

# How to Save Soil, Freight and Labor Costs



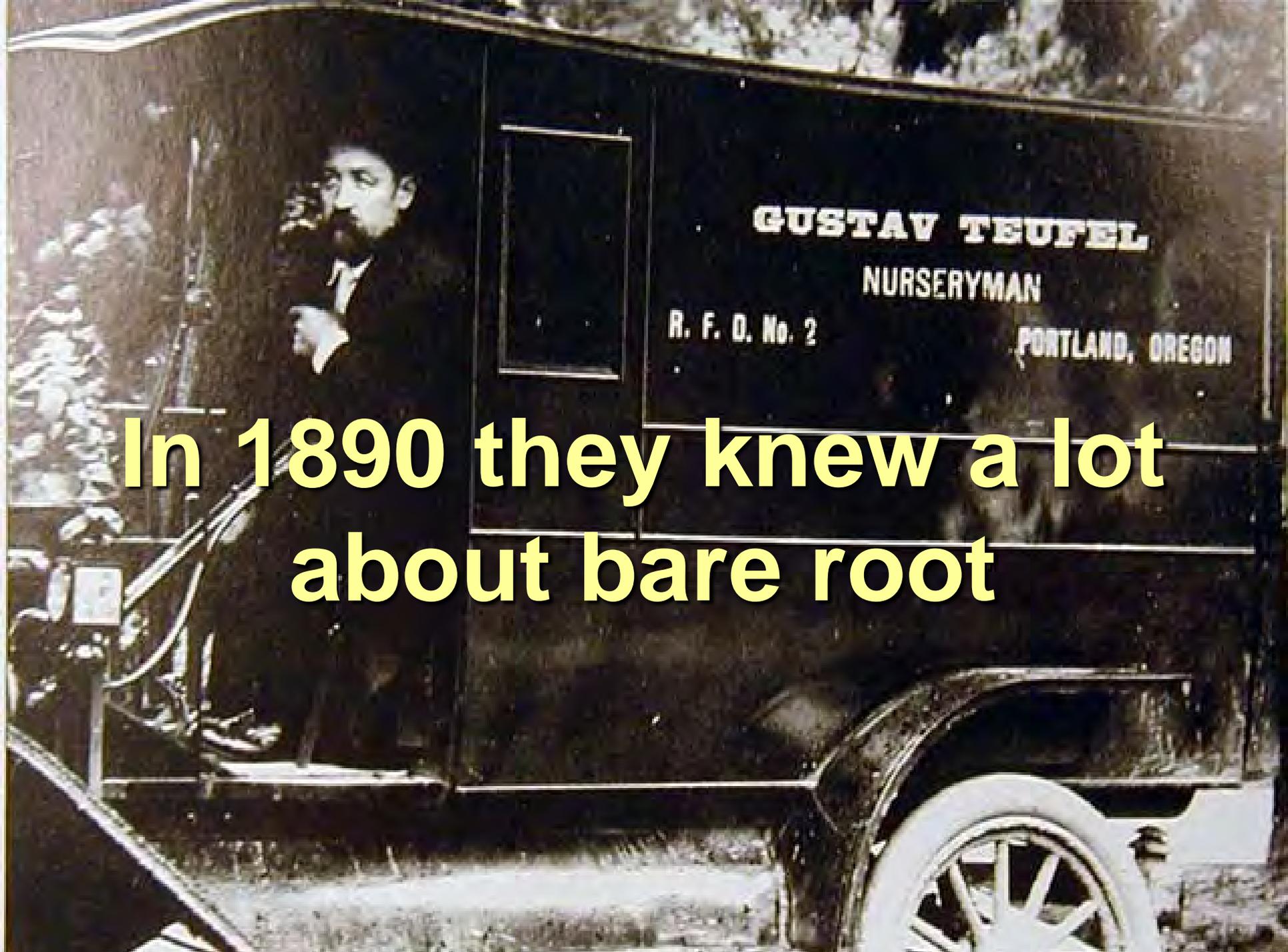
**By Planting  
Bare Root Trees  
All Year Long**



**Back to the Future  
with the**

**Missouri Gravel  
Bed**





**GUSTAV TEUFEL**

**NURSERYMAN**

**R. F. D. No. 2**

**PORTLAND, OREGON**

**In 1890 they knew a lot  
about bare root**

# Why Plant Bare Root?

- Lower cost
- Reduced freight
- Light weight
- Larger root system
- No soil/root ball interface

# Soil Conservation

- Digging B&B trees with 44" balls removes  $\approx 470$  T soil / A
- Combined with erosion losses, this could lead to loss of up to 4 inches of topsoil every 7 years.

