Needle clipping longleaf pine seedlings

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FORD

Question

- Why do you top-prune pines and hardwoods?

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

“Reasons” not to top-prune

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

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)

Needle-Clipping Longleaf Pine and Top-Pruning Loblolly Pine in Bareroot Nurseries

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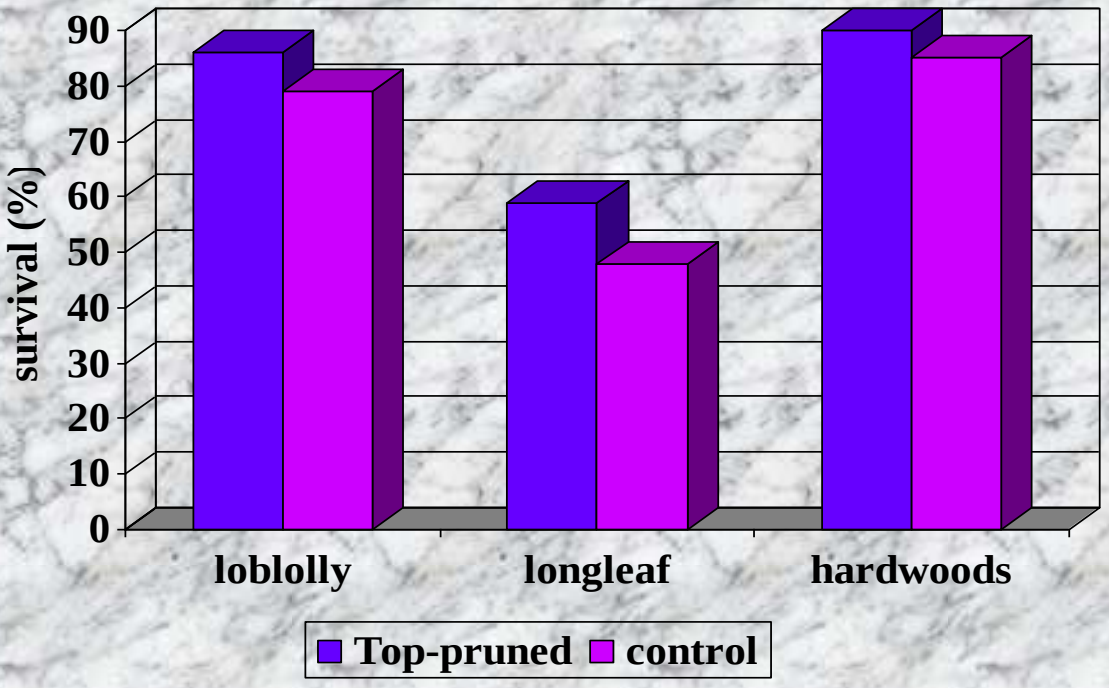


