Water Infilitration

STUKENHOLTZ LABORATORY INC.

1

Water moves by:

- Capillary Action
  - Adhesion
  - Cohesion
- Gravity

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2

Water moves by:

- Capillary Action
  - Adhesion
  - Cohesion
  - Dominates when soil is field capacity or less
- Gravity
  - Dominates when soil is saturated

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3

Capillary Action

- More Surface Area = More Capillary Action per Volume

Sand has low surface area / volume

Silt has high surface area / volume

Clay had very high surface area / volume

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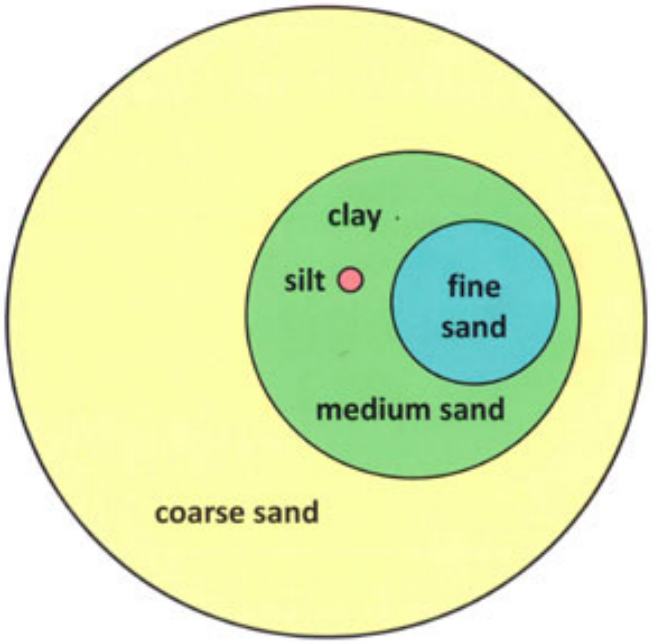
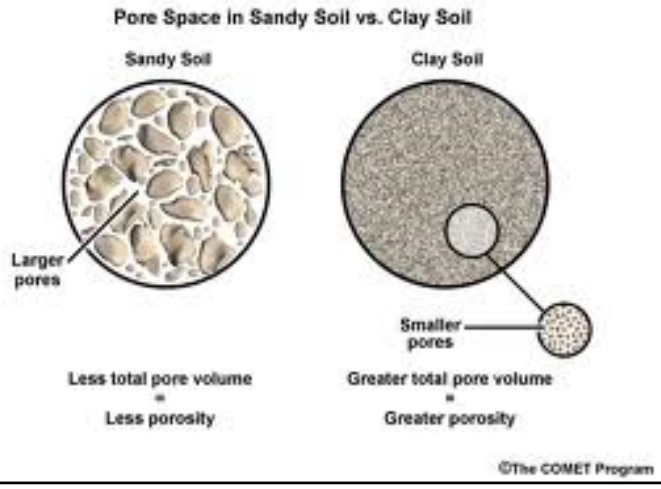
4



5

Pore Size / Space



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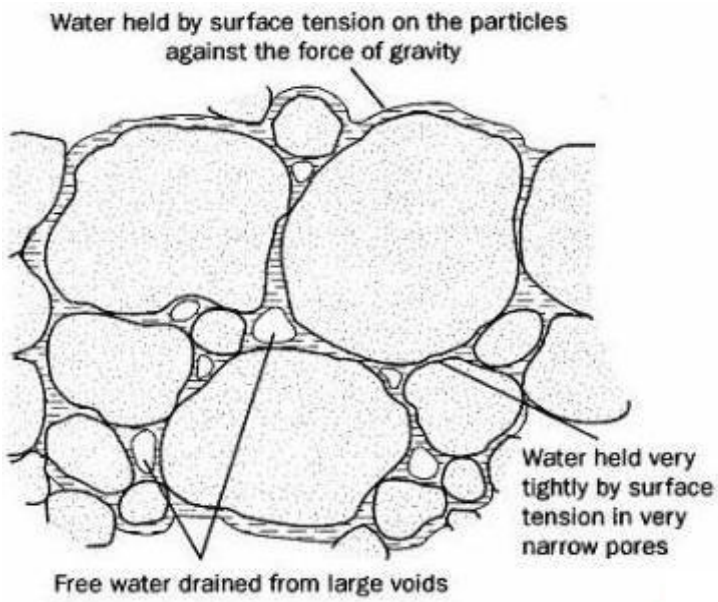
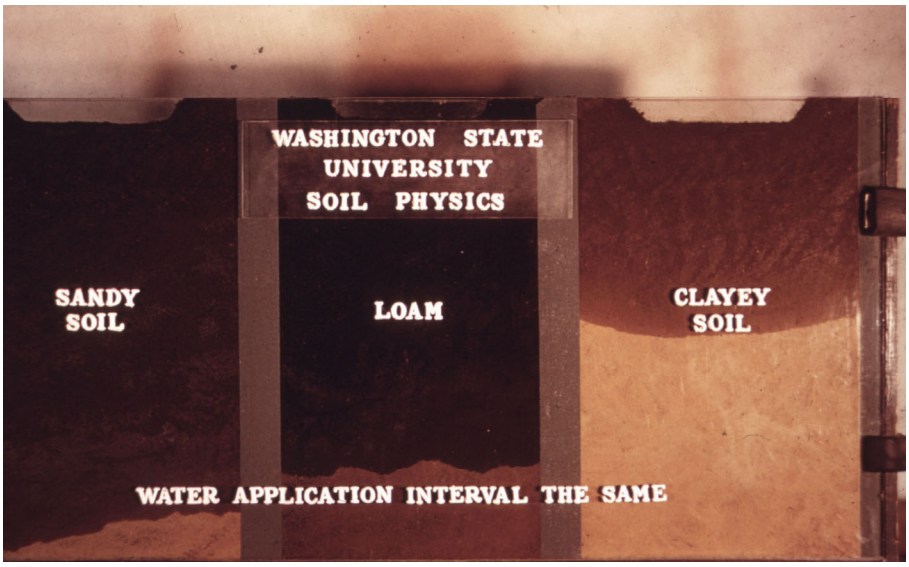
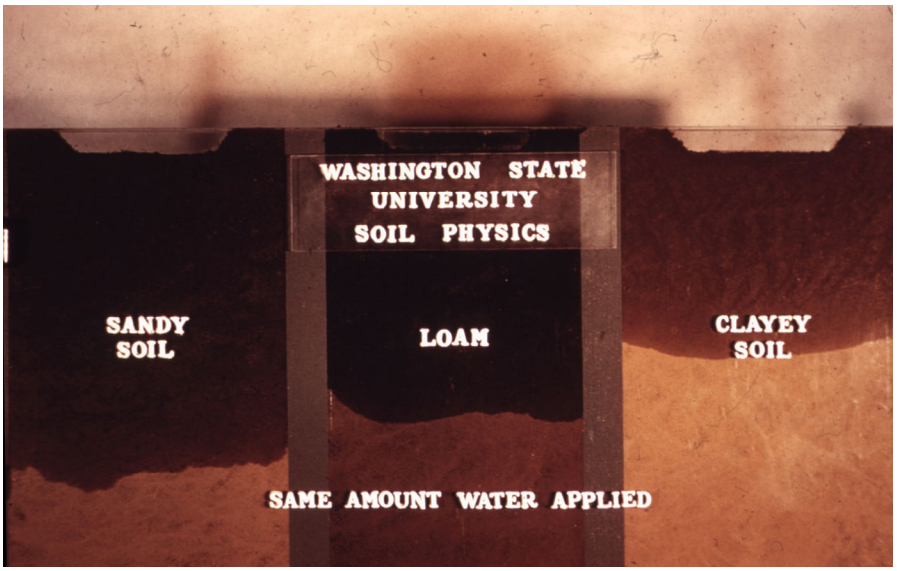

