Thesis Abstract

Perception of touch makes plant more sensitive to changes in the environment and it helps plant to better adapt and survive in the constantly changing environment. Present study is focused on studying morphological, physiological and anatomical adaptations of a dicot crop plant (*Cajanus cajan*) and a monocot crop (*Oryza sativa*) to touch stimuli. Regular mechanical stress in the form of touch suppressed overall growth of shoot and root in both *C. cajan* and rice. In order to cope with the mechanical stress, the *C. cajan* plant stem displayed enhanced lignification of xylems and increased compactness of stem tissue. Burst of reactive oxygen species and altered chlorophyll composition was observed upon touch stimuli in both rice and *C. cajan*. We have also found two novel effects of mechanical stress in *C. cajan* - touch treatment affects the nyctinasty movements of the leaves and nodule development in roots. Cytosolic calcium (Ca^{2+}) levels is altered upon mechanical perturbations. Ca^{2+} mediated intracellular communication is generally facilitated by calcium. Touch induced CaM and CML also as known as TCH genes. In our work we have attempted to identify counterparts of three Arabidopsis TCH genes namely *AtTCH1* (calmodulin; CaM2), *AtTCH2* (CML24) and *AtTCH3* (CML12). In *C. cajan*, expression of the two *AtTCH* gene orthologue (*CcTCH1-1* and *CcTCH2-2*) were found to be upregulated at an early time point after touch treatment. This study indicates presence of conserved molecule for touch response in *C. cajan*. However, in rice we didn't find any changes in the studied TCH gene orthologues in rice. Hence, we studied expression of JA responsive genes in rice and found that mechanical stress induces expression of two jasmonic acid responsive genes *OsWRKY42* and *OsJAZ*. Present study provides evidences of various adaptation to touch stimuli in *C. cajan* and rice plant which can be used as marker for future studies.