Summary

To investigate the physiological basis of salt adaptation in paddy due to inoculation with plant growth promoting bacteria, we compared their effect in paddy under saline and non-saline condition on root length, chlorophyll content, relative water content, stomatal conductance, membrane stability index and change in ascorbate peroxidase and nitrate reductase activities. In a pot experiment, the effect of endophytic and rhizospheric bacteria was studied in a local paddy rice (*Oryza sativa L.*) variety GJ-17 under salt stress. Our findings suggest that inoculation with *Pseudomonas pseudoalcaligenes* and *Bacillus pumilus* resulted in change of ascorbate peroxidase, nitrate reductase activity and plant growth parameters such as root length, chlorophyll content, RWC, stomatal conductance and membrane stability index under salinity. Mixture of both *Pseudomonas pseudoalcaligenes* and *Bacillus pumilus* revealed better response in paddy against the adverse effects of salinity. Salt stress may induce a combination of negative effects on salt-sensitive paddy variety including osmotic stress, ion toxicity and oxidative stress. Present study indicates that regulation of antioxidant enzymes involved in the greater effectiveness in the PGPR inoculated plant with respect to increasing the tolerance of paddy variety GJ-17 to severe salt stress. Present study was also supported by our previous study on the accumulation of osmoprotectants in plant is influenced by inoculation of PGPR under saline stress. In conclusion, we report here a significant report on the understanding of the induction of antioxidant enzymes in the paddy under salinity. In our conducted research, we postulate that stress-related antioxidant enzymes induction could be induced prior to biotic and abiotic stress, i.e. merely by inoculation with PGPR. Our results conclude that inoculation of plant material by the PGPR can protect paddy plant against saline stress. These effects correlate with an increase in plant growth parameters and regulation of ions concentration and antioxidant enzymes.