

# Influence of Mustard seed extract on biomass and photosynthetic pigments in *Mougeotia quadrangulata* Hassall, 1843

Yadav S.G.

Department of Botany, Shivaji Mahavidyalaya Renapur Dist.Latur 413527 (MS), INDIA

## Abstract

*The present investigation is carried out to study the effect of Mustard seed extracts with different concentrations from 0.5 to 2.0% on green filamentous alga Mougeotia quadrangulata for 10 days, algal growth weight and the chlorophyll contents were decreased during investigation period.*

**Keywords:** Mustard, seed extract, different concentrations.

## Introduction:

The rapid growth of nuisance of algal growth causes a number of problems in water. In the back water area of Bhandarwadi Minor Irrigation Project algae are growing very rapidly and the control on the growth of algae is very difficult by using the same other methods. The application of barley straw for controlling algae has been tested in wide range in many countries throughout the world. (James,1994;Wells et.al.1994;Barret,1999).The tremendous growth of algae is controlled by using chemicals has been carried out by Lakshminarayan et.al.(1965).The blue green algal control through the physical, chemical and biological methods has been studied by Lakshminarayan et.al.(1972) in water supply and man-made reservoir. The present investigation is carried out to see the effect of Mustard seed extract on algal growth and the chlorophyll contents. Mustard (*Brassica juncea* L.) belongs to family Brassicaceae.Glucosinolates (GLS) are a group of secondary metabolites found almost exclusively in Brassicaceae and they are well known for their toxic effects in man and animal at high doses. According to Duke, (1983) some allyl cyanid and trace of dimethyl sulphide are found in the seeds of mustard. The effect of higher plant extract on algae and vice-versa have been studied (Mehta et.al.(1999),Mini et.al.(1999),Shakuntala,(1991),Srivastava et.al.(1985) ,Kushwaha and Gupta, (1972),Gupta and Shukla (1969)The antifungal properties of flowering plants have been reported by Sing and Madhu (1978).Mogili et.al.(1984) studied leaf extract of Periwinkle on *Cladophora crispata* ,effect of *Azadiracta indica* bark and root extract by Chandrakala and Vidyavati (1987,1988) and Mustard seed extract effect on *Cladophora* sp.has been worked out by Raval and Gajaria (2003).

## MATERIALS AND METHODS:

For the present investigation the green filamentous alga *Mougeotia quadrangulata* was collected from the Bhandarwadi Minor Irrigation Project back water area at a village Kamkheda in Renapur tehsil of Latur district in the Marathwada region of Maharashtra. The algal sample was collected in acid washed collection bottles and the material was washed with distilled water and cleaned off other algae ,impurities and debries.Fresh healthy filamentous were selected for the experiment. Four sets including control were prepared with different concentration series of water extract of Mustard seeds (0.5% to 2.0%) with duplicates. The period of experiment was for 10 days. The seeds of Mustard were soaked for 24 hours before the preparation of extract.pH ranged from 5.5 to 6 of the extract. The observations made for algal fresh weight and chlorophyll contents. Total chlorophyll estimated was estimated by DSMO method (Short and Lium, (1976).

**RESULTS AND DISCUSSION:****Table.1.Effect of Mustard seed extracts on biomass of algae *Mougeotia quadrangulata* (weight in mg):**

Days	0.5%	1.0%	1.5%	2.0%	Control (D/W)
0	100	100	100	100	100
1	95	90	85	80	105
2	90	85	80	70	110
3	85	80	70	60	113
4	80	75	65	55	117
5	75	70	60	50	119
6	70	65	55	45	125
7	65	60	50	40	127
8	50	45	45	35	129
9	45	40	40	30	132
10	40	35	35	25	135

**Table.2.Effect of Mustard seed extracts on chlorophyll content of *Mougeotia quadrangulata* (in mg/gm.):**

Days	0.5%			1.0%			1.5%			2.0%			Control D/W		
	TC	Chl.a	Chl.b	TC	Chl.a	Chl.b									
0	0.90	0.54	0.48	0.90	0.54	0.48	0.90	0.54	0.48	0.90	0.54	0.48	0.90	0.54	0.48
1	0.83	0.48	0.40	0.86	0.45	0.42	0.84	0.42	0.37	0.82	0.44	0.46	0.96	0.56	0.42
2	0.70	0.44	0.37	0.78	0.43	0.38	0.80	0.38	0.35	0.78	0.40	0.42	1.00	0.60	0.46
3	0.66	0.38	0.32	0.72	0.38	0.36	0.72	0.33	0.32	0.68	0.36	0.42	1.04	0.66	0.43
4	0.58	0.32	0.28	0.65	0.33	0.29	0.60	0.30	0.30	0.62	0.32	0.37	1.10	0.70	0.47
5	0.50	0.28	0.26	0.58	0.30	0.25	0.66	0.26	0.25	0.58	0.27	0.32	1.18	0.74	0.44
6	0.48	0.22	0.23	0.50	0.22	0.21	0.57	0.22	0.20	0.47	0.23	0.28	1.26	0.75	0.48
7	0.40	0.20	0.24	0.42	0.18	0.18	0.48	0.20	0.18	0.40	0.20	0.25	1.30	0.77	0.54
8	0.35	0.18	0.21	0.30	0.15	0.16	0.40	0.18	0.15	0.35	0.16	0.20	1.35	0.80	0.56
9	0.37	0.14	0.17	0.22	0.10	0.12	0.30	0.15	0.13	0.28	0.14	0.15	1.40	0.80	0.62
10	0.30	0.10	0.12	0.15	0.08	0.10	0.25	0.10	0.12	0.20	0.12	0.12	1.44	0.82	0.64

