

Growth Pattern of Some Desert Algal Isolates and Selection of Media

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Abstract

Three experimental axenic isolates of *Chlorococcum hemicolum*, *Trebouxia humicola*, and *Cocconeis scutellum*, are grown in different media to select the best media for future experiments. Results show that BG-11 medium should be the preferred choice for growing them.

Key words: Algal medium, growth curve, *Chlorococcum hemicolum*, *Trebouxia humicola*, *Cocconeis scutellum*

Introduction

The selection of best medium especially when growing cryptogams like algae is prerequisite for any research endeavors. Different nutrient composition can influence the growth parameters of algae; hence, it can be exploited for optimization of culture conditions. Depending upon the future aim of experiments with algae, best condition can be chosen. Even though such kind of studies are considered as trivial in these days of modern era of biotechnology, but it better to follow some basic steps before going to such modern techniques. Since most of our laboratory studies are made with pure cultures, one must be able to sterilize a culture medium and maintain it in a sterile condition¹. Depending on one's objectives, one may use culture media completely defined chemically, or those that contain such undefined ingredients as soil, soil extract, pea cotyledons, or rice grains. Obviously, for precise physiological experiments, defined media would be required^{2,3}. There are perhaps as many media and modifications as there are active phycologists today. Each investigator generally employs their own particular medium for successful cultivation of fresh water algae⁴. The media selected represent a wide diversity of pH and dilution. Among the major considerations are: pH, concentration of major nutrients; nitrogen source; possible organic or growth factors for enrichment; and micronutrient composition⁴. Effect of different nutrient composition on growth pattern forms the objective of present work. Aim is to select the best medium for *Chlorococcum*

hemicolum, *Trebouxia humicola* and *Cocconeis scutellum*. The first two are Chlorophycean algae and last one is a diatom.

Experimental

Chlorococcum hemicolum and *Cocconeis scutellum* (diatom) were collected from Jodri River (pH 6.2 - 6.5). *Trebouxia humicola* was collected from Gudavishnoi sacred pond near Jodhpur (pH 6.8). Standard techniques have been employed for selection, isolation and cloning of the algae. Pure culture of these algae and diatom was established by isolation and selection of different colonies in Petri plate. Growth pattern were determined in different media to identify the best media for and to establish the media i.e. nutrient composition, best suited for future experiments with these algae. For that purpose *Chlorococcum hemicolum* was grown in three media viz. are BG -11 medium, Modified CHU - 10 medium and Allen & Arnon medium. *Trebouxia humicola* and *Cocconeis scutellum* was multiplied in five different media viz. BG -11 medium, Modified CHU - 10 medium, Allen & Arnon medium, K & M medium and Hughes medium. All the media are in liquid form and N (+) i.e. contain nitrogen source. Axenic culture of these algae was grown in culture room under continuous light, illuminated with cool fluorescent tubes (14.4 watt. m⁻²) at 24±1°C. High quality chemical constituents are used for preparation of media with maximum accuracy (0.0001g) in weighing. Pre-sterilized media is then used for experiment. The culture experimentations were performed in sterilized plugged conical flask having 100 mL medium in triplicate individually for each media. For determination of growth patterns, basic algal culture techniques are employed. Equal amount of algae is inoculated and its protein level is determined using lysozyme (Sigma) as the standard^{5,6}. This is protein level on first day i.e. the day on which algae is inoculated. Then at regular intervals protein is estimated in all media. Their changing protein level at regular intervals forms the basis for determining



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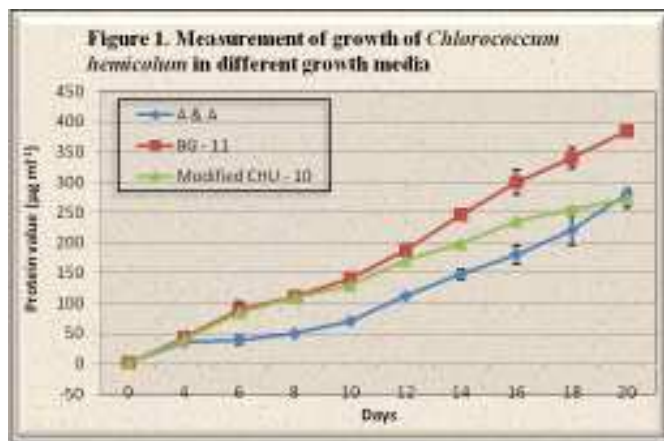
growth pattern as affected by different nutrient composition.

