

A photograph of a tree growing on a rocky cliff edge. The tree has a thick, gnarled trunk and a dense canopy of green leaves. It is positioned on the left side of the frame, with its trunk extending towards the center. The cliff face is rugged and brownish-red. The sky is a pale blue with some light clouds. The overall scene is dramatic and highlights the resilience of the tree.

# The Newly Planted Tree: Living on the Edge

The  Morton  
Arboretum

Gary Watson





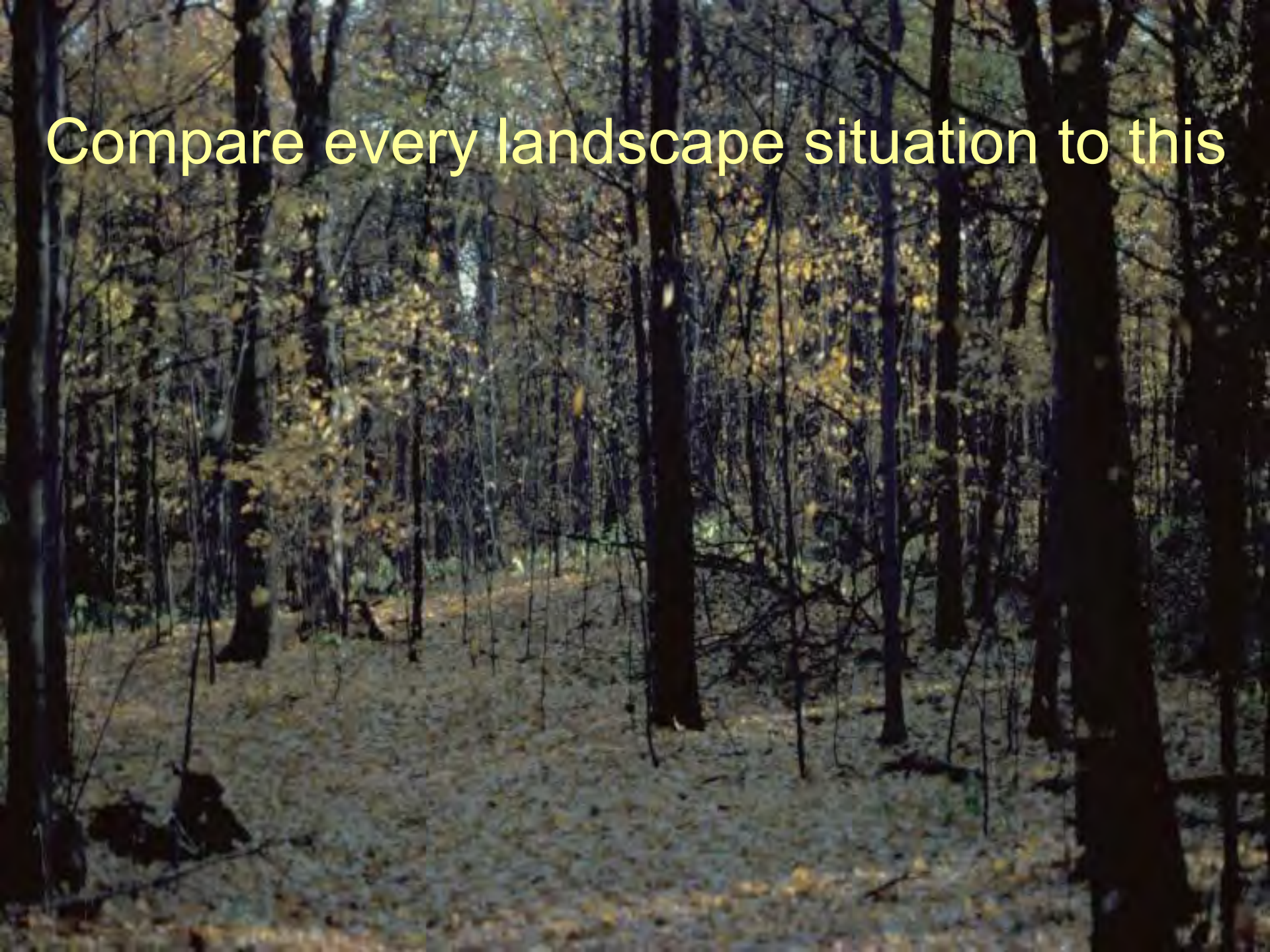
## TREE ESTABLISHMENT

Resumption of pre-transplant twig growth rate.

Gilman (1993): the time required for the tree to have regenerated enough roots to keep it alive without supplementary irrigation.



