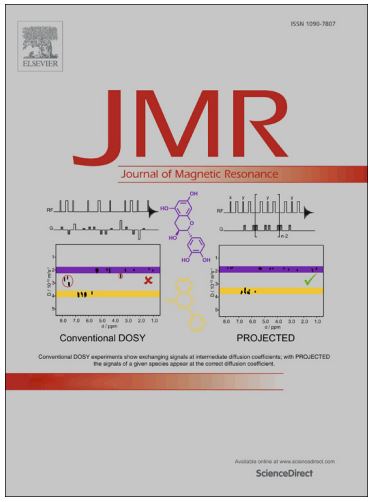
Accepted Manuscript



A size-adjustable radiofrequency coil for investigating plants in a Halbach magnet

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PII: S1090-7807(17)30070-8
DOI: http://dx.doi.org/10.1016/j.jmr.2017.03.010
Reference: YJMRE 6070

To appear in: *Journal of Magnetic Resonance*

Received Date: 1 December 2016
Revised Date: 14 March 2017
Accepted Date: 18 March 2017

Please cite this article as: D. Oligschläger, C. Rehorn, S. Lehmkuhl, M. Adams, A. Adams, B. Blümich, A size-adjustable radiofrequency coil for investigating plants in a Halbach magnet, *Journal of Magnetic Resonance* (2017), doi: http://dx.doi.org/10.1016/j.jmr.2017.03.010

A size-adjustable radiofrequency coil for investigating plants in a Halbach magnet

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Abstract

A radio-frequency coil with adjustable distance has been developed and tested for *in-situ* examination of growing plants. The Helmholtz-based coil design reduces laborious tuning and matching efforts encountered with solenoids wound around a growing stem or branch. Relaxation experiments were performed on tomato plants and winter wheat under controlled light irradiation. Changes in signal amplitude and in relaxation times T_2 were recorded over day and night cycles. Peaks in distributions of relaxation times were attributed to different tissue components of two different plants.

Introduction

Nuclear magnetic resonance (NMR) is a technique widely spread in medicine, chemistry and materials science [1-3]. Soft matter and other hydrogen-rich substances are readily accessible for magnetic resonance imaging [1, 4], and chemical structures are investigated by spectroscopic methods [5]. Furthermore, molecular dynamics and diffusion processes can be probed by NMR relaxometry [2, 3]. While stationary NMR devices operate at high fields, portable low-field instruments based on permanent magnets are used more and more [3, 6]. Low-field instruments were initially developed for food analysis by relaxation measurements