Preface

Plants are most susceptible to soil salinity during seed germination and seedling growth. Sunflower, which is primarily grown for its oil has, so far, not been investigated in a major way for the physiological and biochemical aspects of the mechanisms for salinity stress tolerance at seedling stage. Investigations on sunflower in this area of research are further significant, keeping in view the alternative biochemical routes (oil body mobilization and triacylglycerol hydrolysis) it follows during seedling development, in contrast with non-oilseed plants.

Present work focuses on changes in growth and elemental analysis (Na$^{+}$ and K$^{+}$) in etiolated seedling roots and cotyledons in response to NaCl stress. Quantitative observations on sodium content in roots have also been correlated with its spatial distribution across various regions of the root tip, by visualizing it through confocal laser scanning microscopy and, using sodium specific fluorescent probe (Sodium Green). Alterations in endogenous distribution of nitric oxide (NO) and nitric oxide content due to putative nitric oxide synthase activity and from other sources, have been analysed with respect to the impact of salt stress. Long distance signalling of NaCl stress from roots to seedling cotyledons has been a major area of attention, whereby NO expression and tyrosine nitration of proteins have been analyzed and compared in seedling roots and cotyledons. Nitric oxide accumulation on the surface of oil bodies in seedling cotyledons, leading to tyrosine nitration of some oil body proteins, seems to play crucial role in enhancing the longevity of oil bodies in salt stress conditions. Proteomic analysis of seedling roots has lead to interesting findings on NaCl-induced changes in the expression of specific proteins/enzymes. Lastly, the possible involvement of serotonin (a tryptophan derivative) has been investigated to correlate its distribution pattern in roots from seedlings grown in the absence or presence of NaCl.

The present work, thus, not only adds new information to our current understanding of salt stress associated early biochemical events during seedling growth, it also provides directions for further promising work on salt-stress induced signalling events and their mode of sensing from roots to cotyledons.