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21943 | Determination of Vitamin C content in spinach plants grown under the use of cyanobacteria biomass as fertilizer

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Background and aims: The agricultural sector is continuously exploring sustainable and innovative approaches to enhance crop productivity, driving the quest for *greener* alternatives over synthetic fertilizers. Cyanobacteria have been reported as a promising agricultural fertilizer, with positive effects on crop yield [1]. However, little is known about its potential effects on the produced vegetables' nutritional quality. Studies have documented that exposure of plants to cyanobacterial crude extracts stimulates the production of enzymatic and non-enzymatic antioxidants. Vitamin C, a non-enzymatic antioxidant, plays a crucial role in protecting cells from oxidative stress and spinach is known to be relatively high in vitamin C compared to other vegetables. The purpose of this study was to determine the content of vitamin C in spinach plants grown under the use of cyanobacterial biomass as fertilizer. **Methods:** Spinach plants were tested in soil, under six different conditions: (i) control, (ii) commercial chemical fertilizer, cyanobacterial biomass (iii) non-cyanotoxin producer, and cyanotoxin producer of (iv) Anatoxina (ANA), (v) Microcystin (MC), and (vi) Cylindrospermopsin (CYN). The analysis of vitamin C in spinach plants was performed according to EN 14130:2003 [2]. **Results:** The results showed an increased content of vitamin C in all exposed groups when compared to the control (37 mg/Kg), with statistical differences in the conditions exposed to MC (56 mg/kg), ANA (76 mg/kg), and CYN (114 mg/kg). The results suggest that the rise in vitamin C may be related to a plant defence mechanism against oxidative stress potentially generated by exposure to cyanotoxins. **Conclusions:** Although the antioxidant content in spinach plants can be enhanced as a mechanism to cope with oxidative stress, prolonged exposure may increase plants' susceptibility to accumulate cyanotoxins, which may pose a risk to human health. Additional studies are

needed to understand all the positive and negative effects of using cyanobacteria biomass as a biofertilizer.

Keywords: Cyanobacterial Biomass, Fertilizer, Non-Enzymatic Antioxidants, Nutritional Value, Vitamin C.

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