Water held by surface tension on the particles against the force of gravity
Water held very tightly by surface tension in very narrow pores
Free water drained from large voids

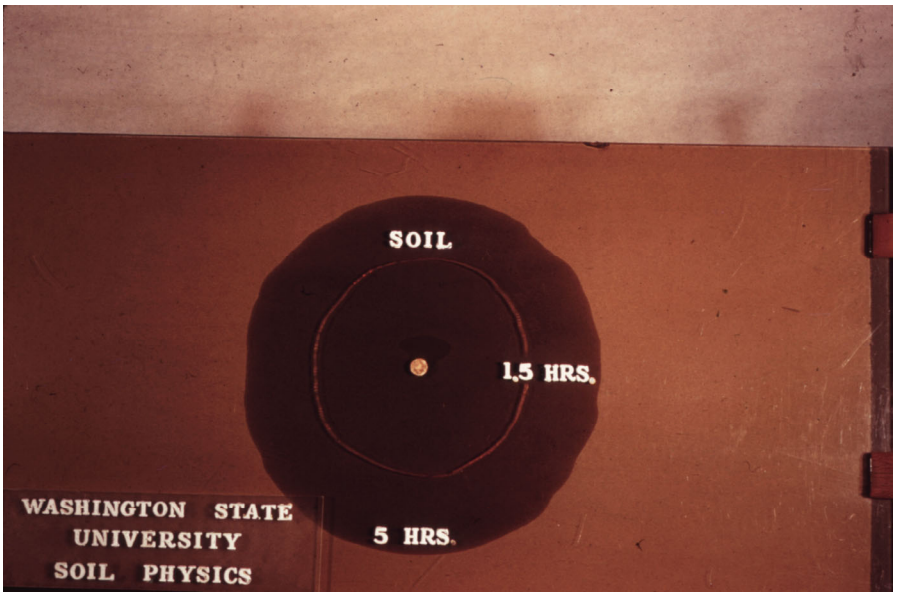
7


WASHINGTON STATE UNIVERSITY
SOIL PHYSICS
SANDY SOIL
LOAM
CLAYEY SOIL
WATER APPLICATION INTERVAL THE SAME

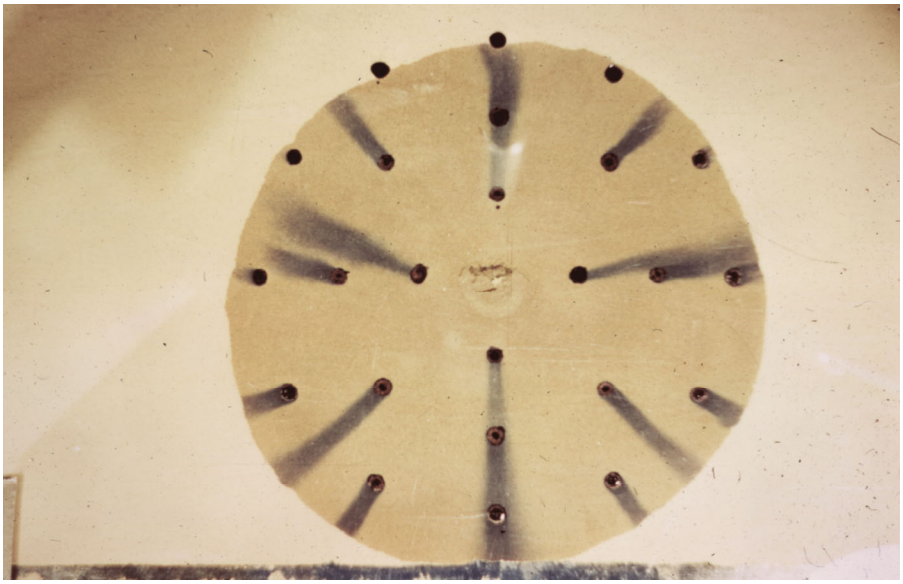
8


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

9


SOIL
