



Grower Summary

Optimising the light recipe for maximum photosynthesis, yield and quality in strawberry

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AUTHENTICATION

We declare that this work was done under our supervision according to the procedures described herein and that the report represents a true and accurate record of the results obtained.

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GROWER SUMMARY

Headline

More efficient high red ratio LED lights are as effective as high blue ratios in driving the yield and photosynthetic rate of out of season strawberries.

Background

There is a high demand for home grown out of season strawberries in the UK. Supplementary lighting facilitates winter glasshouse strawberry production and enables further season extension. Where traditional high pressure sodium (HPS) lights are currently used, LED lights offer an alternative with their greater efficiency and ability to control the spectral output. Blue and red light are the most photosynthetically active regions suggesting that predominant use of these wavelengths would increase efficiency of LED lights for horticultural use. However, the blue: red ratio has significant effects on plant morphology, growth and metabolic processes which consequently impacts on the yield and quality.

Summary

This study aimed to find the optimal blue:red ratio for production of the Junebearer strawberry cv. 'Malling™ Centenary' which is widely used in out-of-season glasshouse production in the UK. The experiment included six treatments; four LED treatments with the following blue: red ratios: 5:90, 10:85, 15:80, 20:75 (with the remaining 5% as far-red radiation) with a HPS and unlit treatment as a basis for comparison. The HPS and LED lights were set up to provide equal light intensities of $120\mu\text{mol m}^{-2} \text{s}^{-1}$ measured at pot height using a PAR sensor. LED lights performed as well as the HPS lights and there was no significant difference between the blue: red ratio treatments. The results are discussed in the context of plant spectral light responses and effectiveness of LEDs for supplementary lighting for winter glasshouse strawberry production in a temperate climate.

Financial Benefits

This experiment indicates that using LED lights are as effective as high pressure sodium and that the blue:red ratio of light has no significant effect on the yield outcome. LEDs use up to 2.7 times less energy and have a 5 times longer lifespan than HPS lighting decreasing operational costs. The setup of LED systems is expensive, however, as LEDs are increasingly used in horticulture their price will reduce. Red light is more efficiently produced by LED lights

than blue. This work indicates that using high red lights will reduce energy costs without impacting yield.

Action Points

If currently using HPS lighting, consider switching to high efficiency LED lighting. It will, if not now then very soon, be the most economical and environmentally friendly option for glasshouse lighting.