ABSTRACT

The study was carried in Botanic Garden, GCU Lahore to investigate the effect of salt (NaCl), alkali ($NaHCO_3$) and salt/alkali (NaCl:$NaHCO_3$, 1:1) mixed stresses on *Hordeum vulgare* L. cv. joa-87. The plants were quantified for various stress levels viz. Control, $4dSm^{-1}$, $8dSm^{-1}$, $12dSm^{-1}$ and $16dSm^{-1}$ for germination percentage, fresh weight, dry weight, vegetative growth, chlorophyll content, ion content, rate of photosynthesis and transpiration. Results showed that the increase in salt stress concentration led to decrease in plant height, fresh weight, dry weight and chlorophyll content, of plants. These parameters were moderately turn down in salt/alkali mixed stress although markedly reduce under alkali stress because of drastic effects of high pH (8.66~11.12) and EC (4.97~16.35) respectively. Plant height (61.92%), leaf number (90.07%), number of tillers (97.67%), plant fresh and dry weights (61.29%) and (83.01%) respectively were reduced by increasing alkalinity level to $16dSm^{-1}$ of alkali stress. Ion contents of Barley cultivars changed under stress condition. The K^+ content decreased and Na^+ content increased with increase in stress concentration, indicative of competitive inhibition in absorption of K^+ and Na^+ ions. Intracellular imbalance of Na^+ and K^+ ions in alkali stress was more significant which might be due to high pH which disturbs ion homeostasis more severely than salt and salt/alkali mixed stress. Ca^{2+} and Mg^{2+} content decreased under stress condition as compared to control and it was found that the deleterious effect of alkali was more severe than (SS) and (S/AS) whilst salt stress revealed the least effect then (AS) and and (S/AS). Rate of photosynthesis (71.47%) and rate of transpiration (42.2%) were also decreased more severely in alkaline stress because of decrease in Mg^{2+} and K^{2+} contents in leaves.