Abstract

Water deficit is a major growth limitation factor affecting plant growth and productivity. To counteract the harmful effects of drought stress, lupine plants were sprayed with two concentrations of algae extract (1 g l^{-1} and 2 g l^{-1}) and hydrogen peroxide solution (0.5% and 1%) under low irrigation level. Morphological, physiological and anatomical studies were performed. It was found that all treatments enhanced plant height, root length, number of leaves, average leaf area, shoot and root fresh and dry weights. A significant increment in chlorophyll a and b, carotenoids and total pigments contents, as well as a significant decrease in electrolyte leakage was noted in treated plants compared with untreated under water deficit. Increment in levels of osmoprotectants such as proline, total free amino acids, glycine betaine and total soluble sugars contents was highly significant in case of 2 g l^{-1} algae extract treatment compared with untreated plants group. Anatomical studies of root, stem and leaf of treated and untreated plants revealed that 2 g l^{-1} algae extract treatment followed with 0.5% H_2O_2 induced significant increments in the thickness of the studied plant organs compared with the untreated plants under water deficit conditions. In general, the concentrations of 2 g l^{-1} algae extract and 0.5% H_2O_2 were the most effective doses regarding all the studied characteristics.