Davidson, Mecklenburg and Davis

# Cost

- **Harvesting a B&B tree represents  $\approx 25\%$  of total production cost**
- **2" Sun Valley Maple (wholesale)**
  - BR = \$57
  - B&B = \$95
- **Freight – Cost/tree 5-10x more for B&B than BR**

# 5 2-inch ash trees



# 160 BR fruit trees

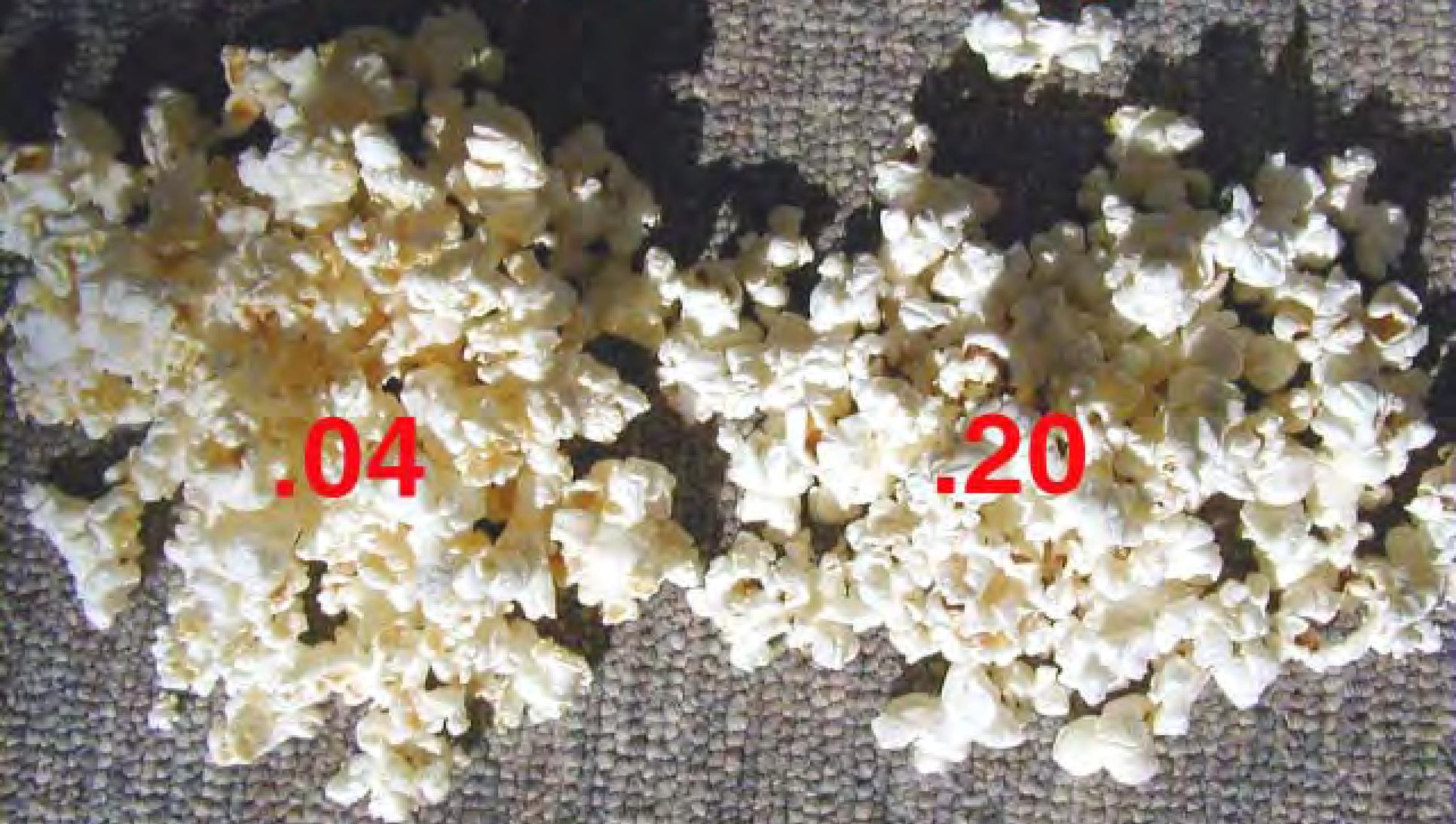




# Cost Per Serving

**.04**

**.20**



# Missouri Gravel Bed



- **Origins**
- **Research and Development**



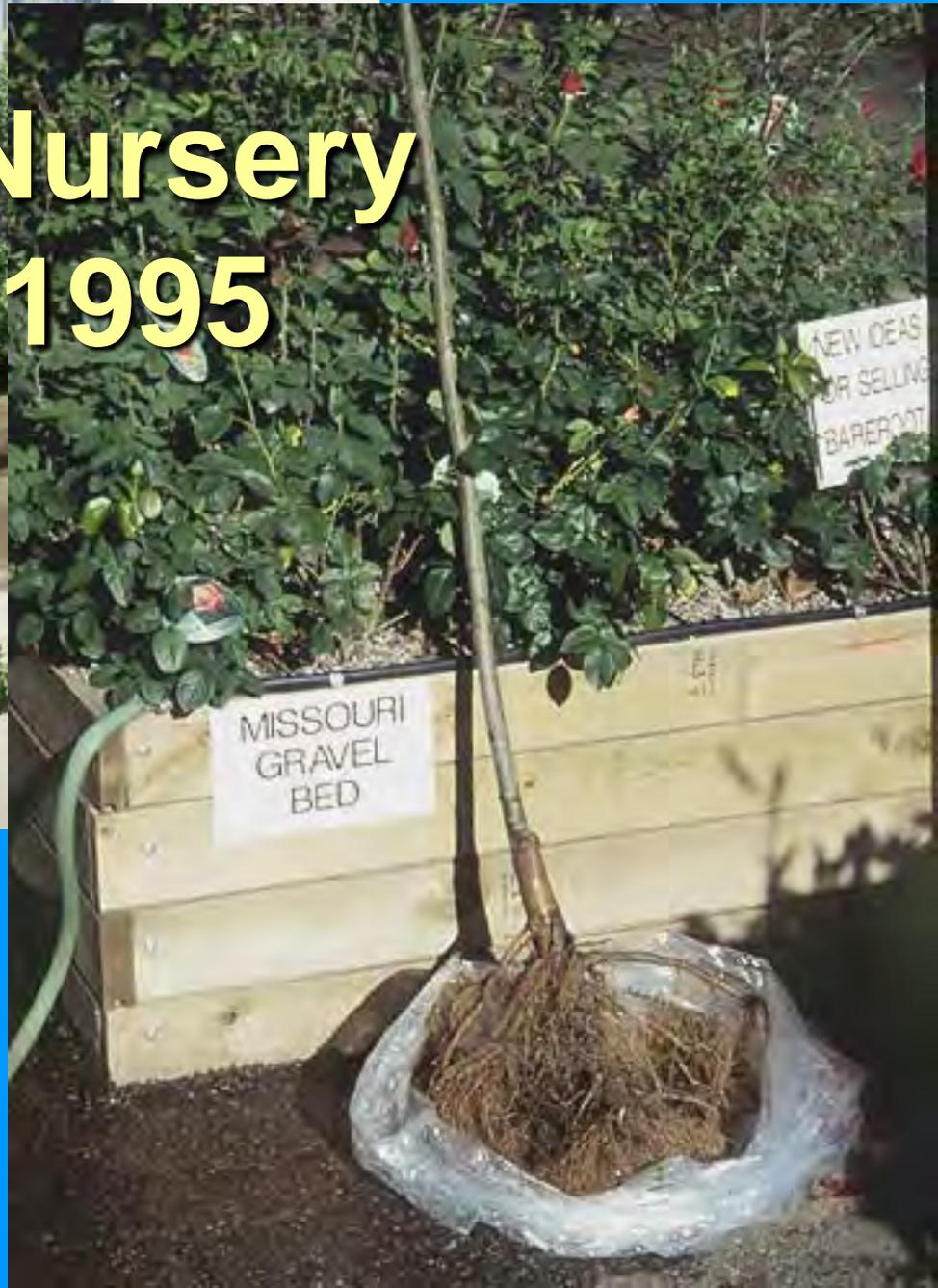
**Aerated Water, 1985**



# Sherman Nursery 1994



# Bailey Nursery AAN 1995



**Sjulin**  
**UPS shipment