Aquaponically cultivation of tomato plants (Solanum lycopersicum L.)

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Aquaponics, being a synergistic integrity of hydroponics and aquaculture, has gained an increasing attention as a promising system for urban applications. The addition of algal component to aquaponic systems could lead to a number of positive effects – maintaining the pH balance, extra oxygen adding and system purification.

Microalgae are now widely studied as a sustainable alternative for the enhancement and protection of agricultural crops and particularly in horticulture. A number of microalgae species have been investigated for their ability to produce bioactive compounds (Borowitzka, 1995; Foley, Beach, & Zimmerman, 2011; Pulz & Gross, 2004). Several studies have established an association between greater nutrient uptake, higher biomass accumulation and greater crop yields to the incorporation of microalgae as biofertilizers (Faheed & Abdel Fattah, 2008; Shaaban, 2001).

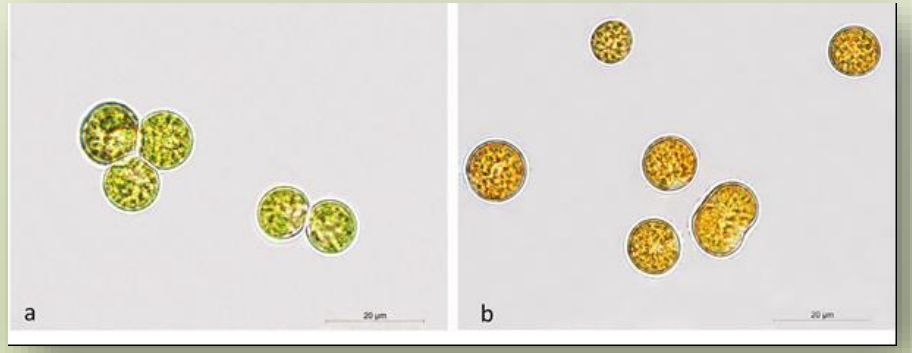

Fig. 1. Coelastrella sp. BGV, a – exponential phase of growth; b – stationary phase of growth

The suspension of *Coelastrella sp.* BGV, a newly isolated green microalgal strain (Fig. 1), was applied to the aquaponic system, aiming to evaluate the effect on plant growth and some physiological changes of tomato plants (*Solanum lycopersicum* L.).

RESULTS

Aquaponics, itself, had a beneficial effect on the tomato cultivation – an improved growth and slight increase of the amount of chlorophyll *a* and carotenoids was registered. Further, the exponentially growing green alga *Coelastrella sp.* BGV, a newly isolated strain, was used as a third component of the aquaponic system, to study the effect of microalgae on the growth and pigment composition of tomato plants. Cultivation in the aquaponic system equipped by the microalgal suspension resulted in a greater increase in the plant growth – about 20%, as well as a stronger effect on the pigment composition (Fig. 2). Chlorophyll *a* and carotenoid content was almost equally enhanced - 20% and 17%, respectively. Interestingly, the most affected was the level of chlorophyll *b*, which was 40% higher than the control plants (Fig. 3).

Future research should focus on assessing the effect of microalgae on the quality of cultivated plants and the possible practical application of algal biomass.

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Fig. 2. influence of Coelastrella sp. BGV on aquaponically grown tomato plants.

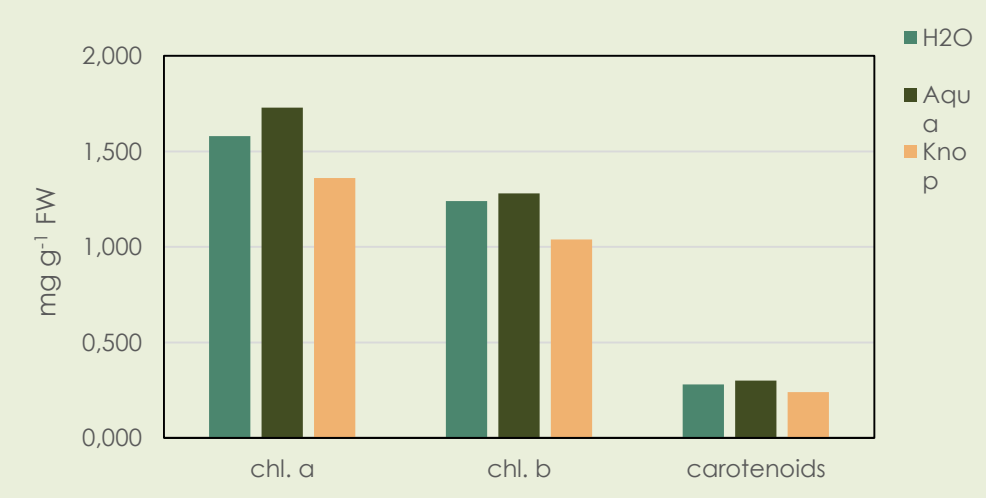

Fig. 2. influence of Coelastrella sp. BGV on pigment content of aquaponically grown tomato plants.