


# Urban Tree Root System Management and Care

  
The Morton  
Arboretum  
Gary Watson



# Root Management Objective: Balance



Achieving a natural balance  
with the environment can be  
achieved in different ways





















Much of Root Management is Soil Management





Dry



Structure



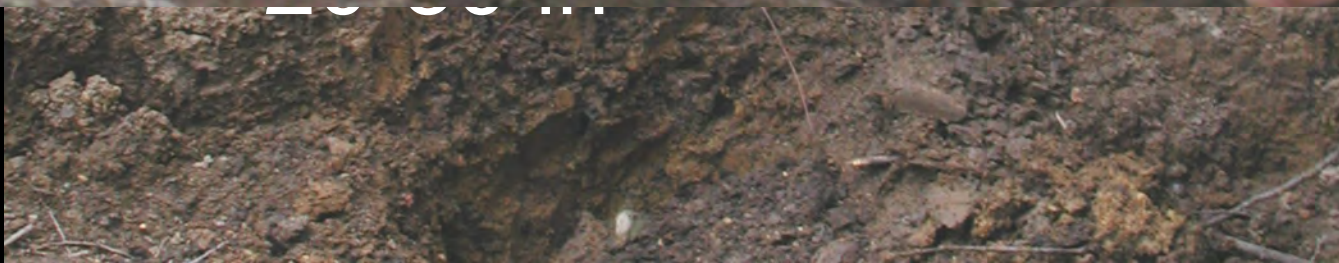
Wet



No Structure











0-12 in

12-20 in

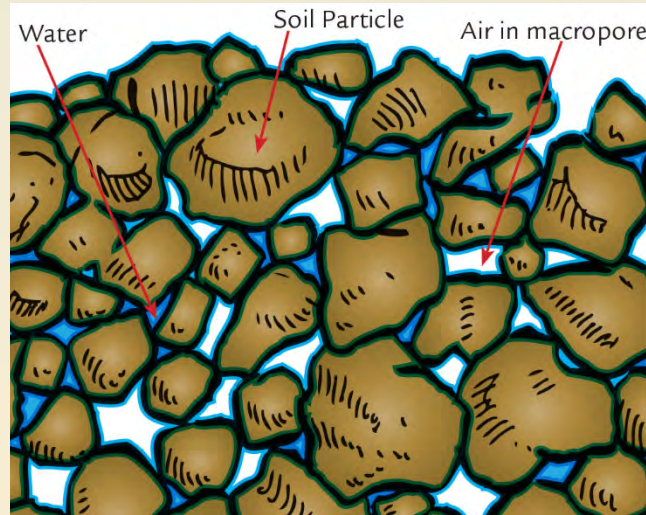
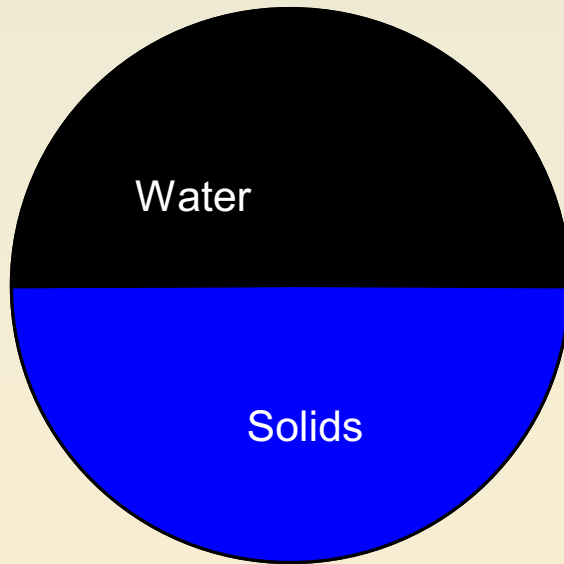
20-30 in