from**  
**Hamburg**



**Snow Goose Cherry**  
**after 2 seasons**

# What is a Missouri Gravel Bed?

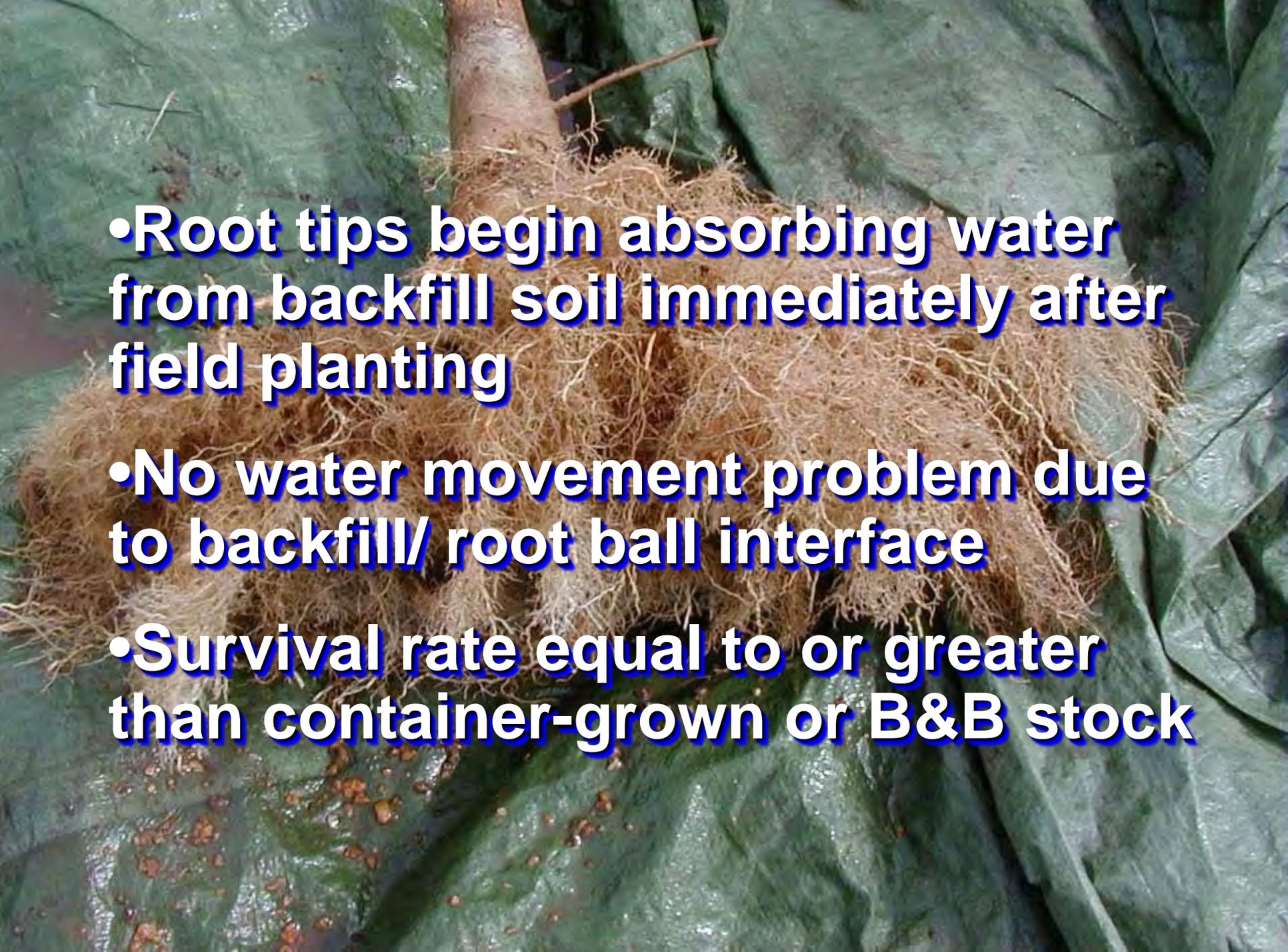
- bed of river rock (pea gravel)
- 1/2-inch and smaller particle size
- 10% sand or 20% calcined clay
- Timer-controlled drip irrigation
- Surface-applied slow release fertilizer or re-circulated solution

# How Does MGB Extend the Bare Root Planting Season?

- Dormant plants placed in gravel in spring
- Plants root into gravel
- Gravel falls away when plants are removed from bed, exposing root tips

# Hair roots



- 
- **Root tips begin absorbing water from backfill soil immediately after field planting**
  - **No water movement problem due to backfill/ root ball interface**
  - **Survival rate equal to or greater than container-grown or B&B stock**

# Research

- **Boxwood campus  
landscape planting**
- **2” caliper ash**
- **3 and 4” caliper trees**
- **Calcined Clay**

A tractor with a large metal bucket is dumping dark brown mulch into a wooden landscape bed. The bed is lined with black plastic. In the background, there are several large greenhouses with metal frames and glass panes. The scene is outdoors on a gravel or dirt surface.

