# THE STATUS OF CONTAINER PLANTING PROGRAMS IN THE NORTHERN UNITED STATES

## 3. NORTHWESTERN UNITED STATES

Thomas D. Landis'

Abstract.--Production of containerized seedlings in the northwestern United States has increased from less than 5% to over 20% of total nursery production in the last decade. Thirty-four container nurseries in six states contain over 130,000 $m^2$ of growing space and in 1980 produced over 62 million seedlings. Seedling production is projected to exceed 73 million trees by 1983.

Résumé.--Au cours de la dernière décennie, les plants en mottes emballées sont passés de moins de 5% à plus de 20% de la production totale des pépinières dans le nord-ouest des États-Unis. Dans les six États de cette région, les 34 pépinières de plants en mottes emballées représentent une superficie de culture de plus de 130 000 $m^2$ et, en 1980, elles ont produit plus de 62 millions de semis. D'ici 1983, on prévoit que cette production dépassera 73 millions de semis.

## INTRODUCTION

It is over 10 years since northwestern nurseries began producing tree seedlings in containers. Containerized seedling production in this region has increased from fewer than 1 million seedlings in 1970 to over 60 million in 1980. Much has changed in container nursery technology over the past decade but the role of containerized seedlings in reforestation is well established.

The purpose of this paper is to examine the container nursery industry in the northwestern United States. Information was gathered through questionnaires sent to container nurseries, telephone conversations, visits and previous nursery reports. Many of the views expressed in this paper are the opinions of practising nurserymen and reflect the unique aspects of their particular operations. It should also be stressed that these statistics are based on survey data and are therefore relative values.

[1]Western Nursery and Greenhouse Specialist, USDA Forest Service, Lakewood, Colorado.

## RATIONALE FOR CONTAINERIZED SEEDLING PRODUCTION

### Program Objectives

Prior to 1970, most tree seedlings used for reforestation were bare-root, produced at one of the 20 nurseries in the northwest. These bare-root nurseries were relatively large and produced seedlings for use by their own agencies as well as under contract for small forest operations. The newly developed technology of growing tree seedlings in containers spawned a new generation of smaller container nurseries which were often operated by newcomers to the tree nursery business.

Container nurseries were developed to meet a variety of program objectives. For land management agencies, the primary objective was to supply a low-cost, healthy seedling for reforestation. Often, containerized seedlings were used to supplement bare-root seedling production by supplying hard-to-grow species on a shorter rotation. Private container nurseries entered the market on a contract basis to meet the growing demand for seedlings. Containerized seedlings are particularly suitable for tree improvement pro-

grams and many nurseries produce genetically improved seedlings or rooted cuttings. An additional objective in some areas is to provide a suitable industry for government agency work and to utilize the local work force more fully.

### Biological Considerations

Container nurseries offer several biological advantages over bare-root nurseries. Greenhouses permit more complete control over the growing environment and, as a result, seedlings can be "custom grown" to meet specific needs.

Many foresters feel that container seedlings have better field survival and growth than bare-root, stock, especially on harsh sites; others report ease of planting as an advantage. Containerized trees are more resistent to poor handling practices in the field and suffer less root disturbance and transplant shock.

Containerization is a definite advantage for species that are difficult or impossible to grow as bare-root stock. Western hemlock *(Tsuga heterophylla* [Raf.] Sarg.), redwood *(Sequoia* spp.), larch *(Larix* spp.), cedar *(Thuja* spp.), and true fir *(Abies* spp.) have frustrated bare-root nurserymen for many years because of low seed germination, slow growth, disease problems or poor rooting habits. Species such as fir with consistently low seed germination may be started as germinants to optimize stocking. Valuable improved seed from trees such as rust-resistant western pine *(Pinus monticola* Dougl.) can be started in the same manner to obtain more seedlings from a small seedlot. Slow-growing species such as Engelmann spruce *(Picea engelmannii* Parry) can be grown to shippable size in one year in a greenhouse, whereas bare-root seedlings require 3 years. Transplanting small containerized seedlings to a bare-root bed for an additional year's growth ('plug-one') is proving popular for producing hard-to-grow species.

### Managerial Considerations

One of the most important advantages of container nurseries is that they are able to operate at relatively low production levels. Several container nurseries in the northwestern area are operating at an annual production level of about one million seedlings, which would be uneconomical for a bare-root nursery. The difficulty of finding or affording top-quality agricultural land and the high operating overhead make small bare-root nurseries impractical. Also, a relatively low capital investment is required to bring a container nursery into operation in comparison with a bare-root nursery.

