Effects of Top-Pruning on Seedling Survival

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Question

- Does top-pruning increase survival of hardwoods?
- Does top-pruning increase survival of southern pines?

Reasons not to top-prune

- It is not “natural”
- It makes trees look funny (forked)
- It wounds the seedling
- It changes seedling biochemistry
- Late pruning removes the terminal bud
- It might increase disease
- It increases seedling uniformity

Reasons to top-prune

- It reduces the shoot/root ratio
- It reduces the number of culls
- It increases seedling uniformity
- It can increase freeze tolerance
  (it changes seedling biochemistry)
- It can reduce shipping and handling costs
- IT CAN INCREASE FIELD SURVIVAL

TOP-PRUNING papers

- Top pruning studies with survival or growth data
- Top pruning studies without survival or growth data

- favor top-pruning
- against top-pruning

HISTORY

- All kinds of forest trees may be, and nearly all should be pruned at time of transplanting. As it is almost if not quite impossible to take up a tree without destroying a portion of the roots, or at least disturbing them, it is well to reduce the number or length of the branches to fully compensate for any loss sustained by the roots. Fuller (1884)

HISTORY

- I am well aware that there are men who object to pruning transplanted trees, because they imagine in their ignorance of the general principles of vegetable physiology, that the larger the number of buds and leaves, the greater the capacity of the tree to assimilate sap, which in a measure be true, provided the roots were in a condition to supply the crude article in unlimited quantities……

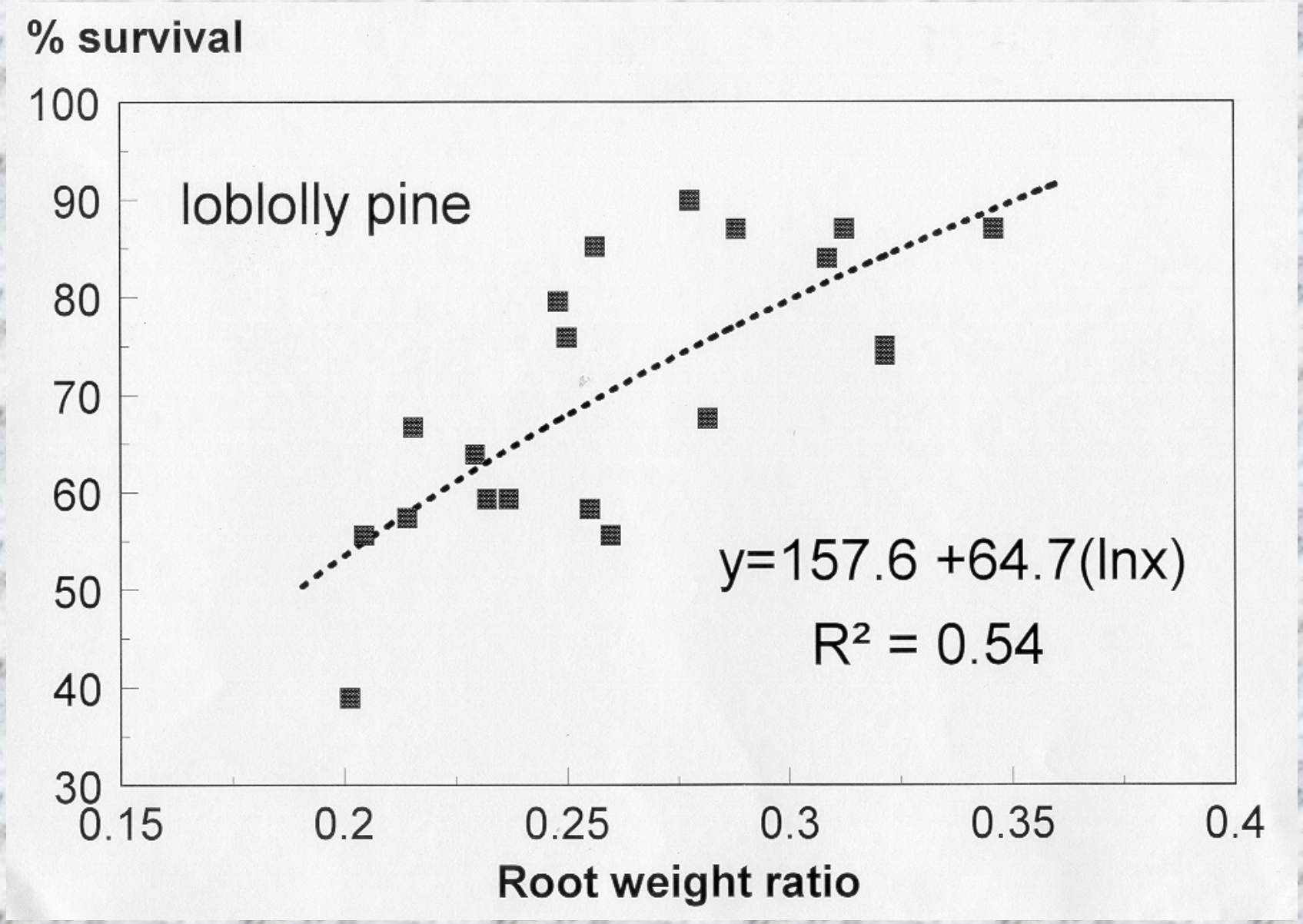
(Fuller 1884)

