TESTS OF SANDWICH PLANTING AT GREEN CANYON TREE NURSERY NORTH LOGAN, UTAH

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In the hope that a more efficient way of planting conifers will be found and yet insure a high percentage of seedling survival, different methods of planting are being tried. "Sandwich" planting is one innovation that maybe worthwhile. This method was originated by Roland Rotty of the Washington office, U. S. Forest Service. It consists of encasing the seedling roots between two pieces of a stiff, water-absorbent, fibrous material (about 3 by 8 inches), which are stapled together (fig. 1). The stiffness of the sandwich would force planters to set the seedlings in the soil properly, because the roots could not be bent up in shallow planting holes. In addition, the fibrous material, when soaked in water before use, should . provide sufficient moisture for the seedling until its roots have developed sufficiently to insure survival during the low-moisture summer months. It would protect the roots against the harmful effects caused by dry soil next to the roots at planting time and by air pockets locked in the soil during planting.

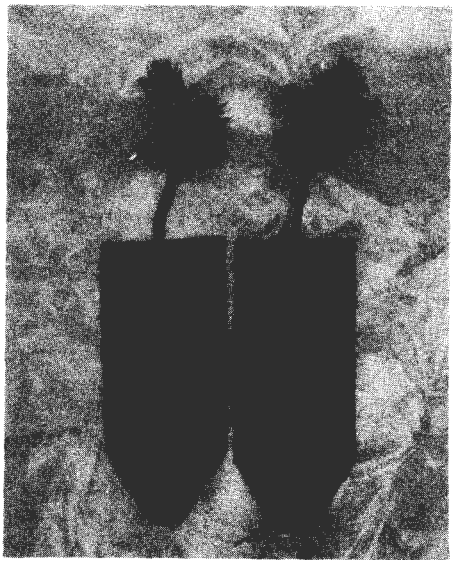

Figure 1.--2-1 blue spruce encased between two pieces, of redwood bark sandwich material.

Specific objectives of the studies were-

1. To compare survival and growth of 2-1 blue spruce seedlings planted bare root with survival and growth of those encased in sandwiches.

2. To determine if survival and growth of 2-1 blue spruce seedlings can be increased by applying a fertilizer solution to the sandwich.

3. To determine if survival and growth of 2-1 blue spruce seedlings can be increased by applying a wetting agent to the sandwich material.

4. To determine if survival and growth of 2-1 blue spruce seedlings can be increased by applying a fertilizer and wetting agent mixture to the sandwich material.

Method

A series of 25 plots in five rows were laid out, with 3 feet between rows, 1 foot between seedlings within the row, and 3 feet between plots. Four seedlings were used per plot. One treatment was used per plot. The plots were laid out on the "Latin Squares" principle, i.e., each treatment appeared in each row but never adjacent to a like treatment.

Below is the plot layout:

C	S	S-WA	S-F	S-WA-F
S	C	S-WA-F	S-WA	S-F
S-WA	S-F	C	S-WA-F	S
SF	S-WA-F	S	C	S-WA
S-WA-F	S-WA	S-F	S	C

C - Control
S - Sandwich material only
S-F - Sandwich material and fertilizer
S-WA - Sandwich material and wetting agent.
S-WA-F - Sandwich material, with wetting agent and fertilizer

Stock grown at the State nursery was used. The seedlings were planted with a regular KBC tree planting bar. Pressed redwood bark was used as the sandwich material for the experiment.

The fertilizer used was the 8-40-0 nonburning type. This was mixed in water at a rate of 1 ounce of fertilizer per gallon of water. The wetting agent was a non-ionic organic substance with the trade name Aqua-Gro. This was mixed in water at a rate of 1/4 ounce per gallon of water. The same proportions were used in the fertilizer-wetting agent solution. The sandwich material was soaked overnight in the various solutions. After soaking it was very limber and difficult to handle.

Sandwich material was taken directly from the water or solution and stapled about the seedlings and the seedlings were planted in the selected site with the planting bar. All seedlings were set in the soil deep enough to place the tops of the sandwiches about an inch below the ground surface. The planting site was a nursery bed with no weed or brush competition. All weeds were hoed out during the growing season.

Method of planting was kept as near actual as possible. Planting conditions were ideal. The temperature was in the low fifties, there was little or no wind, relative humidity was 75 to 85 percent, and soil moisture was about 80 percent of saturation.

The seedlings were furrow irrigated every 10 days. Thirty days after the seedlings were planted, corn was planted between the rows to reduce soil moisture evaporation and transpiration from the seedlings.

A soil analysis determined (1) pH of 7.7; (2) total soluble salts, 0.05 percent; (3) available phosphorus ($P_2 0_5$), 40 pounds per acre; (4) texture, silt loam.

Results

Survival of the planted trees was checked several times during the 1960 growing season. On May 19, for all treatments, survival was 100 percent, vigor was good, and foliage color was good. On three subsequent checks results were as follows:

	Survival (percent)			Vigor			Foliage color		
	June 16	July 12	Aug. 16	June 16	July 12	Aug. 16	June 16	July 12	Aug. 16
Treatment:									
C.....	100	100	96	good	good	good	good	good	good
S.....	100	80	50	fair	fair	poor	good	fair	poor
S-F.....	100	60	50	fair	poor	poor	fair	poor	poor
S-WA...	100	70	65	fair	poor	poor	good	fair	poor
S-WA-F	100	60	50	poor	poor	poor	fair	poor	poor

Survival and growth at the end of the growing season were as follows:

Treatment:	Survival (percent)	Growth (inches)
C.....	96	3/4-1 1/4
S.....	0	0
S-F.....	12	0-1/4
S-WA.....	0	0
S-WA-F.....	0	0

Summary and Conclusions

In theory, the "sandwich" idea of tree planting is good. However, the results of this experiment were so disappointing that few, if any, conclusions can be drawn. The experiment did prove that a near perfect stand of 2-1 blue spruce seedlings can be obtained when using healthy vigorous stock, planted with a planting bar, under ideal planting and weather conditions.

The principal advantages hoped for in sandwich planting were to correct faulty, shallow planting and to aid seedling establishment in areas of low summer rainfall. In this experiment faulty planting may have been reduced, but survival certainly did not improve.

The seedlings apparently used up their reserve strength in attempting to establish themselves and force their roots through the sandwich. Failure to complete this resulted in total inability to obtain help from the soil, and the seedlings slowly died. The porous nature of the sandwich material should not block the transfer of nutrients from the soil to the roots, but the excellent results with the control seem to prove that such a block did occur.

It is apparent that whatever fertilizer solution is used must be very weak, since the plots containing the fertilizer died first. One ounce of powdered fertilizer to 1 gallon of water is a weak solution, but this is apparently still too strong.

Soaking sandwich material 8 hours made it almost unmanageable, or at least great care was needed in handling it. Because the stiffness of the sandwich material was lost, proper planting was not assured. Before conducting further experiments with sandwich materials the optimum soaking time should be determined for maximum water absorption with sufficient rigidity for handling retained.