Soil with structure

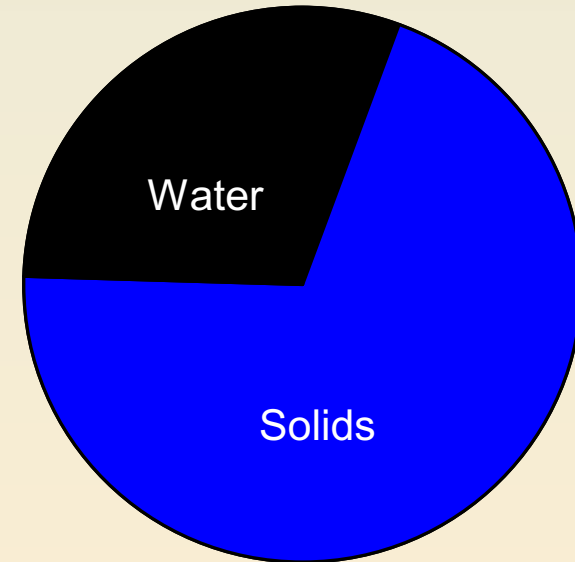


# Soil Compaction Reduces Macropores

Ideal Soil



Compacted Soil



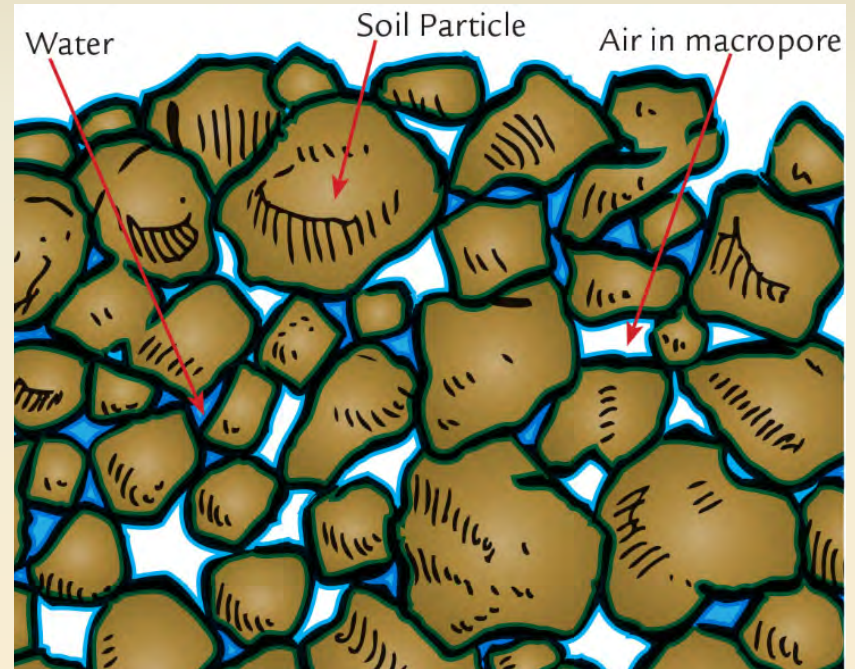
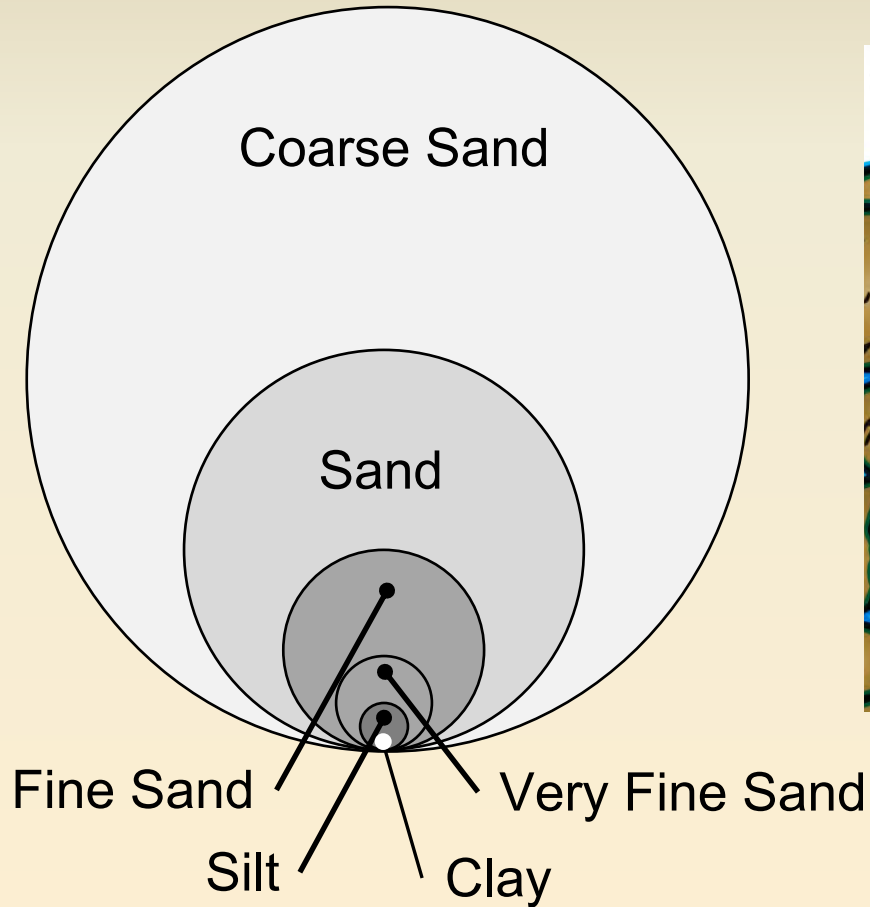






