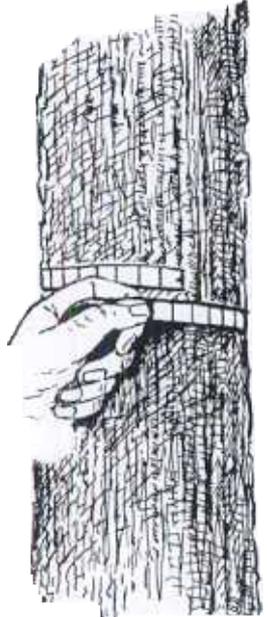
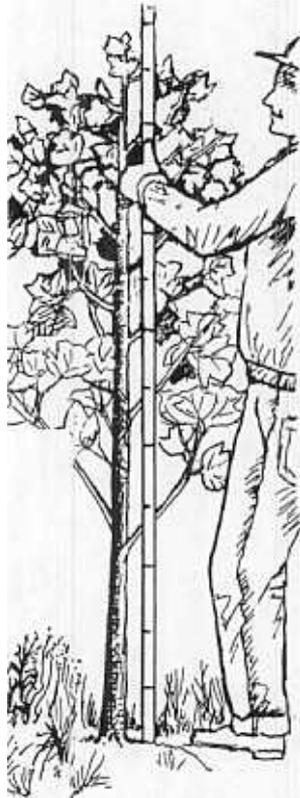




EFFECT OF TIME IN COLD STORAGE ON LOBLOLLY PINE SEEDLING SURVIVAL



EFFECT OF TIME OF LIFTING AND LENGTH OF TIME IN COLD STORAGE

ON SURVIVAL AND GROWTH OF LOBLOLLY PINE SEEDLINGS

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ABSTRACT

Cold storage for periods of up to 3½ months did not reduce the survival of dormant loblolly pine seedlings lifted in December. Cold storage for periods of up to 2 months did not reduce the survival of non-dormant seedlings lifted in April.

DESCRIPTION OF STUDY

In the winter and spring of 1968-69, a study was installed to test the effects of different lifting dates and different lengths of time in cold storage ^{1/} on the survival and growth of loblolly pine seedlings. Twelve different treatments were tested as shown in Table 1.

TABLE 1. Lifting dates, approximate months in cold storage and planting dates.

Lifting Date	<u>Approximate Months Storage</u>			
	<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>
	<u>Planting Date</u>			
12/4	12/5	1/10	2/5	3/6
12/23 ^{2/}	1/10	2/5	3/6	4/7
3/6	3/6			
4/7	4/7	5/6	6/9	

The twelve treatments were replicated 5 times in randomized blocks. A block consisted of a 20 seedling row of each of the 12 treatments. A total of 1,200 seedlings were planted: 5 blocks x 12 treatments x 20 seedlings per treatment row. Spacing was 6.6 x 6.6 feet.

All seedlings were lifted from part of a seedbed selected for uniformity of seedling size and density. Seedlings for each treatment were packed in

^{1/} Temperatures in the cold storage unit averaged around 38 degrees Fahrenheit, and ranged from about 34 degrees at night to perhaps 45 degrees at times during the day when seedlings were being put in and taken out.

^{2/} The seedlings lifted on December 23 could not be planted right away because the ground froze at the planting site and it was not until January 10 that the first planting could be made. The storage periods were, therefore, all increased about 1/2 month, so that instead of 0,1,2 and 3 months they were 1/2, 1 1/2, 2 1/2, and 3 1/2 months.

standard packages of 1,000 seedlings.^{3/} The 100 seedlings planted for each treatment were randomly selected from the 1,000 seedling package.

Seedlings were fully dormant on the first 3 lifting dates, but had broken dormancy and were growing on the April 7 lifting date.

The planting site was prepared by drum chopping and burning. It is on the coastal plain portion of the Pocahontas State Forest, a nearly level area of well-drained soils in the Marlboro soil series.

Survival and seedling heights were measured annually through the third growing season.

RESULTS AND DISCUSSION

Survival after 3 seasons is shown in Table 2 and Figure 1.^{4/} Long periods of storage did not adversely affect survival. March is usually the safest month to plant in Virginia, however, seedlings lifted and planted on March 6 survived only slightly better than seedlings planted at the same time that had been in storage for up to 3 months. For the December 4 and December 23 liftings, survival was better for the longer storage periods. Apparently, the seedlings were under less stress in cold storage than in the field exposed to severe weather. The January 10 planting (seedlings lifted on December 5 and December 23) had the lowest survival. The week following January 10 was unusually cold, and this may have been the reason for the lower survival of this planting.

TABLE 2. Percent survival after three seasons.

