USING LED IN PHOTOCULTURE OF THE GREENHOUSE PLANTS

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The generalized results of modes and the spectral composition of optical radiation for a variety of greenhouse plants. The expediency of application of LED lighting as efficient sources of radiation plants.

Keywords: irradiation plants, modes and spectral composition, LED illuminators.

In the context of energy photoculture optical radiation along with the root nutrition, the presence of carbon dioxide, humidity and air temperature is an important factor influencing the growth and development of plants. There are four most important basic characteristics of radiation: spectral composition, intensity of exposure, duration of daily exposure and the spatial distribution of the light flux.

The purpose of research - to determine the effectiveness of using modern LED lamps for lighting plants in the modern systems of automated lighting.

Materials and methods of research. An important is the process of adjusting the length of daylight. Adjusting the length of daylight hours plays a particularly important role in floriculture.

However, modern LED phytolamps are able to provide more consistent spectrum lamp spectrum of photosynthesis as monochromatic color LEDs emit light in a narrow spectral range, without expending energy on inefficient for photosynthesis area. Modern LED lights cover the entire visible range of the optical spectrum from red to violet. The range of emission wavelengths of LEDs in the red spectral region of from 620 to 635 nm in the orange - from 610 to 620 nm, yellow - from 585 to 595 nm, in the green - 520 to 535 nm in the blue - from 465 to 475 nm and in the blue - from 450 to 465 nm.

The results of research. It should be noted and other advantages of LEDs, for example a small electric power consumption and, consequently, low power consumption devices based on LEDs. In addition, it is necessary to take into account that the radiation directional LEDs, which allows more efficient use of light sources based on them. It should also be borne in mind that the service life of LEDs exceeds the lamp life at least a few times, which makes the use of LEDs as an effective and economically. Figure 1 shows the emission spectrums of the separate blue, green and red LEDs.

The emission intensity of the LED depends on the applied voltage (current flowing through the crystal). This allows you to control the intensity of the radiation of the LED lamp, with relatively easily - by changing the current value. If used in a luminary LEDs with different wavelengths of radiation, by changing the current for the various LEDs can obtain different composition and intensity of the emission spectra and thus pick spectrum lamp depending on the particular stage of plant development.

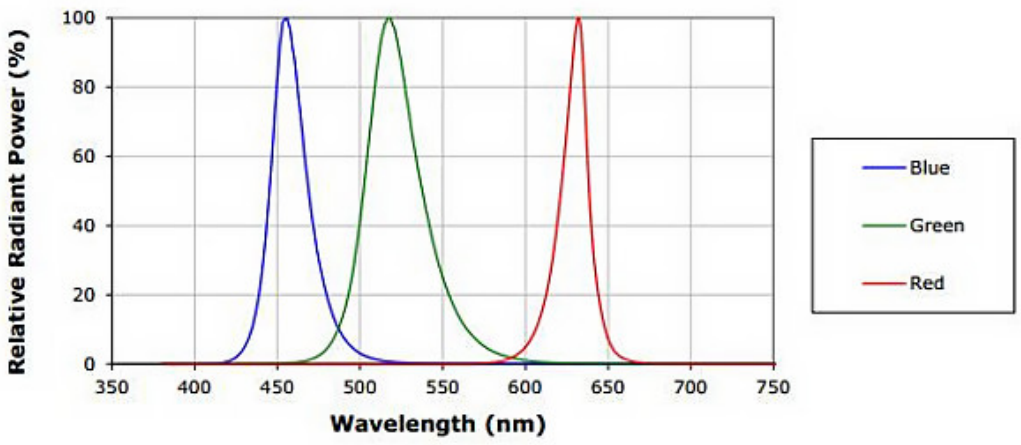

Fig. 1 The emission spectrums of monochromatic LEDs.

The emission diodes warm white (2600-3500 K) predominates red radiation (500-700 nm) and emission diodes cold white light (5000-8300 K) predominates blue radiation (400-500 nm). The combination of both types of diodes lamp provides the most useful plant light and efficient energy consumption. The emission spectrums of standard LED agrolamp shown in Fig. 2.

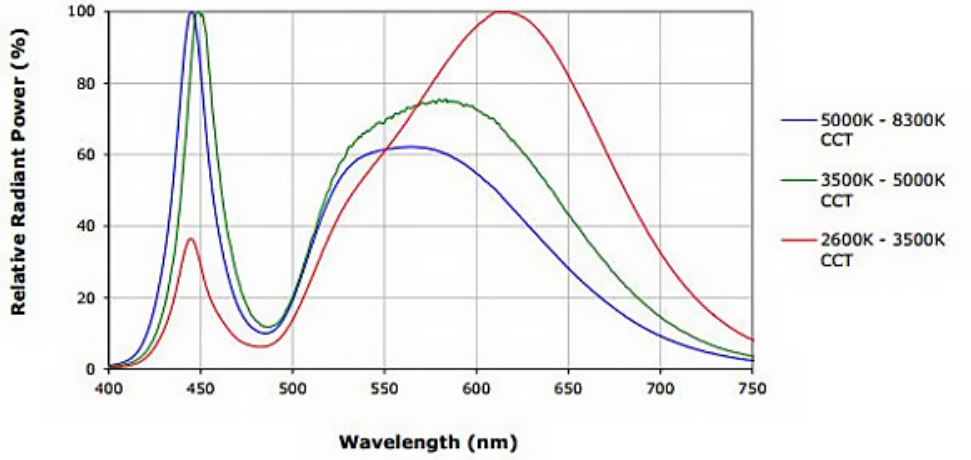

Fig.2. Changes in the emission spectrums of the LED lamp temperature (lamp voltage)

Findings

The given results point to the effectiveness of modern LED lamps for lighting plants.

Modern greenhouses are complex technical systems, in most of the robot, which are controlled by means of automated systems. Therefore, they naturally enough, you can add and control of lighting, with both the intensity and spectral composition of the radiation. Producing such control operations necessary for the program, taking into account the phase of plant development. To do this, the most suitable LED sources.

The LEDs, in contrast to the lamps, not brittle, so the device thereof may be vandal-proof, and the possibility of low voltage power supply makes them safe.