# A Taxonomic Revision of *Chamaecyparis nootkatensis* f. *pendula* and Implications for Rootstock Selection for Grafting©

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## INTRODUCTION

In the last 5 years the genus and species of *Chamaecyparis nootkatensis* and its cultivars have undergone a large taxonomic revision. This revision was fully warranted and justified both from a taxonomic point of view as well as from a horticultural perspective.

The genus and species of *Chamaecyparis nootkatensis* as of 2004 (Little et al., 2004) has now been changed to *Callitropsis nootkatensis* (Little, Schwarzbach, Adams & Hsieh). Earlier revisions of the genus changed the formal name to *Xanthocyparis nootkatensis* (Farjon & Harder) (Farjon et al., 2002), but subsequent work and approval of the International Committee for Binomial Nomenclature has verified the genus to be *Callitropsis* (Wikipedia, 2005).

This is of significance to propagators, horticulturalists, and plant breeders due to confusion created by the original grouping of *Callitropsis nootkatensis* in the genus, *Chamaecyparis* and referred to for many years as *Chamaecyparis nootkatensis* (D.Don) Spach. However, horticulturally *Chamaecyparis nootkatensis* never behaved like any other members of the genus *Chamaecyparis*. There is little or no evidence of it being grafted to other *Chamaecyparis* with any degree of success, nor did it hybridize with other *Chamaecyparis* (Manor House Arboretum, 2005). From a production point of view it would root from cuttings but sparingly so, and grafting was the preferred mode of production; however, this was not entirely successful (Barnes personal observation, 2005). Two of the most frequent rootstocks for the grafting of members of the *Cupressacea* are *Juniperus virginiana* 'Hetzi Glauca' and *Thuja nigra*. Anecdotal information suggests *Callitropsis nootkatensis,* masquerading as *Chamaecyparis nootkatensis*, often exhibited immediate graft incompatibilities that often killed as much as 50% of the original grafts, and this was followed by delayed graft incompatibilities, which claimed another percentage. The overall take was poor for the long term. Large field-grown trees with the advent of cone formation would simply up and die with no real explanation of what caused the sudden decline and death of the plant (Barnes personal observation, 2005).

The graft incompatibilities and the poor rooting performance suggests that the former *Chamaecyparis nootkatensis* was not a *Chamaecyparis* but something else as no other members of the *Chamaecyparis* group behaved like this, especially with graft incompatibility to *Juniperus*, something that just does not occur with the more common species of *Chamaecyparis*. Further examination shows that the seeds of *Callitropsis nootkatensis* do not resemble in any way the seeds of other members of the genus *Chamaecyparis* but instead have a close affinity to those of *Cupressus* (Wikipedia, 2005). When all of the factors plus DNA and phytochemical studies are taken into account it is certain that *Callitropsis nootkatensis* (Little, 2004), now reclassified, is not closely related to the *Chamaecyparis* genus.

Industry practice has shown repeatedly that the choice rootstocks for grafting *Chamaecyparis* do not apply to *Callitropsis nootkatensis*, and ideally other rootstocks should be considered.

The closest relatives to *Callitropsis nootkatensis* for rootstocks would be, in descending order, *Callitropsis nootkatensis* seedlings, *Callitropsis vietmanmensis* seedlings (Gymnosperm database. 2005) (formerly *Xanthocyparis vietnamensis*) (Farjon et al., 2002), species of the genus *Cupressus*, and ×*Cupressocyparis leylandii*, (*Cupressus macrocarpa* × *C. nootkatensis*), ×*Cupressocyparis notabilis* (*Cupressus arizonica var. glabra* × *C. nootkatensis*), and ×*Cupressocyparis ovensii* (*Cupressus lusitanica* × *C. nootkatensis).* (Note: The ×Cupressocyparis hybrids have now been changed to ×*Cuprocyparis leylandii*, ×*Cuprocyparis notabilis*, and ×*Cuprocyparis ovensii*.)

Of this group some can be excluded. *Cupressus* have poor root systems and topple frequently in field and landscape situations. *Callitropsis vietmanmensis* is tropical and only pertinent for the deep southern portions of the U.S.A. and is not generally available. ×*Cupressocyparis notabilis* also is of a tropical origin and unsuitable for most of the U.S.A., ×*Cupressocyparis ovensii,* while present in the U.S.A., is not common. However, Leyland cypress, ×*C. leylandii* is common, fairly cold tolerant, and can be easily grown from cuttings, although it should be noted that toppling of large trees and a canker disease may limit its use in the future.

## MATERIALS AND METHODS

To look further at the grafting situation it was decided to consider ×*C. leylandii* as a possible rootstock for *C. nootkatensis* f. *pendula.*

Rooted cuttings of ×*C. leylandii* were obtained in $2^{1}/_{4}$-inch pots and were fully rooted.

They were cared for normally and allowed to enter winter in a cold polyhouse and were brought into a warm greenhouse in January and placed on heat pipes at 10 °C. After a period of weeks white roots were in formation and grafting could commence. Top growth was reduced by one half to around 25–30 cm.

Scionwood of *C. nootkatensis* was obtained from field-grown plants on days when it was above 0 °C and stored in polybags with moist toweling at 4 °C until use, about 2–3 weeks.

At the time of grafting the scionwood was removed, held for several hours at room temperature to warm up and then grafted. Two-year-old wood was selected about 6–8 cm long and trimmed so that the top of the scion foliage was reduced and was cut differently when compared to that of the understock. It is very hard to distinguish between grafted scions and rootstock that has been cut back so distinctive cuts have to be implemented to tell them apart. This is especially important several months later when the understock is cut off leaving the surviving scions.

A typical side graft was used and tied with grafting rubbers strips, which were in turn sealed with 4 cm × 2.5 cm strips of Parafilm M laboratory grade (Modern Biology, Inc., West Lafayette Indiana 47906). Finished grafts were placed sideways in sealable clear polyethylene boxes (30 cm H × 33 cm W × 85 cm L) with 5 cm of moist perlite placed in the bottom. Grafts were placed in such a manner to maximize quantity in the box and yet to protect the scions from mechanical damage. Boxes of grafts were placed directly on the 10 °C heat pipes. Grafts were periodically watered on as-needed basis if dry spots became a problem. After 6 weeks the boxes were

vented slowly for about a week, before the lids were fully removed and the grafts stood upright in normal greenhouse conditions.

## RESULTS

The grafting work was carried out for two separate years. Year 1 results had a grafting percentage of 78%, and Year 2 had a percentage of 52%. The discrepancy in year 2 being attributed to rootstocks that were overgrown and root bound, a problem that can occur quickly with a fast-growing plant such as ×*C. leylandii*.

Initially the grafts made little or no growth the first year, but following a winter period they started growing and picked up the pace considerably. They do not grow as fast as ×*C. leylandii* but more closely follow what would be natural for *C. nootkatensis*.

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