# Soil Texture

← 1 mm →







Coarse texture

Fine Texture









<1%

2%

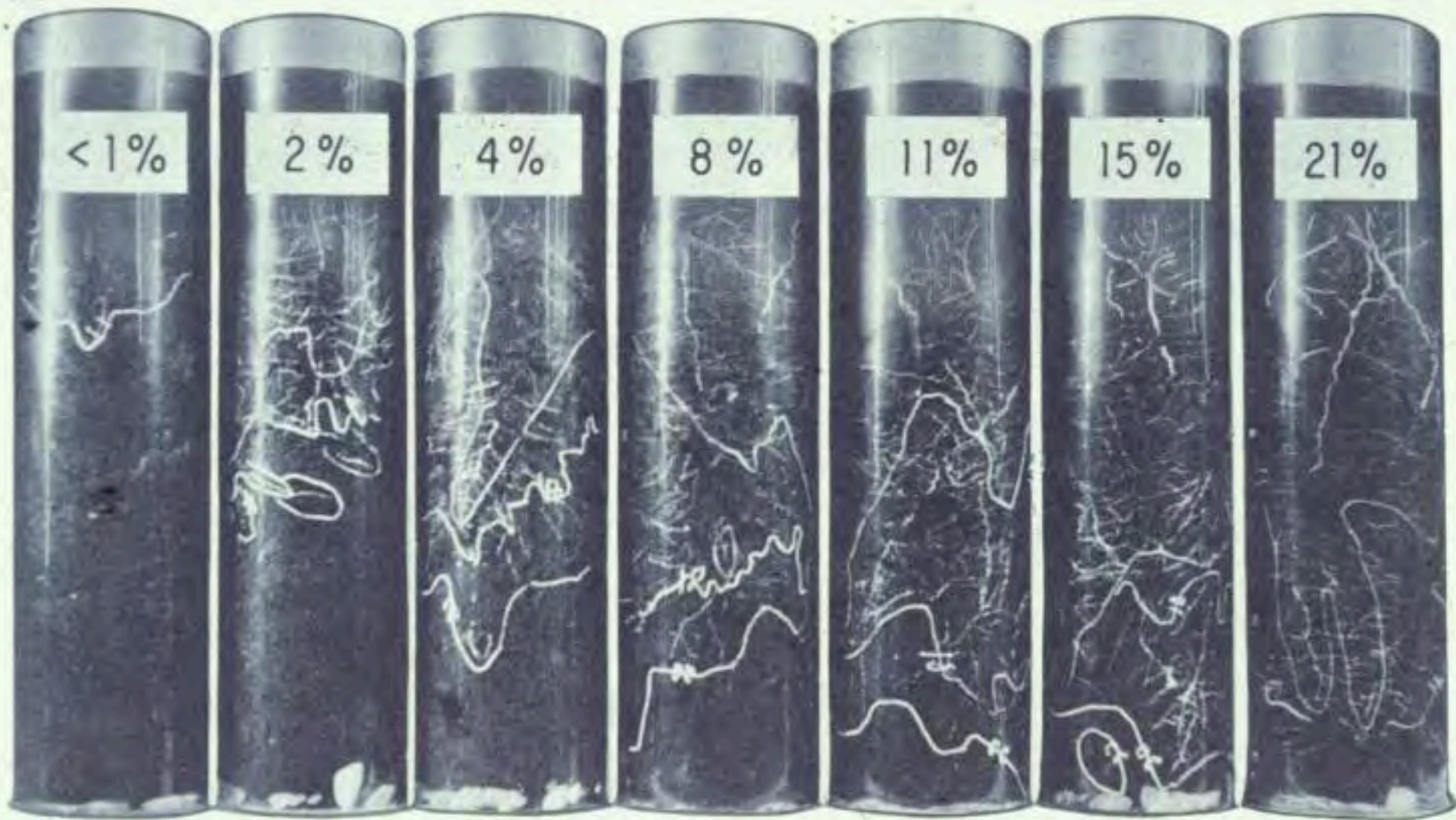
4%

8%

11%

15%

21%





# A Good Indicator of Soil Aeration

First used for the determination of the depth of onset of waterlogged conditions in the soil (Carnell and Anderson 1986)