Compare every landscape situation to this







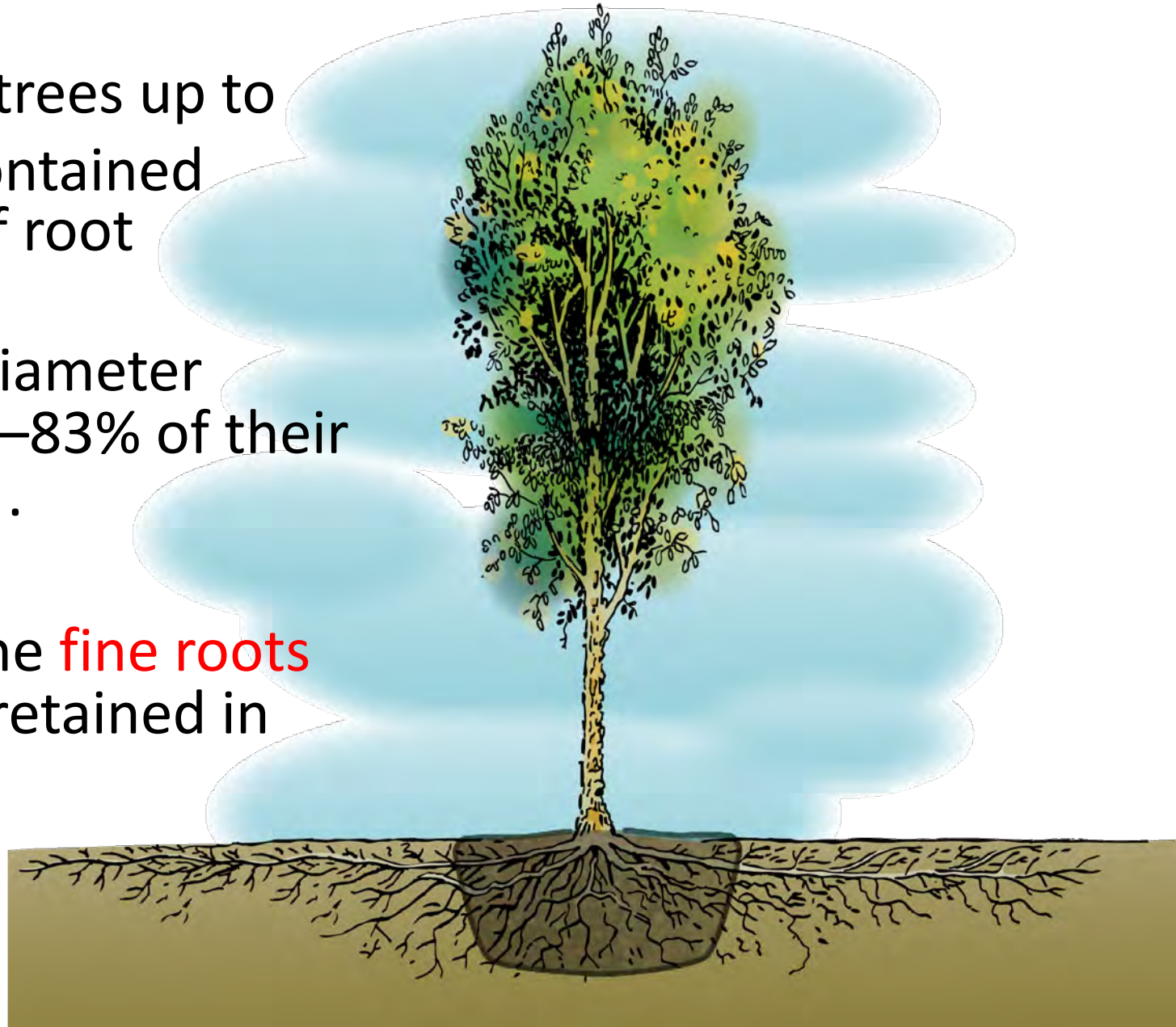


# How much of the root system is in a root ball?

Root balls of trees up to 3-inch dbh contained 53%–100% of root **biomass**.

3- to 8-inch diameter retained 29%–83% of their root **biomass**.

5%–18% of the **fine roots** (<2 mm) are retained in the root ball.



