INVESTIGATION OF ROOT ANATOMY OF RICE (*Oryza sativa*) AND MAIZE (*Zea mays*) GROWN IN AERATED AND STAGNANT CONDITIONS

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Plants in the environment face different types of stresses such as salinity, drought, and water logging. Water logging is considered as a major stress in some areas. Plants have several mechanisms to survive under flooded condition. Development of adventitious roots, superficial roots, increased branching of roots and the formation of aerenchyma are considered to be the mechanisms to survive under flooded conditions. Aerenchyma facilitates gas diffusion between roots and the aerial environment. Some cells in the cortical region die to form aerenchyma. Both the casparian bands and the suberin deposits in endo- and exodermis and suberized sclerenchyma layer act as main barriers to water flow and air movement in monocot roots. As a result radial oxygen loss is prevented.

Rice and Maize plants were grown hydroponically in an incubator at 25^0C under aerated and stagnant conditions. Root lengths were measured daily and a mark was given at a distance of 10 mm from the root tip of the plants. Free hand cut sections of roots were taken using a razor blade and stained with Sudan 7B. These sections were viewed under light microscope and photographed. Some sections were stained with Berberine Aniline Blue and observed under Fluorescent microscope. Root growth was high under aerated condition in maize compared to the stagnant condition over time. However, in rice, root growth was more or less similar in aerated and stagnant conditions. Increased pH was observed under aerated condition, while a declined pH in stagnant condition over time. The different layers of a monocot root (epidermis, exodermis, sclerenchyma layer, cortical parenchyma, endodermis, pericycle and stele core) were observed clearly. Formation of aerenchyma was observed in maize roots grown in stagnant conditions, but not in aerated condition. In rice roots aerenchyma was observed in both aerated and stagnant conditions. Initiation of aerenchyma was observed in the mid cortex region in rice and maize roots (stagnant condition). Both the casparian bands and suberization in endodermis and exodermis were prominent in rice and maize roots grown under stagnant condition than in aerated condition. In addition, a very thick sclerenchyma layer also was present in rice roots grown under stagnant condition.

The results of this anatomical study will be useful in plant breeding programs especially in the production of varieties with constitutive aerenchyma and in the production of drought tolerant varieties.