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Effect of individual and interactive alkalinity and salinity on physiological, biochemical and nutritional traits of Marvel grass

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Soil salinization and alkalinization frequently co-occur in nature. However, only few studies focus on the interactive effects of mixed salt and alkali stresses on plants. To find supplementary feed source under arid and semiarid conditions, *Dichanthium* (Forsk.) Stapf. seeds and root cuttings were collected from extreme saline sodic Kachchh plains, Bhuj (Gujrat), and established at ICAR-Central Soil Salinity Research Institute, Karnal. The experiment was designed in RBD having nine different treatments i.e. control (pH_2: 7.1; ECe: 0.43), alkaline (pH_2: 9.5 and 10.0), saline (ECe: 15, 25, 35 dS m^{-1}) and saline-alkaline (pH_2 9.0 with ECe: 10, 15, 20 dS m^{-1}). Under alkaline conditions, *Dichanthium* maintained their plant height but reduction was observed in chlorophyll concentration at both the stresses. Highest photosynthetic rate (Pn) was recorded in control treatment i.e. 36.05 µmol CO_2 m^{-2} s^{-1} which was decreased with the intensified stress. Reductions were also noticed in the rates of stomatal conductance (gS) and transpiration rate (E) under different stress levels. *Dichanthium* restrict Na^+ accumulation (mean Na^+ 0.27%) in root zone whereas in shoots, mean Na^+ was 4.58%. *Dichanthium* maintained or increased shoot K^+ concentration under saline and mixed stress condition to mitigate the injurious effect of high Na^+ concentration. Among fodder quality parameters, *Dichanthium* contained 5.15% mean crude protein (CP). Stress treatment caused 10-25% reduction in the CP content over all the stress treatments. Alkalinity, salinity and mixed saline sodic stress caused reduction in neutral detergent fiber (NDF) content but maximum reduction was observed under salinity stress condition. ADF (Acid detergent fiber) content was higher in control (47.44%) and decreased with increasing salt stress. ADL followed the same the trend as shown by ADF.

Keywords: Abiotic stress, Alkalinity, *Dichanthium annulatum*, Fodder quality, Gas exchange attributes, Ionic relations, Kachchh plains, Salinity