Rust = good aeration

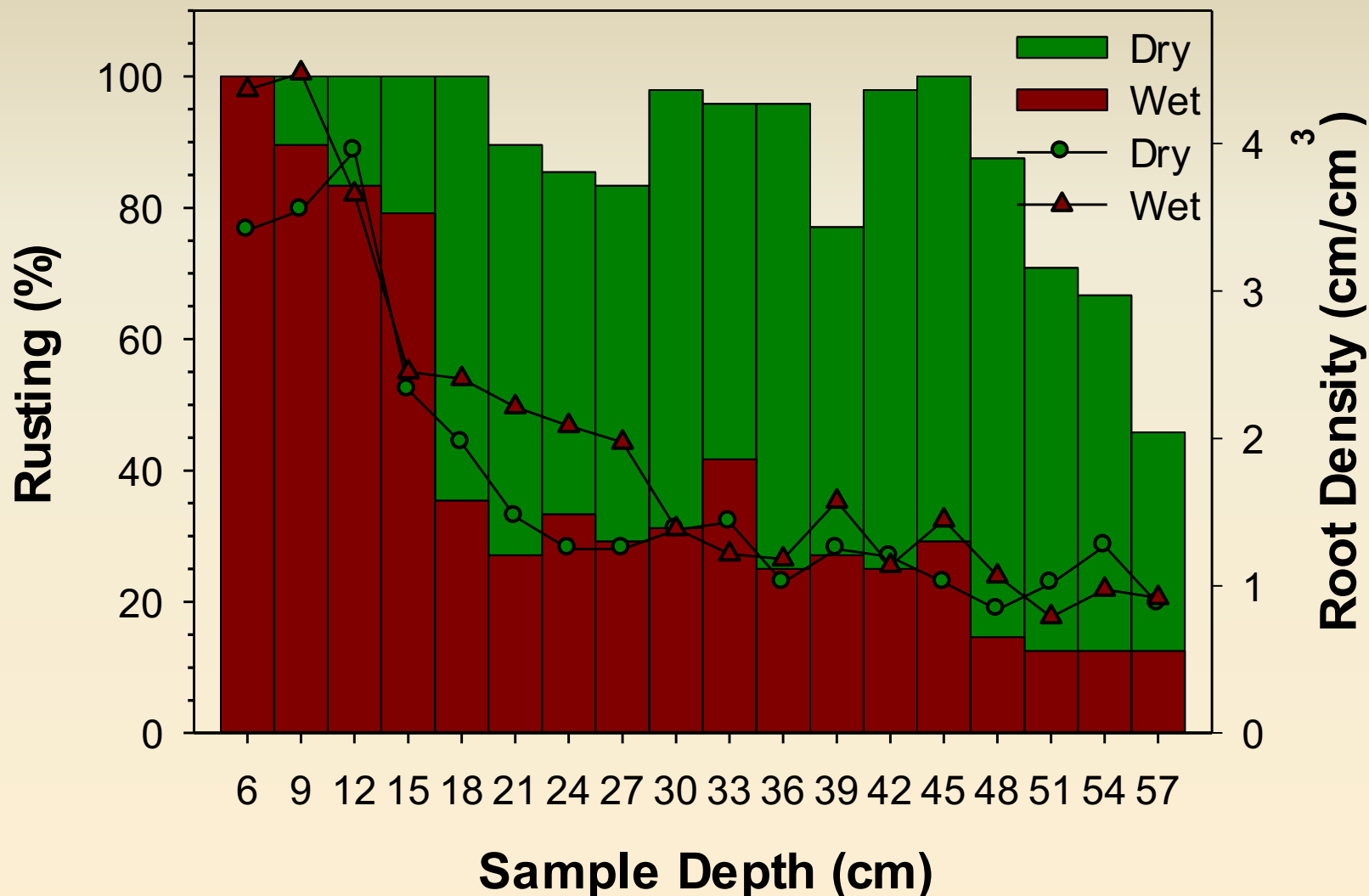


Matt gray = anaerobic conditions



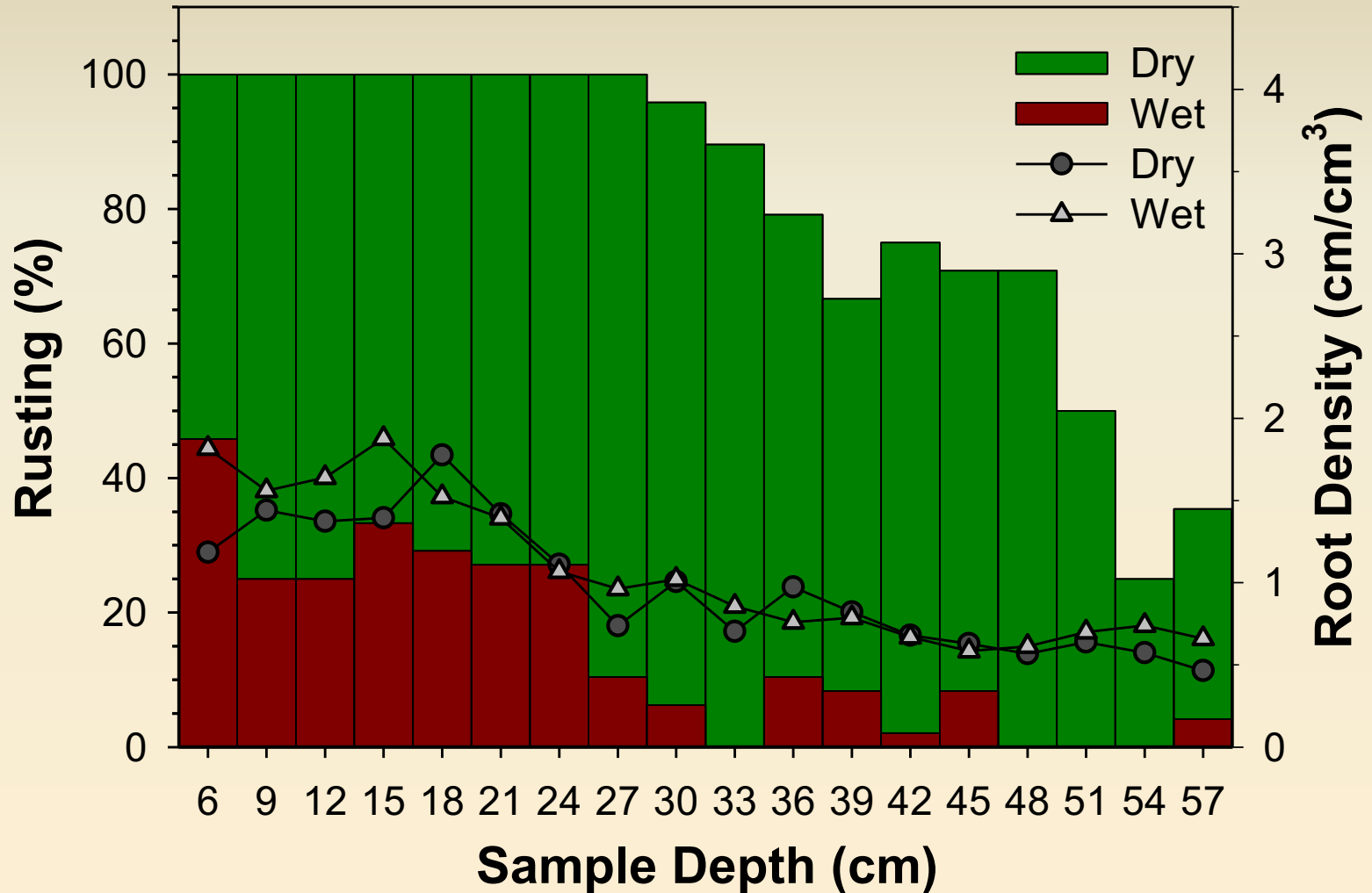