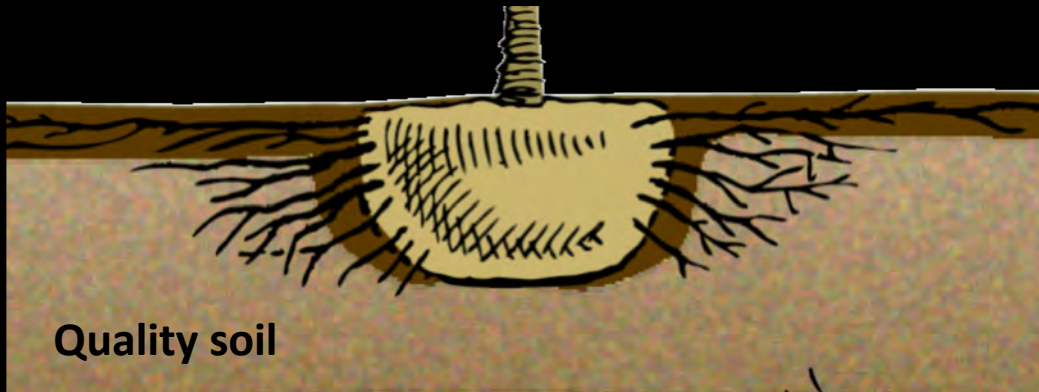












Quality soil











# Root Growth and Backfill Type

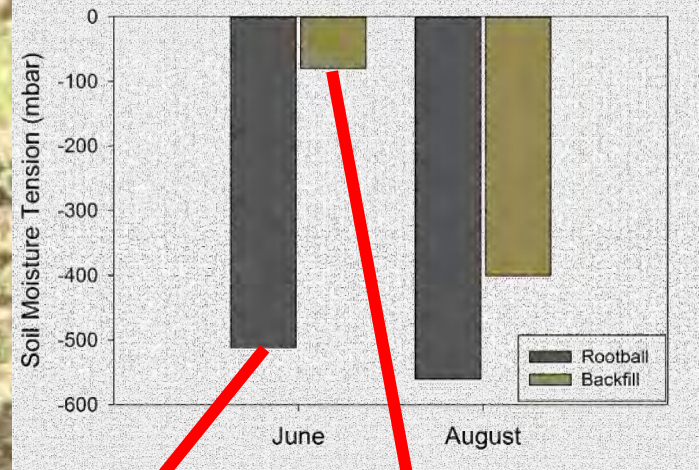
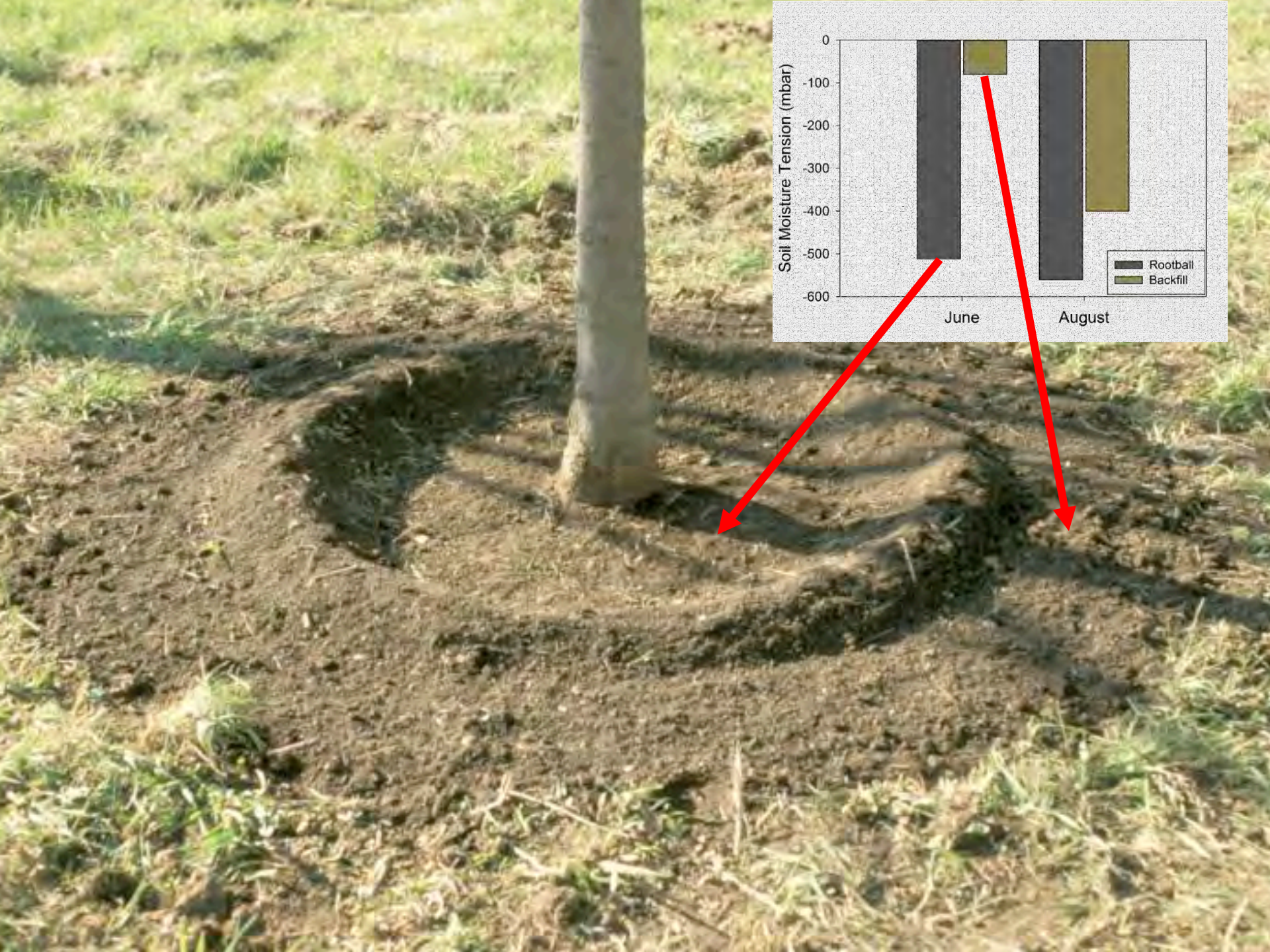
	<u>Back fill</u>	<u>Site-soil</u>	<u>Ratio</u>
Unamended clay	7.3	3.2	0.44
Amended Clay	9.4	4.1	0.44
New Topsoil	7.4	3.8	0.51

