Assessment of cyanobacterial biomass as sustainable agricultural fertilizer: soil-experiment with plants in pot

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Introduction

To provide food to the growing human population in a sustainable way is one of the greatest challenges of modern society (Food and Agriculture Organization [FAO], 1997). In this context, cyanobacterial biomass can function as a source of macro nutrients, phytohormones and vitamins increasing soil productivity (Burjus et al., 2020). These organisms can also be collected from the environment in considerable amounts, as they can grow forming large blooms. However, some of these cyanobacterial species and strains produce toxins as secondary metabolites therefore, its use in the production of food needs to be carefully monitored to ensure food safety (El Khalloufi et al., 2012).

Material & Methods

One-month-old Raphanus sativus (radish) and Spinacia oleracea (Spinach) plants were grown in pots in indoor conditions. There were set 6 experimental conditions: (1) a control with no extra nutrient addition, (2) a recommended dose of a commercial NK fertilizer, lyophilized cyanobacterial biomasses of (3) a nontoxic strain of Cylindrospermopsis raciborskii, (4) toxin producing strains of C. raciborskii; (5) Microcystis aeruginosa; (6) Anabaena sp.

Several variables were estimated, among them: the plant height, photochemical quantum yield of photosystem II, wet weight of the shoot. It was also estimated the dry weight of the root, toxin content of the biomass, plant and soil, and the mineral content in edible parts.

Conclusion

M. aeruginosa amendment decreased the stem wet weight in radish and spinach plant material. Besides, M. aeruginosa drop the growth in high in radish. On the contrary, the toxic strain of C. raciborskii amendment seems to have a beneficial effect in growth for both plant material species. Besides, more research is needed to clearly measure the improvement in plant growth.

References