

Effects of 2, 4, Dichlorophenoxyacetic acid (2,4-D) and Benzylaminopurine (BAP) and alteration of minerals on lipid and sugar content and cell mass of *Chlorella sorokiniana*

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Abstract

Chlorella species are single-celled green algae that have many uses. *Chlorella sorokiniana* is a green algae that is seen as a single cell and a mass. In this study, which was conducted in 2019 at Payame Noor University of Tehran, *Chlorella sorokiniana* was cultured in the modified Bold basal medium by modifying phytohormones, 2,4-D (0.5-1 mg / l), with BAP (1-2 mg / l), and minerals (double nitrate and phosphate), and growth, lipid content, and water-soluble sugars were measured. The experiments were performed in a completely randomized design. Statistical analysis was performed using SPSS13 software and the comparison of means using Duncan's test was determined. In the treatment of 2,4 dichlorophenoxy acetic acid (2,4-D) (1 mg / l) with benzyl aminoporein (2 mg / l), the number of cells (21×10^7 cells per milliliter of algal suspension) was significantly $P \leq 0.05$ increased compared to the control (10.98×10^7 cells per milliliter of algal suspension). The largest cell masses were observed in the treatment of 2,4-D (1 mg / l) in combination with Benzylaminopurine (1 mg/l). In 75% of the hormonal treatments, the diameter of the cells and in all the hormonal treatments, the lipid content showed a significant decrease (13.3%-16%) in $P \leq 0.05$ compared to control (24.7%). The highest percentage of lipids (32.63%) was obtained in the Bold medium with twice as much nitrate and phosphate. The content of soluble sugars in any of the treatments (0.2-3.9 mg /g dry alga) did not show a significant change compared to the control (2.1 mg /g dry alga). Overall, the results of the present study showed that the combination of 2,4-D with Benzylaminopurine hormones in these concentrations increases the growth of algal cell masses but reduces the lipid content of algae. These hormones can only be used to increase of biomass. But adding two fold nitrate and phosphate increases the growth and content of algae lipids, making it the most suitable growing medium for increasing the growth and lipid content of *Chlorella sorokiniana*.

Keywords: 2,4-D, BAP, *Chlorella sorokiniana*, Lipid, Sugar, Minerals.