

LIGHTING CHOICES FOR PLANT GROWTH IN HORTICULTURE

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For many years artificial light has been used in Dutch greenhouses. This started with the use of incandescent lamps for controlling photoperiodic reactions in ornamental crops. Nowadays the use of HID lamps is very common for the improvement of CO₂-assimilation of greenhouse crops. This supplementary light gives an increase in crop production and quality, but also gives the grower the opportunity to produce during the whole year.

In recent years more and more controlled environments have been used for tissue culture, production in more than one layer, and rooting and production of seedlings. The advantage of such systems is a better control of the production process, compared with production in a greenhouse. Disadvantages are the energy consumption and, in most cases, the exclusion of natural daylight. The choice of light source in a closed environment is very important, not only for efficiency reasons, but also for its spectral composition. Many studies have been done on the effect of radiation on plant development (photomorphogenesis). The importance of the red/far-red ratio on plant growth is widely acknowledged, but also the blue component is important.

The most common lamps used in growth chambers are the high-pressure sodium (HPS), the metal halide and the fluorescent tubes. The photosynthetic active radiation (PAR) efficiency of the HPS lamps is very high. However for some plants, the HPS lamps lack blue wavelength emission. This can be supplemented with metal halide or fluorescent light. The use of fluorescent lamps ('TL' D and 'TL' 5, colour 840) for plant growth is, in general, very satisfactory. The spectrum generally matches the requirements of most plants. The spatial distance between lamp and plants can be low, which makes it possible to grow plants in more than one layer. The new generation fluorescent tubes of Philips™ have an improved maintenance. In normal use, the lamps still emit 90% of their original irradiance after 10 000 hours. Metal halide lamps are probably most suitable for growth chambers, especially when high irradiance is required. The efficiency is comparable with the fluorescent lamps, but slightly lower than HPS. Metal halide lamps are available in 250 to 2000 W (HPI and MHN). Philips™ has introduced a new metal halide lamp, which is called the CDM. This is a ceramic metal halide lamp with a warmer white colour (3000 K). The effect of this light source on plant growth is not yet known.