

# Horticultural lighting

## Questions and Answers - Application

### **Q What is the best unit of measurement for light for plant growth?**

A The unit lux is still often used in practice. The lux is based on the sensitivity of the human eye. Naturally enough, a lux-meter is corrected for the eye's sensitivity curve. Plants are sensitive to light in a different way. Plant photosynthesis is determined by the number of light particles (photons) between 400 and 700nm absorbed by the leaves. The amount of photons (400-700 nm) on a certain area is called Photosynthetic Photon Flux Density (PPFD). The PPFD is expressed in micromol of photons per m<sup>2</sup> per second (μmol m<sup>-2</sup>s<sup>-1</sup>).

### **Q What is a micromole (μmol)?**

A A "micromole" means a specific number.

Micro (μ) = 10<sup>-6</sup> and mol = 6.023 x 10<sup>23</sup> (Avogadro's number). One micromole of photons is therefore 6.023 x 10<sup>17</sup> photons = 602,300,000,000,000,000 photons or light particles.

### **Q What kind of light and with what spectrum gives the optimum growth?**

A This depends heavily on the application and the crop being cultivated. Photosynthesis is most efficient at wavelengths between 600 and 630 nm (the orange region). This matches the output peak of the MASTER SON-T PIA Green Power lamp. Moreover, this lamp produces the highest number of photons (photon flux) per Watt. For some crops, the proportion of blue is important to prevent the plants from elongation (become spindly and fragile). In general, the proportion of blue in natural daylight is sufficient to prevent excessive stretching. In cultivation in the absence of daylight (for example in plant growth chambers or multi-layer cultivation) a light source should be chosen with a higher proportion of blue, such as the MASTER HPI-T Plus or the MASTER TL-D lamps.

### **Q After a time, I measure a lower light output, lower than expected.**

A During the lifespan of a system, the light output will drop off due to the following causes:

- reduced light output from the lamp. This will normally be between 5 and 10% after 10,000 hours, dependent on the type of lamp.
- the lamp's outer bulb becomes dirty
- the reflector gets dirty
- problems with the electrical installation

It is recommended that the lamp and the reflector should be cleaned at least once per year (see [maintenance](#)).

If there are still problems with the light output after cleaning, we advise you to contact the electrician.

### **Q I've read reports from Norway and Finland that light levels (illuminance) of 20,000 lux are used for tomatoes and cucumbers. Do those sorts of levels apply in all situations?**

A The amount of assimilation lighting required depends on the amount of daylight. In countries further north, like Finland and Norway, there is less daylight during the winter. In regions where the daytime light level is higher, lower additional light levels are sufficient (e.g. 12,000 lux).

**Q What influence does assimilation lighting have on the ambient temperature in the greenhouse?**

A A proportion of the lighting installation's energy is transformed into light; however, a significant part is also turned into heat. You should allow for a rise in ambient temperature of approximately  $0.75^{\circ}\text{C}$  for every 1000 lux.