# Landscape Services Bed on Univ. of MO Campus

# Wintergreen Boxwood

## March 20 2001



**August 18, 2001**







**7-29-02**

- **100% survival after 1 year in the landscape**
- **165 of 165 plants**

**2001**

**Comparing growth of  
B&B vs MGB**

- 
- **12 2" B&B Summit Ash**
  - **6 trees bare-rooted March 2001**
  - **Bare-rooted trees placed in gravel, B&B healed in**
  - **All plants field planted July 2001**



**B&B**



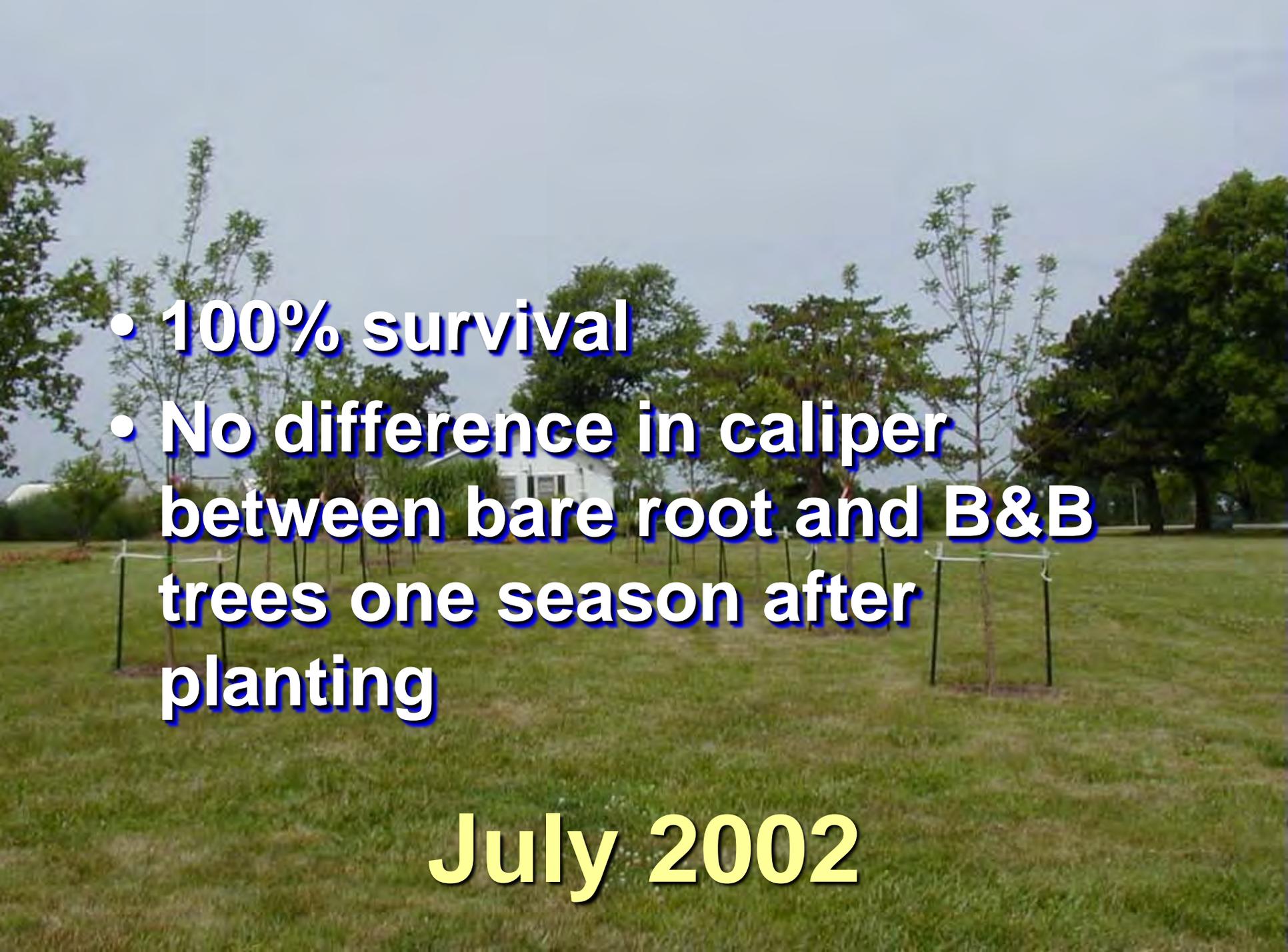
**Bare-rooted**

# Pulling July 10, 2001







- 
- **100% survival**
  - **No difference in caliper between bare root and B&B trees one season after planting**

**July 2002**



**July 2006**

# 4-5" Trees, Columbia MO March 2005











# Red Sunset

## July 30, 2005



*Platanus x acerifolia*



*Acer rubrum*