# Sugar Maple






# Tuliptree







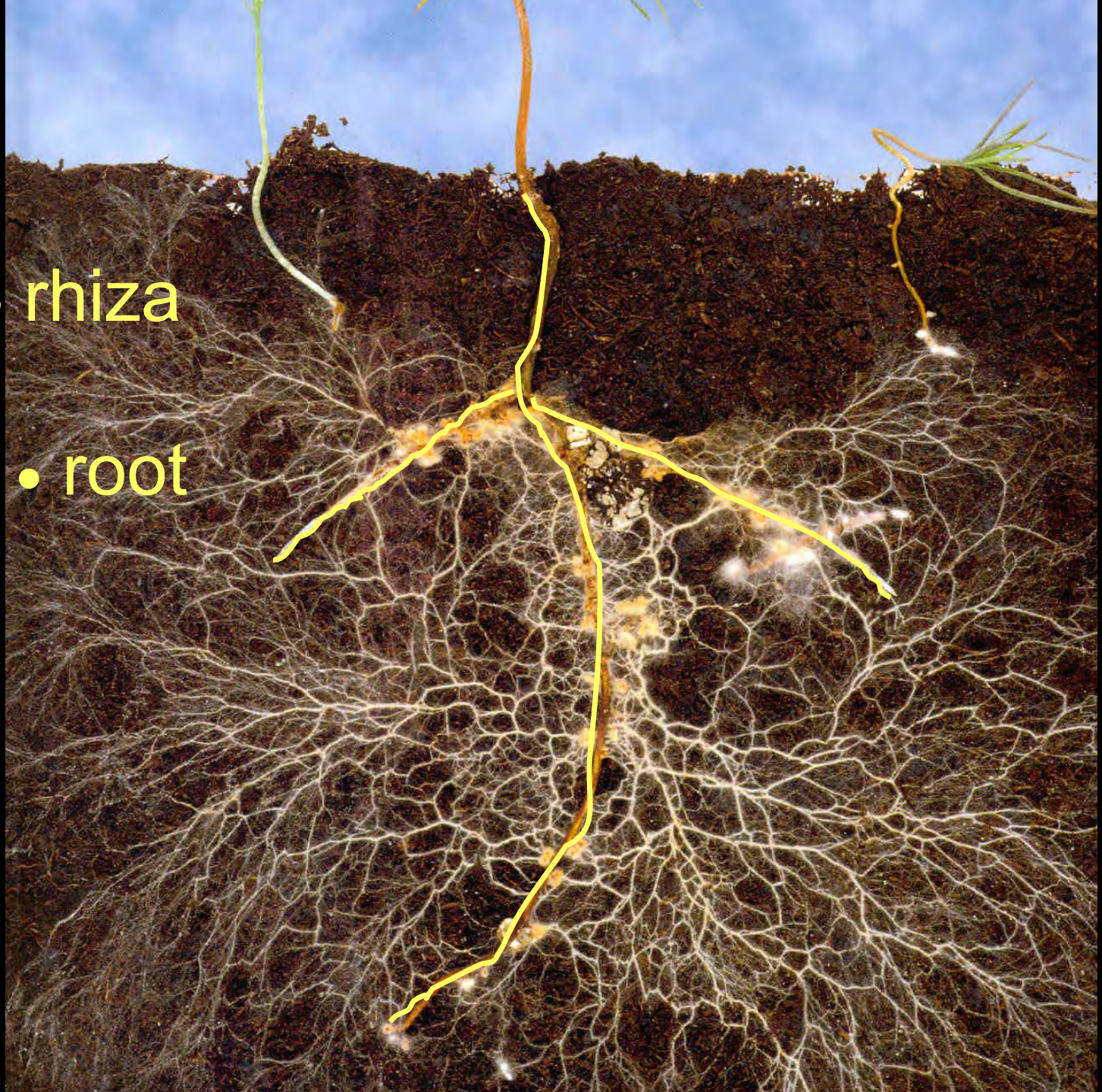
How can root  
growth be  
increased?

- Fertilizer?
- Soil additives?
- Cultural practices?



