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Evaluation of differential photosynthetic attributes, chlorophyll contents, ionic composition and antioxidant enzyme activity of salt sensitive and tolerant wheat genotypes in boron toxic, saline and boron toxic-saline soils

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Statement of the Problem: High levels of boron (B) and salinity are a serious constraint to crop production particularly arid and semi-arid regions of the world. Cropping on saline and B toxic land is restricted by the low tolerance of agricultural crops to these abiotic factors. Prospects for improving B and salt tolerance in wheat can only be made possible by advance research. Frequently, B and salt occur together, however, it is unknown whether the interactions of B and salt increase or decrease the tolerance of a plant to both of these stresses.

Methodology & Theoretical Orientation: In this context, a pot study was conducted to evaluate the effect of combined stresses of high B and salinity on the growth, yield, physiological and biochemical processes of wheat. The study comprised of twelve treatments including four levels of B (control, 2.5, 5 and 7.5 mg kg^{-1}) and three levels of salinity (control, 100 and 200 mM NaCl).

Findings: The results showed that at lower level of B i.e. 2.5 mg kg^{-1}, the growth, yield and physiological attributes of wheat were improved at both levels of salinity. While the higher B levels (5 and 7.5 mg kg^{-1}) and salinity together reduced wheat growth, photosynthetic and transpiration rates, stomatal conductance and yield. However this decrease was higher in sensitive wheat genotype than tolerant one. The activity of antioxidant enzymes increased with increasing salinity and B stresses either alone or in combination. An antagonistic salinity-B interaction was observed as the reduction in growth and yield parameters in the presence of combined salinity and toxic B levels was less than the sum of reduction caused by individual salinity and high B.

Conclusion & Significance: Regarding additional practical significance, wheat genotype i.e., SARC-I was proved as most promising one under saline and B toxic conditions and can be directly used by farmers or can be used for the development of more salinity and B tolerant wheat genotypes by the breeders.

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