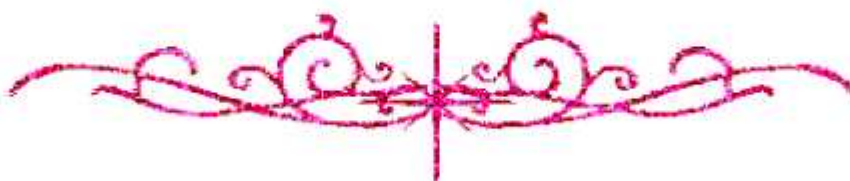


# بسم الله الرحمن الرحيم





# شبكة المعلومات الجامعية التوثيق الالكتروني والميكروفيلم





# جامعة عين شمس

التوثيق الإلكتروني والميكرو فيلم

## قسم

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# **BIOFUEL PRODUCTION FROM ALGAE**

**By**

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**B.Sc. Agric. Sci. (Biochemistry), Fac. Agric., Cairo Univ., 2011**

## **THESIS**

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## **DEDICATION**

*This work is dedicated to My family, A special feeling to my Dad and my Mom for their words of encouragement and pray and their support along the period of my life. My dear Brothers, My dear husband and my lovely sons. with my love and respect.*

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### ABSTRACT

In response to the world energy crisis, micro algal biodiesel production has received much interest in an effort to search for sustainable development. Beside, algae nutrition seems to be the most limiting factor concerning proper growth and economy cost. The main figure in this respect is carbon nutrition. Growth was performed using F2 growth medium for inoculum preparation and sub-culturing; while artificial growth medium was applied in order to enhance both dry weight and lipid productivities. The major properties of the produced biodiesel was investigated , moreover the residual defatted biomass of *Nannochloropsis oculata* alga was used as a fermentation feedstock for bioethanol production after hydrolysis under varying conditions of acid concentration and/or constant enzyme dosage.

Results showed that a high nutritional composition of bagasse extract as an alternative source of organic carbon (98.9% of total cell carbon) was obtained by cultures grown with full F2 growth medium enriched by 10% of bagasse extract. Chemical composition reveled the relatively high content of carbohydrates (26.6%) and oils (11.9%) on the expense of protein content (32.8%) and the maximum figure of ash content (2%) goes back to sodium ions.

Results of bioethanol production from defatted biomass of *N. oculata* indicated optimal conditions for hydrolysis process were 30 hours using a commercial enzyme that includes two stages: liquefaction process using diluted sulphoric acid (3.0% v/v) at 121°C for 15 minute followed by incubation in commercially available hydrolytic enzymes  $\alpha$ -amylase 1000 IU /g at 95°C with a pH of 6, while for the scarification process using commercially available enzyme mixtures contain multiple enzyme activities, mainly exoglucanase, endoglucanase, hemi-cellulose, and beta-glucosidase. The hydrolysis was carried out by incubating the mixture at 60 °C, pH 5.5, for 24 hrs. gave a maximum yield of sugar (232.39 mg.g-1 ) for defatted biomass cultivated vegetative and multi factor stresses conditions. The fermentation of hydrolysate using *Saccharomyces cerevisiae* gives ethanol yield of 0.26 g.g-1 reducing sugar in the highest yield scenario observed during current study.

**Key words:** *Nannochloropsis oculata*, Bagasse, Biodiesel, Fuel properties, Defatted microalgal biomass, Hydrolysate, Bioethanol.



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