Production of vegetables starting with grafted seedlings is common in many countries with documented advantages over non-grafted seedlings, such as improved disease resistance and enhanced abiotic stress tolerance/resistance. However, the involvement of hormonal effects in the responses of grafted seedlings to abiotic stresses is not clear yet. The aim of the present study was to investigate the effect of ABA and of anti-ethylene agents STS and AVG and ascorbic acid (as an anti-oxidant) on the performance of melon/pumpkin grafted transplants under salinity condition. Non-grafted melon transplants were compared to melon grafted on itself or melon grafted on pumpkin rootstock. The transplants were grown in hydroponic solutions containing either normal nutrient concentrations or nutrient solutions containing NaCl at a concentration of 100 mM. The results show that transplant growth was inhibited under salinity and that there were differences in the response of the three transplant groups to salinity stress with the self grafted melons being the most tolerant to salinity. Application of either ascorbic acid or ABA, Silver thiosulphate (STS) (ethylene action blocker) or aminoethoxyvinylglycine (AVG) (ethylene biosynthesis blocker) to the root medium, protected against the growth inhibition caused by high salinity and also protected against growth inhibition caused by application of high ethephon concentration to the roots. Salinity increased oxidative stress in the roots but ABA, STS and ascorbic acid treatments reduced oxidative stress associated with salinity stress. Finally, we demonstrate that melon self grafting (melon/melon) was superior to non-grafted melon as well as to melon grafted on pumpkin rootstock under control as well as under salinity conditions. The possible mechanisms of ethylene and ABA effects are discussed.