Genetic and Biochemical analysis of wheat genotypes under Osmotic stress conditions

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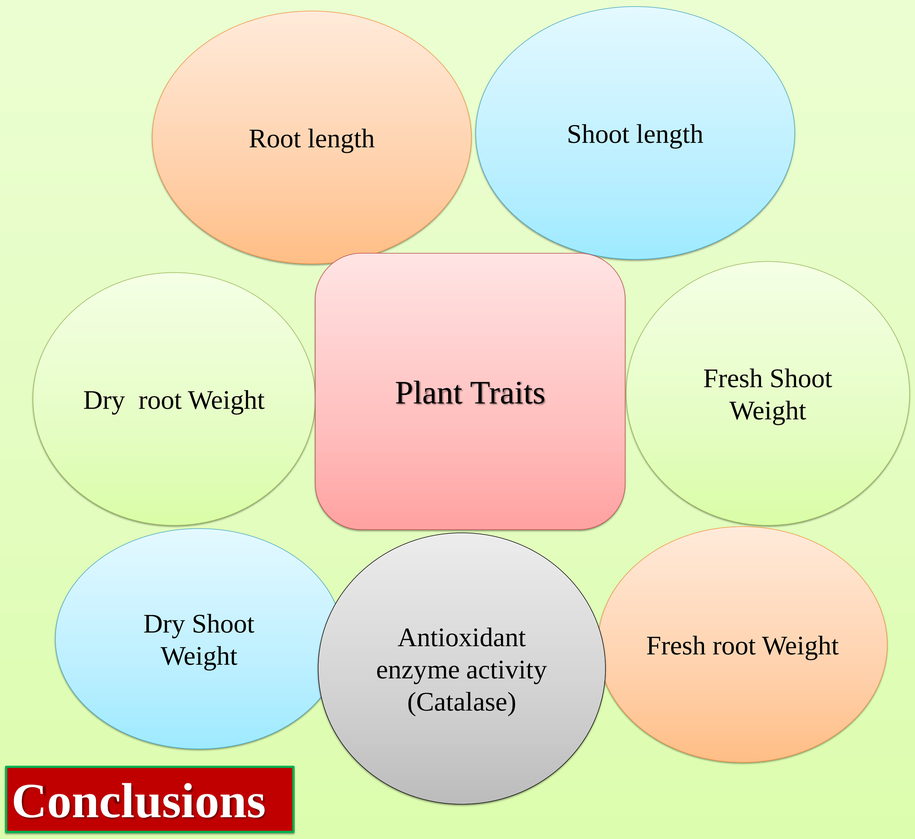
Abstract

In Pakistan, wheat yield affects greater due to shortage of water which is the root cause of yield reduction. So, an experiment was designed to explore genetic potential in wheat which improves the present situation. An experiment was conducted in Department of Plant Breeding & Genetics, Ghazi University, D. G. Khan to evaluate the performance of different wheat varieties under well-watered and water stress condition. The experiment was laid out in a Completely Randomized Design (CRD) under factorial arrangement with three replications and two treatments (normal and osmotic stress). Data were recorded for various morpho-physiological traits at seedling stage in available wheat varieties to sort out water stress tolerant genotypes. Analysis of variance for genetic analysis indicated that all varieties of wheat were different from each other. In some of wheat varieties, CAT activities showed an increased level of this enzyme under drought conditions than well-watered conditions which indicated tolerance to osmotic stress in plants as these antioxidant enzymes are produced when plants undergo the shortage of water. These results suggest that V2 (NAE/IHAC/PVN), V9 (Faisalabad-08), V10 (Punjab-11) showed best result for genetic and biochemical studies. These genotypes can be used as parents for hybrid seed production and for further breeding program for development of water stress wheat varieties.

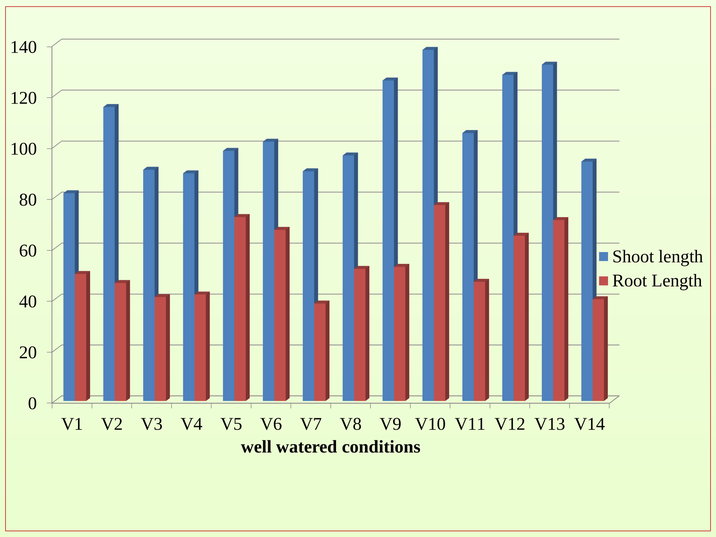
Key Words: Wheat, catalase enzymes, genetic analysis, osmotic stress

