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PLANTING SITKA SPRUCE AND DOUGLAS-FIR ON DECAYED WOOD IN COASTAL OREGON

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When overmature conifers die and deteriorate gradually while standing, a mound of decayed wood builds up about the base of the stem. When such trees fall to the ground, similar material is laid down along the path where the tree fell. Further deterioration results in low mounds or ridges of decayed wood in a state of semi-incorporation with the soil. Depending on the state of decomposition, structure of this organic material may vary from cubical, crumbly yet identifiable wood remains to red-brown masses of finely divided material (fig. 1A).

Crews sometimes avoid planting seedlings in decayed wood because of a belief that stock so placed is subject to malnutrition, drying, and excessive aeration about the roots. In coastal Oregon, however, natural seedlings frequently grow well on decayed wood, which retains more moisture in midsummer than mineral soil of like depth. Moreover, competing vegetation on such microsites is usually scarce. Thus, some of the objections to planting in this material appear questionable.

When planters avoid areas of decayed wood, wasteful openings may be created in the new stand. If planted trees will survive and grow well on decayed wood, plantation spacing could be improved. Trees planted on decayed wood might also grow at an increased rate because of comparative freedom from brush and weed competition. This study was made to determine if there are real differences in survival and growth between trees planted in mineral soil and in decayed wood.

TECHNIQUES

The study was conducted on the Cascade Head Experimental Forest on a site located about 5 miles inland from the Pacific Ocean on the Oregon coast. Average annual precipitation here is about 93 inches, of which about 10 inches falls during the May-August growing season. During 1954, the year study seedlings were planted, rainfall was above average--101 inches for the year, including 14 inches during the growing season.

Two hundred Douglas-fir (Pseudotsuga menziesii) and a like number of Sitka spruce (Picea sitchensis) 2-0 seedlings were planted in February 1954 on both north- and south-facing, clear-cut tracts at an elevation of about 600 feet. Five blocks or replications were installed on each of the two aspects. Each block consisted of 20 Douglas-fir and 20 Sitka spruce seedlings. Ten of each species were planted where decayed wood was sufficiently deep that roots did not initially contact mineral soil. The remaining 10 were planted in mineral soil.

Survival and total height were measured after four growing seasons. Data from trees damaged by animals were excluded from height growth computations but were included when considering survival. Statistical treatment was by analysis of variance.

RESULTS AND DISCUSSION

Survival of planted Douglas-fir and Sitka spruce was the same whether seedlings were planted on mineral soil or on decayed wood. This finding was consistent for both northerly and southerly aspects (table 1).

Height growth was as good or better on decayed wood as on mineral soil. Douglas-fir height was practically the same on both microsites. Sitka spruce, however, grew taller on decayed wood. Practically all height growth occurred during the last 3 years of the 4-year period (fig. 1).

Although rainfall during the 1954 growing season was above average, results of this study probably are not different from those which might have been experienced in a year of average precipitation in this high-rainfall locality. Even on the hotter, drier, south slopes, survival was not significantly different between trees planted in decayed wood and in mineral soil.

Table 1.--Survival and total height of Douglas-fir and Sitka spruce 4 years after planting on decayed wood and on mineral-soil microsites

Species and aspect	Survival		Total height	
	Mineral soil	Decayed wood	Mineral soil	Decayed wood
	Percent		Inches	
Douglas-fir:				
Northerly	90	90	25	25
Southerly	66	62	32	29
Sitka spruce:				
Northerly	98	98	29	43*
Southerly	84	80	36	47*

*Difference significant at 95-percent level.

Several explanations may be advanced for the comparatively high survival and good growth of seedlings planted in decayed wood. This very porous material not only holds moisture late into the summer, but also encourages a well-developed root system which penetrates rapidly into underlying moist mineral soil.

In addition, decayed-wood microsites are apparently unfavorable for the growth of brush and herbaceous plants. Thus, trees planted on these sites receive less competition for light, moisture, and nutrients. This reduced competition is considered an important contributory factor in the good survival and growth of stock planted on decayed wood.

This study indicates that, for areas in coastal Oregon where growing-season precipitation averages at least 10 inches, planting

Figure 1.--Development of a 2-0 Sitka spruce seedling planted on decayed wood: A, At time of planting; B, after one growing season; and C, after four growing seasons.

Douglas-fir or Sitka spruce on decayed wood is a sound practice. However, before this recommendation is extended to sites where average growing-season precipitation is less than about 10 inches, trial plantings should be made to assess survival and growth.