Results and Discussion

Chlorococcum hemicolum

Results are presented in Figures 1-3. All the three media supported the growth of algae in linear fashion in the following order; Modified CHU - 10 ($r^2 = 0.99$; $p > 0.01$) > BG - 11 ($r^2 = 0.99$; $p > 0.01$) > A & A ($r^2 = 0.95$; $p > 0.01$). Although Modified CHU - 10 shows moderately strong linear ($r^2 = 0.99$) relationship but protein content was maximum in BG - 11, which reveals that BG - 11 is most suitable medium for the growth of *Chlorococcum hemicolum*, as represented by their following growth equations:

- (i) BG - 11: Growth = $49.828 + 42.627 \text{ Days}$ ($R^2 = 0.991$)
- (ii) Modified CHU - 10: Growth = $17.064 + 30.314 \text{ Days}$ ($R^2 = 0.991$)
- (iii) Allen & Arnon: Growth = $47.592 + 29.312 \text{ Days}$ ($R^2 = 0.947$)

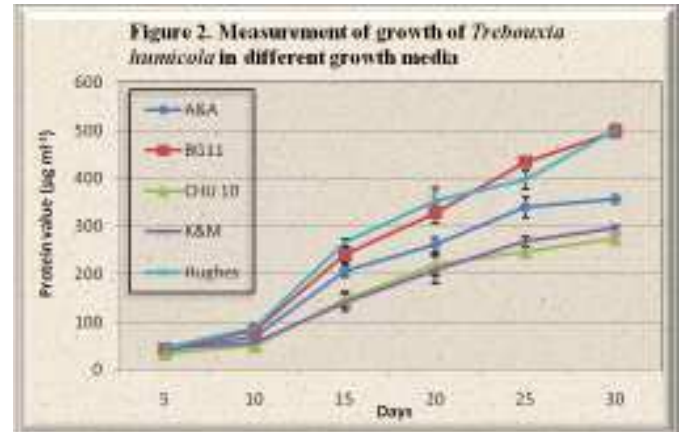


Trebouxia humicola

For *Trebouxia humicola*, BG-11 medium supports maximum protein content and growth pattern follows strong linear relationship ($r^2 = 0.98$) with days, hence BG-11 medium should be the preferred choice for luxuriant growth of *Trebouxia humicola*.

- (iv) BG - 11: Growth = $71.94 + 97.76 \text{ Days}$ ($R^2 = 0.982$)
- (v) Modified CHU - 10: Growth = $24.43 + 53.22 \text{ Days}$ ($R^2 = 0.95$)
- (vi) Allen & Arnon: Growth = $31.08 + 69.56 \text{ Days}$ ($R^2 = 0.956$)
- (vii) K & M: Growth = $27.51 + 56.18 \text{ Days}$ ($R^2 = 0.971$)

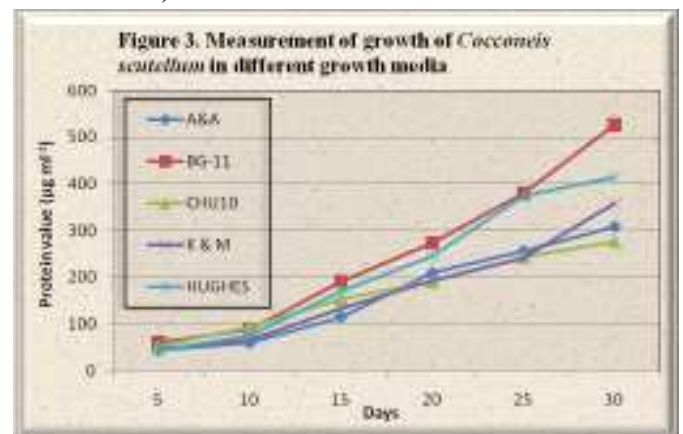
- (viii) Hughes: Growth = $53.98 + 93.88 \text{ Days}$ ($R^2 = 0.968$)



Cocconeis scutellum

C. scutellum also grows well in BG - 11 medium, with maximum protein content and linear growth pattern. The growth equations are as follows:

- (i) BG - 11: Growth = $75.25 + 93.94 \text{ Days}$ ($R^2 = 0.969$)
- (ii) Modified CHU - 10: Growth = $7.263 + 46.11 \text{ Days}$ ($R^2 = 0.995$)
- (iii) Allen & Arnon: Growth = $35.31 + 57.54 \text{ Days}$ ($R^2 = 0.973$)
- (iv) K & M: Growth = $39.02 + 60.86 \text{ Days}$ ($R^2 = 0.959$)
- (v) Hughes: Growth = $60.18 + 80.60 \text{ Days}$ ($R^2 = 0.977$)



Analysis of variance by split plot design revealed that all the factors viz. type of medium, days and their interaction of the present study contributed significantly ($p > 0.01$) towards the observed variations. Present study shows that the BG - 11 medium should be the preferred choice for the laboratory culture of *C. hemicolum*, *T. humicola* and *C. scutellum*.

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