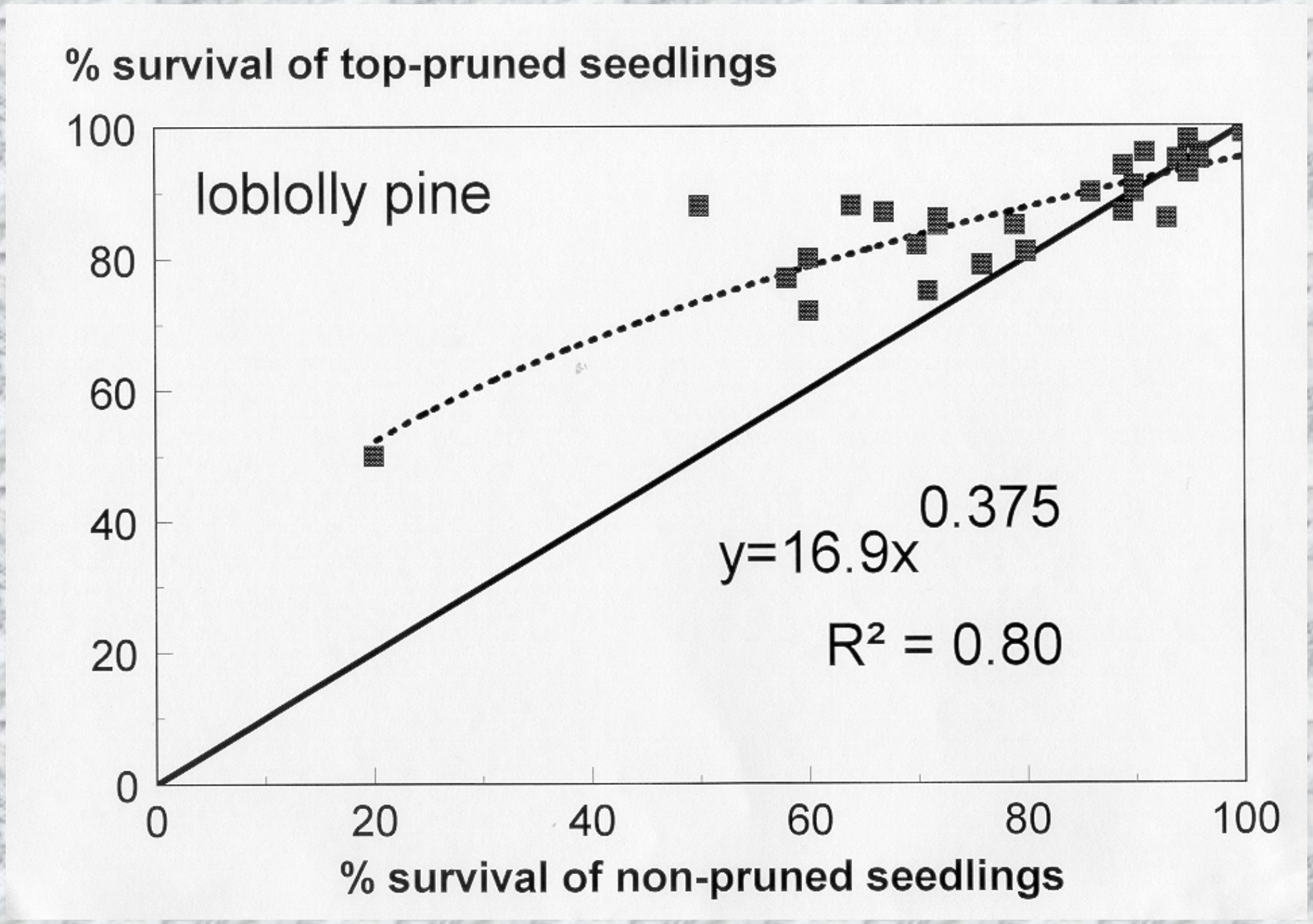
HISTORY

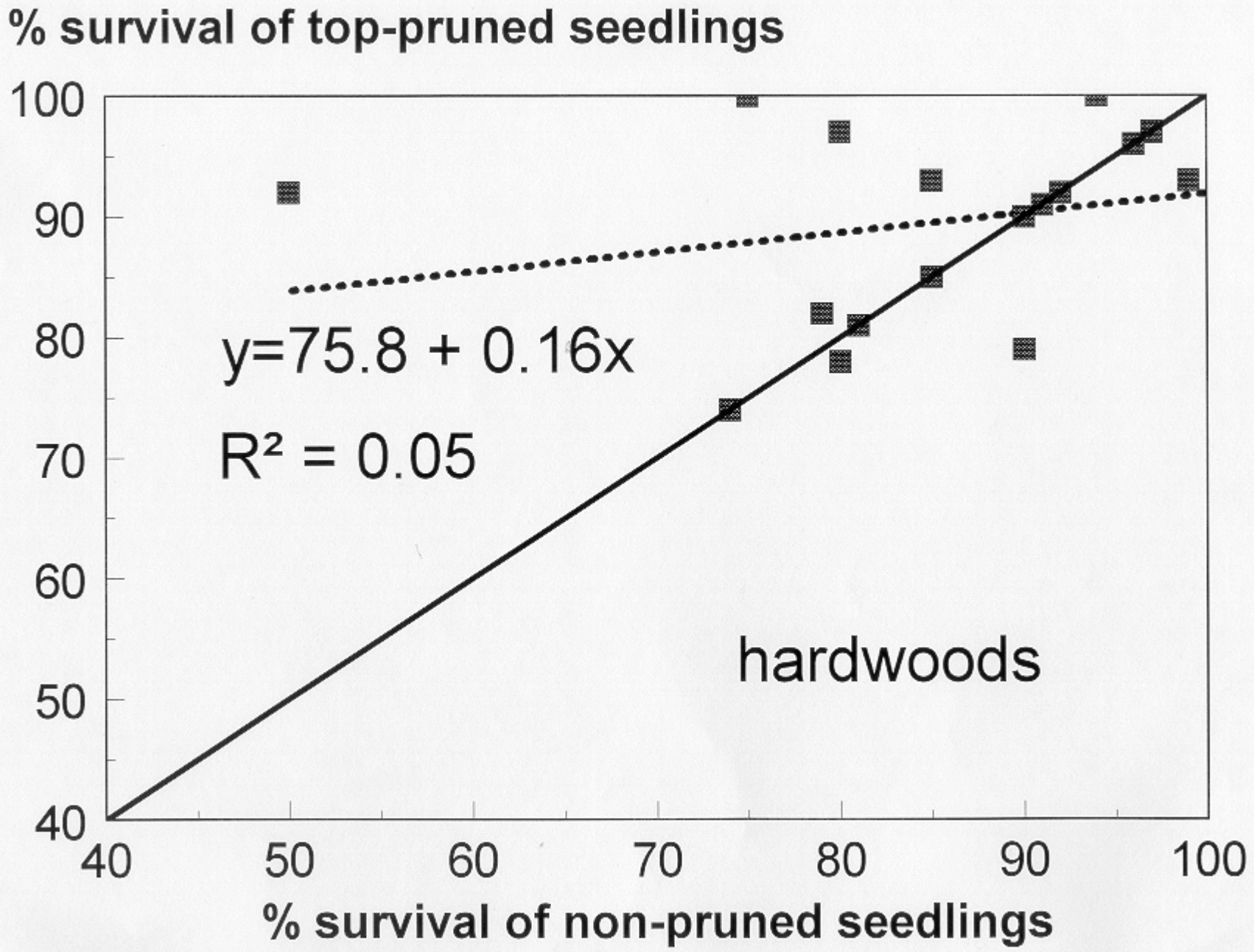
- .. but as they are not at such time, it is absurd to think that the leaves are to be sustained by what they cannot possibly obtain.