Lifting Date	Approximate Months Storage			
	0	1	2	3
12/4	91 ab	77 b	96 a	95 a
12/23 ^{5/}	89 ab	95 a	96 a	94 a
3/6	98 a			
4/7	99 a	94 a	93 ab	

^{3/} Seedlings tied in bundles of 50, roots dipped in a kaolin clay slurry, wrapped in absorbent paper, wrapped in waterproof paper, and finally strapped.

^{4/} Survival percents were transformed to arc sin and an analysis of variance was made. Differences between treatments were tested using Duncan's New Multiple Range Test. In Table 2, means followed by the same letter are not significantly different at the .05 level.

^{5/} Ibid., footnote 2, page 1

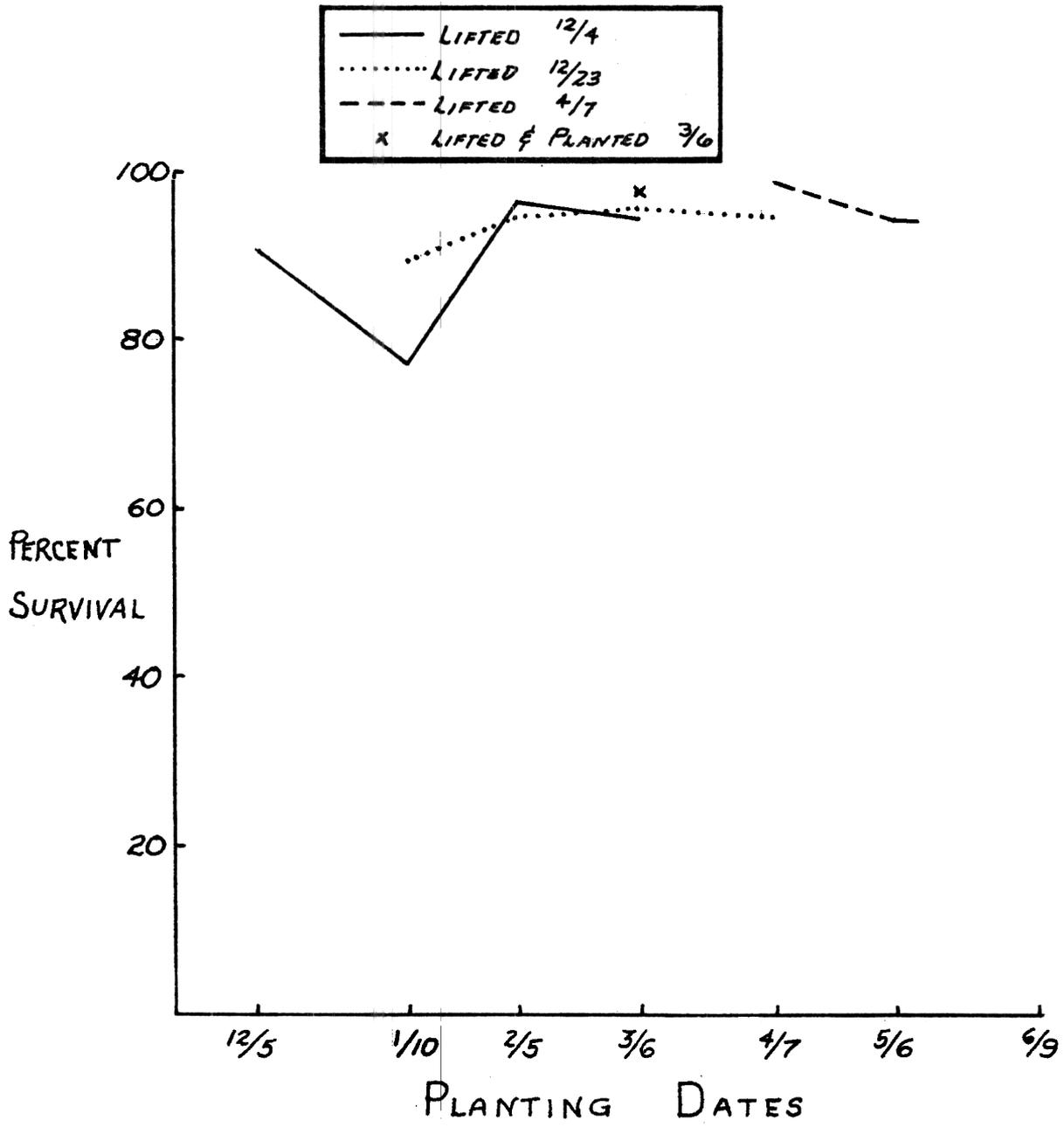


FIGURE 1. Percent survival by lifting and planting date.

Average seedling height after 3 seasons is shown in Table 3.^{6/} Average seedling heights after 1, 2, and 3 seasons are shown in Figure 2. The effect of the different treatments on height growth was similar to their effect on survival.

