Contribution of the solar effect in LEDs and spectral responses

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Abstract. This experimental work describes our work on spectrometric measurements (spectral responses) and measurement of sensitivity of solar radiation by (simulating the solar to a powered lamp) on commercial light emitting diodes of different colors (LEDs). The first experiment was carried out at the electronics department in University of USTHB Bab Ezzouar (Laboratory of thin layers) which has a measurement bench allowing the relative spectral representation of the photo of the detector noted Vphot (λ).

1-Introduction

1: arbitrary unit represents the relative ratio of light intensity

2-Measurement of the sensitivity of the different LEDs green, yellow.

We used the assembly shown in figure 2. We attach an LED on a rod and we light up with a lamp placed at a hundred centimetres away The LED is excited by the
The LEDs have many advantages for plant growth both in terms of energy efficiency and photosynthesis. In addition, with their long lifespan, they are able to ensure economic profitability for producers.

In this work, two measuring devices were installed to measure the spectral responses of three different light emitting diodes (LEDs) in emission and absorption. In addition, another experiment using a measurement bench to simulate sunlight with a spectral lamp.

Measurements of the sensitivity of various LEDs as a function of the power illumination of a light source show that the illumination is almost proportional to the voltage across these LEDs and that for the same voltage of the LED the lighting is different and that the green LED is the most sensitive, then the yellow, the less sensitive is the red. This shows that the lamp light has an effect on these LEDs.

The measurements were carried out on these LEDs and we determined the emission and absorption wavelengths as well as the maximum intensity Imax and the voltage Vsmax of each LED. This work allowed us to draw up a comparative assessment. The results obtained from the different emission and absorption spectra are considered quite interesting.

We also noticed that the graph of the illumination E (lux) = f (VLED) gives a response of the LED for each illumination of the lamp and we observe a difference in sensitivity, the green LED with an illumination of 135lux, then the yellow 80 lux and finally the red 50 lux. These results agree with the results of the measurements made on the part (radiometric measurements with pyranometer).

This result validates our work on the effect of the light of the lamp or the photovoltaic effect of the sun. The results obtained will of course validate our hypotheses, which has already been established, it will also make it possible to assess the potential of LEDs in the photovoltaic field.

References