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Determination of optimum nitrate and phosphate concentrations for maximum growth of *Chlorella* Sp.

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Algae biomass can be used for various purposes such as biofuel production, extraction of high value added food and pharmaceutical products. While growing algae for such purposes, removal of nitrogen and phosphorous from waste water polluted from nitrogen and phosphorous sources also can be achieved by growing algae. To obtain maximum algae growth, both physical and chemical parameters can be optimized. Controlling physical parameters are quite expensive rather than controlling chemical parameters such as nutrients and pH of the medium. Therefore, outdoor conditions with different nutrient contents were used. Nitrogen, phosphorus and potassium are the most significant macronutrients for algal growth. In this research, inorganic phosphate (PO_4^{3-}) and inorganic nitrate (NO_3^-) were used as the nitrogen and phosphorus sources, respectively, in order to find the best NO_3^- : PO_4^{3-} concentration and the best N: P atomic ratio for the maximum *Chlorella* sp. growth. The growth measurement of cell density was taken using UV-Visible Spectroscopy and specific growth rate (μ) was calculated. According to previous research, N: P atomic ratio is the most significant factor for algae growth where N: P = 16:1 for the maximum growth. However according to our results, not only the N: P atomic ratio, but also NO_3^- and PO_4^{3-} concentrations were equally important for algal growth. Under the experimental conditions, the maximum specific growth rate (μ_{max}) was observed when the concentrations of NO_3^- and PO_4^{3-} were kept at 200 ppm and 10 ppm respectively, where N: P atomic ratio was 14: 1. However, under the same N: P ratio (14:1) at different NO_3^- : PO_4^{3-} concentrations (when $NO_3^- > 200$ ppm and $PO_4^{3-} > 10$ ppm) the maximum growth was not observed. The pH of the medium also increased significantly with the growth of algae. This study demonstrated that optimum nutrient conditions maximize the algae growth under outdoor conditions and their nutrient removal capability can be used for waste water treatment.