

1 Can green LED light do a magical to plants?

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7 *Abstract*

8 Red and blue light are the most important in driving photosynthesis to produce adequate
9 yield. It is also believed that green light may contribute to the adaptation to growth. However, the
10 effects of the green light which may trigger specific and necessary responses in plant growth have
11 been underestimated in the past. In this study, lettuce (*Lactuca sativa* L.) was exposed to different
12 continuous light (CL) conditions for 48 h by combination of red and blue light emitting diodes
13 (LEDs) supplied with/without green LEDs in an environmental controlled growth chamber. Green
14 light supplementation enhanced photosynthetic capacity by increasing net photosynthetic rate (P_n),
15 maximal photochemical efficiency (F_v/F_m), electron transport for carbon fixation (J_{SPH}) and
16 chlorophyll content, which led to increases of plant fresh and dry weight under CL treatment.
17 Green light decreased malondialdehyde and H_2O_2 accumulation by increasing superoxide
18 dismutase (SOD) enzyme, catalase (CAT) enzyme and ascorbate peroxidase (APX) activities after
19 24 h CL. Supplementary green light was also shown to lead to a significant increase in the
20 expression of the photosynthetic genes *Lhcb* and *psbA* from 6 to 12 h and retained higher level
21 compared with other light conditions between 12 and 24 h. The results indicate that the effects of
22 green light on the lettuce plant growth via promoting *psbA* and *Lhcb* expression to maintain higher
23 photosynthetic capacity and green light could alleviate the negative effects caused by CL.

24 **Keywords:** Green light, *psbA* and *Lhcb* gene expression, photosynthetic performance, continuous light,
25 *Lactuca sativa* L.