One Year After Plantng, 15 cm From the Root Ball, mm<sup>2</sup> SA/cc soil







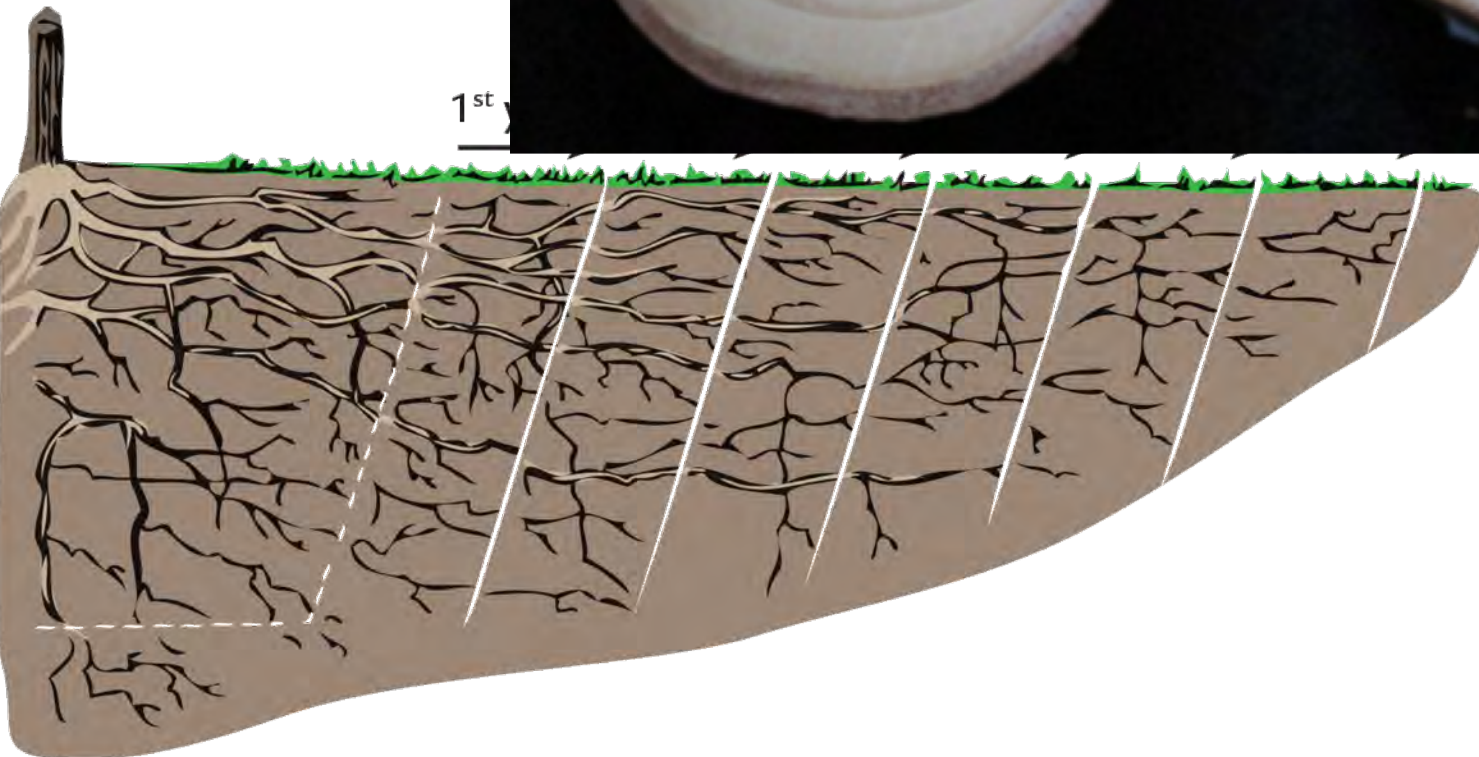
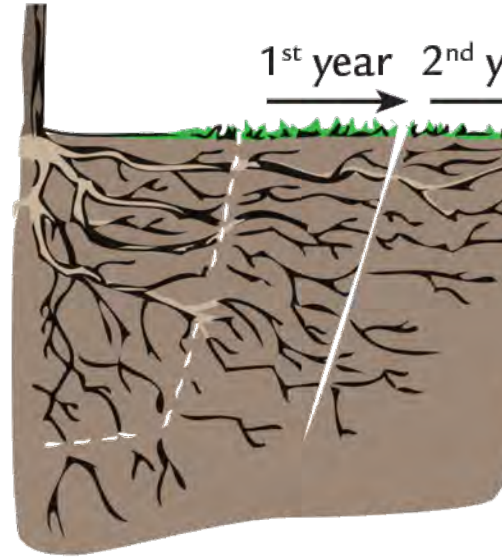




How long will it take for trees to establish after planting?



