

INFLUENCE OF SUPPLEMENTARY LIGHTING
WITH HIGH PRESSURE SODIUM AND LED LAMPS
ON GROWTH AND SELECTED PHYSIOLOGICAL
PARAMETERS OF TOMATO TRANSPLANTS

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ABSTRACT *The objective of the study was to evaluate the physiological response and growth of tomato transplants grown under different light treatment. During cultivation period (November – December), the transplants received supplemental artificial lighting provided by standard high-pressure sodium lamps (HPS) or high-power solid-state lighting modules with red, blue and far red LEDs. Quantum irradiance in both combinations was maintained at the same level. The third group of plants (control combination) was grown under the natural light (without supplemental lighting). The following measurements were taken: leaf gas exchange (net photosynthesis and transpiration rate), leaf greenness index (relative chlorophyll content) and the most important morphological parameters (fresh weight of plant organs, leaf surface area, plant height). The results showed that supplemental illumination using LED or HPS light sources affected growth and physiological responses of tomato plants. The higher rates of gas exchange and leaf greenness index as well as enhanced growth were found in the plants grown under conditions of artificial lighting (compared to control ones). Additionally, significant differences (as a result of light spectral quality) were found between the plants lighted with HPS lamps or LED modules. LED lighting resulted in the stem elongation, greater weight of plant organs and higher chlorophyll content in the leaves. The obtained results proved that HPS lamps can be replaced by LEDs in greenhouse lighting systems. However, much work still has to be done to optimize lighting spectrum of LED modules for the cultivation of the specific crop species.*

Keywords: *gas exchange, photosynthesis, chlorophyll, photomorphogenesis*