Greenhouse application of boron carbon oxynitride (BCNO) nanocomposite material as novel luminescent solar concentrator. Effects on growth and organoleptic quality of lettuce and basil plants

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Abstract

In the present study greenhouse experiments were conducted in order to investigate the effects of a novel luminescent solar concentrator (LSC) -boron carbon oxynitride (BCNO)- on growth, morphological and Physiological characteristics of lettuce and basil plants, grown hydroponically. The LSC compound emits strong blue light after absorption of UV light therefore may contribute to the quantity of light absorbed by chlorophyll of plants at that region. We used two experimental greenhouses (50m^2 each) with the same microclimate conditions. The first one was covered with plastic film and was used as the control and the second one was covered with plastic film, sprayed on the inner side with the luminescent solar concentrator solution. Lettuce (*Lactuca sativa* L., cv. 'Romana') and Basil (*Ocimum basilicum var. "Agioritikos")* plants were grown hydroponically in both experimental greenhouses in an experimental arrangement of randomized complete groups with three replications for each plant species. The nutrient solution was provided to the plants by drip irrigation at pH 5.7 and EC 1.8. The experimental results showed improved plant growth rates during cultivation time of Lettuce and Basil plants in the case of the presence of the covering nanocomposite material (BCNO). Similar results were obtained regarding the morphological and Physiological characteristics of the plants (dry biomass production, photosynthesis rate, transpiration rate and stomatal carbon dioxide (CO_2) conductance. These marginal consistent positive effects indicate that materials such as BCNO are promising for such an application in protected farming but needs more extend experimental investigation.

Keywords: luminescent solar concentrators; greenhouses; Ocimum basilicum var. "Agioritikos; plant growth rates.