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Progressive changes in oxidative enzymes and some biochemical constituent of chickpea genotype under salinity stress

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SUMMARY

A pot culture experiment was conducted to study the progressive stress responses and mechanism of salinity stress tolerance in chickpea genotype. Two chickpea genotype (one tolerant and one susceptible) CSG-8962 and Vijay of different adaptation were taken for the study in control and saline stress (150mM Nacl) condition at interval of 7,14 and 21 days . The sample was analyzed for the levels of peroxidase and polyphenol oxidase enzymes and some of the key biomolecules like reducing sugars, soluble protein, proline, polyphenol and free amino acids to find out the biochemical markers involved in identifying the salt tolerance in chickpea cultivar. The result reveled that the activity of oxidative enzyme peroxidase and polyphenol oxidase, proline, free amino acids and polyphenol were found to be increased comparatively higher in salt tolerance cultivar than the susceptible cultivar under the salinity stress situation. Where the soluble protein content in salt susceptible cultivar decreased with salinity stress.

Key words : Chickpea, Peroxidase, Polyphenol oxidase, Proline, Soluble protein, Polyphenol reducing sugar, Free amino acids and salinity stress

Chickpea (*Cicer arietinum* L.) is the world's second most important pulse crop next only pigeonpea and cultivated in more than 41 countries occupying approximately 15 present of the total pulse area in the world (Datta, 2002). Among the various stress condition salinity causing losses quantitatively in chickpea is one of the major. Chickpea is cool-season legumes grown extensively through out world (12.03M ha), particularly in the India subcontinent, countries of North Africa, North America, West Asia and Mediterranean region (Anonymous, 1999). In India, it is grown on 8.40 Mha areas. Legumes have been found to be highly susceptible to words saline environment, which ultimately manifest in reduced growth and metabolism. Abiotic stress is known to disturb the intracellular water balance of the biological organisms. To counteract such condition, plant accumulates various low molecular weight compounds such as sugar, sugar alcohols amino acids and quaternary ammonia compounds. These metabolites, widely known as compatible solutes or osmolytes are neutral, non-toxic and do not interfere with normal metabolic reaction even in high concentration (Pujni *et al*., 2007). Salt tolerance mechanisms include array of characters, alterations and progressive adaptation in tolerance type and any flow that reflect on the metabolic failures resulting in sensitive behavior (Vasantha and Rajalakshmi, 2009). With these objective of studying progressive changes in chickpea and experiment was designed with tolerant and susceptible variety.

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MATERIALS AND METHODS

The chickpea cultivar CSG-8962 and Vijay are available at all India Co-ordinated Pulses Improvement Project MPKV Rahuri, were used for the present investigation. The seeds were surface sterilized with aqueous solution of 0.1% mercuric chloride and then thoroughly washed with distilled water. The seeds were soaked in cold water and placed in germinating paper for even germination for 2 days. Uniformly germinated seed were sowed in pots filled with soil. Two replication were maintained for each cultivar and treatment. When the seedling reaches 3-4 leaf stage salinity stress of 150mM NaCl was imposed. The shoot of both cultivar were analyzed at 7, 14 and 21 days after imposition of salinity treatment. During the growing of plant the water level was maintained with distilled and saline water respectively. The fresh shoot samples were collected for analysis of biochemical analysis. The proline contains in the sample were determine by the Bates *et al*. (1975). The soluble protein was determination by the procedure of Lowry *et*