

## Impact of Different Culture Conditions on Chlorophyll Content of *Nostoc muscorum*

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*Study on impact of different culture conditions on growth of Nostoc muscorum was undertaken which reveals that photosynthetic activity of Nostoc in the absence of optimum light affected more than that of growing them on optimum pH. At acidic pH (6) and alkaline pH (9.6) the growth is less than the optimum pH (7.8). Also an exposure to 8 hours of light duration has been found better than exposure to 4 and 12 hours.*

**Key words:** *Nostoc, chlorophyll, growth, pH, light intensity.*

**Introduction :** The cyanobacteria are the largest and most diverse group of photosynthetic bacteria and their photosynthetic system closely resembles that of eukaryotes as both performs oxygenic photosynthesis. Growth of *N. muscorum* depends on number of conditions. When different culture conditions such as temperature, pH, light, O<sub>2</sub> is applied there is a variation in the pattern of growth of this algae and also their pigment content. Level of stress proteins, reactive oxygen species (ROS), ROS scavenging enzymes, changes in pigment content, photosynthesis and chlorophyll content are all affected by growth factors, particularly light and nutrient availability (Chauhan et al 1992). Several parameters are used for growth determination of cyanobacteria this constitutes determination of cell number, measurement of chlorophyll contents, dry weights, protein contents etc. Of these parameters, the present study deals with determination of chlorophyll contents. Chlorophyll content is a non destructive measure and is there by well suited for repeated measures of effect and recovery (Siegfried, 2005). The organism thrives in a variety of media, provided the pH and light conditions are satisfactory. The lower and upper limit of growth is 5.7 and 9.0 respectively while the optimum pH is 7.8 (Steward 1973). On providing different culture conditions growth of *N. muscorum* also varies and this can be easily determined by chlorophyll content as growth is directly proportionally to amount of chlorophyll content (Bishop, Premakumar, 1992).

### Materials and Method :

#### CHU-10 media was used for culturing *Nostoc muscorum*

### Composition of CHU-10 media

#### Macro-nutrient :-

Calcium nitrate	–	0.04gm
Dipotassium hydrogen phosphate	–	0.01g
Sodium carbonate	–	0.02g
Magnesium sulfate	–	0.025 g
Sodium silicate	–	0.025g
Ferric citrate	–	0.003g
Citric acid	–	0.003g
Distilled water	–	1000 ml

#### Micro-nutrient :-

Boric acid	–	2.86g
Manganese chloride	–	1.81g
Zinc sulfate	–	0.222g
Molybdenum trioxide	–	0.0177g
Cupric sulfate	–	0.079g
Distilled water	–	1000 ml

### Method of growing *nostoc*

#### Starter culture :

In 100ml of CHU-10 media, 10 ml of suspension was mixed aseptically and left for growing for 15 days at room temperature. The culture flasks were shaken occasionally.

### Experimental protocol

6 flask containing CHU-10 media have been taken. Each flask was inoculated with 10ml *Nostoc* suspension from starter culture. Among six flasks two flasks were kept at optimum pH=7.8 and at optimum light duration

(8hr). Among other four flasks two flasks were kept at different pH i.e pH=6 and pH=9.6 at optimum light duration (8hr) and remaining two flasks were kept at different light duration i.e 4hr and 12hr at optimum pH =7.8. Then, all the flasks were incubated at room temperature for 15 days.

### Method of extraction of chlorophyll

10ml of *Nostoc* suspension from each flask kept at different culture conditions was taken and centrifuged. Supernatant discarded and 10ml of acetone was added to the pellet obtained and was kept in refrigerator for 12 hrs. After 12 hrs, it was again centrifuged. Absorbance of the supernatant was taken at 663nm.

### Result and Discussion :

The inoculum which was exposed to different pH on a optimum light duration of 8hr, the result obtained has been presented in Table-1

**Table-1 Effect of different pH on growth of *Nostoc muscorum***

Sl. No.	pH	Light (hr)	Conc. of pigment (mg/ml)
1.	6	8	0.725
2.	7.8	8	3.24
3.	9.6	8	2.14

Growth is maximum at pH 7.8 with chlorophyll content of 3.24 mg/ml while growth is comparatively less at pH 6 and 9.6 with chlorophyll content of 0.725 and 2.1 mg/ml respectively (table-1).

Similarly, the inoculum was exposed to different period of time on an optimum pH of 7.8, the result obtained has been presented in Table-2.

**Table-2-Effect duration of light on growth of *Nostoc muscorum***

Sl. No.	Light (hr)	pH	Conc. of pigment (mg/ml)
1.	4	7.8	0.495
2.	8	7.8	3.855
3.	12	7.8	1.00

Growth is maximum at light duration of 8 hr with chlorophyll content of 3.855 mg/ml while growth is less at 4 hr and 12 hr with chlorophyll content of 0.495 and 1.0 mg/ml (table-2).

From the data given above it is pertinent to note that light is more important factor in the growth of *Nostoc* than pH. Present study also indicates that in low pH, in initial stage, *N. muscorum* does not grow but at later stage it is capable to sustain consequently, it can add organic matter and biomass to the top soil and thus, increase its fertility. Present experiment also indicates that culture of *Nostoc muscorum* is capable of withstanding several experimental conditions. This salient feature of this cyanobacteria can therefore be exploited for several purposes. It can work as biomarker to indicate pollutants and can be used in soil amelioration (Biondi et al. 2004)

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