

Using Mri to Study Tomato Fruit

NMR Imaging (MRI) is an appropriate technique for studying of internal structure and dynamics of water in plant tissues. Because of its non-invasive and non-destructive character, MRI allows to make repetitive measures of the same sample and can thus be applied to monitor processes of growing, ripening and development of internal disorders. In this study we used the low field MRI to investigate a structure of tomato fruit and its changes during ripening. The technique was employed for the T1 and T2 relaxation times quantification. Different types of MRI images were also used to visualise the tomato macrostructure and to evaluate the degree of air bubbles in tissues. The study was complemented with CDD camera experiments which permitted to correlate results of MRI experiments with cellular structure. The T1 and T2 maps obtained by MRI reflected the structural differences among tomato tissues and permitted to distinguish between them. The parallel CDD camera experiments indicated that cell size contributes in T2 relaxation mechanism. The MRI images showed that the degree of air bubbles also differed among tissues. The later was confirmed by CDD camera images. Further, the changes in T1 and T2 were correlated to the maturity level of fruits. The degree of air bubbles in some tissues was also found to be dependant on the stage maturity. Finally, the macrostructure of tomato fruits was considerably modified as the fruits ripened. We showed in this study that tomato fruit can be successfully studied by MRI. Our attempts to correlate different techniques permitted a better understanding of the fruit structure.

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