



## BIOTECHNOLOGY

# EFFECT OF HUMIC ACID ON *SPIRULINA PLANTISIS* PRODUCTION AND ANALYSIS OF NUTRIENT CONTENTS

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## Abstract

*Spirulina* is a microscopic blue-green alga in the shape of a spiral coil, used as a human dietary supplement, as well as a whole food, which was cultivated in different concentrations of humic acid such as 0.1%, to 0.7 %. The protein, chlorophyll, fatty acids levels measured at the end of the experiment in all concentrations. Among the concentration the maximum biomass was obtained from 0.2% of humic acid treated medium. The lower amount of biomass was obtained from above 0.5%. In this study, it was found that increased concentration of humic acid decreases the biomass of *Spirulina plantensis*. Thus it was concluded in this work, that lower concentration of humic acid increases the growth and nutrient contents of *Spirulina plantensis*.

**Keywords:** Humic acid, *Spirulina plantensis*

## Introduction

Various algae are using as single cell proteins, but among the algae *spirulina platensis* is highly the popular in single cell proteins. Because it's being too easy to grow in all medium and having a simple cultivation, harvest and drying process. *Spirulina plantensis* producing valuable metabolites such as pigments, feed additives, and nanoparticles. Humic acids (Has) comprise a mixture of weak aliphatic (carbon chains) and aromatic (carbon rings) organic acids which are insoluble in water under acid conditions but are soluble under alkaline conditions. Humic acid consist of that fraction of humic substances that are precipitated from aqueous solution when the pH is decreased below 2 (Robert E. Pettit). Humic acid is commercial product contains many that barely crops increased considerably and growth was elements which improve the soil fertility and increasing more rapid with humic acid (Salman et al (2005). In India Neyveli Lignite Corporation/ Centre for Applied Research Centre producing humic acid from lignite by treated with alkaline solution. Prakash et al (2010) reported that *Trichoderma viridi* convert lignite to humic acid from lignite, also he has also reported that humic acid could enhance the mushroom productivity. The objective of this present study is to find out the effect of humic acid on *Spirulina plantensis* biomass productivity..

## Materials and Methods

### Algal strain

The algal culture was obtained from CAS BOTANY, Madras University, Chennai Tamilnadu. The

strain was maintained in half strength of Zarrouk medium.

### Effect of humic acid on growth parameters

500ml of Zarrouk medium with different concentration of humic acid viz 0.1%, 0.2%, 0.3%, 0.4%, 0.5%, 0.6% and 0.7% was prepared and sterilized by autoclaving and the sterilized media was inoculated with one ml of pure culture of the organism. Inoculated flasks were incubated for 14 days under illuminated light. The end of the experiment biomass was centrifuged at 10000 rpm, for carry out the following nutrient contents like chlorophyll, protein and fatty acids estimated by lowery's, methanol extraction, and gas chromatography.

## Results and Discussions

### Biomass

In this study various concentration of humic acid (0.1% to 0.7%) used for improve the qualitative and quantitative nutrient compounds. Among the concentrations from 0.2% and 0.1% maximum biomass was obtained 3.6 gm 2.7 gm and control 1.9gm. B.B. Choonawala reported that 8.12 mg/l. (2004). The study reveals humic acid affect the growth because of containing nitrogen and fulvic acids.

### Chlorophyll

Chlorophyll is having many applications like colouring agents and pharmaceutical application. The present study reveals 0.2 of treated humic acid recorded maximum concentration of chlorophyll 2.0205 (Table 1). Dao-lun et al (2006) found that

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Synthetic human urine increases chlorophyll content, (1408.56 mg).

Table- 1: Effect of humic acid on biomass, chlorophyll and protein

S.NO	HUMIC ACID %	BIOMASS (L)	CHLOROPHYLL (O.D)	PROTEIN %
1	0.1	2.7	1.0987	52%
2	0.2	3.6	2.0203	63%
3	0.3	2.0	1.0901	48
4	0.4	1.8	1.0844	47
5	0.5	1.6	1.0370	39
6	0.6	1.2	1.0341	27
7	0.7	1.1	1.0210	21
CONTROL	NIL	1.9	0.0010	54

### Protein

0.2% of humic acid was found to increase the protein content 63% (control- 54%). Chaiklahan, Chaiklahan et al (2010) reported that *Spirulina plantensis* using modified Zarrouk medium has 61% of protein content.

Fatty acids are one of the important nutrient components in *Spirulina plantensis*. In this present study 0.2% of humic acid treated medium was given 7.168 % of palmitic acid, 4.528 of steric acids, 41.289 of oleic acid and 63.537 % of linoleic acid (Table 2). Luciane Maria Collaa (2004) reported that palmitic acid 48.27 d 0.86, stearic acid; 0.91 d 0.03, oleic acid; 7.50 d 0.41, linoleic acid 12.30 d 0.47.

### Fatty acids

Table 2. Effect of humic acid on Fatty acids Profile

FATTY ACIDS	H.A 0.1%	H.A 0.2%	H.A 0.3%	H.A 0.4%	H.A 0.5%	H.A 0.6 %	H.A 0.7 %	CONTROL
Myristic	0.018	0.0732	0.064	1.071	0.076	0.947	0.080	0.023
Palmitic	6.668	7.168	6.771	12.683	9.157	13.103	13.671	14.43
Stearic	3.516	4.528	4.034	3.774	3.577	3.493	4.0505	3.397
Oleic	28.755	41.289	27.109	39.766	38.345	40.664	23.967	39.488
Linoleic	60.260	63.537	60.904	31.722	31.698	32.624	32.391	37.995
Linolenic	0.0331	0.0740	0.0377	-	0.0529	0.0596	0.0726	-

\*H.A : Humic acid

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