# 3-inch red oak, April 2001



**Struve, Ohio State University**

# 3-inch red oak, Sept. 2001



**Struve, Ohio State University**

# 2001



**Planted bare root  
tree previously  
heeled-in pea  
gravel.**

**Struve**

**Ohio State University**

# 2006



BR



B&B PG



B&B WC

**Struve, Ohio State University**

# Digging Large Bare Root Trees





**Brotzman's, Lake Co OH**

A photograph showing several green plastic pots arranged in rows. Each pot contains a mixture of soil and small, light-colored, irregularly shaped particles, likely calcined clay. Some pots have small white labels with handwritten text and a circular symbol. The text 'Calcined Clay' is overlaid in large, bold, yellow letters at the bottom center of the image.

# Calcined Clay





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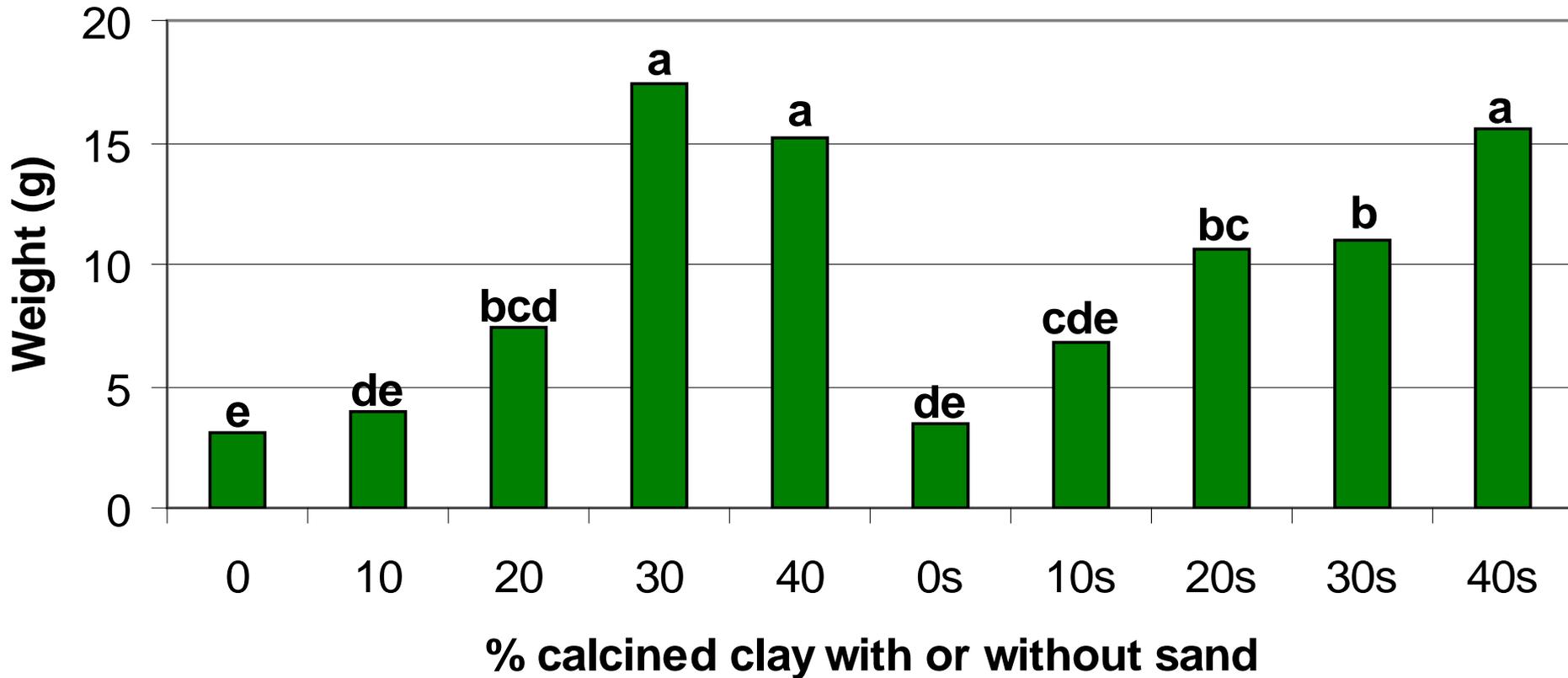
10%

