ABSTRACT

Title of the thesis	:	Study of root architectural and anatomical phenes for drought tolerance in wheat (*Triticum aestivum* L.) genotypes.
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Drought is a common abiotic stress that has a significant impact on wheat (*Triticum aestivum* L.) production in many parts of the world, especially in arid and semi-arid climates. An investigation **entitled "Study of root architectectural and anatomical phenes for drought tolerance in wheat (*Triticum aestivum* L.) genotypes."** was carried out under the objectives: To study the morpho-physiological and biochemical response of (*Triticum aestivum* L.) under drought stress and comparative study of root architecture and anatomical phenes of the crop under drought stress. The experiment was carried out on three wheat genotypes in the acrylic pipe in the Division of Plant Physiology SKUAST, J. The stress was imposed by holding water irrigation for 10 days at the booting stage and sampling was done when the plants showed symptoms of wilting and leaf rolling and estimation of all parameters was done. The field experiment was done to compare only yield traits with an acrylic pipe. The experiment was laid out in a two factorial completely randomized design, consisting of control and treated conditions. Changes due to drought stress, physiological (relative water content, chlorophyll stability index etc), biochemical (total carotenoid, total soluble carbohydrates, grain related parameters etc.), yield attributing characters, root anatomical and root architecture phenes) parameters were estimated.

The results revealed that drought stress at the booting stage declined the RWC% of leaf in stress conditions in the case of PBW644 genotype (83% to 73%) followed by WH1080 (79% to 69%) and PBW175 (76% to 68%) were performed minimum. TSCs (12.06 to 26.14 mg g^{-1} FW) and proline content (6.32 to 18.88 µmoles/g FW) increased in all genotypes during drought stress conditions in acrylic pipe. Morphological parameters such total seed yield per plant, and the maximum was found in PBW644 and minimum was observed in PBW175. Under drought stress, root anatomy showed variations in all the wheat genotypes root diameter (mm), root cortical parenchyma (%), cortical thickness (mm), total cortical area mm^2) decrease in PBW644 followed by WH1080 and PBW175. PBW-644 showed a minimum reduction in morphophysiological traits and grain yield. As a result, sustaining a sufficient yield during the drought has become a priority, particularly considering global environmental changes and the increase in world population.

Keywords: *Wheat, drought, proline, anatomy, architecture, phenes*

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