DEPTH FOR PLANTING PONDEROSA PINE

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Summary

A test planting of 2-0 ponderosa pine in 1962, observed for 2 years, had greater survival of seedlings set with the lowestfascicled needles at ground line rather than at more normal depths. However, by the end of the second year, animal damage had offset the

advantage of better survival from greater planting depth. Initial growth equaled that from normal planting.

Test Planting

Consistent machine planting of 2-0 ponderosa pine at normal depth is difficult, especially at higher rates of travel. Trials indicated that greatest consistency was obtained when the seedlings were planted so that the lowest fascicled needles were at ground line after tamping. The base of fascicled needles is easily located by the machine operator, and it is the best guide to consistent depth of planting.

In May 1962 a test planting was made to determine the effect of deep planting on plantation survival and growth. The seedlings used in this experiment were raised at the Col. William B. Greeley Forest Nursery near Olympia, Wash. Their average height was .60t .14 feet. The seedlings were planted in two adjacent rows within a project planting and randomly assigned to one of three depths. Each seedling was checked for conformity to the depth specified. Depths were defined as (1) normal, corresponding to depth in the nursery, (2) cotyledons at ground line, and (3) lowest fascicled needles at ground line. At the third depth, nearly all the seedling's growth must be buried in its first year in the nursery. Measurements of seedling height in twenthieths of a foot and diameter in hundreths of an inch were made initially, and height was measured after each of two growing seasons.

At the end of the first season, survivalfrom deep planting was significantly better than that for the other depths (table 1). Dieback (9 percent) and browsing (20 percent) had occurred in each treatment. The proportion of trees undamaged and healthy in the deep planting was better than that of the other groups but significantly better only than that of the group planted at normal depth. For undamaged seedlings of all depths, the average first-season height increment was 0.36 feet. This was related to initial height by the equation:

$$E= -0.063+0.732X.$$

Planting depth did not alter the relationship. Multiple regression analysis indicated that the effect of initial seedling diameter was negligible.

Second-year survival of the moderate and deep plantings decreased 15 and 13 percent; that of the normal planting was virtually unchanged. Damage to the trees was severe-only 22 seedlings grew taller. Average second-year growth was negative for all groups.

Discussion

The improved initial survival of deepplanted 2-0 ponderosa pine seedlings may have resulted from placement of the roots in soil with more moisture. The slight increase in depth by planting with cotyledons at ground line did not improve survival. The height increment in the first season was not significantly affected by planting depth.

Browsing of seedlings by deer, rabbits, and cattle during the two growing seasons has eliminated significant differences in survival attributable to planting depth. Sixty percent of the seedlings lost height in the second year.

TABLE 1.--Survival and growth of 2-0 ponderosa pine planted at various depths

Planting depth	First season			Second season		
	Survival	Undamaged seedlings	Height increment	Survival	Height of survivors	Height increment[1]
	Percent	*Percent*	*Feet*	*Percent*	*Feet*	*Feet*
Normal	81	53	0.39	80	0.69	0.27
Cotyledons	79	46	.31	64	.56	-.28
Needles	93	66	.39	80	.56	-.34

[1] Seedlings undamaged in first season.

While browing was twice as prevalent as dieback in the first season, the difference between height loss by browsing and dieback was not distinguishable in the second season. From indicators of animal activity other than pine seedling condition, it may be assumed that animal damage was even more prevalent the second season.

The relationship between growth and initial height of seedlings indicates an advantage of larger planting stock. Assuming that damage after planting can be controlled, grading of seedlings might be desirable. However, the immediate solution is to reduce the animal damage in the first few years following planting.