EVALUATION OF DIFFERENT SOURCES OF WASTEWATER TO CULTIVATE SOME SELECTED ALGAL STRAINS

By

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ABSTRACT

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The purpose of the present study was to assess the growth of microalgae on varied wastewater as a low-cost media for maximizing biomass production and their chemical composition and use producing biomass as feed additive to silkworm. In the current study, nine microalgae were cultivated on four variations of wastewater (agricultural wastewater, industrial dyes wastewater, whey and crystal wastewater) and compared to the synthetic media. The results indicated that the tested microalgae could not grow in crystal wastewater and weak with sterilized whey while, the ability of microalgae to grow in sterilized (synthetic medium, agricultural wastewater and industrial dyes wastewater) and gave greater biomass and chlorophyll (*a*) than in non-sterilized after three weeks of the incubation period but contamination occurred with non-sterilized whey. Out of the tested nine microalgae, four microalgae were selected which gave the highest significant values of dry weight, biomass productivity and chlorophyll (*a*) content ,The selected microalgae showed the highest significant values of the chemical composition, i.e., total carbohydrate, protein and lipid when cultivated in agricultural wastewater more than those cultivated in both industrial dyes wastewater and synthetic broth media,.Among four microalgae, two microalgae were chosen where the chemical composition contents ranged from 1.17 to 1.21-fold and 1.03 to 1.06-fold of carbohydrate, 1.06 to 1.09-fold and 1.88 to 1.93-fold of protein and 1.41 to 1.52-fold and 1.76 to 1.90-fold of lipid more than those of other microalgae, respectively .

The agriculture wastewater was inoculated with a single culture of *A. oryzae* HSSASE6 (KT277789) or *S. platensis* NIES-39 (A00800) individually with 10 % of inoculum size, which more preferred than was inoculated with consortium culture. Results also showed that *A. oryzae* HSSASE6 (KT277789) was more efficient strain for giving biomass and productivity in agricultural wastewater than *S. platensis* NIES-39 (A00800) (about 28% more) .

Optimal custom(factorial) statistical design was performed to screen out the factors contributing to produce *A. oryzae* HSSASE6 biomass in agricultural wastewater using submerged culture technique the maximal *A. oryzae* HSSASE6 biomass (1.693 g/L) were achieved during run number 4 with pH (7.0), and agitation speed (100 rpm), incubation period (21d), incubation temperature degree (35°C), respectively .then has been done maximization of *A. oryzae* biomass production in agricultural wastewater using response surface methodology (RSM), the best growth was (1.948g/l) when used agitation speed (125rpm) and incubation temperature degree (40°C).

Phytotoxicity analysis revealed to faba bean seeds, results showed that control and wastewater after cultivated algae (50%) achieved germination ratio 100%.

Application of *A. oryzae* biomass produced after cultivated in agricultural wastewater as feed additive to silkworms (*Bombyx mori* L.) The mean pupal weights increased by 23.9% after using 12 mg of this alga compared with control. The maximum number of eggs (549 eggs) was recorded after using 12 mg d. w. alga /10 ml water. The greatest fresh cocoon weight was observed at 12 mg of *A. oryzae* HSSASE6 (1.72 g), The cocoon shell ratio was 20.38 and 21.51 % when larvae were fed on mulberry leaves treated with 6 mg and 12 mg *A. oryzae*. The mean length of silk filament was 1123.5 m, while 0.23 g, for weight and 1.842 denier for sizes of silk filament produced from larvae fed on mulberry leaves treated with 12 mg of *A. oryzae* /10 ml water.

Keywords: Biomass production, Microalgae, Cyanobacteria, Agricultural wastewater, Industrial dyes wastewater, Silkworm, optimal custom(factorial) and Response surface methodology.

CONTENTS

Page

Page

LIST OF TABLES

LIST OF FIGURES

LIST OF PHOTOS

LIST OF ABBREVIATION

ABBREVIATION	Mean
AWW	Agricultural wastewater
DWW	Dyes wastewater
d	day
g/l	gram per liter
mg/l	milligram per liter
µg/l	microgram per liter
min	minutes
nm	Nanometer
RSM	response surface methodology
S m-control	Synthetic medium
W	week