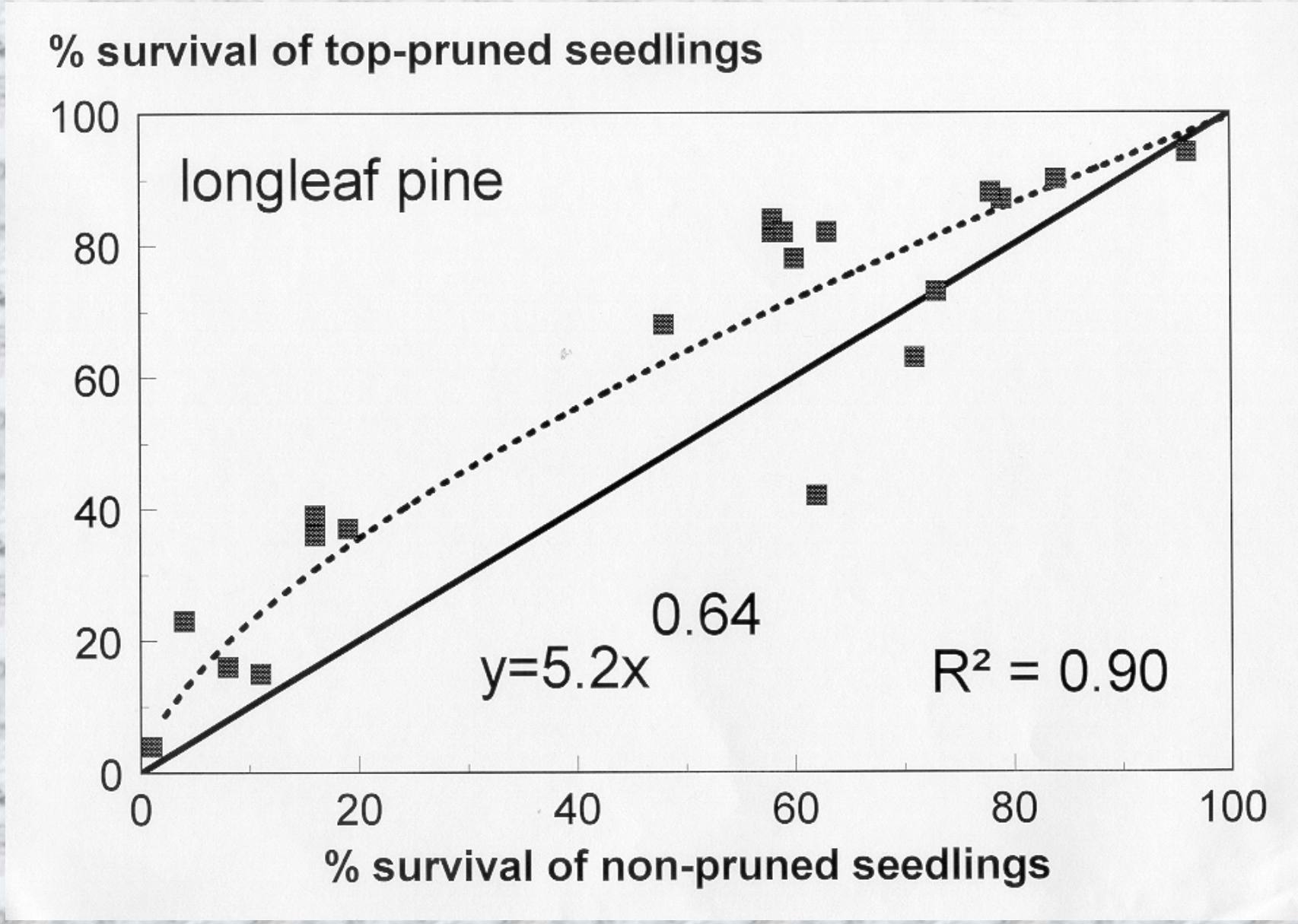
(Fuller 1884)