Mycor • rhiza

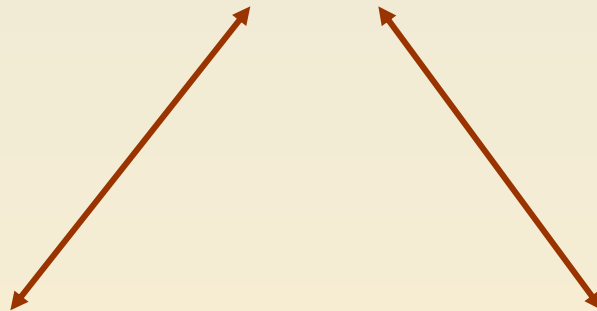
Fungus • root





# Mycorrhizal Triangle

**Susceptible Plant Root**  
(sugars, “helper microbes”)



**Viable Fungal  
Inoculum**  
(spores, hyphae)

**Favorable Soil  
Environment**  
(temp. O<sub>2</sub>, pH, H<sub>2</sub>O,  
fertility)

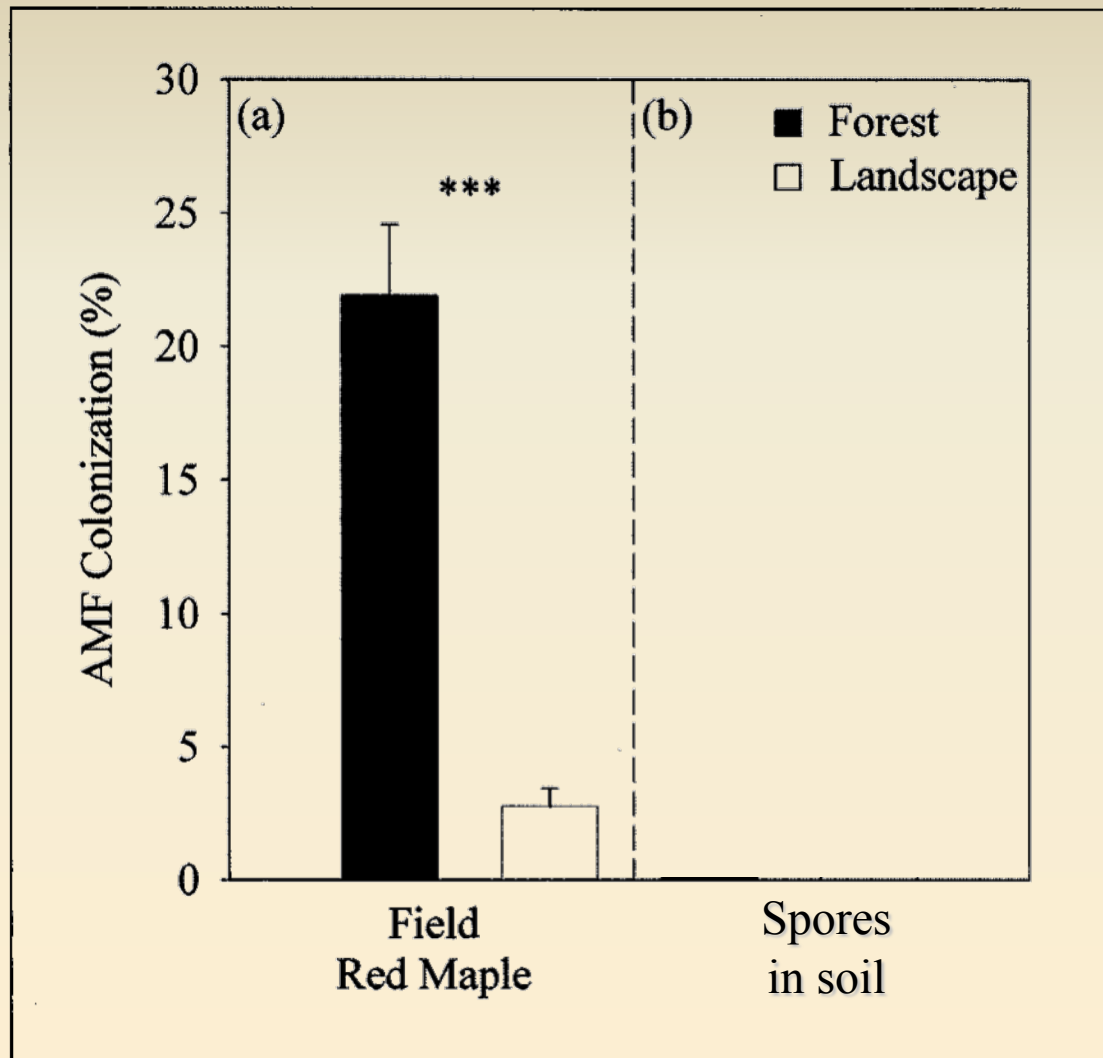








