MITIGATION OF SALT STRESS BY FOLIAR APPLICATION OF JASMONIC ACID IN WHEAT

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Extended Summary

Salinization is expanding posing a threat to world agriculture including Bangladesh. The salt affected areas in coastal region of Bangladesh increased sharply, by 26.71% in 2009 from 1973. The tidal flooding, use of ground water, excessive evaporation, rising of temperature, anthropogenic activities induce salinity especially in southern areas of Bangladesh. Salinity hinders crop growth through altering physiological and biochemical processes and gene functions in plant. The poor cropping intensity in this location is due to intrusion of salinity, lack of suitable salt tolerant crop varieties along with the deficiency of knowledge on crop management practices, etc. Previous reports showed that plant growth regulators: gibberellic acid, salicylic acid, jasmonic acid enhances salt stress tolerance by modulating physiological functions in plant. Introduction of salt tolerant wheat cultivar along with effective management practices into the existing cropping pattern in the saline soil may have a worthy effort to utilize the saline land to meet up the food and nutritional deficit for the over increasing population of Bangladesh. Therefore, an experiment in the laboratory to find out the influence of salinity on germination characters and seedling growth of different wheat genotypes. In addition, another pot experiment in the field to examine the influence of plant growth regulators, methyl jasmonates on changes in morpho-physiology and yield of wheat under salt stress.

First experiment: This research was conducted at plant physiology laboratory of agricultural Botany department, Sher-e-Bangla Agricultural University during the period from October 2015 to March 2016. The study was two factors completely randomized design, factors (a) three different levels of salinity: 0 dSm^{-1}, 6 dsm^{-1} and 12 dSm^{-1}; factor (b) eight wheat genotypes: BARI Gom 21, BARI Gom 24, BARI Gom 25, BARI Gom 26, BARI Gom 27, BARI Gom 28, SONORA 64 and BAW 1135 with four replications. The data on percent of germination, root shoot ratio and seedling fresh weight (g) was taken in the study. The results of this experiment showed that salt stress significantly reduced germination percent, root-shoot ratio and seedling fresh weight. The value of above mentioned parameters were higher at control and gradually decreasing with the increasing of salinity levels, 12 dSm^{-1}. The BARI Gom 25 exhibited better performance in view of germination percent, root-shoot ratio, and seedling fresh weight under saline

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conditions. In addition, no significant difference was observed with other advance line of wheat genotypes including, Sonora 64 and BAW1135 in comparison with BARI Gom 25.

Second experiment: This study was conducted as a pot experiment in the field of Sher-e-Bangla Agricultural University. The variety BARI Gom 25 was used in this study as a salt tolerant variety which was examined by the previous experiment. This was two factors randomized completely block design factor (a) three different levels of salinity; So= without salt (control), S_1= 4 dSm^{-1}, S_2= 8 dSm^{-1} and factor (b) three different concentrations of methyl jasmonate; J_0= without methyl jasmonate' J_1= 5 µM methyl jasmonate and J_2= 10 µM methyl jasmonate with four replications. In this study, I used methyl jasmonate which is a methyl ester of jasmonic acid. The morpho-physiology, yield contributing characters and yield of wheat were decreased to salt stress whereas methyl jasmonate increased the wheat seed yield by improving the morpho-physiology and yield contributing characters under saline environment. The morpho-physiological characters including, plant height, leaf number $plant^{-1}$, tiller number $plant^{-1}$, dry and fresh weight of plant and SPAD value; yield contributing characters spike length, number of grains $spike^{-1}$, grain weight $spike^{-1}$, and grain weight pot^{-1} of wheat were reduced with increasing levels of salinity. Separately, exogenous foliar application of methyl jasmonate significantly increased the seed yield of wheat through improving morpo-physiology, yield contributing character under different levels of salt stress. Therefore, the present experimental results suggest that methyl jasmonate can effectively mitigate the adverse effect of salt stress in wheat.