TABLE 3. Seedling height after three seasons, in feet.

Lifting Date	Approximate Months Storage			
	0	1	2	3
12/4	6.6 ab	5.5 de	5.9 cd	6.0 cd
12/23 ^{7/}	5.4 de	6.2 bc	6.4 abc	6.2 bc
3/6	6.7 a			
4/7	6.6 ab	5.6 d	5.1 e	

^{6/} An analysis of variance was made of mean seedling heights after 3 seasons. Differences between treatments were tested using Duncan's New Multiple Range Test. In Table 3, means followed by the same letter are not significantly different at the .05 level.

^{7/} Ibid., footnote 2, page 1

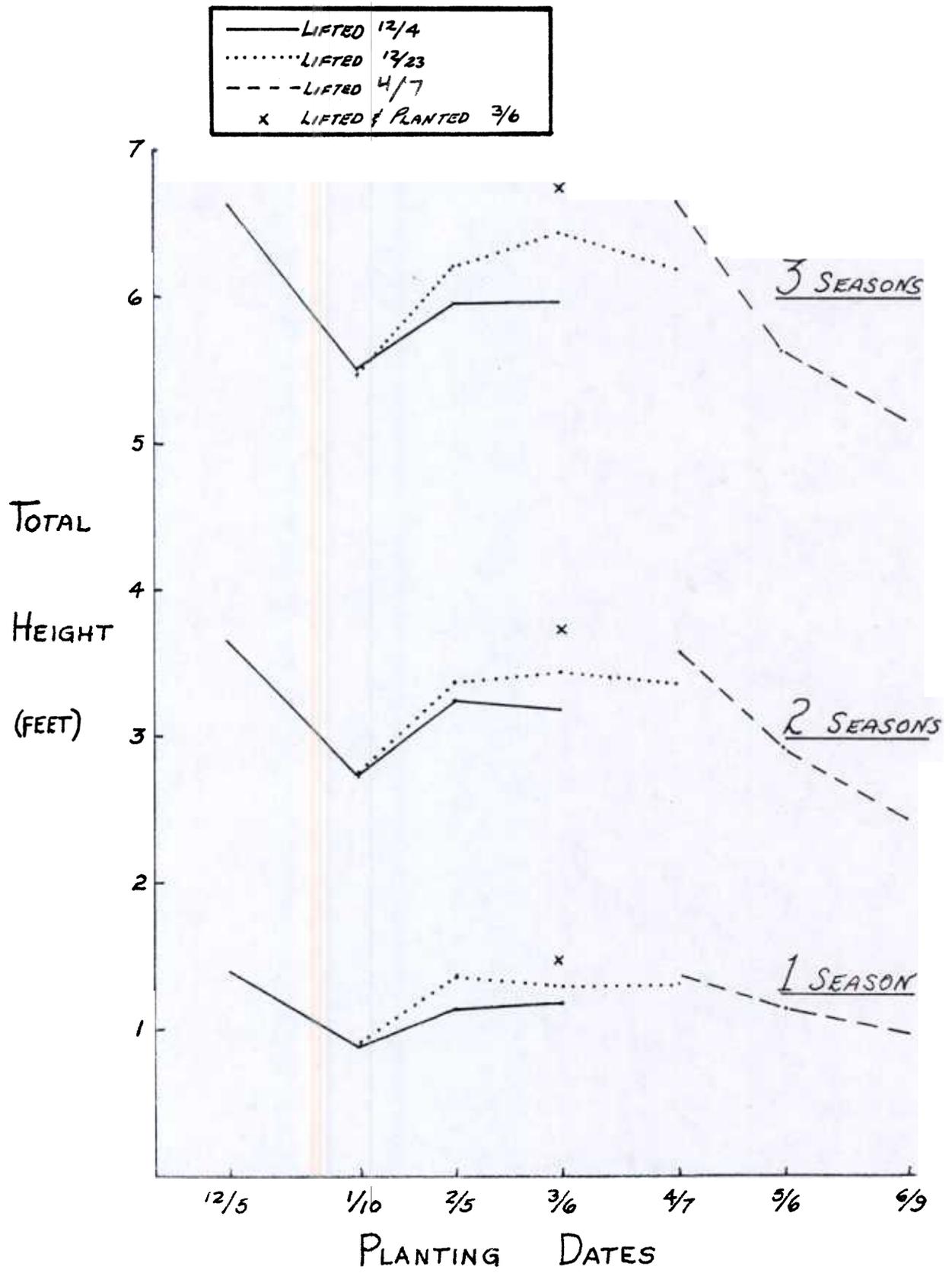


FIGURE 2. Seedling heights by lifting and planting date