REASONS, PROBLEMS AND RESULTS OF GROWING A LARGE TREE IN A GREENHOUSE

by

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In the fall of 1953, when our greenhouse plant was still in the planning stage, it was decided that an addition was needed to house a seed-bearing size tree. Dr. Bruce Zobel suggested this addition and gave as his reason the following:

> "By having a tree growing under conditions which temperature and light can be controlled, we believe we can encourage flowering in the desired direction of the researcher. By means of grafting various and sundry scions, we can study numerous species and hybrids under the same conditions in the same room".

For this sound reason, the "tall house" was built. It measured 25 feet square by 22 feet high.

In the selection of a tree for this building, several factors had to be considered:

1. Size, quite obviously, was the most important. One must be chosen that would not outgrow its confines in two or three growing seasons.
2. It must be healthy, but preferable a slow grower.
3. Sonderegger pine (Pinus sondereggeri) was preferred due to its larger branches. This would make grafting simpler. Loblolly (Pinus taeda) was our second choice.
4. A prolific seed producer was desired.
5, It must be growing in a tight soil to make moving possible.

A loblolly pine was eventually selected, the cone bearing quality having to be sacrificed for size. Its measurements at the time of moving were 15.3 feet tall, 8.6 feet crown width and 4,2 inches dbh.

The tree was moved in March, 1954. The original shock of transplanting, plus terrific transpiration in the glass house, was almost too much. Feeder roots had not grown into the fill dirt and water would not penetrate the root ball in sufficient quantities, so it was dying from a lack of water, Even though several one gallon cans with holes in the bottoms were buried in the root ball to force watering, by August the tree seemed doomed.

At about this point, two of my former professors from L. S, U., with whom we are cooperating on other projects, came by on an inspection tour. Professor A. B. Crow suggested a haircut to cut down on transpiration, and a haircut it got. All the needles were cut back to the basal sheaths except a very small cluster on each twig tip. This haircut proved to be the turning point in its crisis.

Our next problem came in the form of a pine leaf scale. While playing with several recommended treatments, this pest almost got the upper hand. Eventually, a solution of three rounded tablespoons of Wettable Powder, 25% Malathion, in two gallons of water was used, adding an adhesive agent to make it stick. By spraying heavily once each week, the scale was finally brought under control.

The menial weekly task of pulling Bermuda grass out of the soil was overcome by a three inch layer of peat moss underneath.

The tree is sprinkled twice weekly and thoroughly watered once each week by means of overhead sprinklers during the summer months. In winter, it is sprinkled weekly and watered well twice per month. 2

Ammonium Nitrate is applied at the rate of five pounds per month, March through September.

In February, 1955, Bruce and I put 15 grafts of six different hybrids on the tree, All scions were from the Western Institute of Forest Genetics, or hybrids that Bruce had made of southern pines in East Texas. As of this writing, fourteen still survive.

More grafts were put on in February, 1956, Two hybrids and 23 separate species were used for a total of 37. At present, only 16 of the 1956 grafts survive, leaving a total of 30 successes now on the tree.

A list of those attempted, by year, and the survival is attached.

Two types of grafts were employed. Principally, side-bottle grafts were made, using test tubes to supply water until the union was complete. The other type was a side graft, but in using seedlings, the roots were left intact and enclosed in a polyethlene bag of wet spagnum moss.

The latter type worked very well, but in some instances formed a large swelling at the end of the scion after the roots were cut away. This seems to be caused by an excess of food material manufactured by the scion and not used by the stock, thus being more or less stored in the swelling.

One of the many interesting phenomena of this peculiar pinus is an individual graft. A Shortleaf (Pinus echinata) X Sonderegger pine (Pinus sondereggeri) hybrid was grafted in 1955 with the roots in moss. This seedling was perhaps 12 inches tall and the root collar diameter half the size of a cigarette at grafting. At present, the diameter of the scion

