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Research Article

Comparative study on growth of *Spirulina platensis* on different culture media

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Abstract

Spirulina platensis are well known for its high protein value content. Three different media were prepared namely CFTRI, JPJM and DMSD. The sample of *Spirulina platensis* was inoculated in different media .All media continuously stirred after every 3 to 4 hours. Inoculated culture kept in sunlight for 4 to 5 hrs. Everyday Sample was rapidly adapted to CFTRI and JPJM media, less in DMSD media. Experiment conducted for 15 days .It was concluded that order of survival of Spirulina is CFTRI > JPJM >DMSD.

INTRODUCTION

Algae were the first plants to appear on the planet. Billions of years ago, they transformed the carbon-dioxide-based atmosphere to an oxygen-rich atmosphere in which other life forms could evolve. Biotechnological processes based on cyanobacteria have been receiving increasing interest due to their potential to produce a diverse range of chemicals and biologically active compounds, such as vitamins, carotenoid pigments, proteins, lipids and polysaccharides (Zhang *et al.*, 1999). Spirulina are multi-cellular and filamentous blue-green algae that has gained considerable popularity in the health food industry and increasingly as a protein and vitamin supplement to aquaculture diets. It grows in water, can be harvested and processed easily and has very high macro- and micro-nutrient contents (Jana A *et al.*, 2014). The cyanobacteria *Spirulina platensis* has been commercially exploited for the production of human food supplements, animal feed and pharmaceuticals because of its ability to produce large quantities of valuable products, such as phycocyanin (Estrada *et al.*, 2001, Miranda *et al.*, 1998, Sarada *et al.*, 1999). The large-scale production of *Spirulina* biomass depends on many factors, the most important of which are nutrient availability, temperature and light. These factors can influence the growth of *Spirulina* and the composition of the biomass produced by causing changes in metabolism, which considerably modify the time course of the accumulation of the main biomass components (Cornet *et al.*, 1992). The optimal temperature for *Spirulina platensis* growth is in the range of 35°C-38°C. In addition *Spirulina* requires relatively high pH, which effectively inhibits the growth of other algae in the culture medium. In this respect high amounts of sodium bicarbonate must always be present in the culture medium to sustain the high pH and prevent fluctuation. *Spirulina platensis* is a multicellular, filamentous cyanobacteria, consisting of blue-green filaments of cylindrical cells (1 to 12 µm diameter) in unbranched helicoidal trichomes, the filaments being motile, gliding along their axis, and have no heterocysts (Richmond *et al.*, 1990).Carbon is the principal nutrient required by *Spirulina*, and in alkaline lakes this organism is the dominant species because of the presence of high concentrations of sodium carbonate. Vonshak has shown that, after labor, the second major cost in *Spirulina* biomass production is the cost of nutrients, principally the carbon source (Vonshak *et al.*, 1997).

Study confirmed the biological activity of the ethanol extract of *Spirulina platensis* against non-enveloped RNA, DNA enteric viruses and also, *Enterococcus faecalis* and *Candida albicans* (El-Baz FK *et al.*, 2013).The aim of this work was to study the algal biomass production in Laboratory condition using CFTRI, JPJM, and DMSD and to investigate the effect of Different media on biomass production of *Spirulina platensis*.

MATERIALS AND METHODS

The cyanobacteria used in this study were *Spirulina platensis* strain. Zarrouk media was used for growing *Spirulina platensis* (Zarrouk, 1966; Raoof B *et al.*, 2006). Three types of media were prepared namely CFTRI, JPJM and DMSD. Each media of volume 200 ml was prepared in two flasks. The pH of each flask was measured, it is between 9-10. Every day each flask was stirred after every 3-4 hrs. Everyday pH was checked regularly each day. After 15 days all samples are filtered by using 300 micron filter paper and the moist weight was measured.

Composition of media

1) JPJM:-

Sr.no.	Chemical Name	gm./lit.
1	Sodium Carbonate	5.0
2	Sodium chloride	5.0
3	Potassium Nitrate	2.0
4	Sodium Bicarbonate	1.0
5	Potassium Sulphate	1.0
6	Urea	0.02
7	Mono-ammonium phosphate	0.1
8	Magnesium Sulphate	0.2
9	Ferrous Sulphate	0.005
10	Lime	0.02

2) CFTRI:-

Sr.No.	Chemical Name	gm./lit.
1	Sodium Bicarbonate	4.5
2	Dipotassium hydrogen phosphate	0.05
3	Sodium Nitrate	1.5
4	Potassium Sulphate	1.0
5	Sodium Chloride	1.0
6	Magnesium Sulphate	0.2
7	Calcium Chloride	0.04
8	Iron Sulphate	0.015

3) DMSD:-

Sr.No.	Chemical Name	gm./lit.
1	Ujwala N P K (19:19:19)	4.0
2	Magnesium Sulphate	0.1
3	Sodium Carbonate	10.0

Culture collection and maintenance

In the present study the growth of species *Spirulina platensis* (filamentous) were used to cultivate on the formulated medium. The *Spirulina platensis* was obtained from FLY GREEN AGRO TECH, Sanwatsar, Dist. Ahmednagar, Maharashtra, India. The culture was maintained in Zarrouk medium in a 1000 ml Erlenmeyer flask in the normal room temperature, with 12 hours light and 12 hours dark photo period with normal white light and the flask were aerated artificially. The growth of the culture was monitored as per the laboratory condition (Venkataraman LV, 1983) for a period of 15 days and the generation time was calculated (Prescott *et al.*, 2008).

RESULTS AND DISCUSSION:-

Spirulina is claimed as a non-toxic, nutritious food, In addition, because it is so high in minerals, protein and essential fatty acids it is a healthy energy food that is especially useful for people on low-calorie diets (Rosario J Carolin Joe *et al.*, 2015). A culture medium as good as the synthetic medium has been reported in the literature for the growth of *Spirulina maxima* was obtained, i.e., the sea water treated with $NaHCO_3$ at pH 9.2 and 35°C for 2 hours, filtering to remove precipitates and enriched with K_2HPO4, $NaNO_3$ and $FeSo_4$ has been used for Spirulina cultivation. The cultivation was carried out *in-vitro* for a period 15 days. The growth was monitored during cultivation in the laboratory condition (Venkatraman *et al.*, 1983). The *Spirulina platensis* inoculated in DMSD media get dried within 6-7 days. The dried mass of *Spirulina* was floated on media surface and color was yellowish. The JPJM and CFTRI media remains fresh green. But after more 3-4 days 'JPJM' media was change in color and get dried. JPJM also shows layer of media and *Spirulina* biomass when fresh. CFTRI media shows dark green color after 15 days and show pH between 11-12.It shows less layer than JPJM. After filtration, the moist weight of biomass shown in above table, From the present work it was concluded that, 'CFTRI' media is better for cultivation of *Spirulina platensis* as compared to 'DMSD' and 'JPJM', since it gives more *Spirulina* biomass.

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Table 1: growth of *Spirulina platensis* on different culture media

Media & Sr. No	JPJM		CFTRI		DMSD	
	Volume	Weight	Volume	Weight	Volume	Weight
Flask No.1	300 ml	0.957 gm.	300 ml	2.690 gm.	300 ml	1.0 gm.
Flask No.2	300 ml	1.296 gm.	300 ml	3.400 gm.	300 ml	0.900 gm.

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