INTRODUCTION

Planting of yellow cypress (Chamaecyparis nootkatensis [D. Don] Spach) seedlings is increasing in coastal forest regeneration programs. Three factors account for this increase: 1. more frequent higher elevation logging is creating needs for the planting of high elevation species; 2. yellow cypress is now considered a species with high economic priority by several coastal forest companies; and 3. the planting of yellow cypress is now being extended beyond its natural range.

The increased demand is not currently being met because of a shortage of viable seed. Consequently, the bulk of yellow cypress stock produced in British Columbia are rooted cuttings.

Rooted cuttings undergo a different production process than do normal planted seedlings and, therefore, require a different initial nursery regime. In late winter, cuttings are set in warm (20°C) rooting medium with cool (12°C), moist (misting) and low-light conditions. Cuttings must be maintained in these conditions until they have rooted successfully. The cuttings can then be transferred to the normal nursery environmental conditions used in seedling production.

Studies with other species have shown that cultural techniques that delay donor plant maturation, (e.g. hedging) can improve the speed at which the cuttings root and the percentage of cuttings rooted. This study was initiated to determine if such results could be obtained with yellow cypress.

The study had two objectives:

1. determine the effect of donor plant maturity on the rooting processes of yellow cypress cuttings; and
2. identify when rooted cuttings begin to respond in a manner similar to seedlings.

Knowledge of the course and speed of the rooting processes and of the physiological characteristics of yellow cypress cuttings will provide nursery managers with a better and more complete understanding of cutting production technology.

MATERIALS AND METHODS

Cuttings from 5-year-old hedged, 12-year-old hedged, and from the top and bottom of free-growing donor trees were monitored for patterns in morphological and physiological responses over the 5-month period February to June, 1988. Root initiation was also monitored. Comparison of measurements of cutting and seedling physiology identified when the cuttings had developed to the point where they could be treated like seedlings.

RESULTS

Cuttings from 5-year-old hedged, 12-year-old hedged, bottom of 12-year-old free-growing, and top of 12-year-old free-growing plants were ranked greatest to least with respect to speed of rooting and final rooting percentage (Figure 1). As rooting began in cuttings from 5-year-old hedged donor plants, the predawn water stress levels measured were reduced such that they were comparable to those in seedlings. Those cuttings continued to have reduced predawn water stress throughout the remainder of the study. Though rooting occurred in cuttings from other donor plants, their predawn water stress levels were continually higher than those in seedlings and the cuttings from 5-year-old hedged donor plants.

Cuttings from all donor sources exhibited below-normal photosynthetic capability for 10 weeks after being set in the rooting medium. By week 12, photosynthetic capability and stomatal function in the two hedge treatments began to increase, and by week 20 were comparable to the level of activity in seedlings.

NURSERY CULTURAL IMPLICATIONS

The findings of this study have shown that the rate at which rooting occurs, the physiological responses of the cuttings to their environmental conditions, and final percentage of successfully rooted cuttings are all related to the maturity of the donor plants. The more juvenile the donor plants, the less physiological stress the cuttings experience, the more quickly they root and begin to function in a manner comparable to that in seedlings.

Cuttings from the 5- and 12-year-old hedged donor plants required 12 and 20 weeks, respectively, in the rooting environment before being ready for transfer to environmental conditions used to grow seedlings. Cuttings taken from older free-growing donor plants will require longer periods in the rooting environment, with the potential for rooting success being suspect. Thus, cultural practices such as hedging, which maintain the donor plants as juveniles, will increase the final proportion of successfully rooted yellow cypress cuttings.

Cuttings, before they root, are physiologically different than seedlings. A nursery environment of low light, low air temperatures, and high humidity reduces the exposure of cuttings to stressful conditions. Providing a warm growing medium will also enhance cutting survival and rooting success. Once the
cutting has rooted, however, this low-stress nursery environment limits further growth and development. Thus, the timing of the two stages of the cultural regime for cuttings is important. The cuttings must be given sufficient time to root and to begin to function in a manner physiologically comparable to a seedling. Then, they must be quickly transferred to a normal seedling growing regime for optimum growth.

This improved understanding of yellow cypress cutting development will enhance nursery production procedures by allowing growers to tie cultural regimes for cuttings to the maturity (age) of the donor plants.

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Figure 1. Rooting percentage of yellow cypress cuttings taken from following donor plants: (1) 5-year-old hedged; (2) 12-year-old hedged; (3) bottom of 12-year-old free-growing; and (4) top of 12-year-old free-growing. Times when predawn water stress was reduced, and photosynthetic capability were increased in cuttings, from different donor plants, to levels comparable to those in seedlings for the remainder of the study are identified with arrows.