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Hassan Nezammahalleh, Faezeh Ghanati, Thomas A. Adams II, Mohsen
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Effect of moderate static electric field on the growth and metabolism of *Chlorella vulgaris*

Hassan Nezamhahalleh^a, Faezeh Ghanati^b, Thomas A. Adams II^c, Mohsen Nosrati^{a*}, Seyed Abbas Shojaosadati^a

^a Biotechnology Group, Faculty of Chemical Engineering, Tarbiat Modares University, Tehran, Iran

^b Department of Plant Science, Faculty of Biological Sciences, Tarbiat Modares University, Tehran, Iran

^c Department of Chemical Engineering, Faculty of Engineering, McMaster University, Ontario, Canada

* To whom correspondence should be addressed:

Email: mnosrati20@modares.ac.ir; Tel: +98 21 82884372; Fax: +98 21 82884931

Abstract

An electric field (EF) generator device was fabricated and applied to the treatment of *Chlorella vulgaris* ISC33 at three distinct concentrations before cultivation. The EF of moderate intensity (2.7 kVcm^{-1}) has a hormetic effect on algal growth. The highest growth stimulation of 51% was observed after 50 min treatment of 0.4 g L^{-1} algal suspension. The influence of EF on the system was then studied from both theoretical and experimental perspectives. The growth rate increased with treatment time up to a maximum because of improved membrane permeability, and then declined afterwards due to peroxide accumulation in the medium. The contents of chlorophylls, carotenoids, soluble carbohydrates, lipids, and proteins were also measured to understand possible changes on algal metabolism. The EF treatment of algal suspension has no observable effect on the cell metabolism while both algal growth and metabolism was significantly affected by the inoculum size.

Keywords:

Cell metabolism; *Chlorella vulgaris*; electroporation; growth stimulation; inoculum size; peroxide accumulation

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