# If Soil Conditions Are Not Correct?



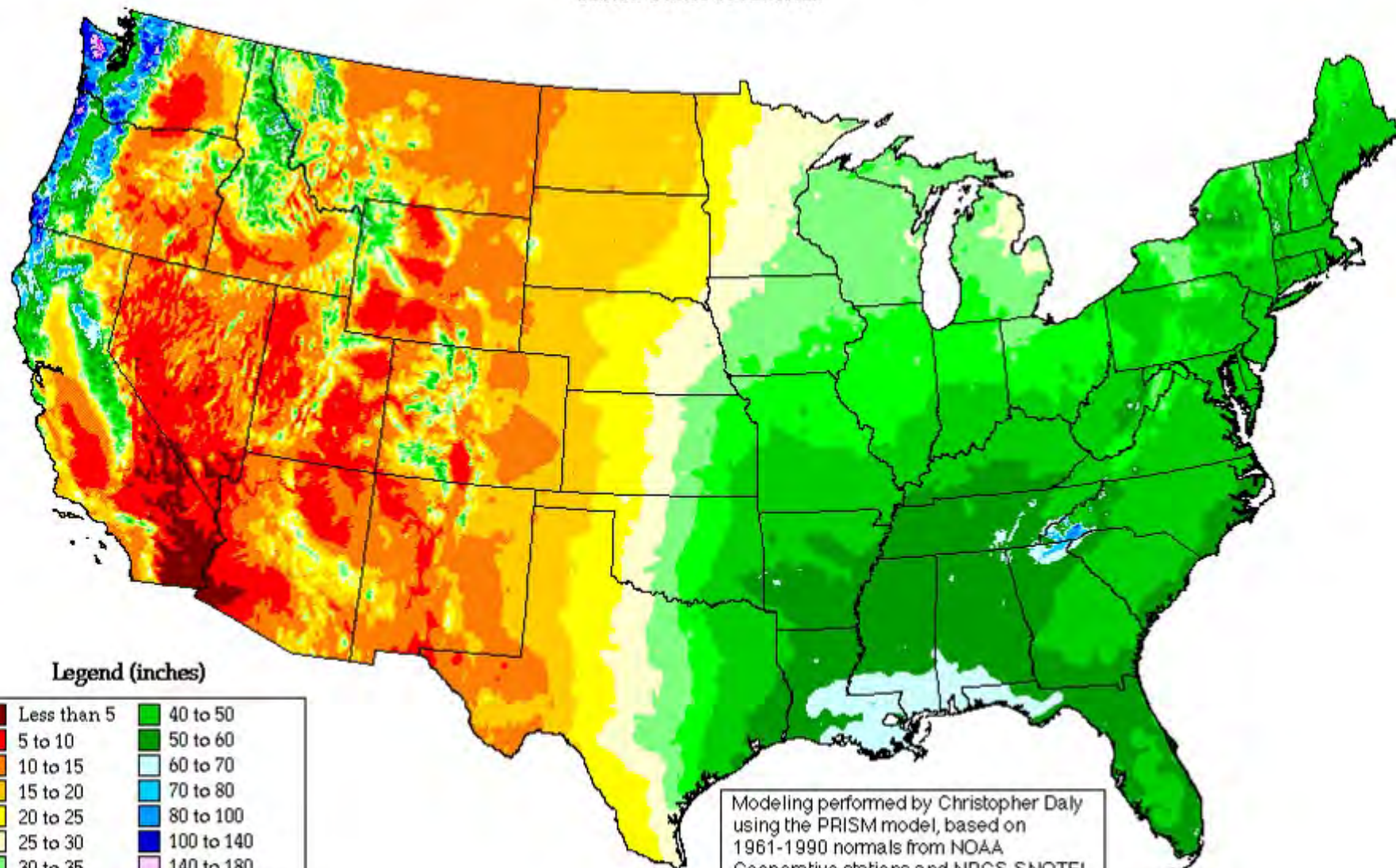






# Annual Average Precipitation

United States of America



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.

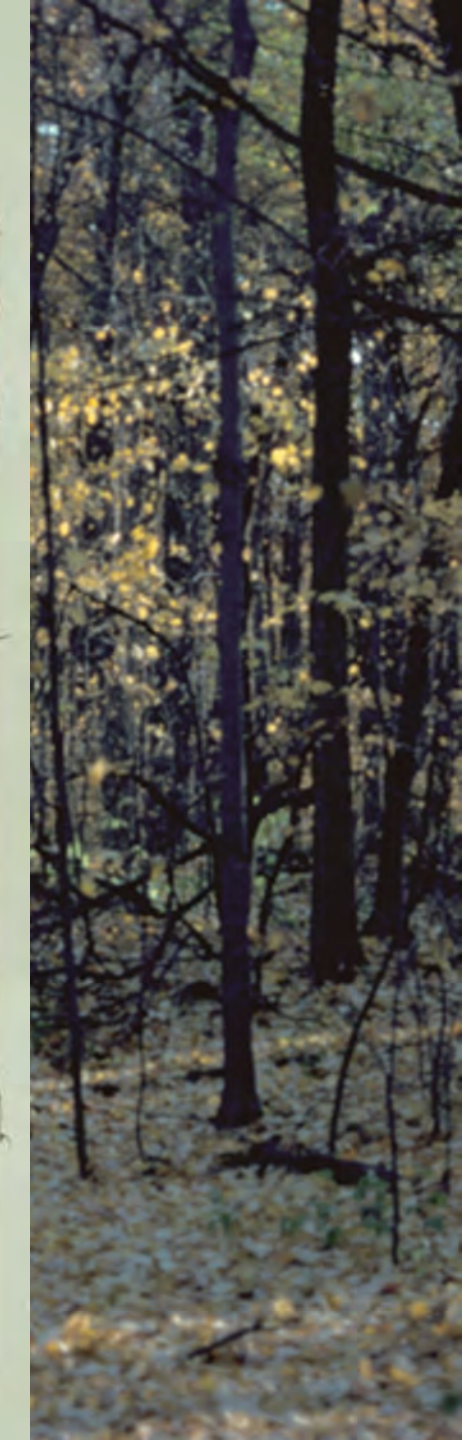
Oregon Climate Service  
George Taylor, State Climatologist  
(541) 737-5705