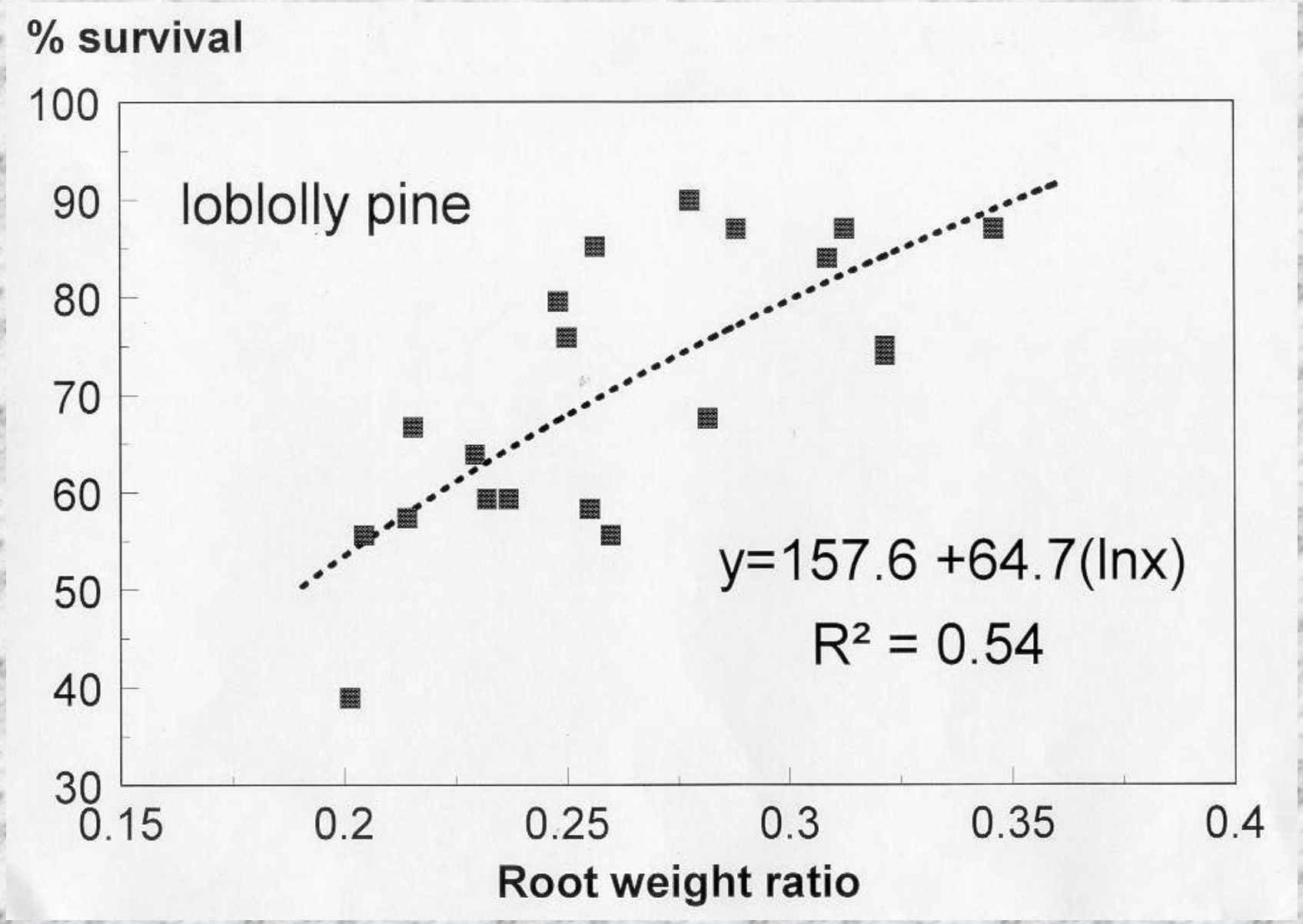
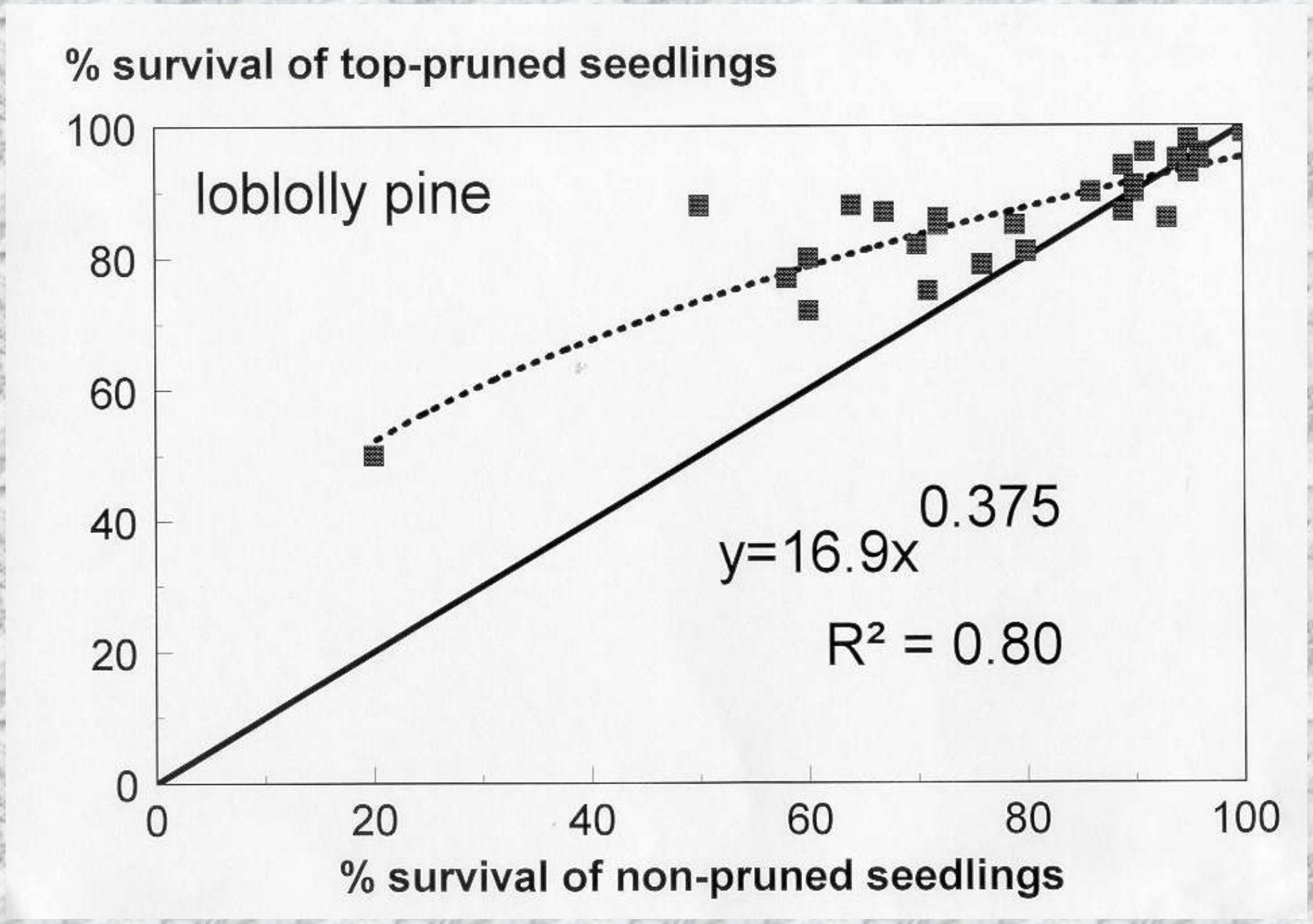
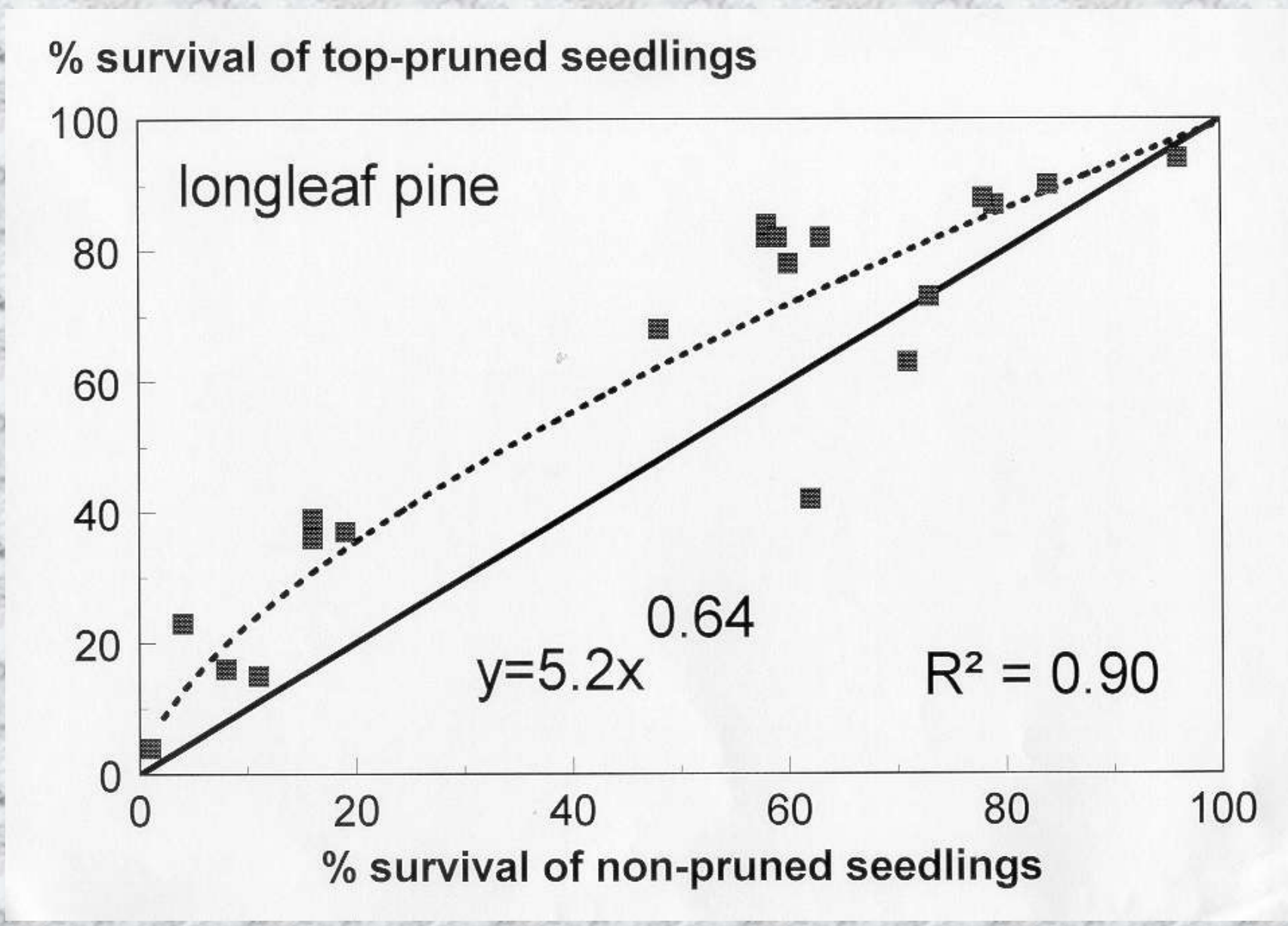