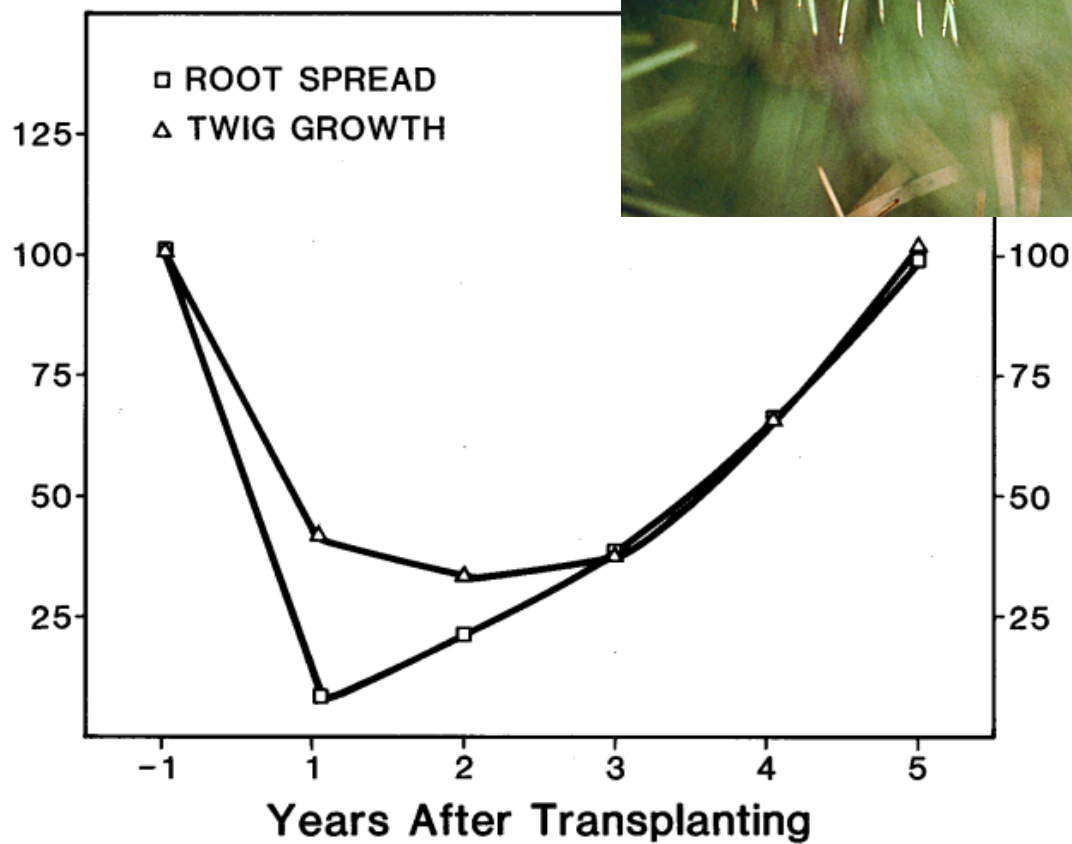








Estimated Lateral Spread of  
Root System (% of Original Size)



Annual Twig Growth  
(Pretransplanting Rate)









1990

Clark Landing



1990

2015



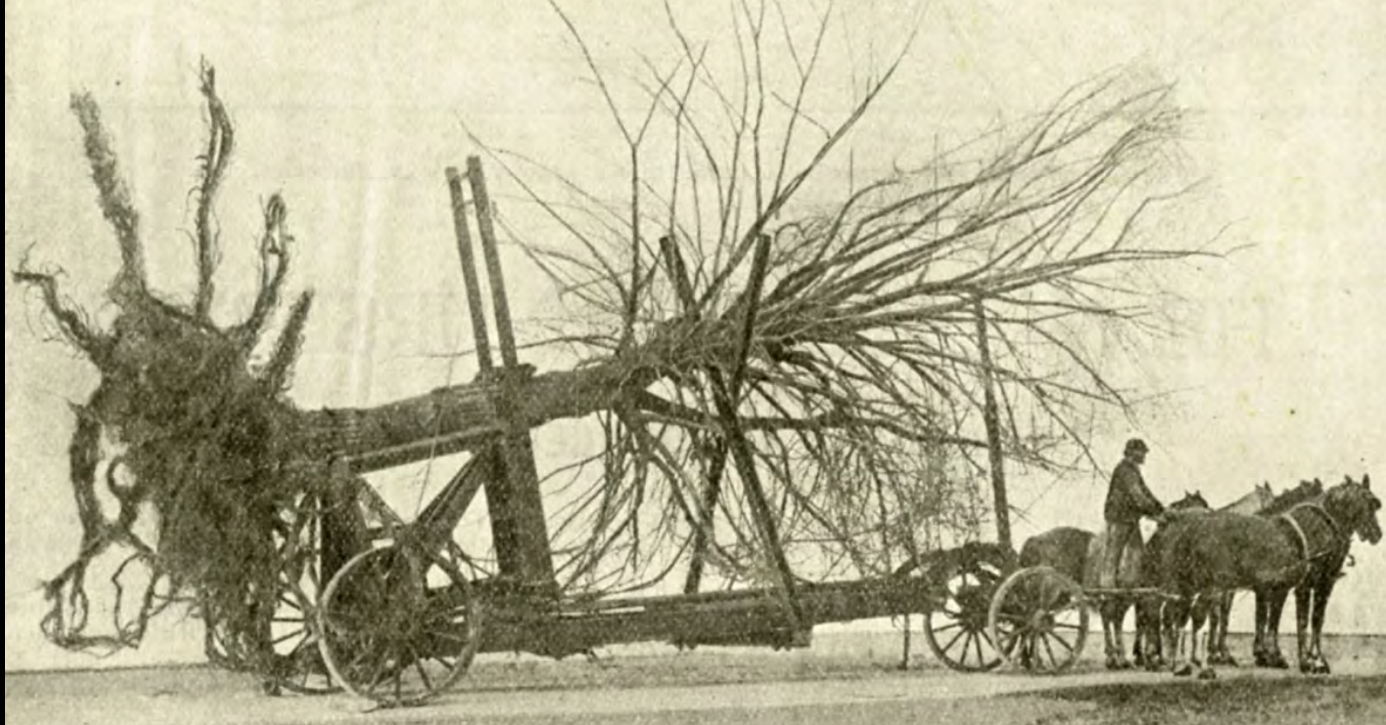


Can anything  
be done to  
speed up  
establishment?

- Fertilizer?
- Soil amendments?
- Soil Additives?
- Bigger root ball?
- Bare root?