Natural Mulch







# Effect of Wood Chip Mulch on White Oak Roots

	Mulch Grass	
Moisture Content (%)	30.8	18.9
Soil pH	5.8	6.7
Bulk Density (g/cc)	0.8	1.1
Root Density	6.2	3.2
Mycorrhizal tips (%)	31.8	14.5

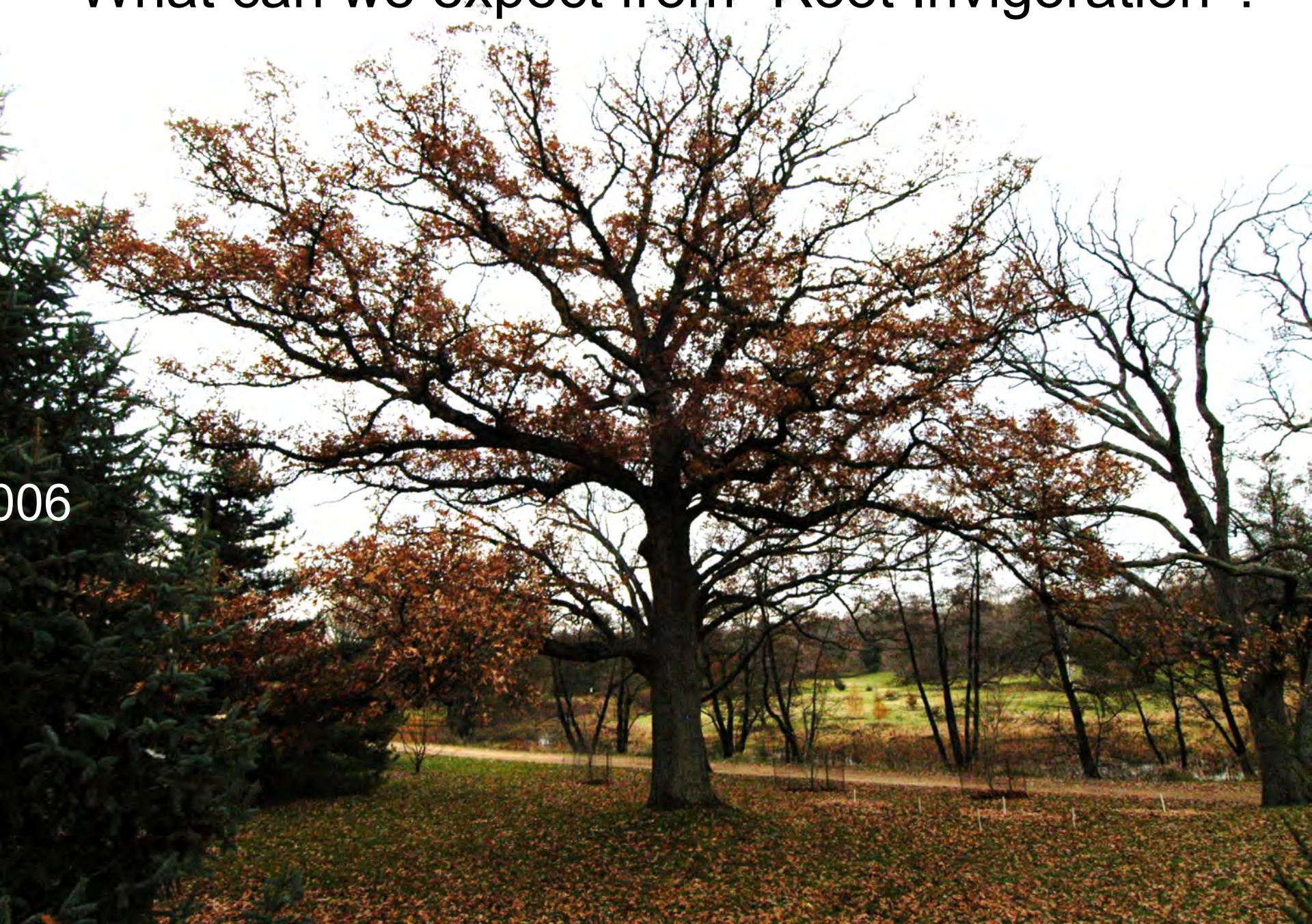






# What can we expect from “Root Invigoration”?

006





2016





2018





# Will root injury cause decay? CODIT applies to roots

## Roots are good compartmentalizers









# *Fraxinus pennsylvanica*

Location	Discoloration	Decay
1 m	4.2 cm	1.5 cm
2 m	7.2 cm	1.8 cm
3 m	6.3 cm	4.5 cm
Root flare	3.2 cm	1.0 cm







# THE LANDSCAPE BELOW GROUND **IV**

International Conference on  
Tree Root Development in Urban Soils

PRE-CONFERENCE WORKSHOPS

October 15, 2018

The Morton Arboretum, Lisle, IL

CONFERENCE PROGRAM

October 16-17, 2018

Lisle/Naperville Hilton, Lisle, IL

Register now at [landscapebelowground.org](http://landscapebelowground.org).

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