% survival
100
90
80
70
60
50
40
30
loblolly pine
y=157.6 +64.7(lnx)
R² = 0.54
0.15
0.2
0.25
0.3
0.35
0.4
Root weight ratio

Table 1. Effects of Multiple Top-Pruning and Planting Depth on Survival of Loblolly Pine from Three Nurseries.

			Normal planting depth	Normal planting depth	Deep planting	Deep planting
	Top-prune Nursery height	Control Nursery height	Top-prune	Control	Top-prune	Control
Nursery	**Inch**	**Inch**	**%**	**%**	**%**	**%**
Florida	10	12	82	70	85	82
Mississippi	8	9	72	60	74	69
South Carolina	10	12	88	64	85	74

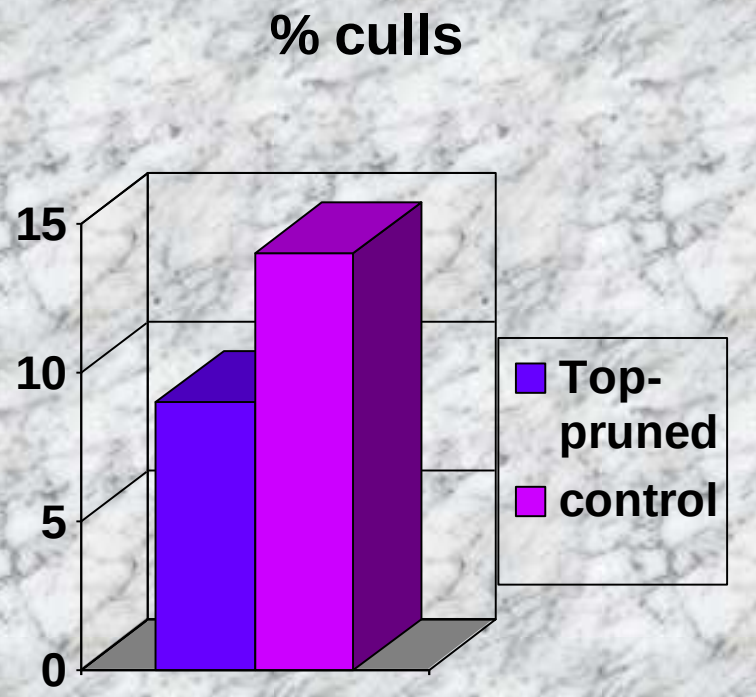

% survival of top-pruned seedlings
loblolly pine
y=16.9x^0.375
R² = 0.80
0
20
40
60
80
100
% survival of non-pruned seedlings