The inherently shorter crop rotations and the ability to produce a year-round crop is another advantage of container nurseries. Short rotations offer land managers more flexibility in planning and permit quick production for emergency plantings (e.g., after fires). Containerized seedlings are also used frequently to make up for shortages in bare-root production. From an economic point of view, short rotations and continuous production create a favorable cash flow pattern for private nurserymen.

Containerized seedlings can add substantial flexibility to a reforestation program. One nursery considered container crops more reliable than bare-root stock, while several operations considered the ability to outplant in the fall a prime advantage. Containerized seedlings are also easier to interplant on understocked lands and large containerized seedlings are more tolerant of plant competition. Where animal predation is a problem, seedlings can be grown in special containers with a protective mesh surrounding the foliage.

## CONTAINER SYSTEMS

Northwestern nurseries are evenly divided in their preference for Leach containers and styroblocks as container systems.

Proponents of the Leach system cite good growth and seedling density, and the ability to consolidate filled cells after sowing and during grading. The ability to ship the seedling in the individual container and the reusability of the container are other advantages of Leach cells. Protection of the root plug during handling and shipping is important when a dibble is used during outplanting.

Styroblock advocates like the low cost, the variety of cell sizes and reusable features of that container. Ease of handling and better seedling growth were frequently mentioned. The insulating properties of the styrofoam provide some heat and frost protection for the root plug.

The size of container chosen ranged from 41 to 492 $cm^3$, and nurserymen cited outplanting site severity and customer preference as factors determining their choice. West coast nurseries produce most of their seedlings in containers with volumes of 41-82 $cm^3$, whereas

Table 1. Container nursery statistics for the northwestern United States.

| State | Owner | No. | Nursery Capacity (000 $m^2$) Heated | Nursery Capacity (000 $m^2$) Unheated | Seedling Production (000,000 trees) 1980 | Seedling Production (000,000 trees) 1983 |
|---|---|---|---|---|---|---|
| Alaska | government | 2 | 1.73 | 0 | 1.31 | 3.10 |
| | industry | 0 | 0 | 0 | 0 | 0 |
| | private | 0 | 0 | 0 | 0 | 0 |
| | total | 2 | 1.73 | - | 1.31 | 3.10 |
| Idaho | government | 2 | 4.14 | 0 | 4.60 | 4.80 |
| | industry | 1 | 3.53 | 0 | 1.60 | 2.40 |
| | private | 0 | 0 | 0 | 0 | 0 |
| | total | 3 | 7.67 | 0 | 6.20 | 7.20 |
| Montana | government | 2 | 0.49 | 0 | 0.85 | 0.85 |
| | industry | 2 | 1.14 | 0 | 0.71 | 0.71 |
| | private | 2 | 0.24 | 0 | 0.12 | 0.16 |
| | total | 6 | 1.87 | - | 1.68 | 1.72 |
| North Dakota | government | 1 | 0.27 | 0 | 0.02 | 0.04 |
| | industry | 0 | 0 | 0 | 0 | 0 |
| | private | 0 | 0 | 0 | 0 | 0 |
| | total | 1 | 0.27 | 0 | 0.02 | 0.04 |
| Oregon | government | 1 | 1.56 | 0 | 1.00 | 1.00 |
| | industry | 3 | 46.82 | 2.79 | 22.30 | 28.00 |
| | private | 6 | 31.79 | 6.22 | 11.22 | 11.92 |
| | total | 10 | 80.17 | 9.01 | 34.52 | 40.92 |
| Washington | government | 3 | 3.85 | 1.90 | 2.40 | 2.90 |
| | industry | 4 | 15.51 | 0.23 | 10.70 | 10.70 |
| | private | 5 | 7.12 | 1.86 | 5.08 | 6.10 |
| | total | 12 | 26.48 | 3.99 | 18.18 | 19.70 |
| Regional totals | government | 11 | 12.04 | 1.90 | 10.18 | 12.69 |
| | industry | 10 | 67.00 | 3.02 | 35.31 | 41.81 |
| | private | 13 | 39.15 | 8.08 | 16.42 | 18.18 |
| | Grand total | 34 | 118.19 | 13.00 | 61.91 | 72.68 |

Interior nurseries prefer the larger (66-164 $cm^3$) sizes. The largest containers measure 492 $cm^3$ and are produced for shelterbelt plantings in the Great Plains Region. The smallest (41 $cm^3$) container seedlings are now being used to produce 'plug-one' transplants.

In the final assessment, the choice of container system is dependent upon the objectives and goals of the particular nursery. There is no single container that will fit all needs.

