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Research Paper :

Effect of brassinolide on biochemical constituents in rice (*Oryza sativa* L.) under salinity stress

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ABSTRACT

Brassinolide (BL) is a natural plant growth promoting substance that also exert anti-stress effects on plants. Five rice varieties *viz*., GR-7, GR-11, GR-12, Dandi and Gurjari were treated with 100 mM NaCl , 200 mM NaCl, 4 µM BL, 8 µM BL concentrations with water as control and supplemented solutions of BL with different salinity levels such as 100 mM NaCl+4 µM BL, 100 mM NaCl+8 µM BL, 200 mM NaCl+4 µM BL and 200 mM NaCl+8 µM BL. Salt solutions were supplemented with brassinolide to observe the ameliorating effect of the phytohormone in the rice seedlings under salinity stress. Biochemical constituents such as the seed reserves, stress proteins and mineral ions were affected by NaCl salt stress. Decrease in soluble protein and increase in soluble sugar, free amino acids and proline, Na^+ ion content and decrease in K^+ ion content in the rice seedlings with salinity were observed with increasing levels of salt stress. Brassinolide was found to ameliorate the adverse effects of salinity stress and thereby increase the yield of the crop.

KEY WORDS : Ameliorate, Brassinolide, Phytohormones, Salinity stress, DAG (Days after germination)

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Abiotic stresses are the main reason for loss in crop yield and productivity. Among various abiotic stresses salinity is a major environmental stress especially for rice, which is mostly grown under irrigated conditions. Rice is a salt sensitive crop and salt stress has adverse effects on the growth of the plant. Attempts are being made to ameliorate environmental stress by using phytohormones (Kamuro and Takatsuto, 1999; Rao *et al.*, 2002). Brassinosteroids (BRs) are steroidal plant hormones with growth promoting activity (Mandava, 1988). This class of plant growth regulators is regarded as the sixth plant hormone (Abe, 1989). Brassinolide (BL) is an important BRs that has emerged as a new phytohormone with pleiotrophic effect (Sasse, 1997). In the present study, effect of salinity stress and its amelioration by brassinolide on biochemical constituents in rice plants was studied.

EXPERIMENTAL METHODOLOGY

An experiment was conducted during the year 2010 in the Department of Biochemistry, B. A. College of Agriculture, AAU, Anand under controlled environmental conditions. Five varieties of rice *viz*., GR-7 (V_1), GR-11 (V_2), GR-12 (V_3), Dandi (V_4) and Gurjari (V_5) differing in degree of salt tolerance to salt stress were procured from Main Rice Research Station, AAU, Navagam, Gujarat. Seeds were surface sterilized with 0.1per cent$HgCl_2$ for 2-3 minutes and rinsed thoroughly with glass distilled water. Surface sterilized seeds were germinated in *Whatman no.1* filter paper lined glass petriplates containing different concentrations of NaCl (100 mM and 200 mM) alone, Brassinolide (4 µM and 8 µM) alone and NaCl solutions supplemented with BL concentrations. Controlled seeds were grown in distilled water. Three replications were maintained for each treatment. For biochemical analysis, seedlings were removed from glass plate on 5, 10 and 15 DAG, respectively. Total soluble sugar (TSS), soluble protein, free amino acids, proline and mineral ions (Na^+ and K^+) were estimated following the methods of Dubois *et al.* (1956), Lowry *et al.* (1951), Lee and Takahashi (1966), Malik and Singh (1980) and Jackson (1973), respectively.

EXPERIMENTAL FINDINGS AND ANALYSIS

The studies done on biochemical constituents indicated significant effects of brassinolide treatment. The data presented in Table 1 revealed that sugar and free