apr 14:	0.08 in
Apr 2016*:	0.18 in
2016*:	3.74 in
Oct - Now*:	6.04 in

	Apr 15*	Apr 14	Apr 2016*
Max	59.2°F↓	61.0°F↓	68.1°F
Time	01:15	20:30	Apr 10 20:15
Min	54.3°F↓	56.9°F↑	50.1°F
Time	10:00	11:00	Apr 06 10:45
Range	4.9°F	4.1°F	18.0°F

Relative Humidity	Atmospheric Pressure	Solar Radiation

ET email to your home



Wed 4/13/2016 5:10 PM

Andy McGuire <amcguire@homenetnw.net>

FW: Ephrata ET

To McGuire, Andrew

-----Original Message-----
From: weather@wsu.edu [mailto:weather@wsu.edu]
Sent: Monday, April 11, 2016 5:56 AM
To: amcguire@homenetnw.net
Subject: Ephrata ET

Evapotranspiration Report
Data Extracted: 2016-04-11
Station: Ephrata
Lat: 47.18 Lng: 47.18 Elevation: 1224
Date Range from 2016-04-04 to 2016-4-11.

Accumlated precip for selected period is: 0.00 Inches.
Date, ETr (in), ETo (in), Accu ETr (in), Accu ETo (in).
2016-04-04, 0.18279, 0.12891, 0.18279, 0.12891,.

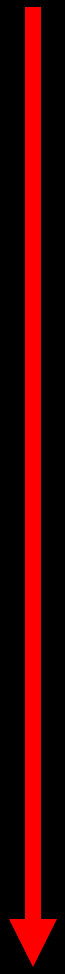
The Look-and-feel Method

USDA NRCS

Screwdriver method

Develop
a simple system

Levels of Irrigation Scheduling



- Same schedule all season / Guessing
- Based on watching plants and sprinkler system knowledge
- Based on ET (AgWeatherNet) and knowledge of application rates of sprinkler system
- + Soil moisture monitoring

Putting it all together…

1. Soil and plant information

Texture, root depth >> Available water capacity

Fine Sand

12” rooting depth

= 0.8” water

BUT, 100% depletion will stress plants

Use 50% in most situations = 0.4” water

Putting it all together…

1. Soil and plant information

   0.4” water

2. Water use information

   ET from monitoring

   Soil

   ET for week = 0.86” for grass

Need to irrigate!

The can method for measuring uniformity – a low-cost approach

Putting it all together…

1. Soil and plant information
   - 0.4” AWC
2. Water use information
   - ET = 0.86” for grass
3. Sprinkler run time
   - Average depth in cans: 0.8” in 2 hours
   - 0.4” per hour
   - Water once a week for a 50, 60, 70 min?

Days Between Lawn Irrigations

	Soil Type		
Month:	Sandy	Sandy Loam	Loam/Clay
April	4	6	7
May	3	5	6
June	2	4	5
July	2	3	5
August	3	4	5
September	4	5	7
October	5	8	11

Fine tune what you are doing…

- Reduce run time by 10%
- Observe landscape
- Reduce run time by 10%

Weather.wsu.edu

irrigation scheduler mobile

Soil Water Dashboard

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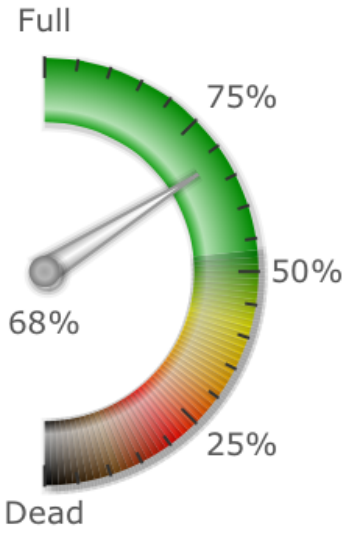
N Pod Pasture, 2014; Grass (Pasture)



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I Irrigated Today: ☐	hrs

Save

Green is good. Crops increasingly stressed below green.

Dashboard

Daily Budget Table

Soil Water Chart

More Charts

Sources of slides and information

- Soil texture: Casoilresource.lawr.ucdavis.edu/soilweb/
- WSU Ag Weather Net: http://weather.wsu.edu/
- Sources of some slides and information:
  - Troy Peters, WSU Irrigation Specialist, Prosser, WA
  - Got Water? OSU and U. of Nevada Extension from Living on the Land curricula.
  - Lori D. Palmquist, Irrigation Basics for Homeowners