ATTACHMENT NUMBER 1
GRAFTS ON HODGES GREENHOUSE TREE

Applied February 17, 1955	12/12/56
Lot 3 (Pinus echinata X Pinus elliottii elliottii)	Living
Lot 4 (Pinus echinata X Pinus elliottii elliottii)	Living
Lot 7 (Pinus echinata X Pinus elliottii elliottii)	Living
Pinus echinata X Pinus elliottii elliottii	Living
Pinus echinata X Pinus sondereggeri	Living
Pinus taeda (1) X Pinus elliottii elliottii	Living
Pinus taeda (1) X Pinus elliottii elliottii	Living
Pinus taeda (2) X Pinus elliottii elliottii	Living
Pinus attenuradiata (P. attenuate X P. radiata)	Living
Pinus attenuradiata (P. attenuate X P. radiate)	Living
Pinus ponderosa X Pinus apacheca V7	Living
Pinus ponderosa X Pinus apacheca .V7	Dead
Pinus ponderosa 1577 X Pinus apacheca	Living
Pinus ponderosa 1577 X Pinus montezumae	Living
Pinus ponderosa 1577 X Pinus montezumae	Living

Applied February 29, 1956		12/12/56
Pinus arizonica	(S.W. & Mexico)	Living
Pinus canariensis	(Canary Islands)	Dead
Pinus clausa	(Florida)	Living
Pinus clausa	(Florida)	Dead
Pinus coulteri	(California)	Doubtful
Pinus densiflora	(Japan)	Living
Pinus edulis	(SWUS)	Dead
Pinus elliottii densa	(Florida)	Dead
Pinus elliottii densa	(Florida)	Dead
Pinus flexilis	(N. Mexico)	
Pinus flexilis	(N. Mexico)	Dead
Pinus halepensis	(Mediterranean)	Dead
Pinus jeffreyi	(California)	Dead
Pinus laricio	(Mediterranean)	
Pinus laricio	(Mediterranean)	Dead
Pinus montezumae	(Mexico)	Dead
Pinus montezumae	(Mexico)	Dead
Pinus mugho	(S. E. Europe)	
Pinus mugho	(S. E. Europe)	Dead
Pinus muricata	(California)	
Pinus patula	(Mexico)	
Pinus pinaster	(Mediterranean)	
Pinus pinaster	(Mediterranean)	Dead
Pinus psuedostrobus	(Central America)	Dead
Pinus radiata	(California)	Dead
Pinus sabiniana	(California)	

Pinus sabiniana	(California)	Dead
Pinus serotina	(SEUS)	
Pinus serotina	(SEUS)	
Pinus thunbergii	(Japan)	
Pinus thunbergii	(Japan)	
Pinus virginiana	(Tennessee)	Dead
Pinus virginiana	(Tennessee)	Dead
Pinus ponderosa 4B59 X Wind		Dead
Pinus ponderosa 4BF9 X Wind		Dead
Pinus taeda (1) X Pinus elliottii elliottii (DAA)		Living
Pinus taeda (2) X Pinus elliottii elliottii (N)		Living

above the union is 1.1 inches, the length of the grafted branch is 5.5 feet and a breadth of five feet.

In September, seven months after grafting, five cone flowers put in their appearance, These lasted until just before opening for pollen, then all died, This has been the only graft to produce flowers up to this time.

The tree itself seems completely out of harmony with the seasons as far as flowering is concerned. Loblolly pine in our section normally flowers during the first half of February. In early August of 1956, apparent flower buds emerged, but were thought to be vegetative growth. Examination two weeks later proved them to be seven true cone flowers. Bags were put on these for controlled pollination and, for no apparent reason, they were all dead eight days later.

At this point, I might add that along with the cone flowers, nine pollen catkins appeared, but never reached maturity.

A close examination on December 12, 1956, for any new signs of flowering, produced a conelet in the very tip of the tree. Though this flower was not definitely marked in August, I strongly believe it to be one of the same group due to its location and appearance. Its location is very difficult to observe, and the conelet is much smaller and greener than normal loblolly cones outside the greenhouse. To strengthen my belief, the seven flowers which had been bagged, plus three other dead ones not previously seen, were still in evidence.

We had hoped to have a normal tree producing seed in a normal manner in our greenhouse, except for any forcing we may attempt at one time or another. Instead, with no attempt to change anything, we have something going on which we can't explain. Although we do realize it isn't normal for a pine tree to be enclosed in glass, protected from all the natural elements and growing under strange conditions, we hadn't expected such strange things as these to happen. However, we are eagerly looking forward to any future phenomenon that our pampered pinus will put forth.