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Pectin and cellulose cell wall composition enables different strategies to leaf water uptake in plants from tropical fog mountain

D. Boanares [a], B.G. Ferreira [a], A.R. Kozovits [b], H.C. Sousa [b], R.M.S. Isaias [a], M.G.C. França [a,*]

[a] *Departamento de Botânica, Universidade Federal de Minas Gerais, 31270-901, Belo Horizonte, MG, Brasil*

[b] *Departamento de Biodiversidade, Evolução e Meio Ambiente, Universidade Federal de Ouro Preto, 35400-000, MG, Brasil*

* Corresponding author.

E-mail address: marcel@icb.ufmg.br (M.G.C. França).

A B S T R A C T

Leaf water uptake (LWU) has been observed in plants of different ecosystems and this process is distinct among different species. Four plant species from the Brazilian fog mountain fields were evaluated in order to detect if leaf water uptake capacity is related to the cell wall composition of leaf epidermis. LWU measurements and their relation to anatomical and biochemical traits were analyzed. Cell wall composition was verified through immunocytochemistry using monoclonal antibodies recognizing pectin compounds, and histochemistry with calcofluor white to track cellulose. Differences in LWU among the four species were clearly revealed. Two species presented higher maximum leaf water content and the lowest values of water absorption speed. The other two species presented opposite behavior, namely, low leaf water uptake and the highest values of water absorption speed. The anatomical traits associated with the cell wall composition corroborated the data on the different LWU strategies. The species with abundant detection of cellulose in their epidermal cell walls absorbed more water, but more slowly, while those with abundant detection of pectins absorbed water at a higher speed. These results indicate that cell wall composition regarding pectin and cellulose are significant for water uptake by the leaf epidermis. Pectin provides greater porosity and absorption speed, while cellulose provides greater