How Quality of Light Affects the Bioactive Potential of Microalgae?

Zhaneta Georgieva, Zornitsa Karcheva, Detelina Petrova, Miroslava Zhiponova, Ganka Chaneva

Department of Plant Physiology, Faculty of Biology, Sofia University "St. Kliment Ohridski", Sofia, Bulgaria

Correspondence: zpgeorgiev@uni-sofia.bg

The newly isolated Bulgarian strain *Coelastrella* sp. BGV (Chlorophyta) was investigated to determine the influence of light quality on its growth, metabolic composition, antimicrobial potential and antioxidative activity. For the purpose of that study, we have assembled a laboratory setup that allowed algal suspension to be intensively cultivated under 5 different LED light formulas – white/red (W/R); royal blue (Royal B); photo red; red/blue (R/B) and white light (W) as a control.

The highest growth of microalgal culture was observed under red light illumination – 1.3 mg ml^{-1} DW, followed by the white light – 1.2 mg ml^{-1} DW. All other light formulas showed a decrease in biomass accumulation – from 15% to 50%, especially in the R/B variant. No strict correlation was found between the changes in growth rate and those in protein and pigment contents. The highest amount of proteins was recorded in the variants R/B and W/R – 30% and 20% above the control. The most pronounced increase of pigment content was measured under the R/B light, where the amounts of chlorophyll *a* and carotenoids were about three times higher than the control, and the content of chlorophyll *b* was twice as high.

Further, for the preparation of microalgal extracts (ethanolic extracts, water extracts and cultural medium), R/B and Royal B variants were preferred, considering them the most promising. The ethanolic extracts obtained under R/B, Royal B and white light (as control), were characterized by the enhanced total antioxidant activity (TAA), as well as the highest phenolic and flavonoid content. The most pronounced antimicrobial activity was shown by the cultural medium grown under R/B and Royal B light conditions.

The present investigation confirmed the high bioactivity of *Coelastrella* sp. BGV, so more in-depth studies are needed to establish the mechanisms of action and beneficial effects of the extracts and products obtained from algal biomass. In our future research, several prokaryotic microalgal strains will be also included, in an attempt to investigate and assess their biotechnological potential.

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