



Effect of Light Spectral Quality on Essential Oil Components in *Ocimum Basilicum* and *Salvia Officinalis* Plants

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In plants grown with artificial lighting, variations in light spectral composition can be used for the directed biosynthesis of the target substances including essential oils, *e.g.* in plant factories. We studied the effect of light spectral quality on the essential oil composition in *Ocimum basilicum* and *Salvia officinalis* plants grown in controlled environment. The variable-spectrum light modules were designed using three types of high-power light-emitting diodes (LEDs) with emission peaked in red, blue and red light, white LEDs, and high-pressure sodium lamps as reference. Qualitative and quantitative essential oil determinations were conducted using gas chromatography with mass selective detection and internal standard method.

Sweet basil plant leaves contain essential oils (ca. 1 %) including linalool, pinene, eugenol, camphor, cineole, and other components. And within the genetic diversity of the species, several cultivar groups can be identified according to the flavor (aroma) perceived by humans: eugenol, clove, camphor, vanilla basil. Essential oil components produce particular flavor of the basil leaves. In our studies, we are using two sweet basil varieties differing in the essential oil qualitative composition – “Johnsons Dwarf” (camphor as a major component of essential oils) and “Johnsons Lemon Flavor” (contains large amount of citral defining its lemon flavor).

In sage, essential oil composition is also very variable. As for the plant responses to the light environment, the highest amount of the essential oils was observed at the regimes with white and red + blue LED light. And it was three times less with red light LEDs alone. In the first two environments, thujone accumulation was higher in comparison with camphor, while red LED light and sodium lamp light favored camphor biosynthesis (three times more than thujone). The highest amount of eucalyptol was determined in plants grown with red LEDs.

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