20%

30%

40%

## Average Top Dry Weights for Treatments



# Rost Landscape Columbia MO



**1 bucket TerraGreen**



**4 buckets pea gravel**





# Experimental Beds New Franklin MO



Standard MGB  
c 10% sand



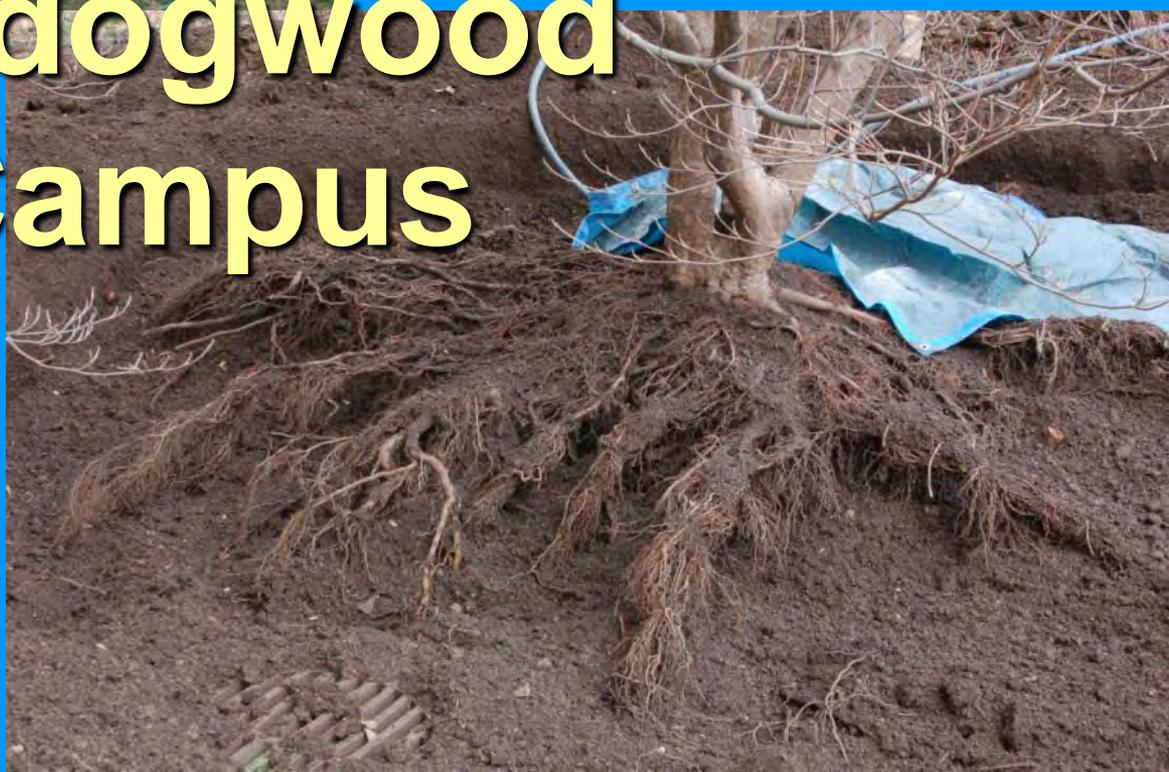
20% calcined clay

5% subsoil clay





# Kousa dogwood MU Campus



**October 2010**

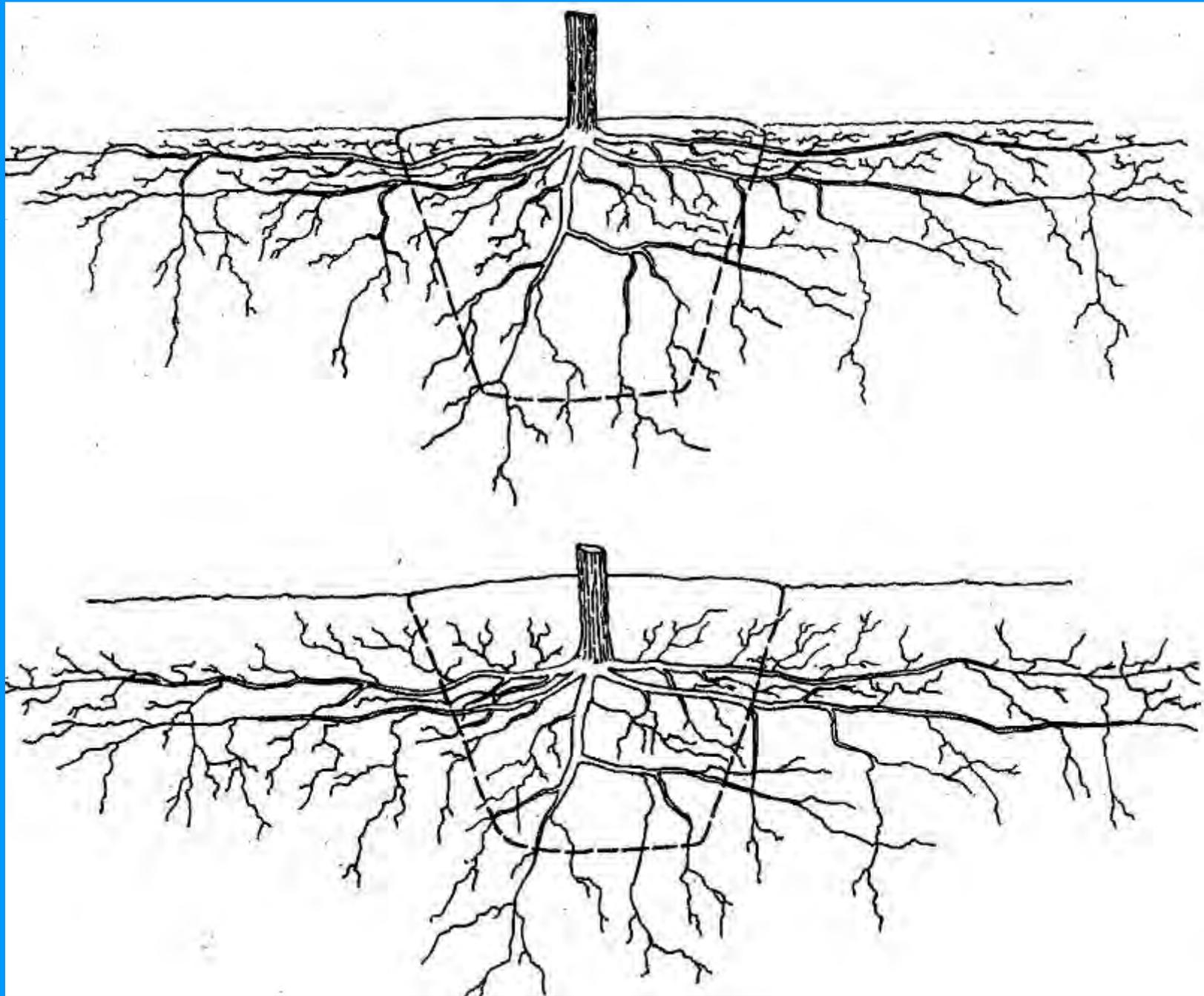


# Trees from rooftop garden in Toronto



**SGRs**











**If you plant this too deeply,  
it's your own fault**



# The future of MGB?

- **Incentives**

- plant cost
- labor
- freight
- quarantines
- profitability
- survival

- **Barriers**

- conservatism
- consumer acceptance
- packaging, shipping challenges

# **MGB is a Natural Extension of Bassuk's Program in Ithaca NY**

- **Bassuk has shown that bare root trees can outperform B&B in street tree plantings.**
- **MGB allows one to take advantage of bare root benefits without a restricted planting season.**

[http://www.plantsci.missouri.edu/  
PS2210/mgb/mgb\\_home.htm](http://www.plantsci.missouri.edu/PS2210/mgb/mgb_home.htm)