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

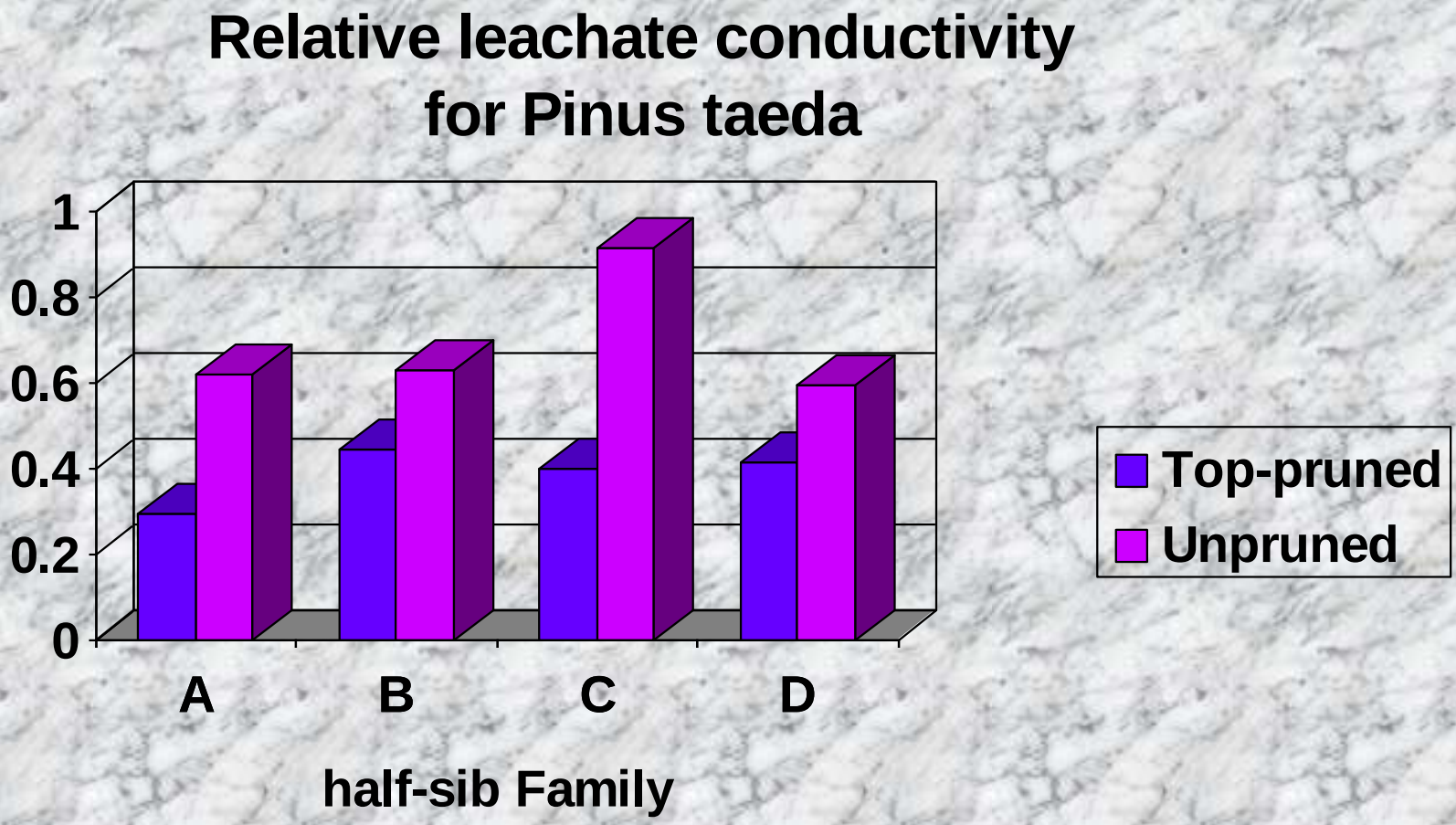
Nursery Fertilization and Top Pruning of Slash Pine Seedlings

Mary L. Duryea, *Department of Forestry, University of Florida, Gainesville, FL 32611.*[1]

- 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



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.

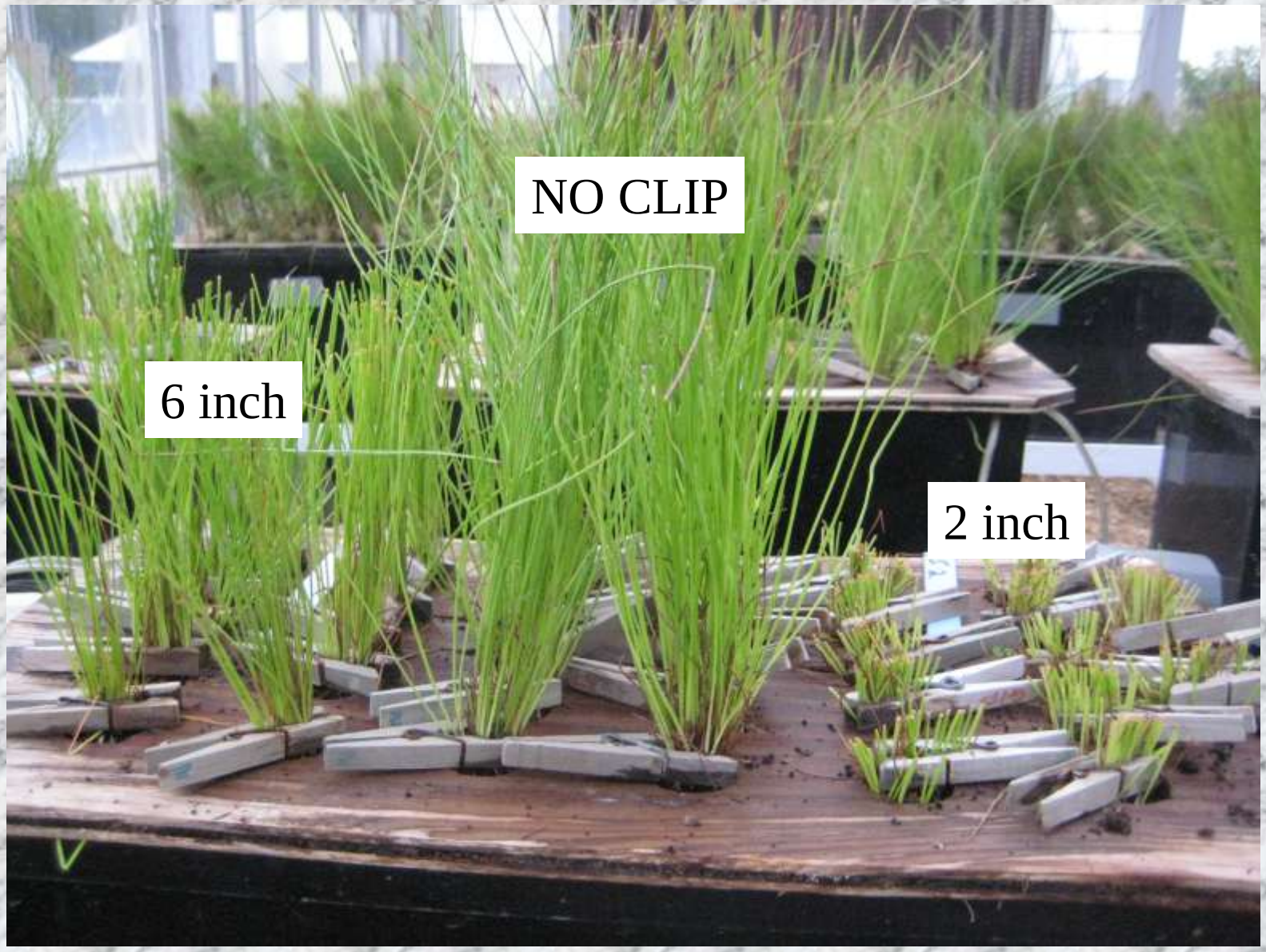
Auburn University
Southern Forest Nursery
Management Cooperative

