Early Lessons from Propagating Pacific Yew[1]

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Abstract.-Pacific yew can be propagated from both vegetative cuttings and seeds. This paper describes some of the growing requirements and culturing procedures learned from several years working with this species.

INTRODUCTION

The propagation of Pacific yew (Taxus brevifolia) has generated a lot of interest in the past several years. This, in part, is a response to the commercial collection of bark for taxol production. The Pacific Yew Act of 1991 and the yew management guidelines of both the Forest Service and the BLM require the sustainability of this species through natural and artificial regeneration.

In the last several years, the Forest Service has begun to incorporate the concept of biodiversity into its land management philosophy. Consequently, wildlife biologists, ecologists, botanists and other are interested in revegetating with more than just commercial species. From this standpoint, revegetating with Pacific yew is not entirely hinged on the harvesting of yew trees and will be important long after the need for bark on federal lands has decreased.

Other species in the genus Taxus have been grown commercially and the propagation techniques are well documented. Unfortunately practically nothing has been written on the propagation of Pacific yew. In 1990 the Forest Service began work at several of its nurseries to learn how to best propagate this species. The following paper is a summary of what has been learned in the past three years at the J. Herbert Stone Nursery.

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PROPAGATION FROM SEED

Seed was collected from several districts on the Rogue River National Forest during the fall of 1990. The collection was split into three stratification treatments: 1) one month cold, 2) five months warm, two months cold and 3) seven months cold, seven months warm and four months cold. The first two treatments were sown in bareroot beds during the spring of 1991 and covered with one half inch of sawdust mulch. During that spring, the seed in treatment 1 did not germinate while approximately five percent germinated in treatment 2. The beds of both treatments were covered with a 50 percent shadecloth and kept moist for the remainder of the year.

In March of 1992, the additional seeds in the beds of both treatments germinated. Total germination rates (first and second year combined) exceeded 95 percent. There were no differences in total germination between treatments 1 and 2 by the second year. Subsequently these seedlings have been grown under a very moist culturing regime developed for the western red cedar and western hemlock. Aside from being shaded, these seedlings have been fertilized, wrenched and pruned in the same manner as these other species. As of November 1992, these seedlings average four inches in height and have a well developed root system. This winter, they will be lifted and transplanted back into our nursery beds. In the winter of 1994 they will be lifted for outplanting.

Treatment 3 was sown in the spring of 1992 but to date, no seeds have germinated. A stratification study was installed in the spring of 1992 under the guidance of the PNW Experiment Station to investigate other stratification methods.

USING VEGETATIVE MATERIAL

1991 Cuttings

Our work with cuttings began in early May 1991. We stuck several hundred locally collected yew cuttings in small, self-contained growing chambers. The cuttings were dipped in an IBA solution and stuck in coarse sand with bottom heat set at 70°F. Flourescent lamps were hung one and a half feet above the cuttings, delivering a very low light intensity. An attempt to maintain a constant film of moisture on the foliage was done by misting one minute every hour. The first rooting was observed by early July and by the time we transplanted the rooted cuttings in October, approximately 15 percent had rooted. The low rooting percentage was attributed to the late sticking.

Rooted cuttings were transplanted into bareroot growing beds in October 1991. The beds were screened with a 50 percent shadecloth during the fall and early winter. In mid-winter, the screens were removed under the premise that the seedlings had established an adequate root system and would respond favorably to more sunlight. We assumed that the Pacific yew was very similar to the other shade species in its growing requirements. These species, such as the western red cedar and the western hemlock, are grown under shade the first year but require full sun the second year for optimum growth.

By May of 1992 we realized that Pacific yew did not respond favorably to high light intensities. By this time the foliage of the seedlings had turned reddish orange and the new growth had a stressed appearance. We returned the shadecloth to the beds and within a month the stecklings began growing vigorous new shoots and returned to a dark green color. Shoot growth occurred during most of the summer and by October of 1992, most stecklings were at least 12 inches tall with a very fibrous root system. The plan for these stecklings is to lift them in January and cold store them until outplanting in the spring of 1993.

1992 Cuttings

A propagation facility was constructed during the winter of 1992 specifically to grow Pacific yew stecklings. During this period, yew branches were collected from around the Northwest by Forest Service and BLM employees. A portion of the collections were made by Nan Vance, Research Scientist with the PNW Experiment Station, for an ongoing research project. The remaining collections were taken for wildlife and reforestation projects. The branches were stored for several months in open plastic bags within refrigerated rooms. Storage temperatures were maintained at 34°F and foggers held the humidity near 100 percent.

The optimum time for sticking yew is reported to be between December and February but due to the late completion of the propagation facility, cuttings were not brought into the facility until the first week of April. To compensate for this, all cuttings were cut and stuck during the month of March but held in refrigerated rooms until the completion of the building.

Our procedures for cutting and sticking were as follows. Cuttings were made in lengths of 4 to 6 inches from healthy foliage. The needles were removed from the lower inch of the cutting and dipped for 10 seconds in Dip and Grow rooting hormone, diluted 1:5. They were then stuck into individual Ray Leach Supercell containers with the stripped portion of the cutting pressed firmly into the media. The containers were filled with a 50 percent peat and 50 percent perlite mix. The selection of this well draining media was based on the premise that any heavier mix would rot the stem of the cutting over time.

Once the cuttings were brought into the propagation facility, they were kept under a very controlled environment. High light intensities were reduced by covering the double poly skin with an 80 percent shadecloth. Humidity was maintained above 80 percent throughout the season using four Agitech fogger units. Periodically during the day, a light mist was delivered through a traveling irrigation boom to assure that a uniform humidity was maintained on all foliage. Irrigations were scheduled to maintain the media at field capacity while limiting any prolonged, saturated conditions around the stem. Forced air heat was supplied below the benches during April and May when night time temperatures dropped below 60°F. Temperatures were maintained between 68 and 72°F during the summer using a cool cell and fans.

Within the first two months after bringing the cuttings into the propagation facility, new foliage began developing on many of the collections. The color of the new growth was a reddish orange and very similar to what we had observed in the unshaded transplant beds. Assuming that this was a response to excess light, we added another 40 percent shadecloth to the facility. In June the first roots were observed and by the middle of August an inventory of the cuttings indicated that approximately 25 percent of the cuttings had rooted. We estimate that the final rooting will be between 40 and 50 percent, although this will vary from clone to clone.

Once rooting had been observed, we started fertilizing on a weekly basis with a soluble fertilizer. A monthly treatment of the algicide, Blue Shield, controlled a slime mold that had become established on some of the foliage. In the coming spring of 1993, a portion of the cuttings will be transplanted into bareroot beds and another portion held in the containers for another growing season before outplanting.

CONCLUSIONS

Early work with Pacific yew indicates that it can be successfully propagated from both cuttings and seed. Propagation from seed will take three years while those from cuttings will take two. However the extra year should be worth the wait for several reasons. First the costs of producing a seedling will be much less than producing a rooted cutting. The greatest costs will be in the collection of seed. Depending on its availability, up to three quarters of the cost of the seedling could be in the seed. Second, propagation from seed will ensure the greatest genetic diversity. Whereas the cuttings represents the traits of the trees they were collected from, the seed encompasses the traits of a wide range of trees present in the forests. Third, it is likely that the morphology of the rooted cuttings will not be as desirable as seedlings. Seedlings adopt a natural tree-form, whereas rooted cuttings retain the branching morphology.

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