1.5 HRS.
5 HRS.
WASHINGTON STATE
UNIVERSITY
SOIL PHYSICS

10



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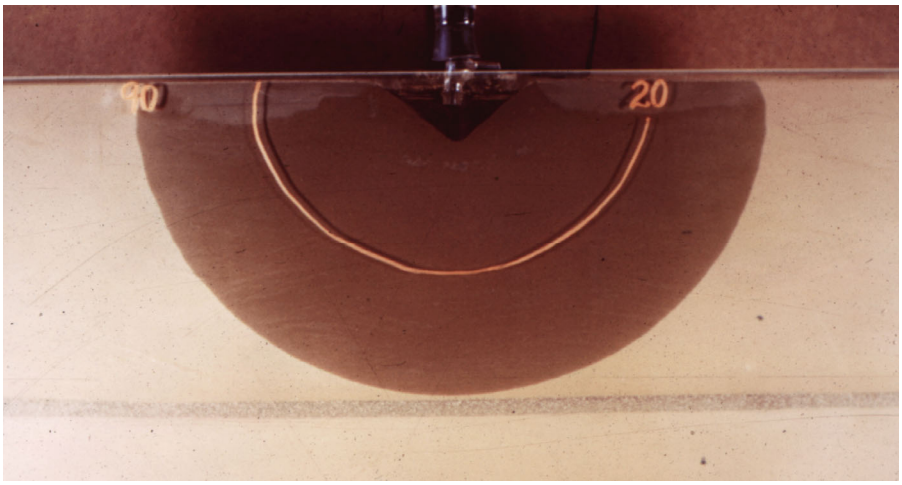

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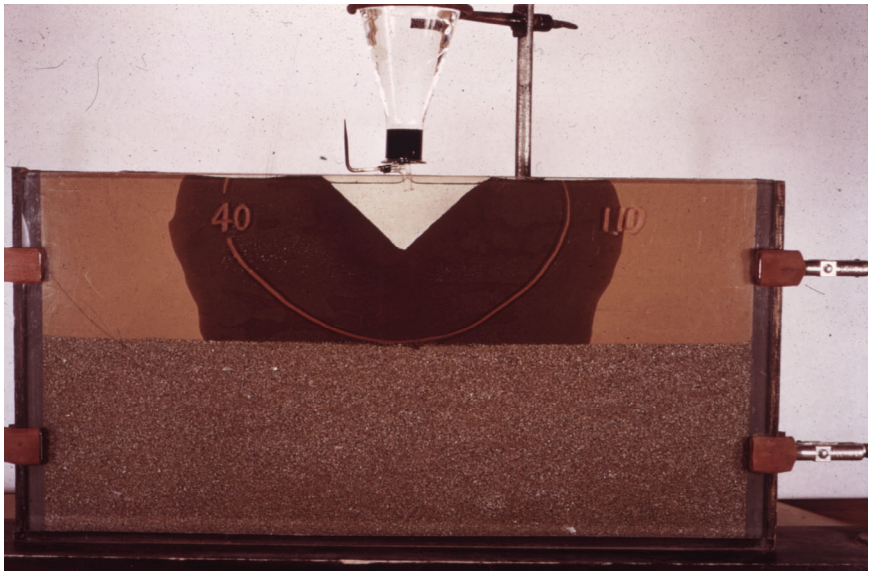

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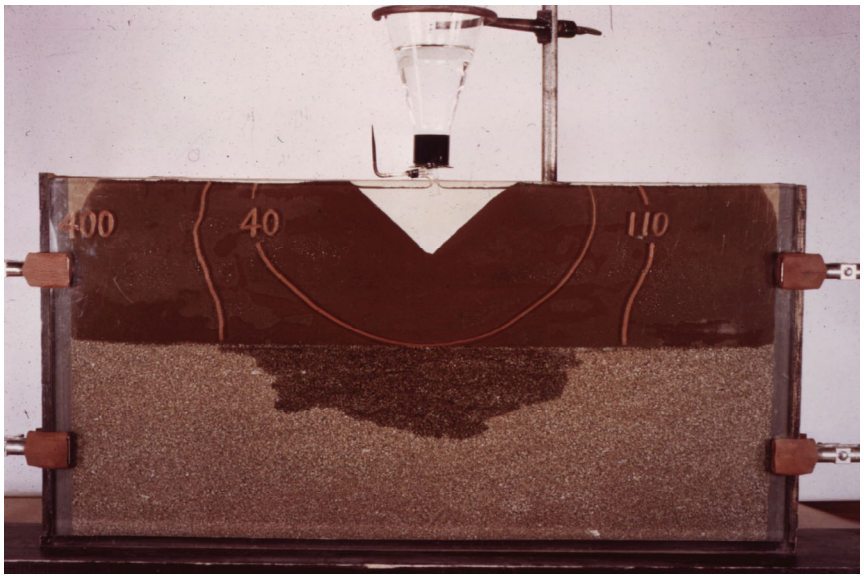

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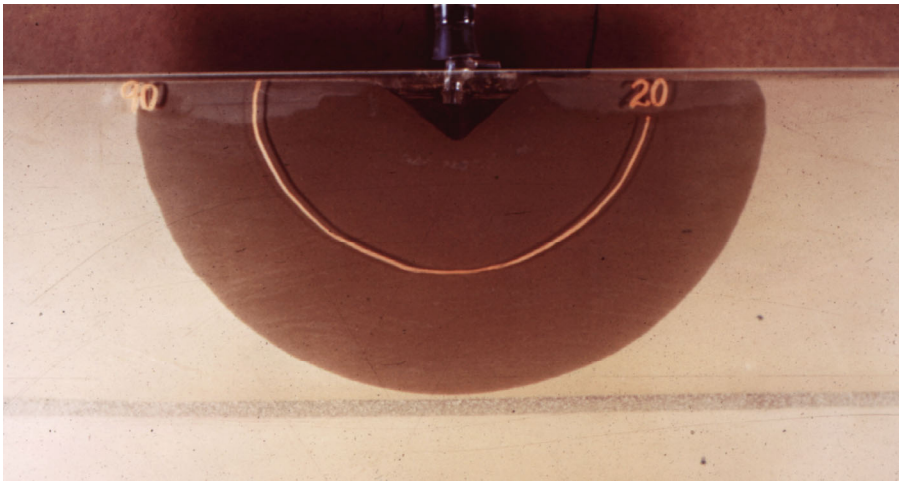

