Cover Stories:

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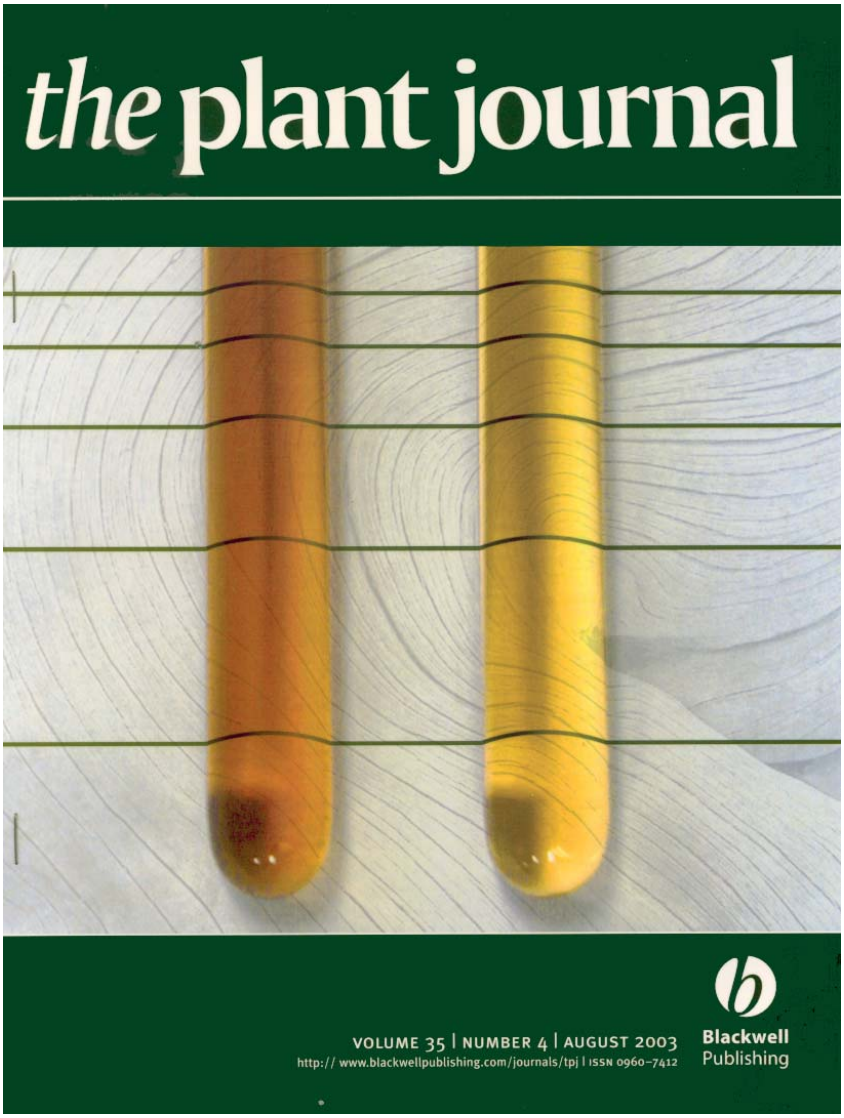

NMR tubes containing acetylated ball-milled pine (left) and aspen (right) cell walls in deuterochloroform, over a background to illustrate the clarity and homogeneity of the solutions. Cover reprinted with permission by The Plant Journal

Fachuang Lu and John Ralph. August 2003. Non-degradative Dissolution and Acetylation of Ball-milled Plant Cell Walls: High-resolution Solution-state NMR. ***The Plant Journal*** *35(4): 535-544*

Plants unlike animals have cell walls surrounding their cells which give structural support to the plant. Currently, detailed structural examination of plant cell walls takes many months. The author's main interest has been in a component called lignin which acts as the glue holding fibers together in the plant. As valuable as it is for the plant, it is the lignin that limits the utilization of the plant fiber in various natural and industrial processes (including digestion of forages by ruminants, and chemical pulping to make fine paper). This article tells of an advance that the authors have been seeking for over a decade — realizing complete dissolution of the whole cell wall with limited degradation. This is important since it currently is not possible to look in detail at the structure of cell walls in their native state. With the authors' discoveries it has become possible to run Nuclear Magnetic Resonance (NMR) Spectra on the whole cell wall fraction. As a result, structural profiling, particularly of the lignin component, can be completed in much less time (what formerly took months can now be completed in days) and the results are more reliable since the wall is not fractionated (and the entire lignin fraction is analyzed). The resultant degree of detail allows more rapid insight into plant processes such as the perturbations occurring in mutant and transgenic plants. This advance will facilitate the understanding of cell wall chemical structure in studies ultimately aimed at improving the utilization of valuable plant resources.

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