

Application of *Bacillus subtilis* for the Alleviation of Salinity Stress in Different Cultivars of Wheat (*Triticum aestivum* L.)

ABSTRACT

Salinity has a negative impact on the agricultural production of crops. It adversely affects the physiochemical properties of the soil and ecological balance of the area. Plant growth-promoting bacteria play a key role in the biological control of phyto-pathogens and abiotic stress including salinity. Four varieties of wheat crop (V1: Akbar 2019, V2: Dilkash 2021, V3: Faisalabad 2008, and V4: Subhani 2020) were compared for their salinity stress tolerance and response towards *Bacillus subtilis* NA2. A completely randomized design (4 wheat varieties × 3 salt stress levels × 3 replicate × 2 control and bacterial treatments = 72 pots) was adopted using distilled water as a control. Stress negatively affected the plant growth. However, plants primed with *Bacillus subtilis* NA2 showed improved growth (plant lengths 29.45% and increased biomass 33.23%). Overall, bacterial strain enhanced the levels of carotenoids (45.53%), anthocyanin (32.51%), ascorbic acid (41.53%), total soluble proteins (59.21%), chlorophyll contents (49.65%), and peroxidase activity (31.76%). Levels of malondialdehyde (27.42%) and hydrogen peroxide (20.37%), catalase (16.48%), and ascorbate peroxidase (19.24%) decreased. With commensurable benefits, it can be inferred from the above study that the *Bacillus subtilis* NA2 strain is beneficial for the better yield of wheat under salinity stress by improving the plant defense mechanism and may be adopted in future by farmers.