



LED light improves strawberry flavour, quality and production

Maike Hanenberg, Jan Janse, Caroline Labrie, Wouter Verkerke; Wageningen UR Greenhouse Horticulture.

Introduction

Various quality parameters of strawberries can be improved by the application of extra LED lighting on the plants and fruits during cultivation. This is the finding of the demonstration of IDC Flavour in Bleiswijk in the autumn of 2014. The demonstration was performed with two common cultivars, Elsanta and Sonata. Three different illumination treatments were applied during cultivation.

Illumination



Additional LED illumination directed towards the leaves.



Additional LED illumination directed towards the fruits.

All plants were illuminated with modules containing red and some blue LEDs. The control group received only illumination with LED top light and is referred to as 'top' ($90 \mu\text{mol m}^{-2} \text{s}^{-1}$). Two other groups received additional LED lighting, either directed towards the leaves ($200 \mu\text{mol m}^{-2} \text{s}^{-1}$) or towards the fruits ($90 \mu\text{mol m}^{-2} \text{s}^{-1}$). These groups are referred to as 'top+leaves' and 'top+fruits' respectively.

Quality measurements

Strawberries were harvested and analysed two times per week. To determine overall quality, various measurements were performed:

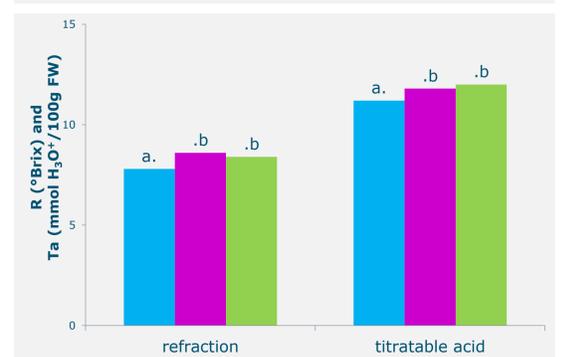
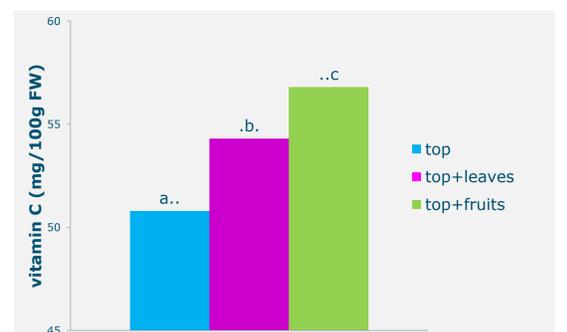
refraction and titratable acid content was determined, as well as vitamin C content and total production. Besides the instrumental measurements, sensory tests were carried out by a sensory consumer and an expert panel to measure flavour levels of the differently illuminated strawberries.



Flavour research by sensory panels

Results of instrumental measurements

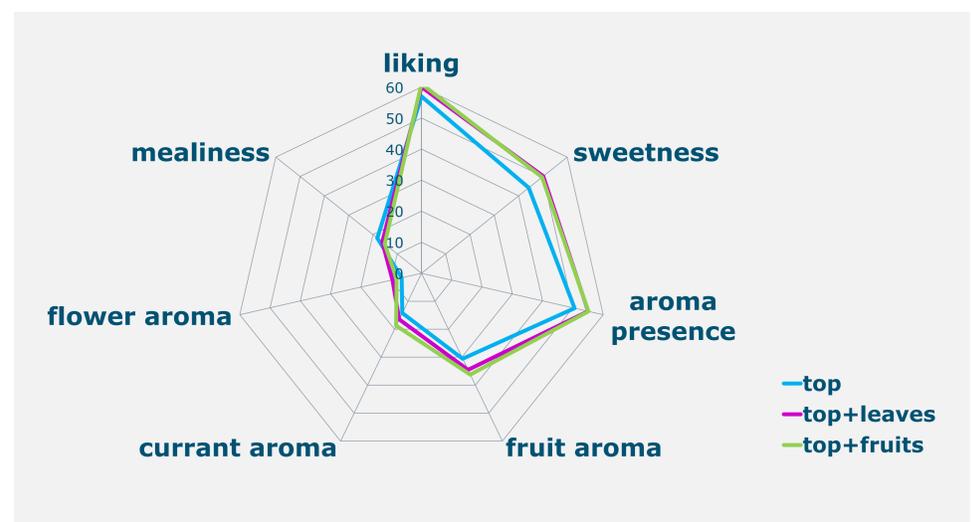
- Vitamin C content increased with additional LED lighting towards the leaves and even more with LED lighting towards fruits.
- Refraction increased with additional LED illumination.
- Titratable acid content increased with additional LED illumination.
- Production per m^2 increased 14-17% with additional LED illumination.



Vitamin C levels (mg/100g fw), refraction (R, °Brix) and titratable acid (Ta, mmol H₃O⁺/100g fw) of all treatments, including significant differences ($p < 0,001$).

Results of sensory research

Additional LED illumination increased liking by consumers.



'Liking' was indicated by the consumer panel, all other factors in the diagram were indicated by the sensory expert panel and were significantly different ($p < 0,05$). Strawberries from both additional illumination groups were sweeter, contained more aromas and were less mealy.

Conclusions

- Extra LED lighting towards strawberry plants increases flavour, vitamin C content and production.
- More research is needed to explain why there is no difference between additional lighting towards the leaves or the fruits.