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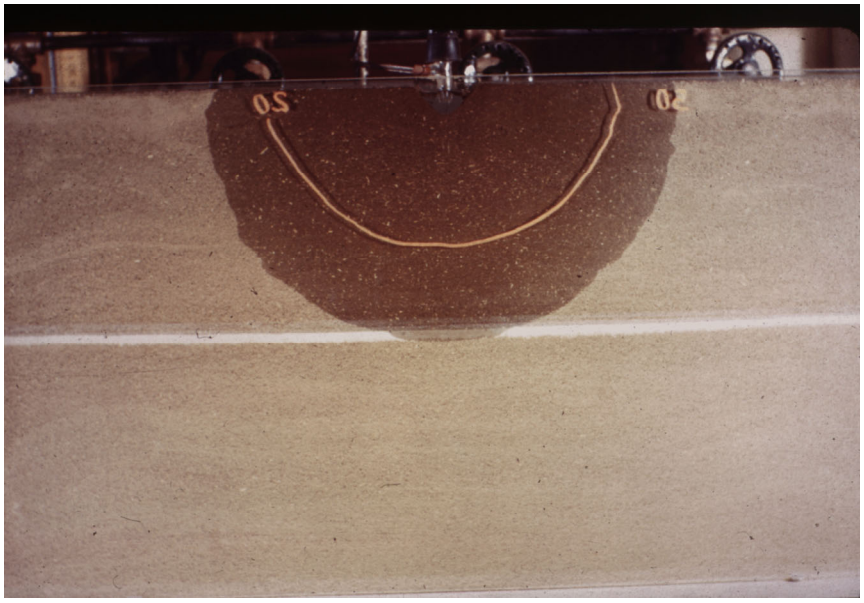

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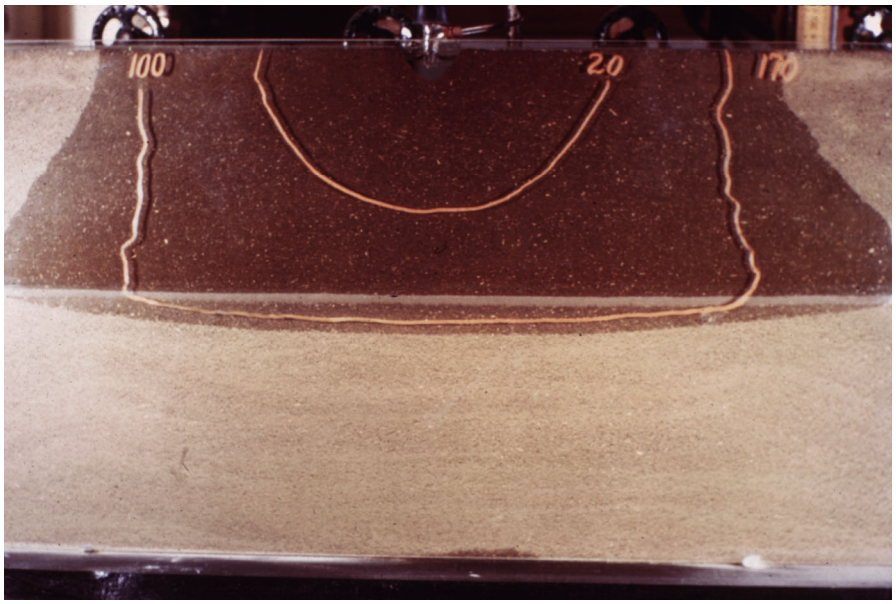

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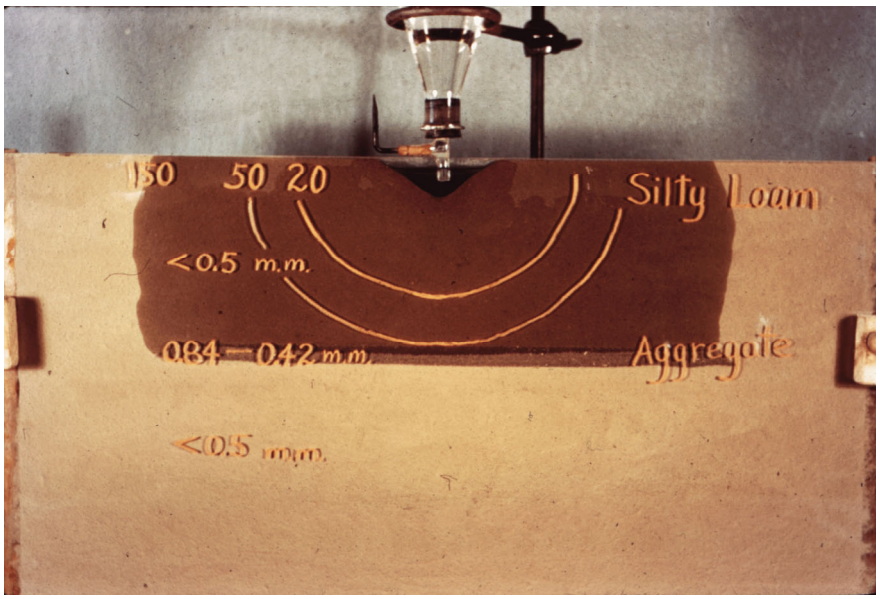