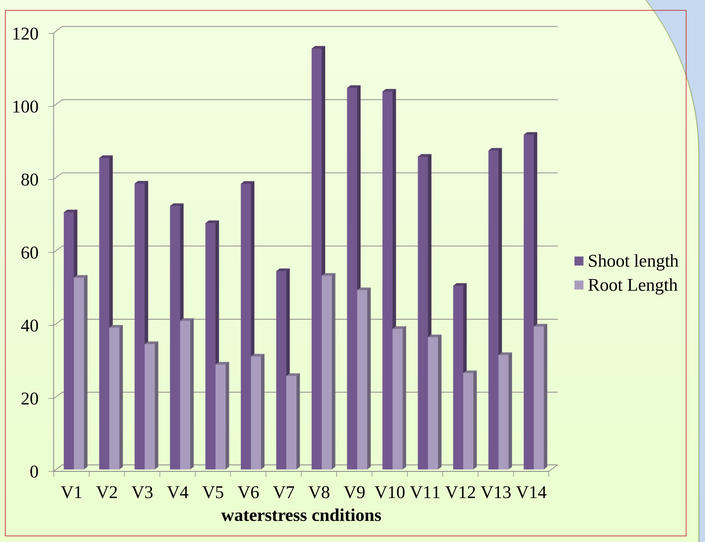
MATERIALS AND METHODS

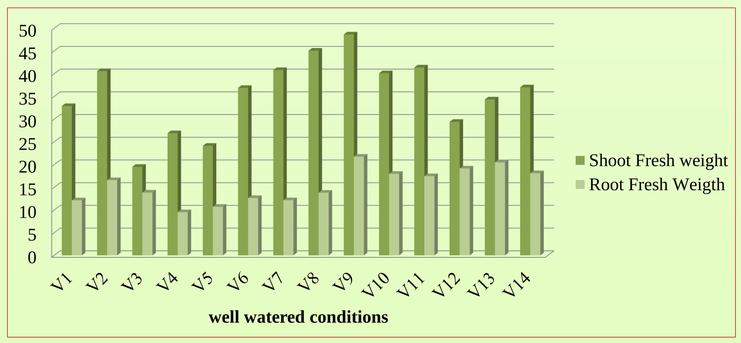
This experiment was conducted in green house at Department of Plant Breeding & Genetics, Ghazi University, D. G. Khan, Punjab, Pakistan. Experimental material comprised of Fourteen wheat genotypes was sown in metallic trays under complete randomized design with three replications and two treatments (normal and osmotic stress). Normal irrigation was applied according to field capacity until germination of all genotypes. After germination, water stress was produced by withholding water i.e. 50% of normal irrigation. Twenty days after sowing, plants were harvested and data were collected for following traits:

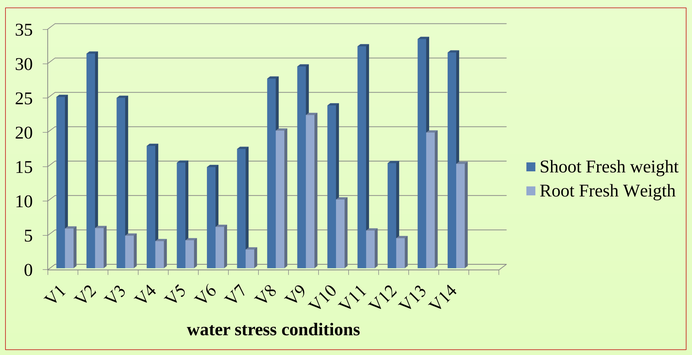


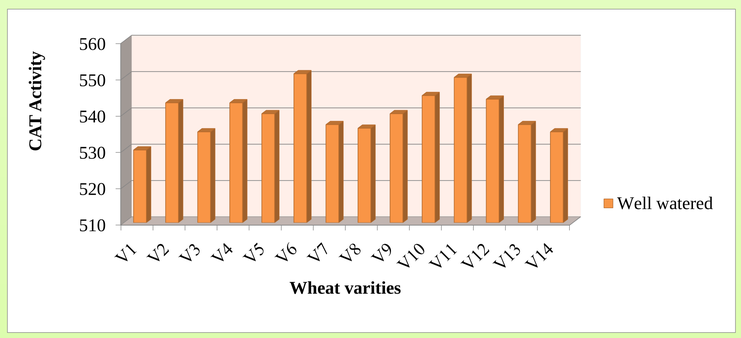
Results

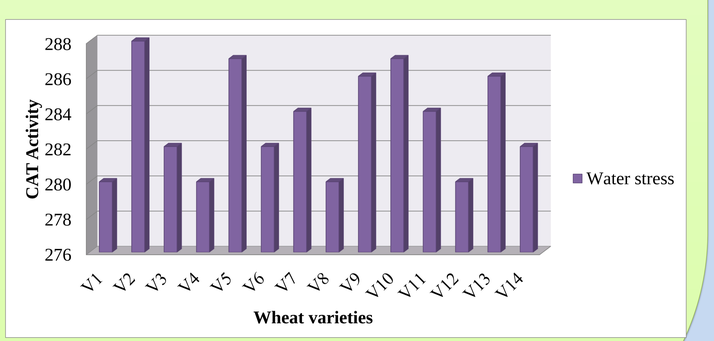












Conclusions

V2 (NAE/IHAC/PVN), V9 (Faisalabad-08), V10 (Punjab-11) are found best genotypes on the base of and enzymatic studies under normal and osmotic stress conditions and these genotypes can be used as parents for hybrid seed production in wheat breeding program to increase per acre yield under normal as well as osmotic stress conditions.

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