Effects of Lighting on Growth and Functional Compounds of *Chlorella sorokiniana*

林培鈞 (5112)

2023/04/26

Outline

1. Introduction
2. The effect of light source on the growth of *C. sorokiniana*
   - ・LED light – Green light, Aeration, Light intensity
   - ・Comparison between fluorescent lamp and LED mixed light
3. The effect of light source on the functional compounds of *C. sorokiniana*
   - ・Pigment
   - ・Fatty acid
4. Conclution

Abstract

Chlorella sorokiniana (C. sorokiniana), a type of green microalgae, features broad prospects for applications in such fields as health foods, biodiesel and so on. Microalgae grow through photosynthesis through their chloroplasts, so the source of light in the environment has a considerable impact on the growth of microalgae.

The aim of this study was to find the optimal light source for culturing *C. sorokiniana* by comparing growth and functional compounds under LED mixed light and fluorescent light. *C. sorokiniana* was cultured at 25℃, photoperiod 12:12 (Light : Dark), aeration 1vvm (L_{air} L_{media}^{-1} min^{-1}), and cultured with fluorescent lamp or different ratios of red and blue mixed light. The results showed that the OD_{650nm} on the 7th day of culture: (Red:Blue:Green = 189 : 21 : 45 μmol • m^{-2} • s^{-1}) > (63 : 147 : 45) = (fluorescent lamp) = (21 : 189 : 45) = (105 : 105 : 45) > (210 : 0 : 45) = (0 : 210 : 45), R:B:G =189: 21: 45 μmol • m^{-2} • s^{-1} was the best mixed LED light source for cultivating *C. sorokiniana*, which can effectively promote chlorophyll, total carotenoids and PUFAs contents of *C. sorokiniana*. It is worth mention that if there is no red or blue LED light source, the growth of *C. sorokiniana* is worse than other mixed light conditions .

Reference

李汶。(2010)。臺灣蜆 (*Corbicula fluminea*) 生物活性物質受濾食微藻之影響。國立臺灣海洋大學食品科學系碩士論文。基隆。

行政院衛生署。(2013)。食品中脂肪酸之檢驗方法。食字第 1021950978 號公告。臺北。

Lizzul A. M., Lekuona-Amundarain A., Purton S., & Campos L. C. (2018). Characterization of Chlorella sorokiniana, UTEX 1230. *Biology*, *7*(2), 25.

Mackinney G. (1941). Absorption of light by chlorophyll solutions. *Journal of Biological Chemistry*, 140(2), 315–322.

Paterson E. and Amado R. (1997). Simplified method for the simultaneous gas chromatographic determination of fatty acid composition and cholesterol in food. *LWT-Food Science and Technology*, 30(2), 202-209.

Ritchie R. J (2006). Consistent sets of spectrophotometric chlorophyll equations for acetone, methanol and ethanol solvents. *Photosynthesis Research*, 89(1), 27-41.

Taghavijeloudar M., Yaqoubnejad P., Amini-Rad H., & Park J. (2021). Optimization of cultivation condition of newly isolated strain Chlorella sorokiniana pa. 91 for CO 2 bio-fixation and nutrients removal from wastewater: Impact of temperature and light intensity. *Clean Technologies and Environmental Policy*, 1-13.