

## Effect of different concentration of gibberellins on Algae

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### I. Introduction

A hormonal network regulates growth processes and stress responses in vascular plants there is evidence for a similar hormonal network in micro algae also .This study investigated the effect of exogenous gibberellins GAs on algae.Hormones can also be effective in inducing growth and differentiation of mosses.Sabovljevic et .al.(2010)investigated the influence of gibberellic acid on algae,Bahel et al (1973),Padhe and Patnayak(1974), Adhikari and Patnaik (1978)Bongale(1978 )andKhalil (1983)have studied cyanophycean members with regards to their growth pattern after gibberellic acid treatment.

Naga prasanna Lakshmi (1979 )has dealt with the effect of 3 concentration 0.025% 0.0025% and 0.025% of gibberellic acid on *Cosmarium* sp. on various aspects namely the growth of algae morphological diversity and on the cell cycle. During the present investigation effect of various concentration of gibberellic acid was studied on algae.

### II. Materials And Methods:

During the present investigation 5 different concentration of gibberellic acid i.e. 0.0001%, 0.001%, 0.01% ,0.1% and 1% were employed .Desired concentration of gibberellic acid was made and added to the sterilized culture medium under aseptic conditions.The flasks were gently heated to ensure complete solubility of the chemical .After obtaining a clear solution of the acid the flasks were allowed to cool down .The cells were treated for a period of one week with different concentration .After treating the cultures cells were thoroughly washed with sterilized distilled water and inoculated into the fresh medium .The control and treated cultures were kept in the culture room at 21 + -2 degree centigrade under light and dark conditions.The cultures were shaken thoroughly twice a day.

The control and the treated cultures were kept under observation for a period of 8 weeks.Different aspects such as growth pattern morphological diversity and cell counts were studied . Growth was determined by taking optical density measurements at weekly intervals for a period of 8 weeks.Initial optical density of the culture was also recorded cell counts were made at weekly intervals for 8 weeks and for this study 10 slides were prepared from each sample.

### III. Observations:

The cultures treated with 0.0001% of gibberellic acid was green in colour and the growth of the culture measured by optical density was more than control .During the subsequent period the cells showed an increasing trend in the growth till the end of observations. The cell showed an increasing trend in the growth ,till the end of experiments .The cells remain healthy in short light green chloroplast colour after treatment with 0.01% and 0.01% concentration of gibberellic acid.The growth of the culture was more when compared to control upto 4th week but further gradual decline was there.In the concentration of 0.1% and 1% gibberellic acid overall growth of the culture was less compared to control.In the last 2 weeks of 0.1% gibberellic acid the growth rate of culture was less compared to

control .The cultures were white after 3 weeks and optical density was considerably low .In further readings in all concentration of gibberellic acid the cell count observation showed correlation with those of optical density readings.

**Table: 1**

Optical density measurements of gibberellic acid treated cultures of *Euastrum* species

S.No.	Time in weeks	Control	.0001%	.001%	.01%	0.1%	1.0%
1	Initial	.026	0.031	0.025	0.026	0.029	0.030
2	1	.036	0.037	0.040	0.041	0.033	0.024
3	2	.056	0.046	0.060	0.050	0.041	0.012
4	3	.064	0.067	0.066	0.067	0.030	0.0
5	4	.077	0.080	0.070	0.039	0.023	0.0

6	5	.085	0.086	0.050	0.03 1	0.017	0.0
7	6	.067	0.066	0.040	0.025	0.000	0.0
8	7	0.43	0.060	0.030	0.016	0.000	0.0

Morphological:

.0001% concentration:

The chloroplast of the cells were found to be green and in some cases they were contracted. the variation in the chloroplast could be observed after 6 weeks.

.001% concentration:

In this treated culture some of the cells showed diversity's in their morphology. The chloroplasts was contracted and the chloroplast colour was observed pale green .

0.01% concentration:

Most of the cells treated with this concentration were recorded with yellowish green pigment besides these, binucleate cell was contracted and granulated chloroplast was found.

0.1% Concentration:

In this concentration more cells were seen with yellowish green pigment and granulated chloroplast. after 6 weeks most of the cells were unhealthy and chloroplast colour was changing almost 2 white.

1% conc.:

Most of the cells in this concentration were having yellowish green pigment formation of adherent cells were also same this might be due to incomplete separation of 2 daughter cells after cell division presence of yellowish green pigment showed signs of unhealthy conditions

**Table 1 Cell counts of j Gibberelic Acid treated culture Of Euastrum sp.**

S NO.	Weeks after treating material	Nature of cell	Control	.0001%	.001%	.01%	.1%	1%
1	Initial	Healthy(H)	45	49	43	45	44	45
		Unhealthy(UH)	55	51	57	55	56	55
2	1	H	54	52	48	50	46	37
		U	46	46	52	50	54	63
3	2	H	65	67	52	52	38	26
		U	35	33	48	48	62	64
4	3	H	76	72	56	41	31	10
		U	24	28	44	59	69	90
5	4	H	60	66	57	34	27	06
		U	40	34	43	66	63	54
6	5	H	49	53	56	27	03	01
		U	51	57	54	73	97	99
7	6	H	40	38	42	20	2	-
		U	60	62	58	80	98	100
8	7	H	33	23	25	11	-	-
		U	67	73	75	89	100	100

**IV. Discussion:**

The culture was normal and showed a study growth in 0.0001% concentration however the culture was growing slightly more than the control which may be due to the effect of lower concentration 0.001% of chemical. In higher concentration the growth of the culture was less compared to control sample.

0.1% of Gibberellic acid was found to be sublethal and 1% concentration was found to be lethal. The treated cells have shown great diversity .The morphological variations were observed only in 1% concentration of gibberellic acid. It was observed that gibberellic acid was found to be growth stimulating when it is applied in low concentration while higher concentration was found to be lethal and growth inhibitory .Similar growth promoting effect of gibberellin was reported by Paster and Abbolt(1970 )on unicellular algae .The maximum effect was obtained with 10<sup>-7</sup>molar gibberellic acid while concentration greater than this inhibitory.

Griffin( 1958) reported that that cell size increased when gibberellic acid was added at a concentration of 1000 milligram per litre. Conrad et.al.(1959) observed that 0.05 mg/liter of gibberellic acid gave a seven -fold increase in the growth of ulothrix while higher concentration proved to be inhibitory. Growth stimulation was also found in chlorella by Fernandez et.al.(1968). Binucleate cells were found mostly in 0.01% of gibberellic acid treated cultures and similar results were observed by Naga prasanna Lakshmi (1979 )and vijayakumari(1977 )who found more or less same results in cladophora. The effect of gibberellic acid on growth metal biosorption and metabolism of green algae *chlorella vulgaris* when exposed to cadmium and lead stress was reported by Monica et al(2011) Gibberellin promote cell growth and induces changes in fatty acid biosynthesis in chlorella vulgaris was reported by Mallina Jusoh et.al. (2019)

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