

Application of Magnetic Resonance Imaging (MRI) in Plant-Water Relationship

The aim of our research is to expand the adaptability of MRI measurements used in human diagnostics for examination of water barriers in living plants. Cucumber (*Cucumis sativus*) and *Phyllirea angustifolia* were chosen as test plants. The measurements were carried out at Kaposvár University Institute of Diagnostic Imaging and Radiation Oncology by Siemens Avanto type MRI equipment. Two different relaxation times were applied: T_1 that is capable of histological mapping, and T_2 which is used for examining water content. MRI measurements were made using 3-3 sample plants in the same position. In the analysis, proof was found that certain histological formation and branching cause modification in the intensity detected in T_2 relaxation time and these positions can be detected in T_1 measurements. Linear correlation can be experienced between T_1 and T_2 measurements. Linear correlation coefficient was 0.8223 in case of cucumber and 0.8874 for *Phyllirea angustifolia*, respectively. During the statistical examination of the signal intensities of xylem it can be concluded that they are not independent in statistical sense. The course of the intensity in xylem elements depends on the anatomic structure. Intensity profile is modified by nodes, by leaves and branches.

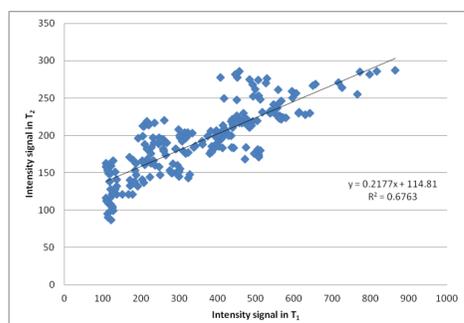
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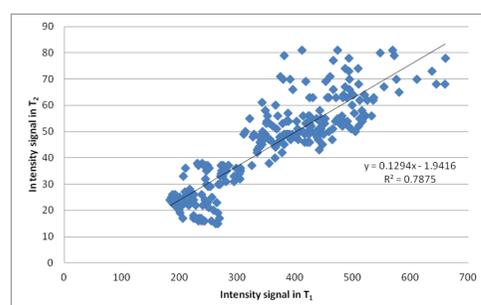
Siemens Avanto type MRI equipment



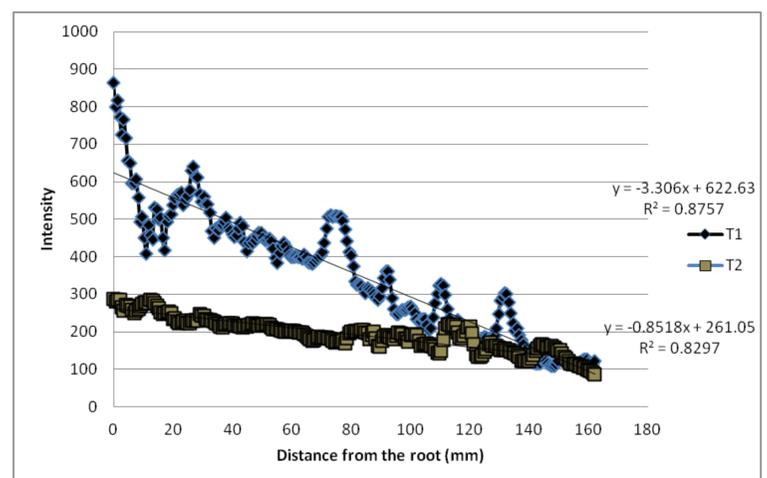
MRI pictures of the plants used in MRI measurements (above are the T_1 measurements and below are the T_2 measurements of cucumber and *Phyllirea angustifolia* from the left to right side, respectively)



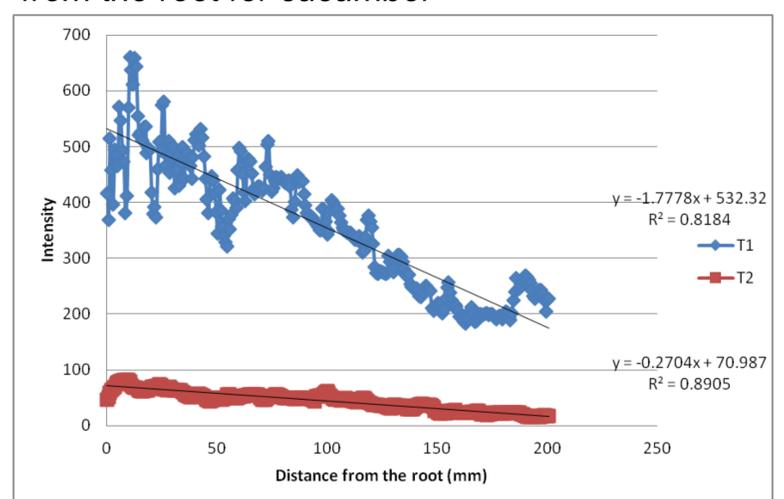
Linear relationship between T_1 and T_2 measurements of cucumber



Linear relationship between T_1 and T_2 measurements of *Phyllirea angustifolia*



The intensity signal of T_1 and T_2 measurements as a function of the distance from the root for cucumber



The intensity signal of T_1 and T_2 measurements as a function of the distance from the root for *Phyllirea angustifolia*



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