Increase in Survival


% survival
100
90
80
70
60
50
40
30
loblolly pine
y=157.6 +64.7(lnx)
R² = 0.54
0.15
0.2
0.25
0.3
0.35
0.4
Root weight ratio

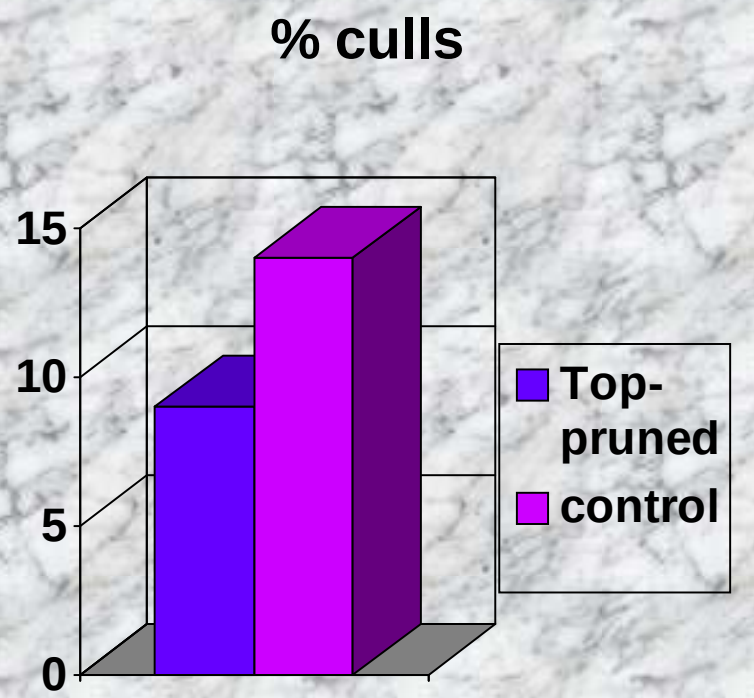

% survival of top-pruned seedlings
loblolly pine
y=16.9x^0.375
R² = 0.80
0
20
40
60
80
100
% survival of non-pruned seedlings


% survival of top-pruned seedlings
100
90
80
70
60
50
40
y=75.8 + 0.16x
R² = 0.05
hardwoods
40
50
60
70
80
90
100
% survival of non-pruned seedlings