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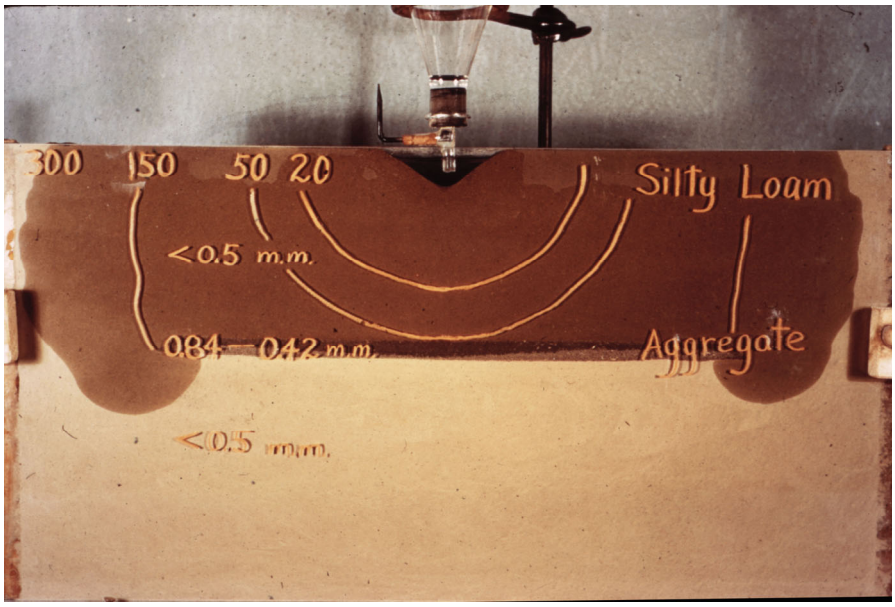

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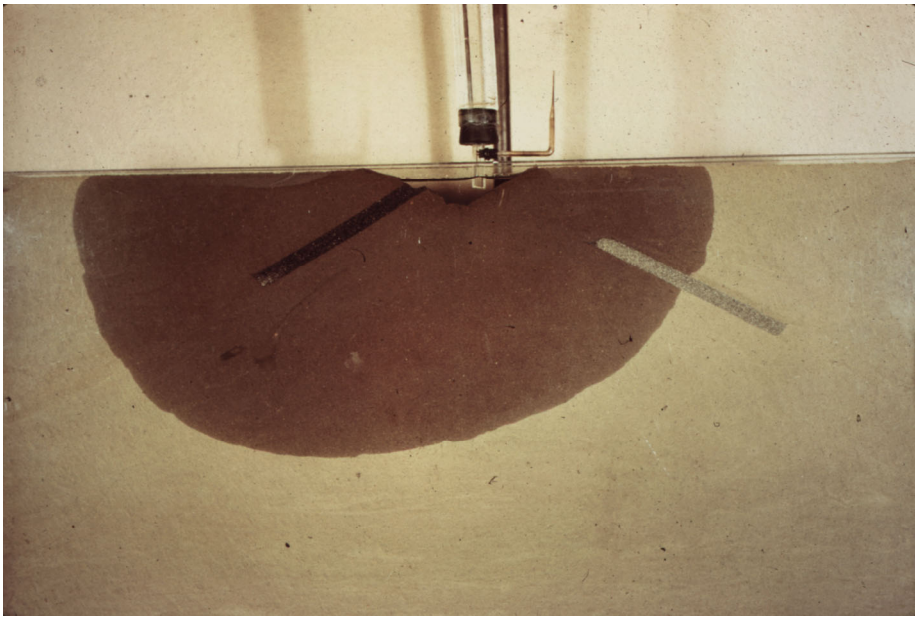

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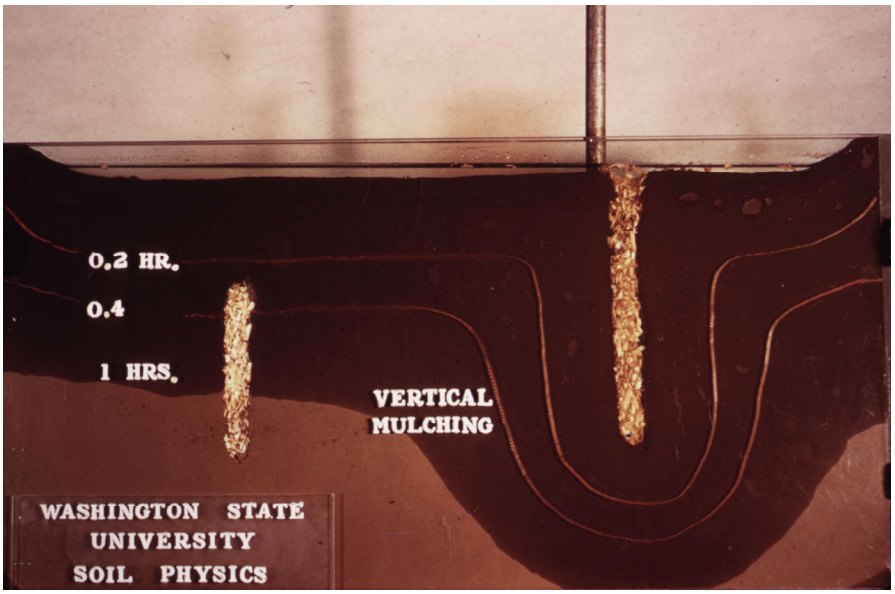
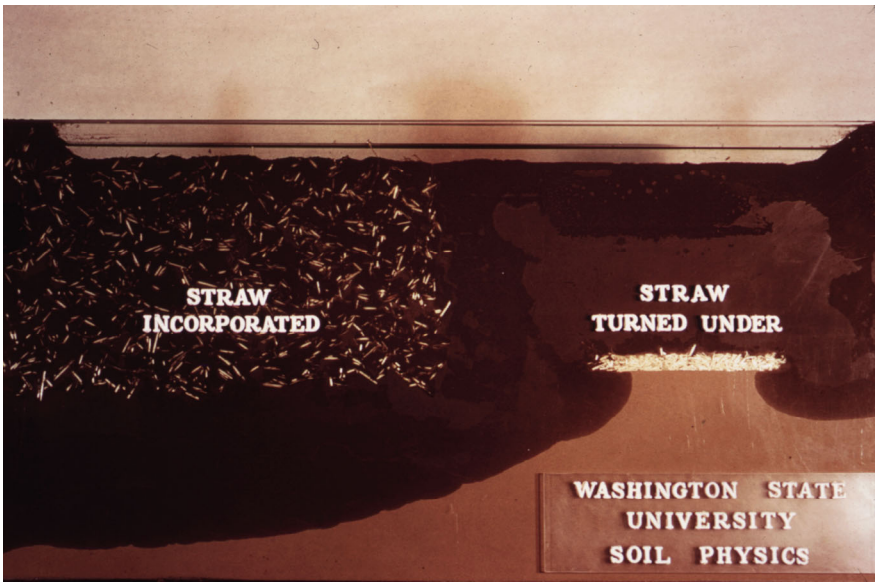

