PHYSIOLOGICAL RESPONSES OF TOMATO PLANTS TO OZONE APPLICATIONS UNDER GREENHOUSE CONDITIONS

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Introduction. In Mexico, the demand of fresh tomato (*Lycopersicum esculentum*) has been increasing, generating the need to look for alternative technologies to make more efficient its production.
The use of aqueous ozone in the substrate brings benefits such as: providing more oxygen to the roots, which promotes growth and more vigorous and productive plants, and ensures a quick and effective disinfection of the microorganisms growing in the substrate and at the root level (1, 2).
In the present study, the evaluation of some physiological responses of tomato (cv. Cedral) under the application of aqueous ozone to the substrate was performed.

Methods. Variables evaluated were: photosystem II quantum efficiency (Yield or Φ_{PSII}) and the Non-photochemical quenching (NPQ). For that, a "portable chlorophyll fluorometre" (MINI-PAM, Heinz Walz GmbH®, Germany) was used (3). Photosynthetic photon flux density (µmol m^{-2} s^{-1}) and air temperature (°C) were also registered.
Measurements were made from 6:00 am to 6:00 pm at three hours intervals (6 am, 9 am, 12 pm, 3 pm y 6 pm). The study was performed at a greenhouse in "El Sureno Invernaderos SPR de RL de CV", located in the Valley of Arista, San Luis Potosí, Mexico. Experimental treatments applied the substrate consisted of eight different concentrations of aqueous ozone via the irrigation system. Concentrations were: 0, 0.5, 0.75, 1.0, 1.25, 1.5, 1.75 y 2.0 ppm.

Results. Treatments showed significant differences when compared to the experimental control (0 ppm). The concentration of 1.25 ppm showed the higher significant difference during the experiment. From data of three days of measurements NPQ showed significant differences in all the doses used (0.5, 0.75, 1, 1.25, 1.5, 1.75 y 2 ppm) in comparison to the experimental control on the measurements made during the day (6 am, 9 am, 12 pm, 3 pm y 6 pm).
The analysis of the data from the evaluations showed there were differences, statistically significant, between the eight treatments and the experimental control. It was found that plants treated with aqueous ozone in the substrate increment their quantum efficiency, which could be reflected in an increment in plant growth.

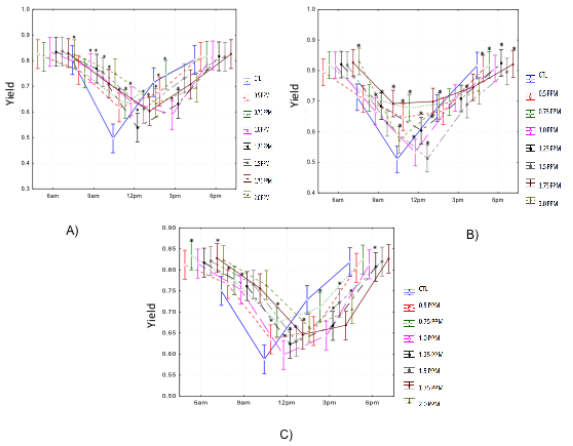

Fig.1 Effect of ozone applied to the substrate on the photosystem II quantum efficiency (Yield) of tomato plants.

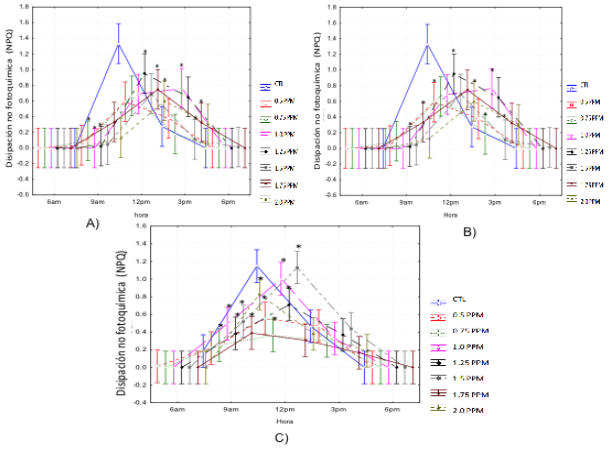

Fig.2 Effect of ozone applied to the substrate on the Non-photochemical quenching (NPQ) of tomato plants.

Conclusions. Results suggest that the applications of ozone, at the different concentrations applied in this study, induces a positive effect in the photosynthesis process of tomato plants, which could be reflected in the productivity and yield of tomato fruits.

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