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# EXPERIMENTAL RESEARCH OF TOMATOES GROWTH INTENSITY AND ITS RESULTS

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*The multivariate experimental results for determination of photosynthetic productivity of tomatoes are adduced, the mathematical model in the form of the regression equation is worked out, optimal microclimate mode for maximum photosynthesis performance is determined.*

***Multivariate experiment, photosynthesis, regression equation, mathematical model.***

The intensity of the tomato growth depends on complex microclimate factors that should ensure maximum productivity, which depends on the photosynthesis intensity. The multivariate active experiment was conducted to determine the values of microclimate factors.

**The purpose of research –** to determine the optimal microclimate for tomatoes due to developing the mathematical model, which describes growth productivity on influence rate of photosynthesis.

**Materials and methods.** It is known that the rate of photosynthesis is largely dependent on the illumination of plants; form of dependency led to the conclusion that the process of photosynthesis consists of light (photochemical) reactions and reactions in the dark (chemical). To maximize growth should maintain optimal conditions of the photosynthetic apparatus and, above all, it concerns the light, temperature and CO2 concentration.

The level of illumination and intensity of solar radiation affect not only the intensity of photosynthesis and plant assimilation and carbon dioxide, which, in turn, is a major substrate for the growth of the mass of plants. The intensity of photosynthesis depends linearly on the concentration of CO2, with carbon dioxide saturation concentration of CO2 in the air is equal to 0.01 - 0.04%. Based on the analysis of the literature found that along with the intensity of light and CO2 concentration important factor in photosynthesis is the temperature. A significant effect of temperature due to the fact that the process of photosynthesis consists not only of photochemical, but with chemical reactions in the dark during the day, which increases the rate of 2 - 3 times when the temperature at 10 °C.

For the active multifactorial experiment used artificial climate chamber, which contains a box with the growing vessels for growing tomatoes from the nutrient solution tank, pump, humidifier capacity for CO2 supply, lamp light cameras, camera fan, air heater chamber temperature sensor, light sensor, analyzer CO2 power block, the microprocessor.

Experiments were carried out in a series of maintaining uniform concentration of CO2 in all cells fitotrona (4 experiments).

A series of experiments conducted within 15-18 days for other varieties of tomato seedlings at planting plants with 4 leaves of plants for vegetative 8 - 9 leaves.Determining the percentage of dry matter in plants was performed by dividing the dry weight of the dried completely to dryness plants, plants for wet weight.Automation fitotrona operation carried out by the developed algorithm, which consists of a block of initialization programs and program controllers.

Treatment of experimental data was performed by The technique for software Mathcad 11 Professional and Statistica 7.0. The mathematical model is tested for adequacy by Fisher criterion. Analyzing static model intensity of photosynthesis of tomato culture, we can say that it has a distinctly non-linear. It can be concluded that the maximum rate of photosynthesis characteristic of the upper limits of our two selected factors, namely at maximum temperature and at the maximum intensity of solar radiation.

It was found that the maximum tomatoes growth is at 21,3 °C, illumination 0.00834 W / $cm^2$ and $CO_2$ 0.135%.

The results of the active experiment allowed to determine the optimal value of microclimate, which provide maximum performance tomatoes.