

The effects of planting methods on survival of cottonwood seedlings

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Survival of auger planted seedlings was 11 percent higher than of dibble planted seedlings.

A common method used in planting cottonwood (*Populus deltoides* Bartr.) seedlings is to plant in auger holes. While survival rate is usually high for this method, it is slower and more costly than the dibble method. If acceptable survival and growth could be obtained with the dibble method it would be of significant help to the forester. However, to successfully plant cottonwood seedlings with a dibble, the root system first should be pruned for ease of planting and possibly for future root development.

This report compares the survival of cottonwood seedlings planted in auger holes with dibble planting, fall with spring planting, and three styles of root treatments with no root treatment.

Description of Area

The planting area, located in extreme southern Illinois, is nearly level. The soil type is Cisne silt loam (Mollic Albaqualfs), a poorly drained soil that developed in 20 to 50 inches of loess over weathered glacial drift. The native vegetation was prairie grasses. It is characterized by a well-developed clay pan, occurring 3 feet below the surface, that impedes both root penetration and the downward movement of water. Available moisture capacity is high and natural fertility is low. The

area was uniformly fertilized with 96 pounds of N, 31 pounds of P, and 72 pounds of K per acre when the seedlings were planted.

Methods

The experiment consisted of two methods of planting, four treatments to the seedlings, and two planting dates; all replicated three times for a total of 48 plots of 38 seedlings each. The cottonwood seedlings were 1-0 from a local seed source and planted at 11' x 11' spacing. The eight combinations of methods times root treatment were:

1. Planted in 6-inch auger hole, 20 inches deep; lateral roots cut to ½ - inch of tap root and main stem severed at ground line after being planted.
2. Same as 1 except stem not cut.
3. Same as 1 except lateral roots not cut.
4. Same as 1 except no treatment to the seedlings (control).
5. Planted 8-inches deep with a dibble; lateral roots cut to ½-inch of tap root and main stem severed at ground line after being planted.
6. Same as 5 except stem not cut.
7. Same as 5 except lateral roots not cut.
8. Same as 5 except no treatment to the seedlings (control).

The two planting dates were the first part of December, 1964, and late March, 1965.

The plantation was disk cultivated four times during the first growing season and twice each during the second and third growing seasons.

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Survival was checked at the end of the first three, and the eighth growing seasons. Total height was measured at the end of the eighth growing season.

Results and Discussion

Table 1 shows the average survival after 3 years for each treatment and for the two planting methods. Survival for seedlings planted in auger holes was over 11 percent better than that for seedlings planted with a dibble. There were no significant (5 percent level) differences in survival among means for replications, season of planting, or root treatment.

Average height of all trees was 45 feet at the end of eight growing seasons. There was no difference in height that could be attributed to treatment or replication. Some frost heaving occurred on those trees planted in the fall but it was not serious. Mortality increased slightly between the third and eighth year, which was attributed to site factors and not test variables. Therefore, survival counts made at the end of the third year were used to reflect the effect of treatment on seedling mortality.

The probable reason for the higher survival of seedlings planted in auger holes must be that these seedlings developed a better root system than the dibble planted seedlings. Not only was the tight montmorillonitic clay broken up when the auger hole was made, but the greater depth of the auger hole afforded the Seedling an opportunity to develop a better root system than the seedlings

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 planted only 8-inches deep with the dibble. When available soil moisture became low in the summer, the

added depth that the seedlings were planted, along with the greater root system developed, increased their chance of survival. If the soil had

been of a coarser texture, more than likely the difference in survival between the two methods of planting would have been even greater.

This study found that survival of cottonwood seedlings was higher when seedlings were planted in auger holes as opposed to dibble planting. It did not reveal what is acceptable survival for dibble-planted seedlings. It still leaves to each land manager the problem of deciding between alternatives of lower survival or lower planting costs.

Table 1. Average survival of cottonwood seedlings according to treatments.

Planting method	Treatment ¹								Average
	1	2	3	4	5	6	7	8	
	Percent ²								
Auger	91	89	94	92					92.5
Dibble					83	81	78	82	81.0

¹ Refer to text for description of treatments.

² Treatments (1-4) different from (5-8) at 5 percent level. Average percents underlined in same line are not significantly different.