

Effects on Anthocyanins Biosynthesis of Roselle Cells by Different LEDs Light Sources

Chia-Yi Kuo, Mu-Hsuan Liou, Meng-Shiou Lee, Ming-Kuem Lin, and Wen-Te Chang*

Department of Chinese Pharmaceutical Sciences and Chinese Medicine Resources, China Medical University, 40402, Taichung, Taiwan

Light-emitting diodes (LEDs) have many advantages over conventional light sources, including high energy-conversion efficiency, small volume, long life, wavelength specific, light intensity/quality adjustable and low thermal energy output. The applications of cultivation and the photosynthesis studies on plants using LEDs light source have been investigated. However, the influence of LEDs light on the production of the secondary metabolites in medicinal plants is getting more attentions.

In this study, we have investigated the different combinations of LEDs light applying into the callus culture of Roselle (*Hibiscus sabdariffa*), a traditional medicinal plant widely used for treating heat-stroke, cough, drunkenness and high blood pressure, to examine the production of anthocyanins which have strong antioxidant capacity to inhibit the growth of cancer cells, prevent cardiovascular disease and protect liver functions.

Roselle callus was cultured under nine different combinations of LEDs light, including infrared ray (IR), red light (R), blue light (B), green light (G), warm light (WW), cold light (CW), and control group grown in dark (D), with the condition of 16h photoperiod and 1000 watt of light strength. The result indicated that IR light has shown the significant effect on the biosynthesis of Roselle anthocyanins. The major Roselle anthocyanin, Cyanidin-3-sambubioside and Delphinidin-3-sambubioside, were stimulated and reached to 10 and 5.6 times compared to control group, respectively. Therefore, the present study may provide a technique platform for the production of the secondary metabolites using LEDs light under a novel "Plant Factory" system for medicinal applications.