DETERMINATION OF WATER STATUS IN GERMINATING LUPINE SEEDS USING MRI AND NMR SPECTROSCOPY

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Water content and its molecular mobility in hydrated lupine (\textit{Lupinus luteus} L.) seeds, the important factors to initiate a sequence of events during germination, have been monitored through NMR imaging and T\textsubscript{2} relaxation time experiment [1]. Analysis of T\textsubscript{2} relaxation times revealed three component water proton system (structural, intracellular and extracellular water) in germinating lupine seeds [2]. The data on the components of transverse relaxation time studies indicated the complex exchange processes taking place between water components inside lupine seed over first 2.5 h of hydration, with a distinguished increase in structural water and decrease in other components. This speaks in favor of high water absorbing capacity of seeds and may be due to chemical composition of lupine seeds, which are protein rich but contain low amount of starch and lipid reserves as compared to other legume species. Germination was accompanied by swelling of protein bodies and changes in organization of stored reserves with gradual disappearance of protein from the cells as confirmed through TEM microscopy results. MRI experiments showed that water distribution in lupine seeds was inhomogenous and seed tissues hydrated at different rates and extent. Water entered the seed through the hilum and micropyle. The embryonic axis was the first to show hydration followed by seed coat and later cotyledons.

References