technical notes

Growing Yellow Birch Seedlings In Polyethylene Bullet Containers

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Abstract

Introduction

Plastic, bullet-shaped containers 2.5 and 4.5 inches long were suitable for producing healthy and vigorous yellow birch planting stock in the greenhouse. The larger containers favored the growth of taller plants with a better root system. In field trials, roots became established outside the containers during the first year of growth but did not break the plastic casing. After the first winter in the open nearly two-thirds of the seedlings had survived, but only one-third of them were in good condition.

La production en serre de merisiers dans contenants en plastique en forme de balle.

Résumé

Pour la production en serre de jeunes plants vigoureux de Merisiers (*Betula alleghaniensis*) on a utilisé avantageusement des contenants en plastique en forme de balle qui mesuraient soit 2.5 pouces (6.2 cm) et 4.5 pouces (11.2 cm) de hauteur. Le système racinaire et la hauteur des jeunes plantes progressaient mieux dans les contenants plus grands. Dans les expériences sur le terrain, des racines s'établissaient en-dehors des contenants — mais sans les briser — dès la première année. Passé le premier hiver hors de la serre, près des deux tiers des plants avaient survécu mais seulement le tiers était en bonne condition.

Walters (1961, 1963, 1967) did considerable research in the growing and planting of forest tree seedlings in plastic, bullet-shaped containers. In preliminary field tests on level ground, a planting rate of 1,500 seedlings of Douglas fir (*Pseudotsuga menziesii* (Mirb.) Franco) per hour at a spacing of 8 feet (Walters, 1963) was attained. Ackerman et al. (1965) showed that bullets containing unfertilized seedlings of lodgepole pine (*Pinus contorta*

Dougl.) and of white spruce (*Picea glauca* (Moench) Voss), 8 weeks or more of age, could be planted successfully throughout the frost-free season on a wide range of sites and seedbeds. In recent years, this method has been widely used in the practice of forestry (Anonymous 1967, 1968).

In the winter of 1968, the suitability of "bullets" for growing planting stock of yellow birch (*Betula alleghaniensis* Britt.) was investigated. The length of stems and roots of seedlings grown in the plastic containers was also studied. Reactions of seedlings to field conditions were examined.

Methods and Materials

In the fall of 1967, seeds were obtained from healthy and well-formed yellow birch trees in the watershed of the Rivière des Neiges, approximately 30 miles north of Quebec City. In January 1968, seeds were placed on moist filter paper in Petri dishes. Two weeks later the seeds that had germinated were "transplanted" into 216 plastic bullets 2.5 inches long and 432 plastic bullets 4.5 inches long. These bullets were in strips of 12', with 18 strips fitting into a prefabricated plastic frame. Bullets were filled with a mixture of 1½ parts perlite², 1½ parts vermiculite³, 2 parts peat moss and 2 parts of a calcareous clay. Nutrients were added in solid and liquid form.

Seedlings were grown in a glass greenhouse where the temperature was not allowed to fall below 68°F. On sunny days at noon, however, the temperature reached 85°F for very short periods. Additional light was supplied from dusk to 23.00 hr, maintaining a minimum of 15 hr photoperiod. The spectral energy was mainly in the blue, yellow and red.

¹ Columbia Plastic Ltd., 2155 W. 10th Ave., Vancouver 10, B.C., Canada

² Buffalo Perlite Co., 100 Sugg Rd., Buffalo 25, N.Y., U.S.A.

³ F. Hyde (Ontario) Ltd., Toronto, St. Thomas, Canada.

Seventy-two seedlings were weighed and measured; these were always from the median strip of 12 bullets. Stem heights and root lengths were correlated to root weights (Sd 1.23 and 0.79). In the spring, seedlings in bullets were planted by hand in holes made with a pointed planting stick, 105 in sandy loam in a field near Quebec city, 420 in bouldertill of fresh sandy loam in a cutover maple-birch-beech stand near Dudswell, Quebec. Survival was categorized as follows: live trees in good condition, live trees in poor condition (damaged or with dead top), dead trees and missing trees (where bullets and trees were not found).

Results and Discussion

After 120 days in the greenhouse, over 97% of the bullets contained seedlings that had attained an average height of 10.2 inches. The tallest seedlings had reached 15 inches (Fig. 1).

Roots began to grow out of the containers approximately 90 days after germination, at which time the seedlings were ready to be planted, but, since it was too early, seedlings were kept in the greenhouse for an additional 30 days.

Stem heights and root system lengths were plotted against root weights (Fig. 2). Curves were calculated for 72 samples. Until seedlings reached a height of approximately 5 inches, stem growth was slower than root growth.

The root systems of plants in the 4.5-inch bullets developed along the side of the prefabricated slit while the roots of plants in the 2.5-inch containers showed a tendency to clump (Fig. 3). At the end of the first growing season no bullets had been cracked open by the roots (Fig. 3). After the first winter in the field 34% of the seedlings were alive without apparent damage, 26% alive but in poor condition, 21% dead and 19% missing. In the forest, the survival of trees without apparent damage was comparable, but the percentage of missing bullets and trees was twice as high.

In the field as well as in the forest, the planted

trees were exposed to damage from various sources. Tracked and wheeled equipment was inadvertently run through the plantation and caused part of the damage. The bright colors of the plastic bullets attracted the curiosity of both men and animals. Bullets were pulled out of the ground, and, in many instances, bullets as well as seedlings were

Fig. 2. Height of stems and length of roots on root weight of yellow birch trees.

Fig. 1. Yellow birch seedlings 120 days after germination. Ruler is approximately 6 inches long.

Fig. 3. Yellow birch seedlings at the end of first growing season. On the right are plants as they were found in the ground, on the left are the same plants without containers.

missing. Seedling stems were frequently broken, possibly as a result of snow or of tampering by men or animals.

Stem terminals were often dead, possibly because of drought. Drying occurred mostly where bullets were loosely planted and roots had not established contact with the soil. In the case of bullets planted

firmly, the seedlings were healthy and well shaped and no frost heaving had occurred. Trees showed less damage and were in better condition where the bright colors of the plastic were covered by soil.

This method of planting is feasible, but better results could be obtained with bullets made of a material more adapted to the physiology of the plants.

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