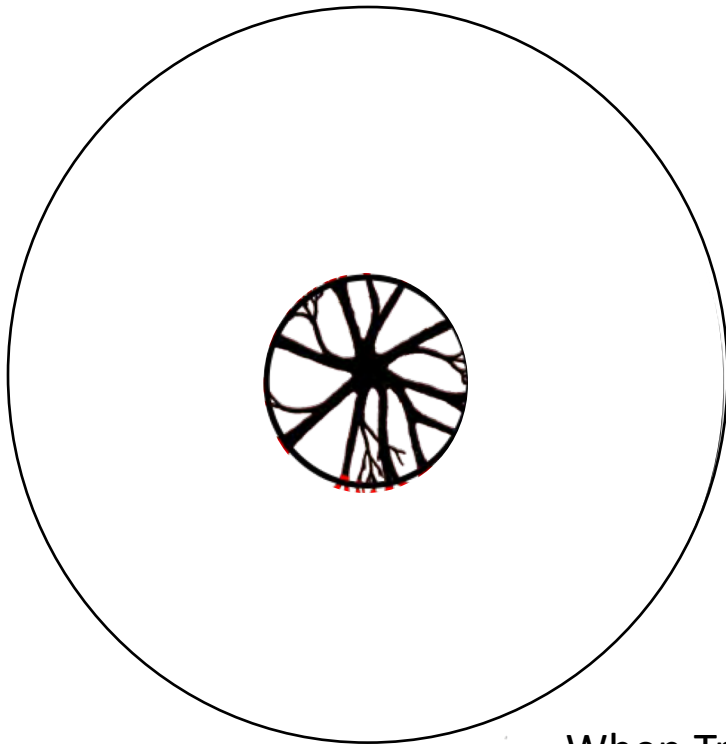




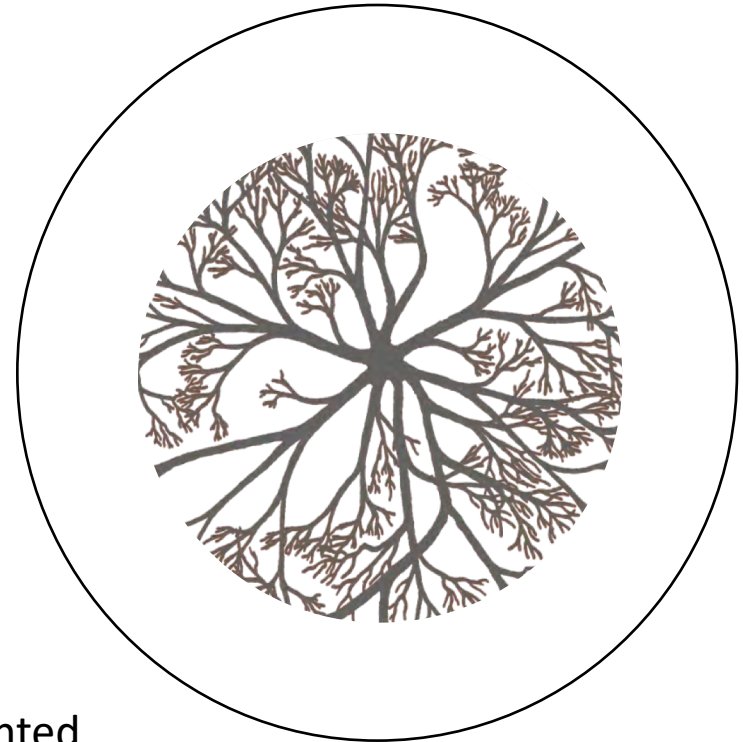




**Balled and Burlap**



**Bare Root**



When Transplanted

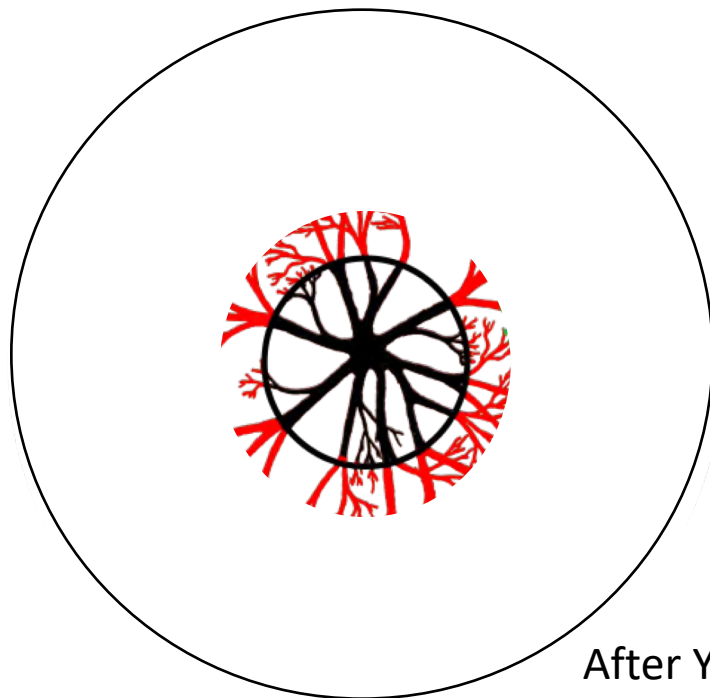


After 8 weeks  