In the present study of Mustard seeds, four concentrations (0.5%, 1.0%, 1.5% and 2.0%) showed varied degrees of inhibition and in 2.0% concentration series proved to be lethal for *Mougeotia quadrangulata*. While 0.5% to 1.5% showed less growth inhibition. In all the concentrations of above series the negative correlation of chlorophyll contents were noted. The chlorophyll a content was lesser than the chlorophyll b content so the chlorophyll a suffered more at lower concentration, this might be due to the presence of toxic substance present in mustard seeds. The mustard seeds have strong antibacterial and antifungal properties and sinigrin has been reported to be toxic to certain insect larvae (Duke, 1983). Determination of toxic substance GLS in Mustard seeds is toxic to other plants (Font et al., 1999; Das et al. 2000). Table 1 shows result of the growth inhibiting activity of mustard seed extract 2.0% showed much better effect on growth and weight inhibition in comparison with control. On the 10<sup>th</sup> day of experiment the alga turns to yellowish and colourless and showed disintegration of filaments and chloroplast. The effect of extract on total chlorophyll, chlorophyll-a and chlorophyll-b is summarized in table 2. Overall 2.0% extract showed marked effect on the total chlorophyll compared to other concentration series. Total chlorophyll, chlorophyll-a and chlorophyll-b were gradually decreased up to 10<sup>th</sup> days. Higher the concentration showed significantly effective for the inhibiting the growth and chlorophyll content of *Mougeotia quadrangulata* Hassall. A chlorophyll level in the herbicides treated plants indicate the damage cause to photosynthetic system. The degradation to chlorophyll-a was found to be more rapid than chlorophyll-b with 5ppm of EPTC treatment (Wolf,

1956 and Kaiser Jamil and Shakuntala Devi, 1986). *Cosmarium botrysis* and *Cosmarium praemorsum* proved to be lethal at 0.01 and 0.1 concentrations of Ethyl Methane Sulphonate (EMS) and these two species showed the negative correlations between the amount of total chlorophyll content, here chlorophyll-a found less than chlorophyll-b so chlorophyll –a content effected more at lower concentrations treatment only. This might be due to the toxic effect of EMS (Sathaiah et.al., 1989). The chlorophyll-a is first to be affected by 2,4-D than phycocyanin and carotenoids of *Chlorella pyrenoidosa* ( Bertagnoil and Nadakavukaran,1974). *Pithophora oedogonia* (Mont) Wittrock was markedly affected with chemical mutagen DES and growth of organisms was inhibited and various types of spore formation in *Pithophora oedogonia* (Mont) Wittrock with various pigments was observed by Varalaxmi and Vidyavati (1996). The effect of extract reveals that seed of mustard (*Brassica juncea* L.) retard the growth weight and chlorophyll contents of *Cladophora crispata* (Roth) Kuetz. (Rawal and Gajaria, 2003) .The effect of Periwinkle leaf showed lower the concentration lower the effect on green filamentous alga, *Cladophora crispata* (Roth) Kuetz. and the higher concentration showed to be lethal effect on alga *Cladophora crispata* (Roth) Kuetz.(Mogilli et.al.,1984). Chandrakala and Vidyavati (1987) reported the morphological effect on *Cladophora crispata* by *Azadirachata indica*. A juice leaf extract at 2.0% of concentration and these series proved to be lethal for the species of *Cladophora*. Other two series 1.0% and 1.5% showed the inhibition but it were lesser than 2.0% while bark extract of *Azadirachata indica* A.Juss found less dry weight and survival percentage in *Cladophora crispata* (Roth) Kuetz. Whole plants (including roots) extracts of *Parthenium hysterophorus* L. and *Kalanchoe verticillata* L. effect on fresh and healthy filaments *Rhizoclonium hieroglyphicum* (Ag.) Kuetz. and *Lyngbya confervoides* Ag. ex Gomont showed for the survival on 15<sup>th</sup> day .1.0% of *Parthenium* and 1.5% of *Kalanchoe* extracts showed the growth inhibition from the 7<sup>th</sup> day onwards. It was also noted that the 1.0% and 1.5% onwards concentration series of *Parthenium* and *Kalanchoe* proved to be more effective for the mix algae of *Rhizoclonium* and *Lyngbya* than the pure algae. Higher the concentration series higher growth *Rhizoclonium* and *Lyngbya* inhibition and survival of percentage found in the mixture. (Rawal, 2003).

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