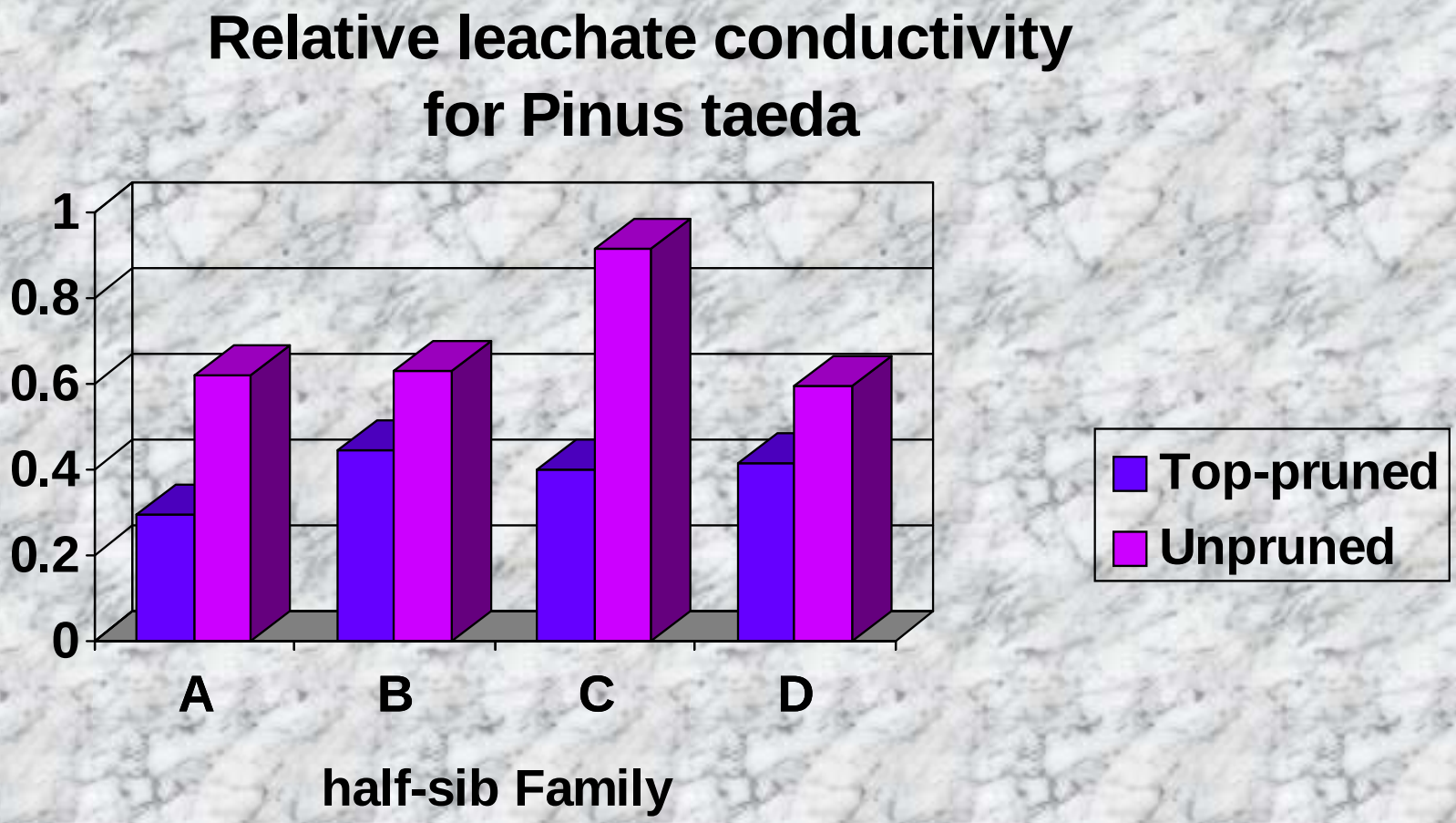

% survival of top-pruned seedlings
longleaf pine
y=5.2x^0.64
R² = 0.90
0
20
40
60
80
100
% survival of non-pruned seedlings

Reduction in Culls

- With slash pine, Mary Duryea (1990) reported a 5% reduction in culls.
- This increase can amount to 85 thousand tress/ha.
- About $2,500/ha