in Missouri  
Gravel Bed





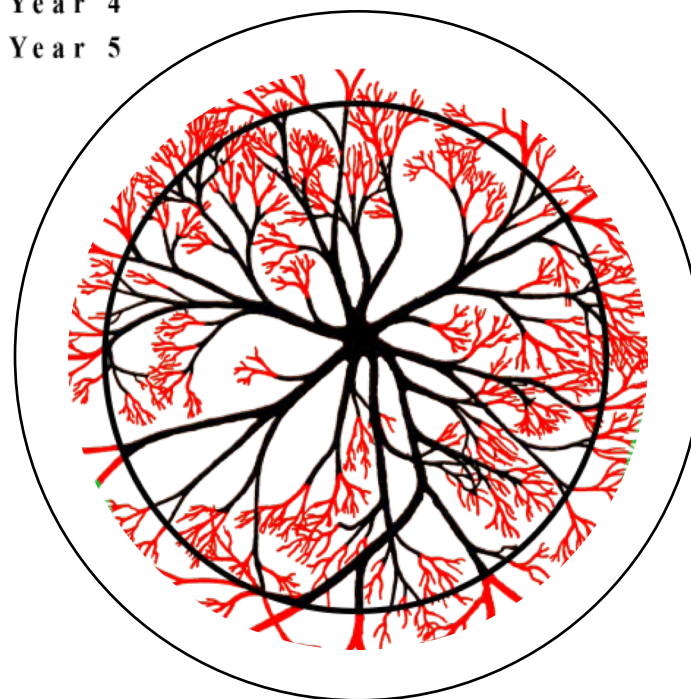
**Balled and Burlap**



After Year 1

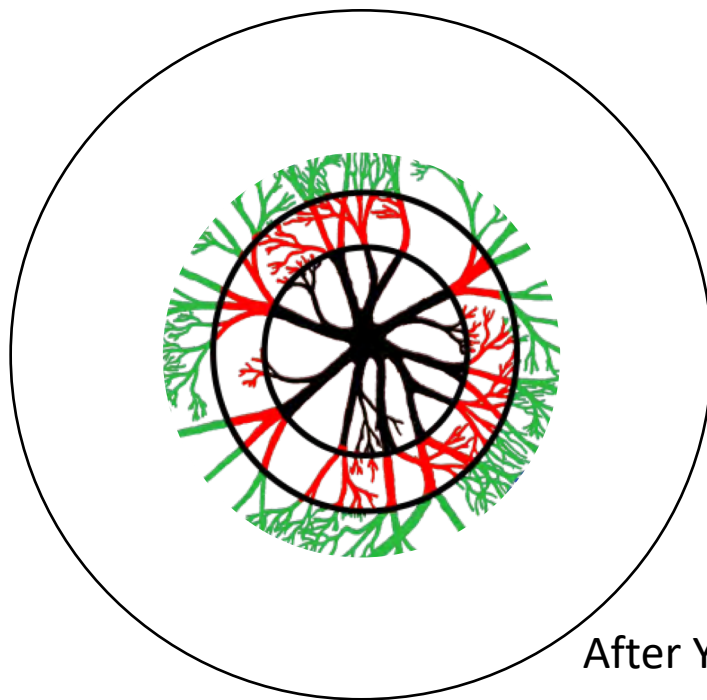
- Transplanted
- Year 1
- Year 2
- Year 3
- Year 4
- Year 5