RESEARCH REPORT 10-05

TOP-CLIPPING OF LONGLEAF PINE MORE IMPORTANT THAN ADEQUATE RGP?

by
David B. South and Tom E. Starkey

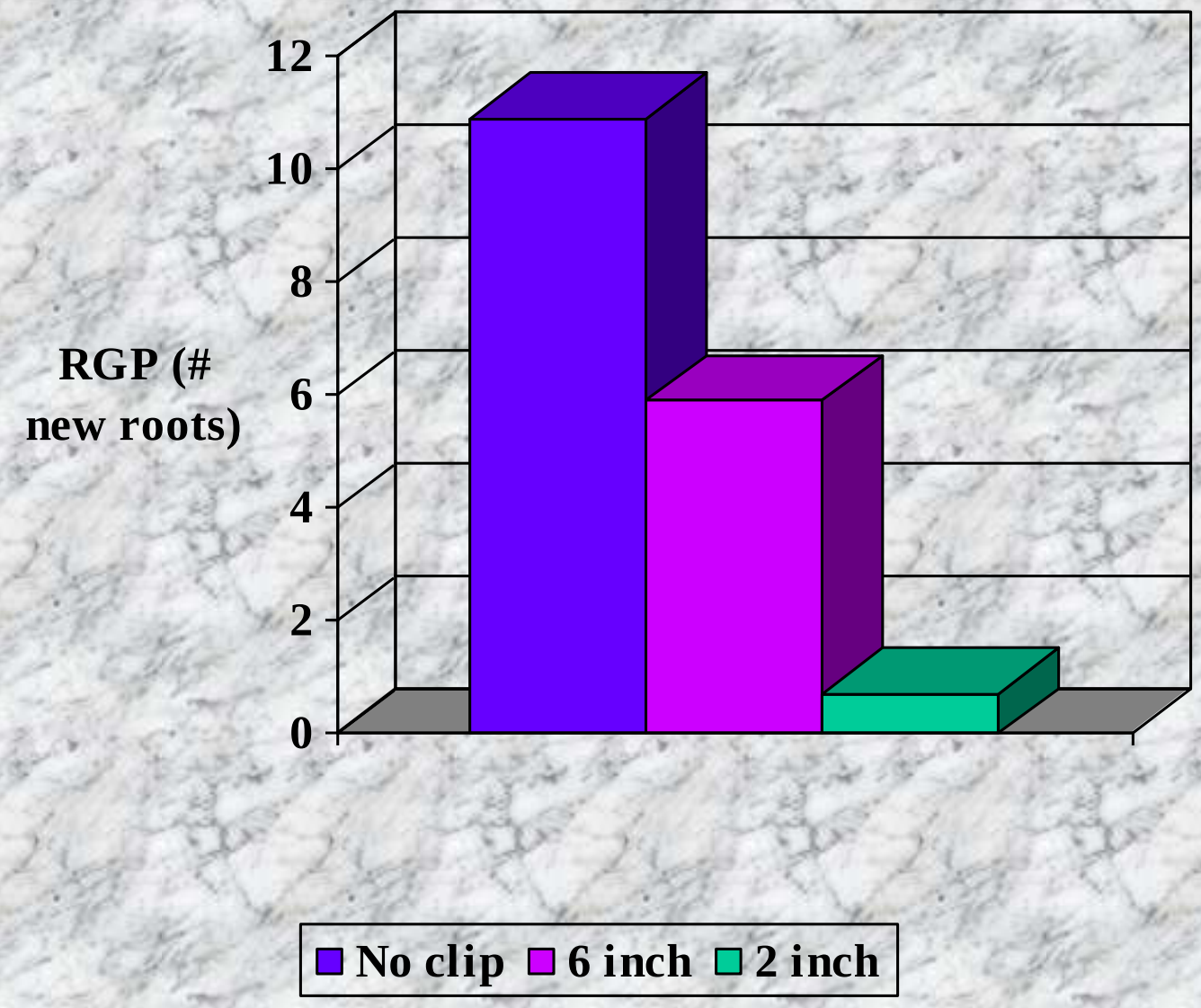
3 clipping treatments



Treatment	**0-Clip**	**6-Clip**	**2-Clip**
Needle length (in)	11	6	2
Needle mass removed (g)	0	819 mg	1746 mg
Top dry weight (g)	2.76	*1.94*	*1.01*
Top mass removed (%)	0	30%	63%
Root + media (g)	11.4	--	--

