

### **P-029: Basil cultivation without sunlight**

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To enable a high-quality as well as cost-efficient greenhouse production in temperate zones like Berlin and Brandenburg, Germany, all year round, an LED system was developed which optimally serves the plants needs in the photosynthetically active (400-700 nm) range. Additionally, ultraviolet A and B (280-400 nm) radiation can be added to the visible light spectrum.

To evaluate the effectivity of these LED lights for the cultivation of certain aroma and medicinal plants, a randomized full-factorial experiment with two different light intensities (PPFD of 200 and 100  $\mu\text{mol}/\text{m}^2/\text{s}$ ) and four independent replications with four basil cultivars (*Ocimum basilicum* L. var. *cinnamomum* `Cinnamon`, *O. basilicum* L. var. *thyriflorum* `Thai Magic`, *O. basilicum* L. var. *odoratum* `Anise` and *O. basilicum* L. var. *purpureum* `Dark Opal`) under the exclusion of natural sunlight was conducted. In a second experiment with identical study design, UV-A (315-400 nm) or UV-B (280-315 nm) light were added to the spectrum with the PPFD of 200  $\mu\text{mol}/\text{m}^2/\text{s}$ .

Within the relatively short cultivation period of four weeks, `Cinnamon`, `Anise` and `Thai Magic` grown under the high light intensity reached a marketability, which is met under optimal commercial greenhouse cultivation conditions of the region, only within seven weeks. Lower radiation as well as the addition of UV radiation delays the development of all four basil cultivars by maximal nine days.

Detailed results of the weekly assessment of plant height, plant development and leaf composition of volatile substances determined by GC-FID and GC-MS are provided to compare the efficiency of the novel cultivation system with respect to a cost-benefit calculation as compared to conventional systems.