**Bare Root**

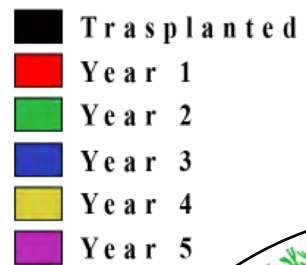




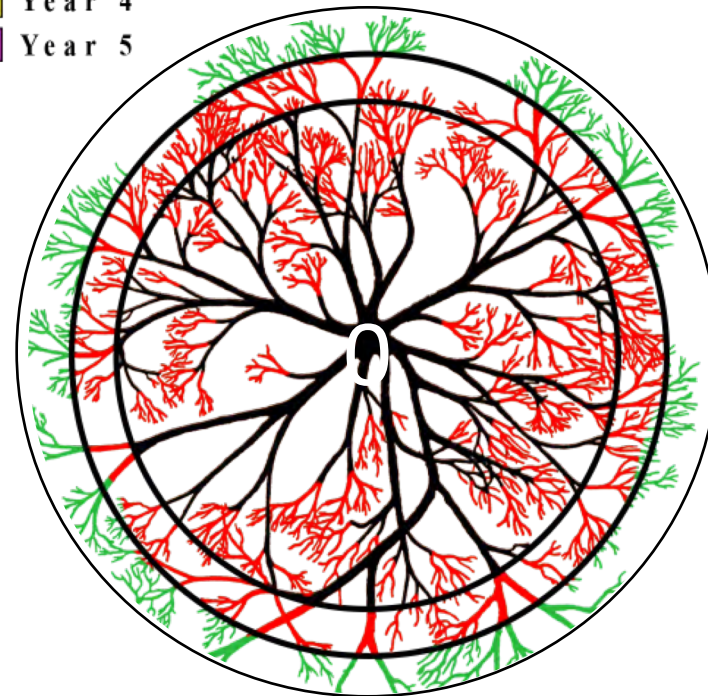
**Balled and Burlap**



After Year 2

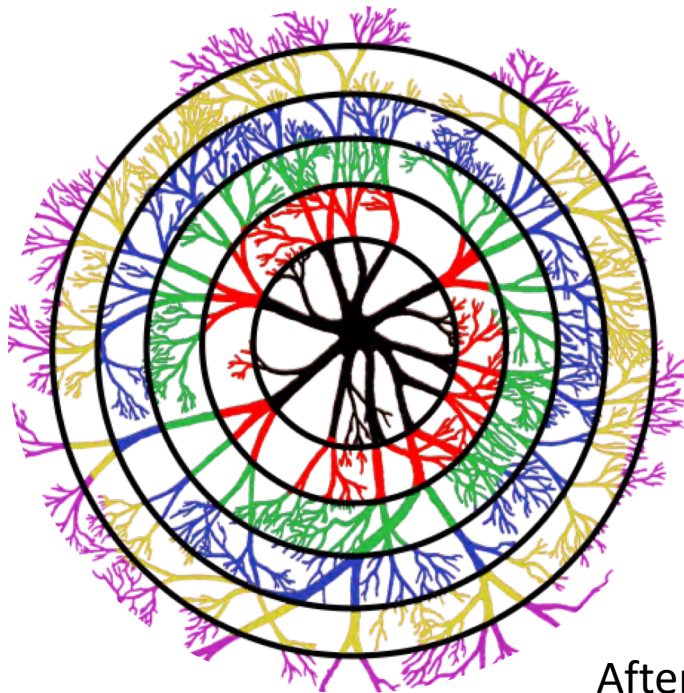


**Bare Root**





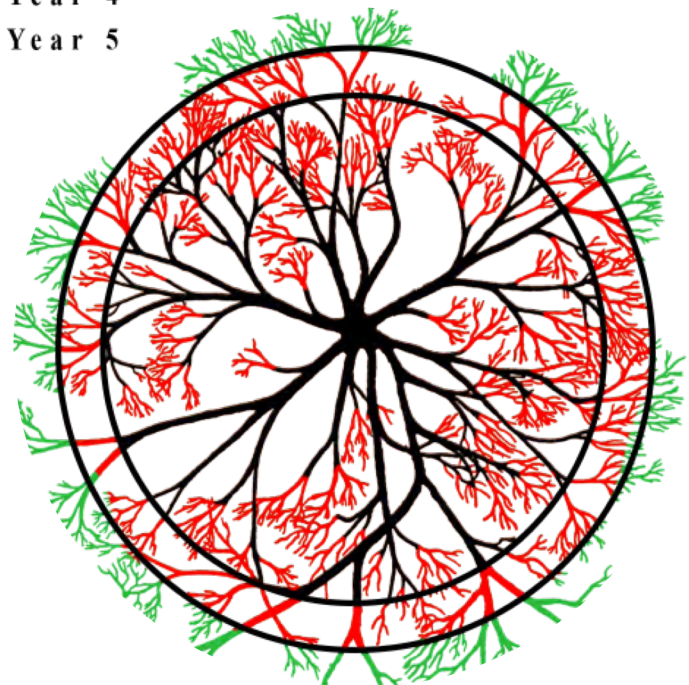
**Balled and Burlap**



After Year 5



**Bare Root**





# The Burnley Method

Six factors were selected as being indicative of successful or poor establishment:

- whether trees had been planted too deeply (or too shallow)
- whether trees have trunk movement at or below the soil surface,
- damage to the trunk,
- trunk sunscald injury,
- presence of epicormic shoots on the trunk/branches
- whether there were co-dominant stems

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**Table 2.** Number of trees exhibiting the conditions used as criteria for tree establishment.

<b>Number of trees</b>	<b>Trunk Movement</b>	<b>Trunk Damage</b>	<b>Epicormic shoots</b>	<b>Sunscald</b>	<b>Codom-inance</b>	<b>Planted too deep</b>
<b>510</b>	<b>214</b>	<b>42</b>	<b>61</b>	<b>64</b>	<b>25</b>	<b>62</b>
	<b>41.96%</b>	<b>8.23%</b>	<b>11.96%</b>	<b>12.55%</b>	<b>4.9%</b>	<b>12.16%</b>









Average tip extension of trees with and without trunk movement. The asterix indicates measurements with significant difference ( $p < 0.05$ ), using a two sample t-test.

Species	Months after planting	Number of trees	No. of trees with trunk movement	Average tip extension of affected trees (mm)	Average tip extension of non-affected trees (mm)
<i>Angophora costata</i>	12	37	19	*44	67
<i>Brachychiton acerifolia</i>	44	10	8	1yr = 112 2yr = 119	1yr = 72 2yr = 102
<i>Celtis australis</i>	12	28	16	104	81
<i>Corymbia maculata</i>	12	89	64	*39	52
<i>Eucalyptus scoparia</i>	12	17	9	104	84
<i>Olea europaea</i>	40	66	16	201	190
<i>Platanus x acerifolia</i>	12	40	10	126	110
<i>Platanus x acerifolia</i>	40	38	7	*1yr = 219 *2yr = 259	1yr = 294 2yr = 278
<i>Pyrus calleryana</i>	12	37	10	*15	34





## CONCLUSION

For the field arborist, three practical criteria for street trees establishment:

- tip extension,
- percentage of canopy dieback
- trunk movement in the root ball

Provide useful data for management decisions

All three criteria can be easily and quickly applied and do not require specialist or expensive equipment.





# 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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