Development of a Rooted Cutting Propagation Method for *Prunus serotina*©

Paula M. Pijut
U.S.D.A. Forest Service, North Central Research Station, Hardwood Tree Improvement and Regeneration Center (HTIRC), 715 West State St., West Lafayette, Indiana 47907, U.S.A.

Carolina Espinosa
Purdue University, Dept. of Forestry and Natural Resources, HTIRC, 715 West State St., West Lafayette, Indiana 47907, U.S.A.

INTRODUCTION

Black cherry (*Prunus serotina*) is the only native *Prunus* species (southeastern Canada and throughout the eastern United States) that is of high commercial value for timber and sawlog production. Black cherry wood is highly valued in North America for cabinets, furniture, fine veneer, and architectural woodwork. Hardwood lumber mills are constantly seeking high-quality sources of this fine hardwood species because stands of large, straight-stemmed black cherry trees are becoming increasingly difficult to find. Forest inventories conducted in the largest commercial range of black cherry (Kentucky, Pennsylvania, West Virginia, and New York) estimate the volume of black cherry growing stock on timberland at 120.6 million m^3, with an average annual harvest of 1.4 million m^3. Attack by several species of insects causes gum defects in black cherry, resulting in reduced timber quality, especially for veneer.

Vegetative or clonal reproduction of a commercially important hardwood tree species is necessary in a tree improvement program; in order to provide test materials for genetic studies and as improved planting stock for use in production forestry. Vegetative propagation methods (including rooted cuttings) will be required in order to produce clones of elite or genetically improved genotypes of black cherry. Adventitious root formation is a requirement in any successful vegetative propagation program. Many ecologically and economically important hardwood tree species have a low genetic or physiological capacity for adventitious root formation, and are considered recalcitrant to routine, commercial-scale vegetative propagation. However, successful propagation of difficult-to-root species can be achieved if the type of cutting (hardwood, softwood, or root), date of collection (seasonal growth development), stock plant or cutting manipulation (pruning, wounding, etc.), rooting treatment (auxin type and concentration, rooting media), and greenhouse parameters (mist bed system, supplemental lighting, temperature, etc.) are carefully considered. The objective of this study was to determine the conditions necessary for successful stem-cutting propagation of black cherry.

MATERIALS AND METHODS

In 2003, 12 trees were arbitrarily selected from a 9-year-old black cherry plantation located in Lafayette, Indiana. Hardwood stem cuttings were collected 31 March (budbreak) and 14 April (branches flushed out). Sixteen cuttings (25 cm in

length) were taken from each tree at each collection date. Two years of growth were pruned from the tree branches (after the last hardwood collection date) to encourage sprouting. Softwood cuttings were collected 13 June and 2 July. Stems were recut to between 20 and 23 cm in length. The basal 3 cm of cuttings were treated by dipping for 10 to 15 sec in 0, 12, 29, or 62 mM K-IBA dissolved in deionized water or 0, 15, 34, or 74 mM IBA dissolved in 70% ethanol. Cuttings were inserted vertically to a depth of 5 to 7 cm in Deepots™ (D40) containing a moist medium of 1 perlite : 1 peat (v/v) mix. Cuttings in Deepots™ were placed under intermittent mist (12 sec every 18 min; 24 h) on a greenhouse bench (24 ºC day, 18 ºC night). After 5 to 6 weeks, cuttings were harvested and number of cuttings rooted, number of roots per cutting, and individual root lengths were recorded. Rooted cuttings were transplanted to Treepots™ (Tall One) containing a moist medium of Scotts Metro Mix 366-P and returned to intermittent mist for 1 week. Rooted cuttings were then acclimatized to greenhouse benches and allowed to initiate new shoot growth. In late October or early November, rooted cuttings were placed in a cooler environment and lower light to induce dormancy. Containerized cuttings were overwintered in a controlled cold-storage environment (3 to 4 ºC in darkness; 4 to 5 months). After overwintering, the pots were returned to the greenhouse, allowed to acclimatize to this environment, initiate new growth, and survival data were recorded.

RESULTS AND CONCLUSIONS

- Forty-two percent rooting was achieved overall for softwood cuttings collected mid-June and treated with K-IBA or IBA (Table 1).
- No rooting was achieved using hardwood stem cuttings.
- The greatest rooting success was with 12 mM K-IBA (54%). Increasing the concentration of K-IBA decreased percent rooting.
- Fifty percent rooting was achieved with 15 or 74 mM IBA.
- The number of roots per cutting increased with increasing concentration of K-IBA.

Table 1. Effect of rooting treatment concentration on rooting percentage, root count, and root length of *Prunus serotina* softwood cuttings[z].

Rooting treatment (mM)	Rooting (%)	Roots per cutting (no.)	Root length (cm)	Survival[x] (%)
0 K-IBA	0	---	---	---
12 K-IBA	54	9.3 + 2.4[y]	1.9 + 0.2	92
29 K-IBA	42	16.0 + 5.3	1.9 + 0.2	100
62 K-IBA	21	24.6 + 13.2	0.8 + 0.1	80
0 IBA	0	---	---	---
15 IBA	50	13.0 + 3.5	2.3 + 0.2	100
34 IBA	33	23.1 + 4.5	1.7 + 0.1	100
74 IBA	50	13.8 + 3.5	1.2 + 0.1	83
TOTAL	42	15.2 + 1.9	1.7 + 0.1	93

[x] Percent of rooted cuttings surviving overwintering in cold-storage.
[y] Mean + SE.
[z] Sample size for 13 June 2003 and rooting treatment concentration, n = 24.

Figure 1. Root induction on black cherry softwood cuttings (random samples) 15 mM IBA (left), 34 mM IBA (middle), and 74 mM IBA (right).

- The greatest mean root length (2.3 cm) was achieved with 15 mM IBA (Fig. 1).
- Rooted cuttings survived (80% to 100%) overwintering in a controlled cold-storage environment.
- Propagation of 9-year-old black cherry from softwood cuttings was successful.

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