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Developmental Responses of Wheat cv. Norin 61 to Fluence Rate of Green Light

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Abstract: Wheat (*Triticum aestivum* L. cv. Norin 61) plants were grown under five different photon flux densities obtained by modulating the number of green light-emitting diodes (LEDs) under white fluorescent lamps. The experiment was conducted under continuous irradiation at a constant temperature of 20°C to clarify the developmental responses of wheat to the fluence rate of green light. The higher the photon flux density of green light, the shorter the number of days from emergence to heading. The earliest heading was observed in the plants grown under 496 green LEDs, 32.0 days after emergence. A significant logarithmic function could fit the relationship between the fluence rate of green light and developmental rate. In this report, principal component analysis (PCA) was adopted to analyze the confounding of green light versus photosynthetic photon flux density (PPFD) with 17 developmental and morphological traits. The eigenvalues explained were 5.64, 3.20, and 2.61, respectively, for the first, second and third principal components (PCs). The first PC was assumed as the factor related to the isometric growth, and the third PC was assumed as the factor related to the developmental rate and culm elongation. Therefore, it was supposed that the first and third PCs were affected by the PPFD and the photon flux density of green light, respectively. The results suggested that the fluence rate of green light affects the development of wheat as a signal source. Furthermore, the development of wheat was promoted by the green light independent of PPFD.

Keywords: Development, Fluence rate, Green light, Light-emitting diode (LED),

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