Effect of biofertilizers on leaf yield, nitrate amount, mineral content and antioxidants of basil (*Ocimum basilicum* L.) in a floating culture

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According to the United Nations, the world population of 7.79 billion will increase to 9- 10 billion by 2050 while the arable land per capita continues to be reduced. Moving from soil to soilless culture systems can improve water use and nutrient efficiency, especially in closed-loop systems with a recirculating water/nutrient solution that recaptures the drain water for reuse. Soilless culture is one of the best techniques to overcome local water shortages and soil-borne diseases while producing high-quality products, even in poor soil structure and problematic conditions.

However, when soil is rich in beneficial microorganisms, supporting plant nutrition, producing phytohormones, controlling phytopathogens, and improving soil structure, soilless culture usually contains no beneficial microorganisms. Therefore, in this study, the response of three bio-fertilizers, namely bacteria, micro-algae, and mycorrhiza, on basil leaf yield and quality (*Ocimum basilicum* L.), in a floating culture system was investigated, where mineral fertilizers were reduced by 50%.

Considering the total harvest data, bacteria, mycorrhiza, and micro-algae treatments increased basil yield compared to 50% control by about 18.94%, 13.94%, and 5.72%, respectively. The maximum total yield and leaf area were recorded using bacteria with 2744 g m^{-2} and 1528 cm^2 $plant^{-1}$. Plants with mycorrhiza achieved the highest number of leaves and branches, with 94.3 leaves $plant^{-1}$ and 24.50 branches $plant^{-1}$, respectively. In addition, it was observed that this biofertilizer increased the formation of lateral branches in the basil plant without thickening its stems. In addition, bacteria and mycorrhiza induced the highest percentage of dry matter and total soluble solids. The effect of bio-fertilizers on basil leaf EC and pH was insignificant for all the treatments at different harvest periods ($p< 0.05$). Using bio-fertilizers enhanced the intake of nutrients N (nitrogen), P (phosphorus), K (potassium), Ca (calcium), Mg (magnesium), Fe (iron), Mn (manganese), Zn (zinc), and Cu (copper). Using bio-fertilizers represents a promising and environmentally friendly approach to increasing crop yields and ameliorating quality and antioxidant compounds with fewer resources. An application of bio-fertilizers in hydroponic cultivation of basil cv. 'Dino' reduced the need for mineral fertilizers. At the same time, bio-fertilizers affected an increased plant yield and improved product quality. Furthermore, the bacteria had a pronounced enhancing effect on the increase of phenol and flavonoids in the leaves of basil plants.