PLUG SEEDLING SUCCESS IN THE HIGH COUNTRY

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ABSTRACT: This paper discusses the success of container seedling outplantings in the high country of Southwestern Oregon over the last several years. A brief history of Weyerhaeuser's plug seedling production is also presented.

INTRODUCTION

Weyerhaeuser Company went into plug seedling production with a bang in the early seventies. The early plug was seen as a panacea that would quickly revolutionize the entire regeneration business. Plugs were prescribed rather indiscriminately without much regard to site index or economic evaluation. Demand ballooned to the point that all three of Weyerhaeuser's greenhouse facilities on the west coast were scheduled for double cropping. This system required early (February or March) sowing and, in June, moving the first crop out to a holding area followed by resowing the germination houses with a second crop. Both crops were outplanted in the spring.

During the mid-seventies, economic evaluation of stock type and site index began to modify seedling orders. Prescription of stems per acre dropped across the board, and bareroot stock began to rapidly replace the relatively expensive plug stock. By 1977, Weyerhaeuser had permanently closed one greenhouse facility, mothballed a second, and lumped all remaining plug orders into the third facility. This enabled us to start producing one crop per year and it also allowed us to begin growing stock for outside customers under contract.

One of our biggest plug customers since then has been the National Forests of the western United States. Over eight million containerized seedlings have been shipped by Weyerhaeuser to the National Forests of the Pacific Northwest over the last 5 years. Species involved have been numerous including Douglas-fir, noble fir, white fir, Shasta red fir, ponderosa pine, sugar pine, western white pine, and Englemann spruce.

USE AND SURVIVAL

The experience with these plugs at Rogue River, Umpqua, and Siskiyou National Forests has been typical of the success our customers have experienced, both within and outside the company. For the last several years these forests have typically prescribed plugs for hard to regenerate, problem sites. Elevations usually run between 3,000-5,500 feet (914 to 1 670 m) and soils are typically very shallow and skeletal in nature. Sometimes particular species are matched with adverse environmental conditions, for example, Englemann spruce in wet low lands. Some units were bareroot failures in which planting quality in shallow rocky soils presumably had been a problem, hence they were rescheduled for plug stocking. The foresters provided district-wide comparisons between first year survival of plug seedlings and bareroot stock. This information is summarized in table 1.

These data do not represent side-by-side stock comparisons, but rather survival plots in the widely scattered units. Plug stock generally went to sites that would have been difficult to properly plant bareroot stock in. The foresters were convinced that side-by-side trials would have favored plug survival even more than table 1 data indicate.

The main thing this table shows is the consistent performance of the plug seedlings. Whereas the plug stock didn't always outperform the bareroot stock, it consistently had excellent survival. This is extremely critical when you consider experiences like the one at Siskiyou last year, where the 58 percent survival of bareroot Douglasfir was an average over 963 acres. The preliminary survival plot data indicated that 396 acres would have to be replanted in 1984!

Table 1.--First-year survival comparisons -- plug vs. bareroot

Forest	Year	Species	Stock Type	1st Year Survival Percent
Umpqua	1982	Douglas-fir	Plug	92
Umpqua	1982	Douglas-fir	Bareroot	88
Umpqua	1982	Shasta red fir	Plug	95
Umpqua	1982	Shasta red fir	Bareroot	83
Umpqua	1982	Lodgepole pine	Plug	97
Umpqua	1982	Lodgepole pine	Bareroot	93
Umpqua	1982	White sugar pine	Plug	88
Umpqua	1982	White sugar pine	Bareroot	95
Umpqua	1982	White fir	Plug	100
Umpqua	1982	White fir	Bareroot	60
Rogue River	1982	White fir	Plug	92
Rogue River	1982	White fir	Bareroot	92
Rogue River	1982	Shasta red fir	Plug	92
Rogue River	1982	Shasta red fir	Bareroot	97
Rogue River	1982	Engleman spruce	plug	96
Rogue River	1982	Engleman spruce	Bareroot	80
Siskiyou	1983	Douglas-fir	Plug	96
Siskiyou	1983	Douglas-fir	Bareroot	58
Umpqua	1983	Shasta red fir	Plug	94
Umpqua	1983	Shasta red fir	Bareroot	78

Paper presented at combined meeting of the Western Forest Nursery Council and Intermountain Nurseryman's Association, Coeur d'Alene, ID, August 14-16, 1984.

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PLANTATION SCENES

The following are some scenes from slides taken on field tours to the plantations in 1980, 1982, and 1983. They rather descriptively portray the field results and are typical of the success we have realized in these relatively hard to regenerate sites.

Figure 1.--Umpqua, 1980. Ponderosa pine plug seedling plantation after one season's growth (planted in spring, photographed in August). This unit had been planted with 2+0 Douglas-fir in 1978, but required restocking due to poor survival.

Figure 2.--Same site as fig. 1, 1982. Ponderosa pine pushing waist high.

Figure 3.--Same site as fig. 1, 1983. Plantation approaching shoulder high after four growing seasons.

Figure 4.--Rogue *River,*1980. White fir shade card plantation. One season's growth.

Figure 5.--Same site as fig. 4, 1982. White fir pushing waist high.

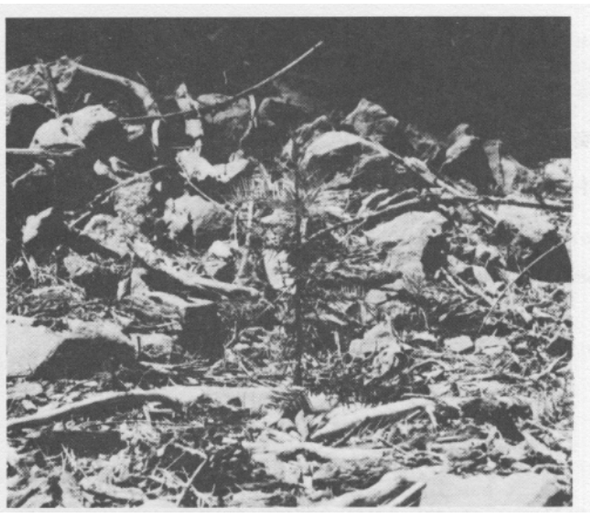

Figure 6.--Rogue River, 1980. White fir "Rock Pile" plantation. One season's growth.

Figure 7.--Rogue River, 1982. White fir "Rock Pile" plantation. One season's growth.

Figure 8.--Rogue River, 1983. Englemann spruce - rocky wet land plantation. Two seasons' growth. Note root egress.

PRESSURES ON STOCK

The pressures put on this plug stock have essentially come from two sources. Animal damage is probably the most severe with deer browse causing most of the damage. Some insect girdling has also been noticed. Installation of vexar tubing has been quite successful in protecting the seedlings from deer browse, particularly at Umpqua National Forest. The second source of pressure has been sun scalding or heat girdling at ground line. The Forest use of shade cards, micro-site planting, and shelter wood units has minimized damage from scalding, but it needs to be noted that higher density type plugs (leach pine or styro-2) can be quite sensitive to heat damage because of their smaller stem caliper.

This report has referred to comparisons between bareroot stock and plug seedlings, and it should be noted that all bareroot stock involved has been 2+0 seedlings. Survival of transplants might be more appropriate to compare with plug seedlings, but in the soil types discussed planting quality of large root systems could present even greater problems. The experience in the Southwestern Oregon high country of these three National Forests very closely matches that of our own company units in the same geographic area. Plug seedlings for us have also proven to be reliable performers in the shallow skeletal soils common in this region.