Food security could be in danger due to the negative impact of climate change/global
warming which may leads to low production; therefore, there is an urgent need to develop
climate-resilient crops with no yield loss for future food security. Use of beneficial fungus
(root endophyte Piriformospora indica) through non-transgenic and transgenic approaches
could be one of the best innovative approaches for improvement crop productivity. Through
non-transgenic approach P. indica has been found to provide strong growth-promoting
activity during its symbiosis with a broad spectrum of plants including mustard, pea, tobacco,
tomato, onions, rice, lepidium and medicinal plant Coleus forskohlii. Despite its positive
impact on the host, little is known about the P. indica genes that may be involved in stress
tolerance. However, for transgenic approach to improve the crop under stress condition, first
high salinity-tolerant genes from P. indica need to be cloned. Recently we have cloned
several salinity-tolerant genes from P. indica fungus by functional screening, based on
random over-expression of a P. indica cDNA library in Escherichia coli grown on medium
supplemented with 0.6 M NaCl. Out of these one of the salinity tolerant genes from P. indica
(cyclophilin; PiCypA) has been functionally validated for its role in salinity tolerance in
bacteria and plant. This gene product catalyzes the inter-conversion of peptidyl prolyl imide
bonds in peptide and protein substrates and functions as molecular chaperones. This is also
known to be involved in pre-mRNA splicing. Other approaches for crop improvement will be
discussed.