

Physiological and phenotypic characters of sweet marjoram in response to pre-harvest application of hydrogen peroxide or chitosan nanoparticles

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Abstract

Hydrogen peroxide (H_2O_2) and chitosan nanoparticles (CH NPs) represent a promising tool for improving the productivity and quality of marjoram herbs [*Majorana hortensis*, Moench.]. In this paper, we investigated the response of sweet marjoram to the foliar application of CH NPs and H_2O_2 during two successive seasons 2017 and 2018. Three concentrations of CH NPs, being “0.0325, 0.065 and 0.13 mM” and of H_2O_2 at 2.5, 5 and 10 mM as well as control were applied. Vegetative growth characters, total microbial load, essential oil (%) and its components were recorded. Whereas, fresh herbs of each treatment packaged and stored at 0 ± 5 °C and 90–95 % Relative Humidity (RH) for 21 days where the quality parameters were determined at weekly intervals of 7, 14 and 21 days. In 1st season, plants treated with H_2O_2 at 10 mM showed a pronounced increase in plant height, number of branches, fresh weight and oil % by 35 cm, 13 branches, 306.44 g/plant and 0.49 % respectively, compared to control of being 26.67 cm, 6.33 branches, 122.03 g/plant and 0.41 %, respectively. Additionally, the packed treated fresh herbs with 10 mM H_2O_2 presented the lowest value of weight loss (%), minimum decreased in total chlorophyll content and essential oil%, moreover, a significant minimum of both O_2 % decreasing with CO_2 % increasing as compared to other treatments. Furthermore, the 2nd season had the same trend. This means, the pre-harvest H_2O_2 (10 mM) application have good potential strategy to improve the marjoram productivity with extend its shelf life period.