## CURRENT NURSERY SITUATION

The six states in the northwestern region contain 34 containerized seedling nurseries (Table 1). In all states except Oregon and Washington, the majority of container nurseries are run by government agencies. Forest industry nurseries and other private nurseries account for 18 of 22 container facilities in Oregon and Washington; such facilities are obviously popular in this timber-oriented region.

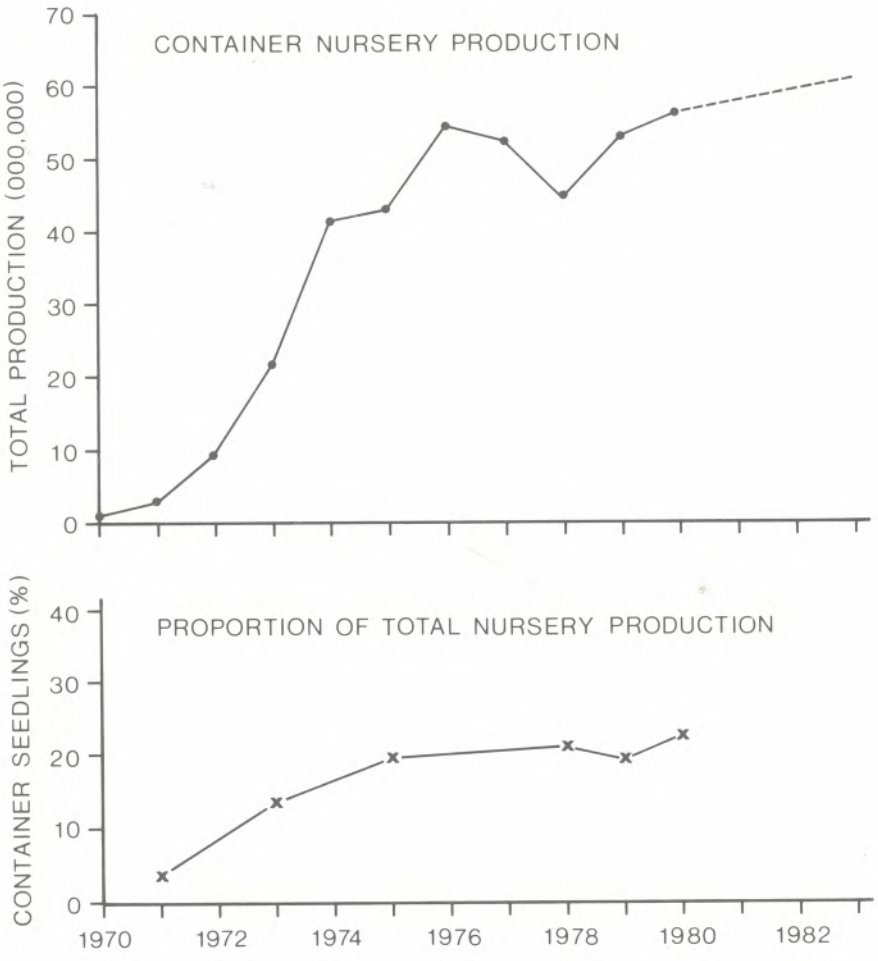


Figure 1. Container nursery trends in Oregon and Washington.

Container nurseries in the northwestern border states boast a total capacity of over 130,000 $m^2$ of growing space (Table 1). Heated greenhouses are the rule in all states except Oregon and Washington, where a few unheated structures are used. The distinction between heated and unheated facilities is vague, however, because many container nurseries use greenhouses with permanent roofs but sidewalls that roll up. These modified greenhouses provide supplemental heat during germination and early growth but not later in the growing season when the open ventilation provides cooling.

In 1980, container seedling production exceeded 62 million trees in the six-state region (Table 1). Oregon and Washington, which have the most nurseries, produced 52.8 million seedlings or 85% of the regional total. One interesting sidelight of these statistics is that while Alaska produces only 1.3 million containerized seedlings, this figure constitutes 100% of its nursery production. The scarcity of good nursery soil and the short growing season prevent bare-root nursery operations in that state.

## OUTLOOK FOR CONTAINER NURSERIES

Container seedling production in the six northwestern states is projected to exceed 73 million trees by 1983 (Table 1). This anticipated production is a continuation of an upward trend, as evidenced by data from Oregon and Washington (Fig. 1). The exponential growth of the early 1970s was followed by a drop in production in the late 1970s and then a gradual increase.

In the Pacific Northwest, containerized seedlings increased from less than 5% of total nursery production to over 20% in 1975 (Fig. 1). Since that time, the proportion of containerized to bare-root seedlings has remained fairly constant at about 22%. This stable trend is verification of the fact that containerized seedlings play a significant role in northwestern nursery production.