STEP 1 – CONDUCT AN RGP TEST

Removing foliage reduces RGP



STEP 2 – CONDUCT A “TRANSPIRATION” TEST

Clipping reduces transpiration

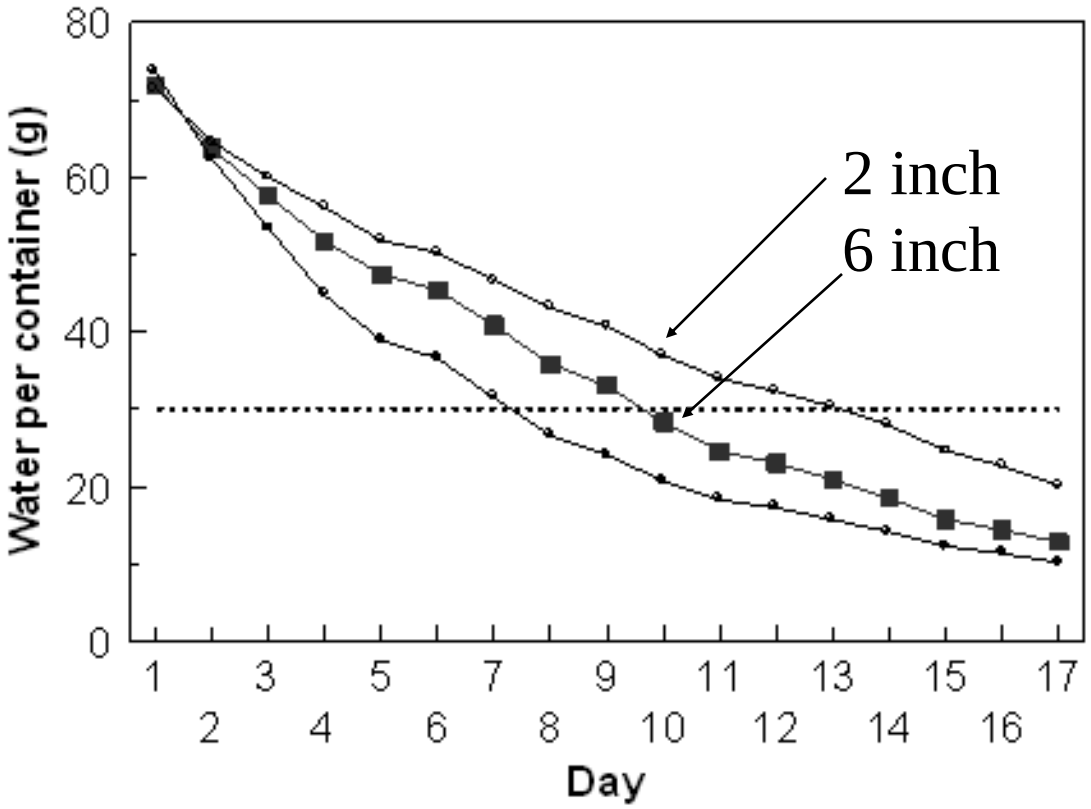


Figure 1. Effect of clipping treatment on water remaining in the container-seedling. Control = bottom line, solid circle; 6-Clip = solid square; 2-Clip = top line, open circle.

6-Clip treatment reduced the onset of stress by an estimated 2.3 days

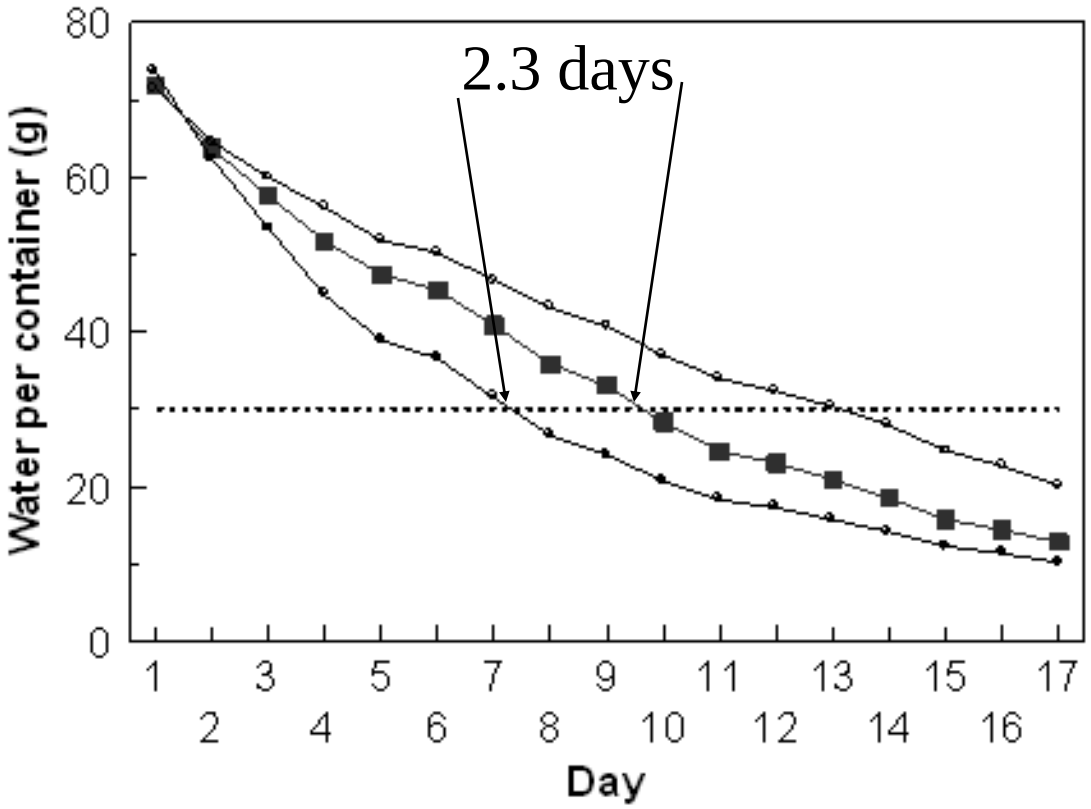


Figure 1. Effect of clipping treatment on water remaining in the container-seedling. Control = bottom line, solid circle; 6-Clip = solid square; 2-Clip = top line, open circle.

