

## APPLICABILITY OF RING-WIDTH ANALYSES AND $\delta^{13}\text{C}$ VARIATIONS IN TREE-RING CELLULOSE OF RIVERINE SHRUBS TO DETECT CHANGES IN HYDROLOGICAL REGIMES IN SOUTHERN BRAZIL

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The endangered evergreen shrub species *Raulinoa echinata* R.S.Cowan (Rutaceae) grows along Rio Itajaí Açú river banks in Santa Catarina, southern Brazil. The wood is diffuse porous and forms annual tree-ring boundaries marked by tangential bands of wood parenchyma. Wood discs from branches from five individual shrubs growing in five sites located along the river were collected. According to tree-ring counting, the age of branches reached a maximum of 22 years. Due to the young age of most samples, statistical tree-ring dating was not possible, but visual crossdating between growth patterns of several radii within one disc and between individuals of a site supported the assumption of annual ring formation. Wood samples from the inner, middle, and outer parts of each disc were separated and extracted  $\alpha$ -cellulose from whole wood by extracting solvents with NaOH 5%, delignification with acidified sodium chlorite NaClO<sub>2</sub> (7%), and subsequent alkaline hydrolysis with sodium hydroxide solution NaOH (17%). Stable carbon isotope ratios of  $\alpha$ -cellulose samples were analyzed with an analytical precision of 0.25‰ with a continuous-flow Delta Advantage V isotope ratio mass spectrometer coupled to an EAFLASH 2000-elemental analyzer at a combustion temperature of 1020°C. Mean  $\delta^{13}\text{C}$  values of the studied sites were generally rather low, indicating humid growing condition, and varied between  $29.78 \pm 2.2\text{‰}$  and  $27.65 \pm 1.3\text{‰}$ . Two sites growing within a part of the river that had been influenced by lowering of the water table by hydropower projects had less negative  $\delta^{13}\text{C}$  values than sites growing at the banks with the natural water table, showing a maximum between-site difference of 2.12‰, indicating reduced water supply. In addition, a trend of mean  $\delta^{13}\text{C}$  values at the driest site of 1.9‰ between the inner and outer parts of the branches, indicate an increasing water-use efficiency of the plants and an overall trend towards drier site conditions. In contrast, no trends of  $\delta^{13}\text{C}$  were found at the other sites, indicating a change in hydrological conditions along the parts of the river affected by hydro-engineering activities. These first results indicate the suitability of *R. echinata* tree-rings for dendroecological studies and the use of  $\delta^{13}\text{C}$  analyses to detect changes in hydrological growing conditions.

**Keywords:** *Raulinoa echinata*, ring width, Rutaceae, stable carbon isotopes.