0.2 HR.
0.4
1 HRS.
VERTICAL
MULCHING
WASHINGTON STATE
UNIVERSITY
SOIL PHYSICS

21


STRAW
INCORPORATED
STRAW
TURNED UNDER
WASHINGTON STATE
UNIVERSITY
SOIL PHYSICS

22

WASHINGTON STATE UNIVERSITY

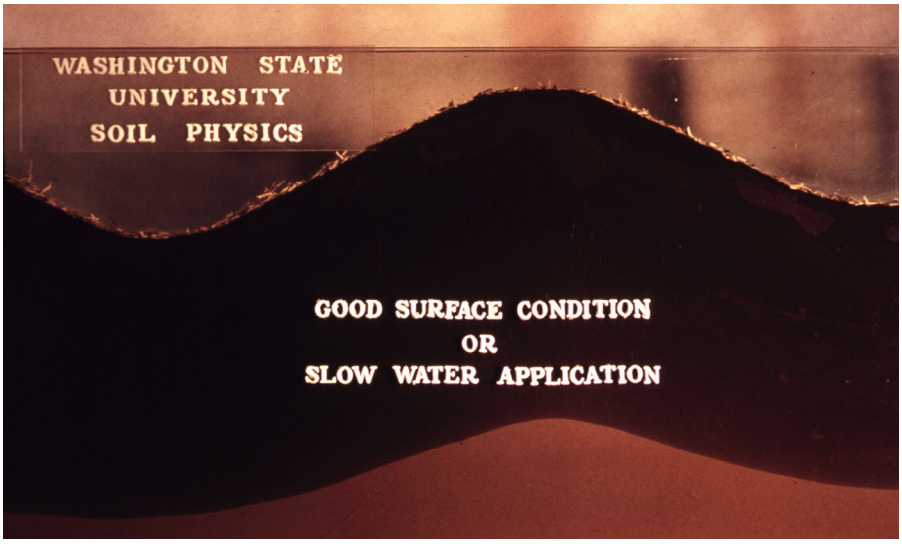
23

WASHINGTON STATE UNIVERSITY

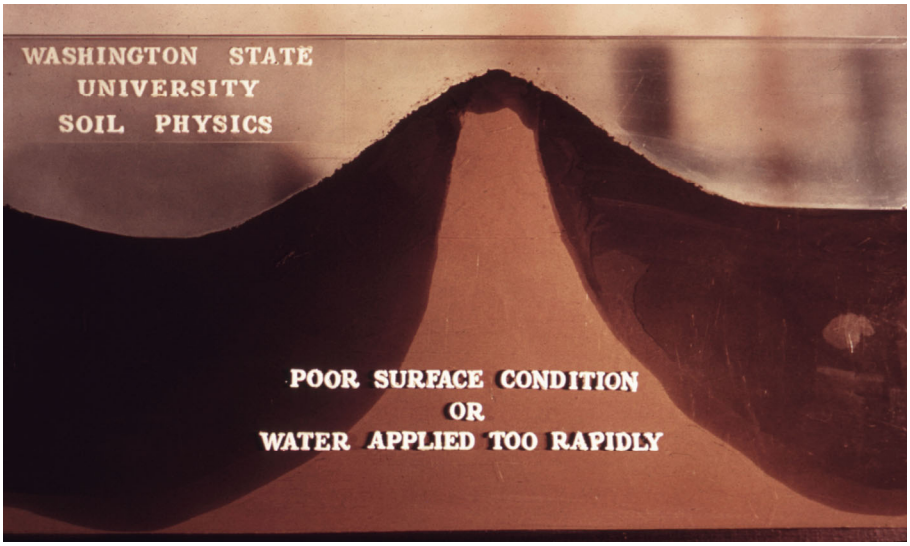
24

WASHINGTON STATE UNIVERSITY

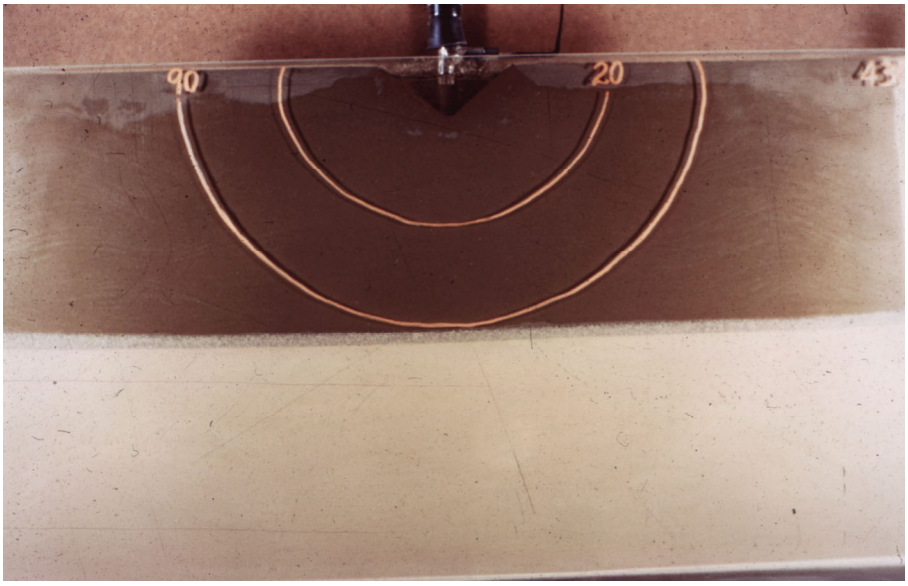
25


WASHINGTON STATE
UNIVERSITY
SOIL PHYSICS
GOOD SURFACE CONDITION
OR
SLOW WATER APPLICATION

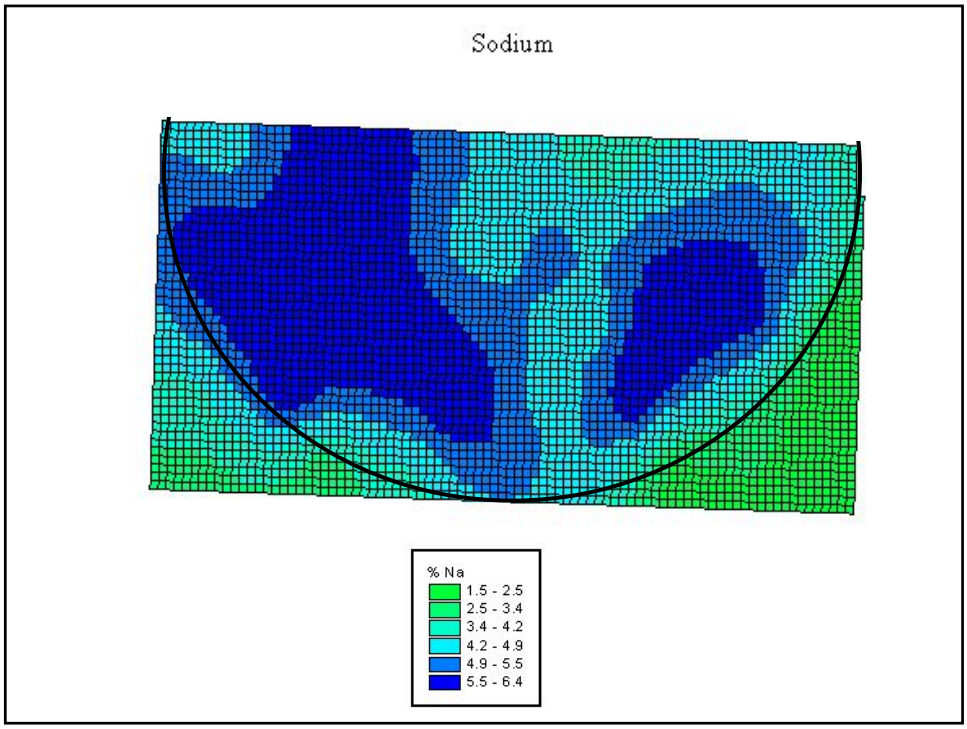
26


WASHINGTON STATE
UNIVERSITY
SOIL PHYSICS
POOR SURFACE CONDITION
OR
WATER APPLIED TOO RAPIDLY