Clipping reduces transpiration

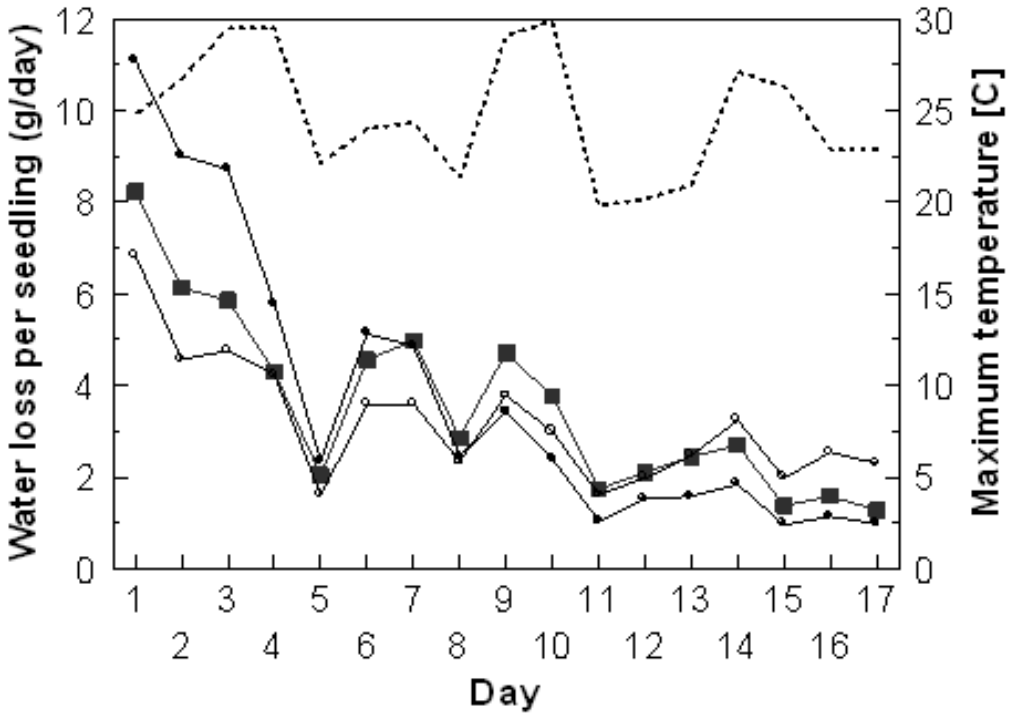


Figure 2. Water loss per seedling by day and clipping treatment. Control = solid circle; 6-Clip = solid square; 2-Clip = open circle. Maximum daily temperature (dashed line) was highest on day 10.


We no longer have to presume that clipping reduces transpiration.

STEP 3 – CONDUCT A "SURVIVAL" TEST

Trees not watered
for 4 weeks

Then they were irrigated to determine which ones were still alive.

