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Early stage detection of tobacco mosaic virus in tomato seeds by NMR Relaxometry

Kubra Unal[1], Hami Alpas[1], Bayram Cevik[2], Hakan Aktas[2] and **Mecit Halil Oztop[1]**
[1]Middle East Technical University, Turkey
[2]Süleyman Demirel University, Turkey

Because of rapidly increasing population and limited agricultural areas, it becomes compulsory to fight against viral contamination that disrupts effective agricultural production. In this study, use of NMR Relaxometry is investigated to see the effect of salt diffusion and to detect seeds, which had been infected by virus. Tobacco mosaic virus (TMV) infected tomato is chosen since tomato has a high commercial value in sector. T2 relaxation times were measured by using low resolution NMR Relaxometry. Tomato seeds were diluted with distilled water and with 10%, 20%, 30% NaCI solutions and measurements were done by 15min intervals. T2 values of diluted virus free seeds has dropped to 278 ms from 372 ms after 1 day waiting and has dropped to 189 ms after 2 days. In order to distinguish signals coming from different compartments of seed, relaxation spectra were obtained. At seeds diluted with distilled water, it was observed that T2 of peaks have become closer to each other after 1 day due to diffusion of water into cells and becoming relative water by time. In infected seeds, merging of peaks and decrease in T2 were observed after 1 day. 3 peaks were observed at relaxation spectra after 2 day. Presence of viruses in seeds causes changes in cell structure which can directly be observed by relaxation spectra. Seeds diluted with NaCI solution revealed higher T2 values because of lysis of cell wall and diffusion of more water into cell. These results have proved that NMR Relaxometry can accurately be used in differentiation of infected seeds.

Biography

Kubra Unal has completed her BS Degree at Middle East Technical University Food Engineering Department. Currently, she has been studying Integrated-PhD at METU and she is also a research assistant.

ukubra@metu.edu.t

Notes:

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