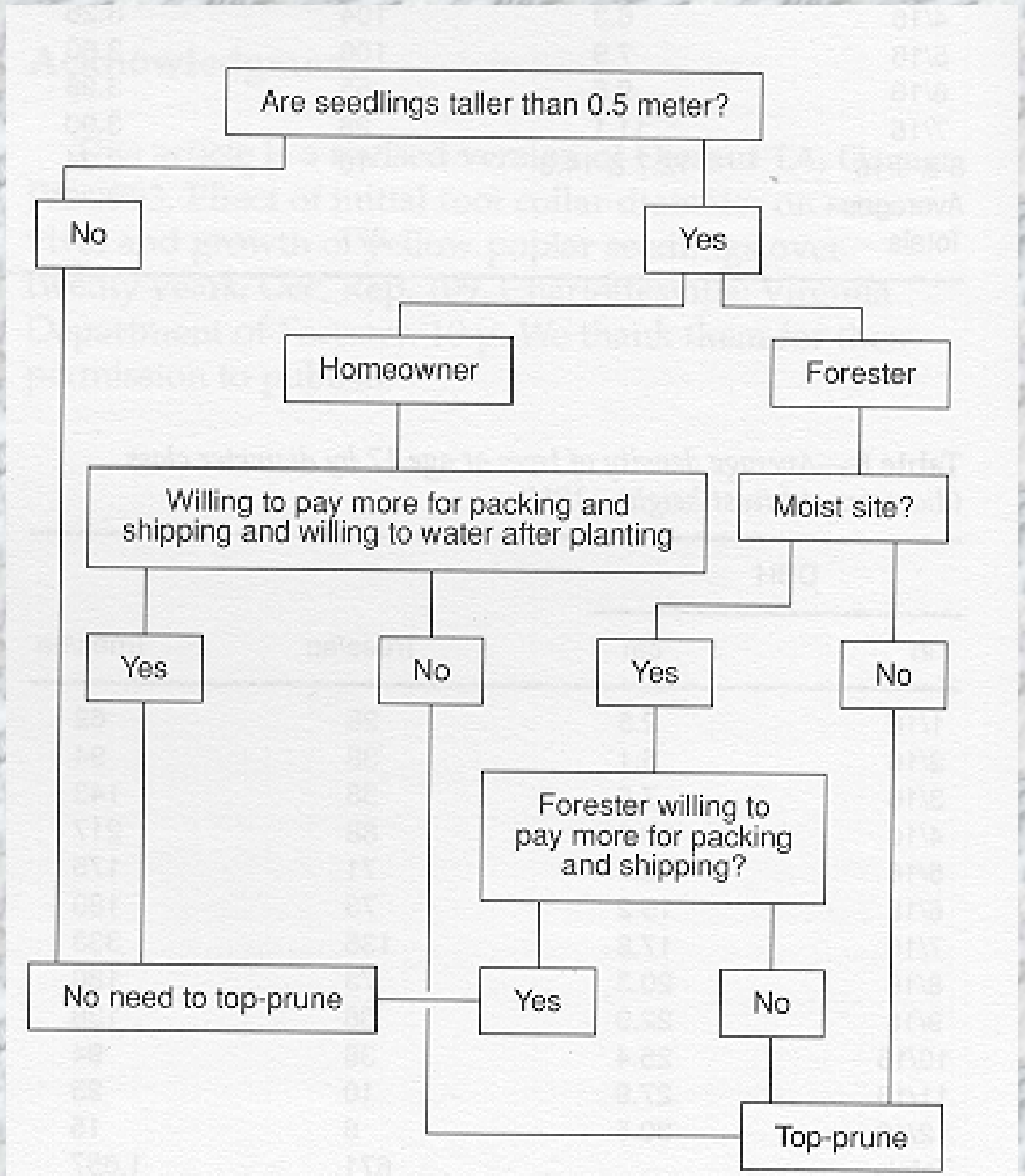


FREEZE INJURY



Diseases caused by top-pruning

- Published literature indicates the following pathogens have increased after top-pruning.
- (1) ….
- (2) ….
- (3).....


Are seedlings taller than 0.5 meter?
No
Yes
Homeowner
Forester
Willing to pay more for packing and shipping and willing to water after planting
Moist site?
Yes
No
Yes
No
Forester willing to pay more for packing and shipping?
No need to top-prune
Yes
No
Top-prune

SUMMARY

- Top-pruning tends to improve survival on sites were survival is not “optimum.”
- Top-pruning of loblolly pine tends to make the seedlings more freeze tolerant.
- Top-pruning can increase the production of plantable seedlings.
- Top-pruning can reduce lifting and shipping costs for hardwoods.