STEP 3 – “SURVIVAL” TEST

11 inch seedlings

8% survival

STEP 3 – “SURVIVAL” TEST

6 inch seedlings

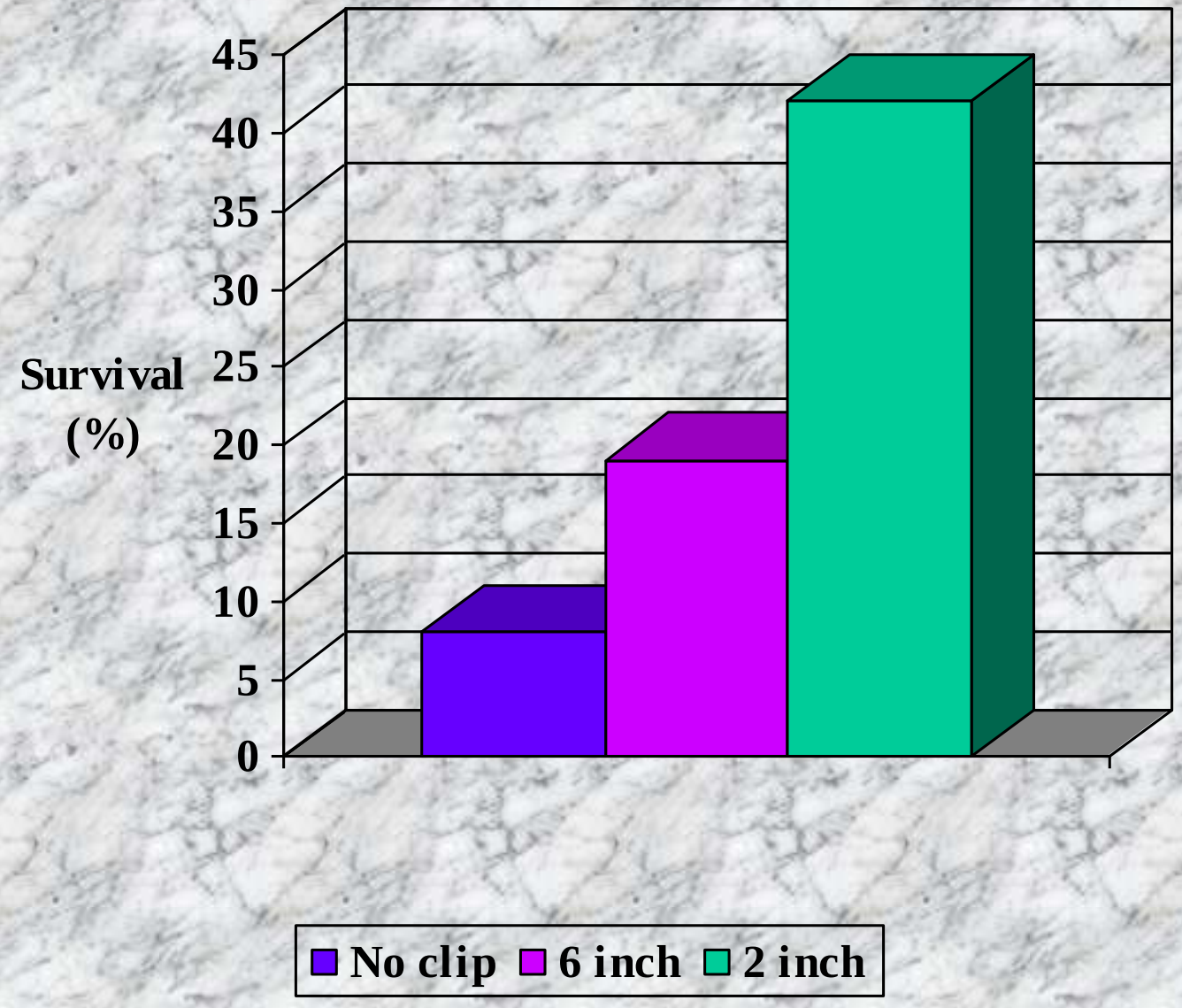
19% survival

STEP 3 – “SURVIVAL” TEST

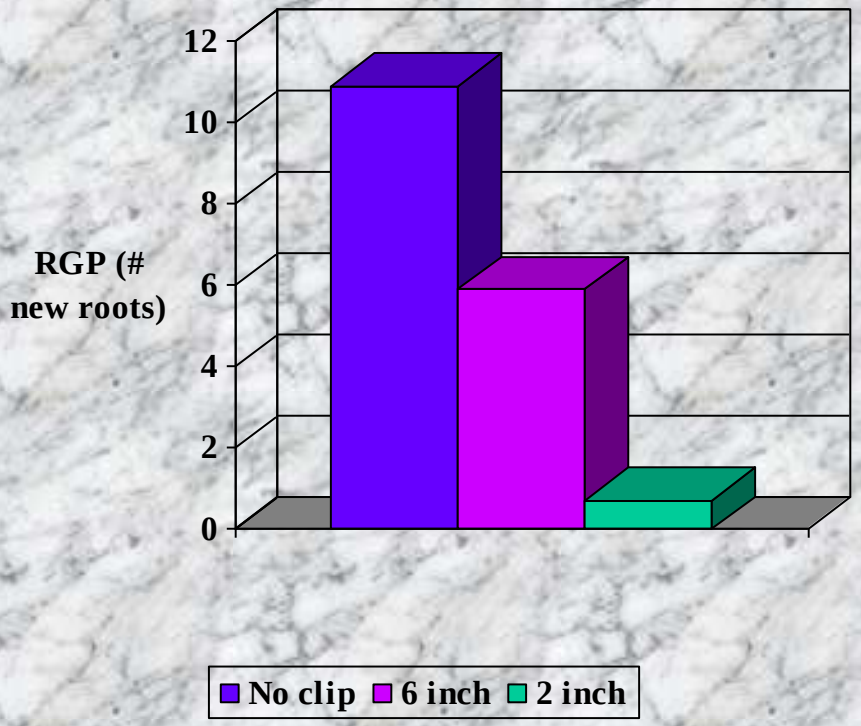
2 inch seedlings

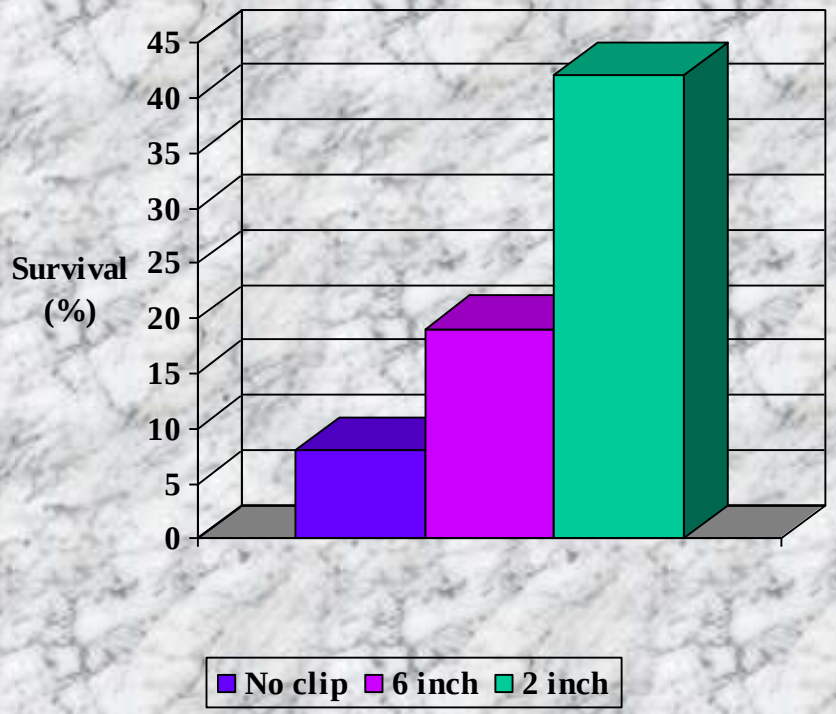
42% survival

Removing foliage increases survival in greenhouse when containers are not watered



Which is more important? Good RGP or good survival?





SUMMARY

- Removing foliage reduces early RGP of pine

(RGP of pines depends on current photosynthate)

- Top-clipping reduces the amount of water loss by seedlings.
- Top-clipping can increase survival which affects future root growth.

- (Live for another two days and then grow more roots)