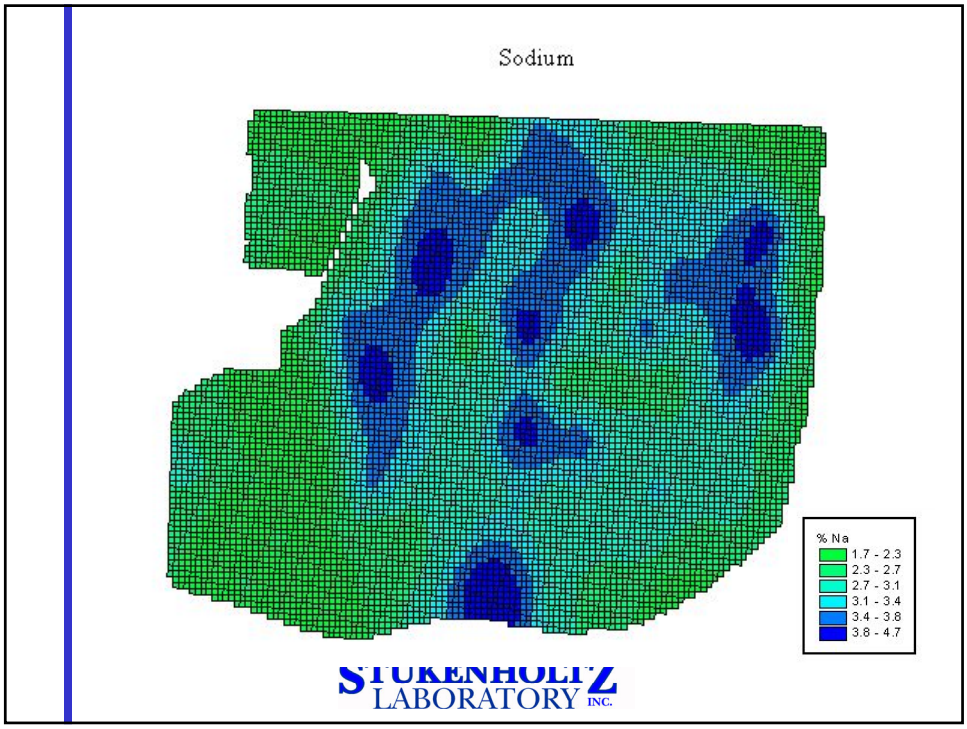
27


90
20
43

28


Sodium
% Na
1.5 - 2.5
2.5 - 3.4
3.4 - 4.2
4.2 - 4.9
4.9 - 5.5
5.5 - 6.4

29


Sodium
% Na
1.7 - 2.3
2.3 - 2.7
2.7 - 3.1
3.1 - 3.4
3.4 - 3.8
3.8 - 4.7
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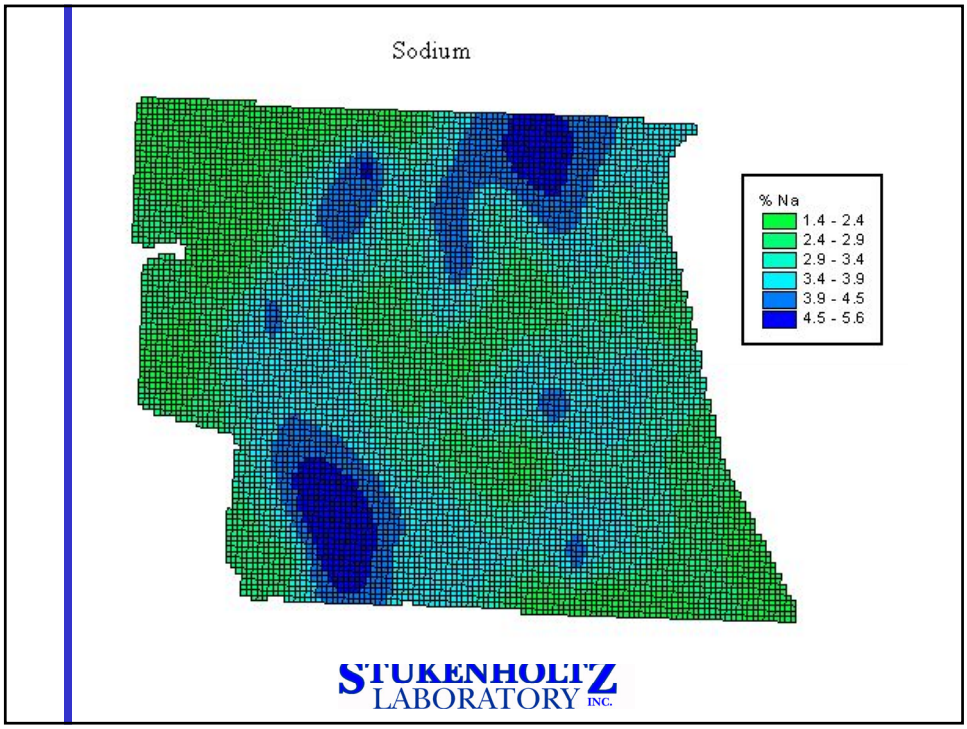
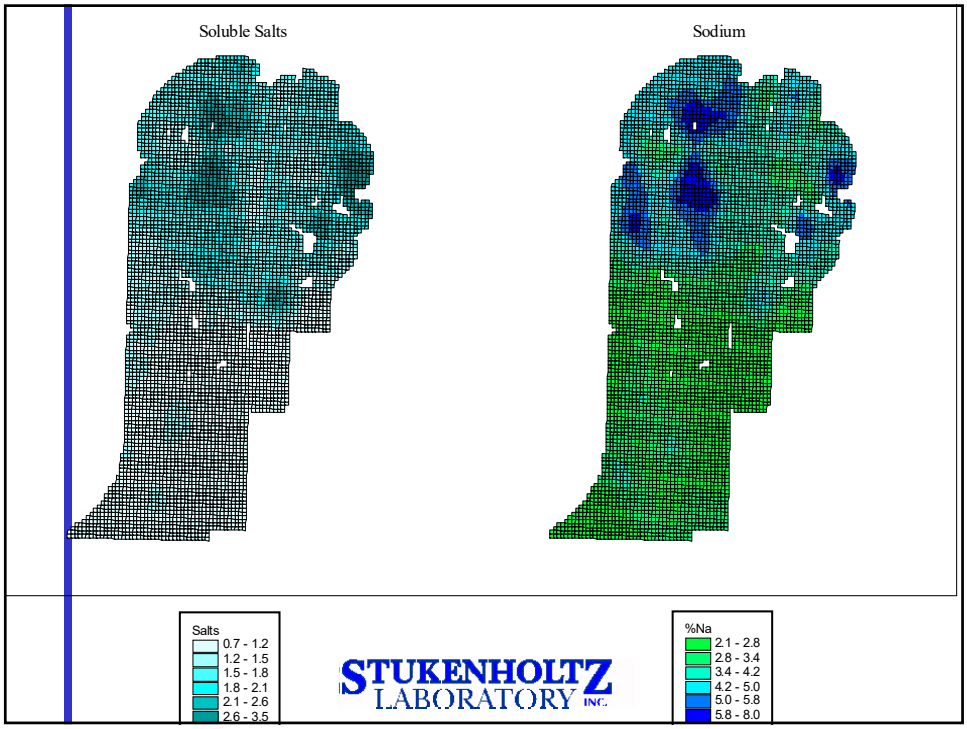
30


Sodium
% Na
1.4 - 2.4
2.4 - 2.9
2.9 - 3.4
3.4 - 3.9
3.9 - 4.5
4.5 - 5.6
STUKENHOLTZ
LABORATORY INC.

31


Soluble Salts
Sodium
Salts
0.7 - 1.2
1.2 - 1.5
1.5 - 1.8
1.8 - 2.1
2.1 - 2.6
2.6 - 3.5
STUKENHOLTZ
LABORATORY INC.
%Na
2.1 - 2.8
2.8 - 3.4
3.4 - 4.2
4.2 - 5.0
5.0 - 5.8
5.8 - 8.0

32

Depth of Water Penetration

Center Pivot	Solid Set 9/64” x 60 psi
0.8” Water x 90% Efficiency 0.72”	0.22” Water/hr x 11 hr x 90% Efficiency 2.18”
Water Penetrates 0.6 ft	Water Penetrates 1.8 ft

Assuming a silt loam soil 35% depleted of available water

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What is happening here?

- Pivots deliver much less water per irrigation.
- Water from solid sets and wheel lines moves deeper.
- With less leaching, salts and sodium are staying in the rooting zone of the crops.

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