

Propagation of *Thuja* x 'Green Giant' by Hardwood Cuttings

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Nature of Work: *Thuja* x 'Green Giant' (syn. *T. 'Giganteoides'*) is a hybrid of *Thuja plicata* J. Donn ex D. Don (western red cedar) and *Thuja standishii* (Gord.) Carrière (Japanese arborvitae) (Kim Tripp, personal communication). The cultivar exhibits a rapid growth rate, approaching 1 m (3.3 ft) of height growth per year, while maintaining a tightly pyramidal habit. Summer foliage is a lustrous dark green turning a shade of bronze in winter where exposed to sunlight. At maturity, 'Green Giant' can reach a height of 18 m (60 ft) without sacrificing superior growth form (1). 'Green Giant' is reported to be hardy to USDA Zone 5 and tolerant of stressful landscapes and clay soils (1). Trees do not appear to be susceptible to wind throw and significant pest problems have not been observed. These qualities make 'Green Giant' a promising landscape plant with utility as a fast growing hedge. To date, an extensive literature search has failed to reveal any information on propagation of *T. x 'Green Giant'*. Therefore, the objective of this research was to develop a protocol for successful propagation of this cultivar by hardwood stem cuttings.

On February 15, 1997, fifty terminal cuttings, approximately 45 cm (18 in) in length, were collected from the lower 2 m (6.5 ft) of each of seven trees growing under uniform fertility near Boonville, NC. Cuttings were packed on ice and transported to the Horticultural Science Greenhouses, Raleigh, NC. From the initial cutting material, two types of cuttings were prepared: a 24 cm (9.5 in) terminal and a 20 cm (7.9 in) lateral cutting. A lateral cutting consisted of a side shoot removed from that portion of a terminal cutting which was inserted in the rooting medium. The basal 1 cm (0.4 in) of all cuttings were then treated for 1 sec with 0, 3000 (0.3%), 6000 (0.6%), or 9000 ppm (0.9%) indolebutyric acid (IBA) in 50% isopropanol. The cuttings were air dried for 15 min before inserting the basal 4 cm (1.6 in) into a raised green house bench containing a medium of 2 perlite : 1 peat (v/v) with bottom heat maintained at 24° (2°C (75° (4°F). Intermittent mist operated daily for 5 sec every 5 min from 7:30 am to 6:00 pm. Cuttings were maintained under natural photoperiod and irradiance with day/nights of 24° ± 5°C (75° ± 9°F)/ 18° ± 5°C (65° ± 9°F). The experimental design (within the rooting bench) was a randomized complete block with a factorial arrangement of treatments (two cutting types x four IBA levels), six blocks, and six cuttings per treatment per block. After 6 weeks, cuttings were harvested and data recorded. Data included, percent rooting, number of primary roots ≥ 1 mm (0.04 in),

and root lengths. All data except rooting percentages were based on the actual number of cuttings that rooted (at least one primary root). Data were subjected to analysis of variance and regression analysis.

Results and Discussion: Auxin treatment had no significant affect on percent rooting with rooting percentages of both terminal and lateral cuttings ranging from 93% to 100%. Averaged over all IBA treatments, rooting percentages of terminal and lateral cuttings were identical (96%). Similarly, the type of cutting had no affect on root number with each averaging 11 roots per cutting. However, IBA treatment had a significant quadratic affect on root number with the greatest number of roots (14 per cutting) occurring following treatment with 6000 (0.6%) or 9000 ppm (0.9%) IBA.

With regards to root length, there was a significant interaction between cutting type and IBA concentration. Average root length for lateral cuttings was not influenced by IBA concentration [30 mm (1.1 in)]. On the other hand, root length of terminal cuttings responded to IBA treatment in a quadratic manner. Average root length of nontreated terminal cuttings was significantly shorter than the lateral counterparts [18 mm (0.7 in) vs. 31 mm (1.2 in) respectively]. However, at IBA concentrations \geq 3000 ppm (0.3%), root lengths of terminal and lateral cuttings were virtually identical [\approx 32 mm (1.3 in)].

Significance to Industry: Results demonstrate that rapid and efficient propagation of *T. x 'Green Giant'* by hardwood cuttings is possible. Although percent rooting was not enhanced statistically by IBA treatment, quality of the rooted cuttings (root number) increased with IBA treatment. Treatment of terminal and lateral cuttings with 6000 ppm (0.6%) IBA not only resulted in 100% rooting, but also stimulated an average of 14 roots per cutting with an average root length of 31 mm (1.2 in). The fact that terminal and lateral cuttings root in high percentages should permit propagators to make efficient use of propagation material. The ease and speed of rooting suggest 'Green Giant' is an excellent candidate for 'direct sticking' as it's rapid growth rate will ensure a salable plant in a very short period of time.

Literature Cited

1. Tripp, K.E. 1994. *Thuja 'Giganteoides'* (syn. *T. occidentalis* 'Gigantea', 'Giganteum', 'Giganticum'). Proc. Intl. Plant Prop. Soc. 44: 554-555.