

THE FUTURE OF GREEN ROOFS IN THE UNITED STATES OF AMERICA

In Germany, it is estimated 12% of all flat-roofed buildings are covered with vegetation, a number that is increasing as the German green roof industry continues to grow 10% to 15% per year. In the U.S.A. the concept of green roofs is just now being introduced and will likely become more common in the future. They represent an entirely new market for landscape designers/architects, nursery operations, and landscape contractors; and the potential market includes all existing and future roofs in the country.

Cultivar Verification Using Molecular Techniques[©]

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INTRODUCTION

The techniques of molecular biology are increasingly being applied to horticultural research, including cultivar verification and new cultivar breeding. In this poster we summarize two projects conducted at the Arnold Arboretum that demonstrate the application of these techniques to horticultural plants. We envision this area of research will continue to develop, and we foresee a need for collaborative efforts to establish a comprehensive database of different taxa. Such a database should be readily accessible online for the benefit of researchers, the green industry, and the general public.

Stewartia 'Scarlet Sentinel'

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Following is a summary of the description published in *HortScience* 37(2): 412–414 (2002).

Stewartia 'Scarlet Sentinel' is a unique tree that originated as a spontaneous, open-pollinated seedling at the Arnold Arboretum of Harvard University in Jamaica Plain, Massachusetts, U.S.D.A. Hardiness Zone 6A. The plant is a putative spontaneous hybrid between *S. pseudocamellia* Maximowicz and *S. ovata* (Cavanilles) Weatherby f. *grandiflora* (Bean) Kobuski that are growing adjacent to one another in the Chinese Path section of the Arnold Arboretum.

'Scarlet Sentinel' was originally collected in 1982 as one of a group of spontaneous seedlings growing beneath *S. pseudocamellia*. One of the seedlings was cultivated on the private property of author Peter Del Tredici; when the plant flowered for the first time in 1992 at approximately age 12, its hybrid nature became apparent.

The morphological intermediacy of 'Scarlet Sentinel' between *S. ovata* f. *grandiflora* and *S. pseudocamellia* strongly suggests that the cultivar is a hybrid between the two species. In order to verify this supposition, the authors conducted molecular analyses of both species and their putative hybrid. Total genomic DNA of the putative hybrid and the parents was extracted and analyzed using random-amplified polymorphisms of DNA (RAPD). Five of the twenty primers produced one or more

markers that were unique to either parent and also shared by the hybrid; other markers were nonspecific. Five markers were unique to *S. ovata* f. *grandiflora* and eight markers were specific to *S. pseudocamellia*, and all of these markers also occurred in 'Scarlet Sentinel' strongly suggesting that the plant is a hybrid between the two species.

Nuclear ribosomal DNA (nrDNA) is biparentally inherited; thus it is expected that the hybrid would show additivity of nucleotides that are unique to each parent. In this study, we conducted polymerase chain reaction (PCR) to amplify the internal transcribed spacer (ITS) region of nrDNA. Plant material used in this analysis was collected from 'Scarlet Sentinel', *S. ovata* f. *grandiflora*, *S. pseudocamellia*, and five seedlings produced by an artificial hybridization of the two. 'Scarlet Sentinel' showed additivity at nine sites that have unique nucleotides in all clones of each parent, as did the artificial hybrid seedlings. Therefore, both PAPD and DNA sequence analyses provide additional evidence that 'Scarlet Sentinel' is a hybrid between *S. ovata* f. *grandiflora* and *S. pseudocamellia*.

Systematic Relationship of Weeping Katsura Based on Nuclear Ribosomal DNA Sequences.

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Sequences of the internal transcribed spacers (ITS) of nuclear ribosomal DNA were used to examine genetic divergence of the two species of katsura — *Cercidiphyllum japonicum* Sieb. & Zucc. and *C. magnificum* (Nakai) Nakai — and four clones of weeping katsura ('Amazing Grace', 'Tidal Wave', 'Pendulum', and 'Morioka Weeping') and also to characterize the affinity of these weeping katsura to both species. Our results indicate that *C. japonicum* and *C. magnificum* are genetically distinct, supporting the recognition of them as separate species. Based on our DNA sequence data and morphological evidence, all weeping selections are phylogenetically derived from *C. japonicum*, not *C. magnificum*; nor are they of a hybrid origin between *C. japonicum* and *C. magnificum*. We propose the new cultivar group *C. japonicum* Weeping Group to include all katsura clones of weeping or pendulous habit, and to recognize the cultivar epithet 'Morioka Weeping' and its application to the excurrent and upright clone obtained from Japan and distributed in North America by the Arnold Arboretum.

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