



REGULAR ARTICLE

EFFECT OF MANIPULATED ENVIRONMENTAL CONDITION ON THE DISTRIBUTION OF AERO-ALGAL COUNTS

JOGITA T. PANDKAR

Department of Botany, Fergusson College, Pune, India

ABSTRACT

Reports on occurrence, distribution pattern, listing of aero-algal forms, seasonal calendar, allergenic aero-algal forms, effect of meteorological parameters on occurrence of aero-algal forms etc. has been reported by number of aero phycologists. But solution on reducing such aero-algal counts which can be a possible cause for allergenic reaction has not been suggested until known. Hence preliminary study with respect to effect of manipulated environmental condition on the distribution of aero-algal counts has been done. Presence of cooling tower results into manipulation of the climatic factors, such as temperature and humidity percentage. The high humidity percentage act as an unfavorable condition for the surviving of aero-algal forms resulting into sporulation. This spores required some incubation period under favorable condition to undergo for its vegetative development. This knowledge can be used as a possible solution for the allergenic patients. Manipulation of climatic factors can be done both at intramural as well as extramural sites by using water coolers, A. C, introducing water falls etc. It can be considered as possible manageable solution for patient suffering from allergy due to aero-biological pollutants.

Keywords: Cooling tower, Humidity, Aero-algal counts, Allergy patients, Manipulated climatic factors.

INTRODUCTION

The air we breathe is full of bio-pollutants, one of which is aero-algae. Certain pioneer reference with respect to occurrence, distribution pattern, listing of aero-algal forms, seasonal calendar, allergenic aero-algal forms, effect of meteorological parameters on occurrence of aero-algal forms etc. were reported earlier [1-9]. In India, the earlier passing references were reported [10-28].

Different meteorological factors have different effects on the distribution pattern and percentage occurrence of the aero-algal forms. But studies with respect to manipulated meteorological condition and its effect on the aero-algal counts has never been attempted. Hence the present criteria were considered for further studies.

Material and methods

Aero-algal sampling was carried out at two different industries having cooling tower within their factory premises, using rotarod air sampler [29]. Two parallel

cellophane strips coated with petroleum jelly were mounted across the two bars of the rotarod sampler. Operational time of the sampler was 30 min/sample. One of the strip was mounted on a clean slide with glycerin jelly as mounting medium and other strip was dropped in a sterilized test tube containing B. G-11 culture medium. Cultures were allowed to grow under natural condition and were exposed to north side window under natural light condition. Slide mounting and culture inoculation procedure were carried out at the sampling sites to avoid contamination during transport.

Site-I

Peacock Industry-is a small scale industry manufacturing dye, situated on the Hingana side of M. I.D. C., Nagpur.

Site-II

Paper products Industry-is a small scale industry engaged in the manufacture of specially coated paper (required for costly wrappings as on toilet soaps or for pouch making as of pan-parag etc.) at M. I.D. C Wadi, Nagpur.

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*Corresponding Author

Jogita T Pandkar

Department of Botany, Fergusson College, Pune, India

Email: jogita_pandkar@yahoo.co.in

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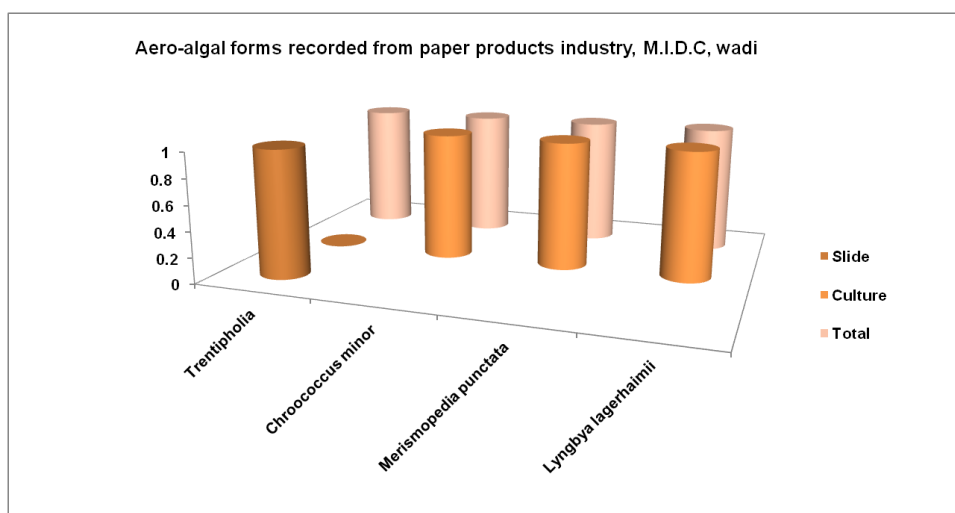
Table 1: Aero-algal forms recorded from peacock industry, M. I.D. C, Hingana

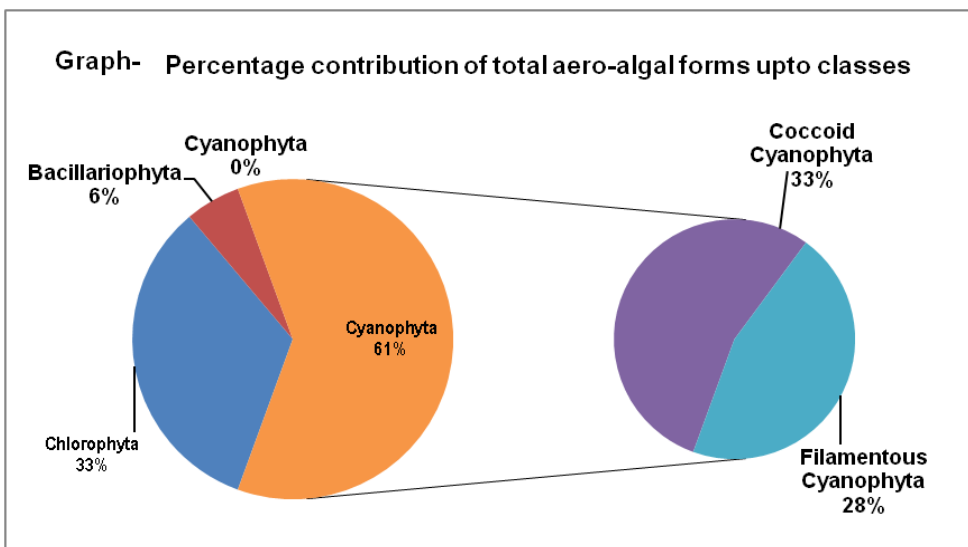
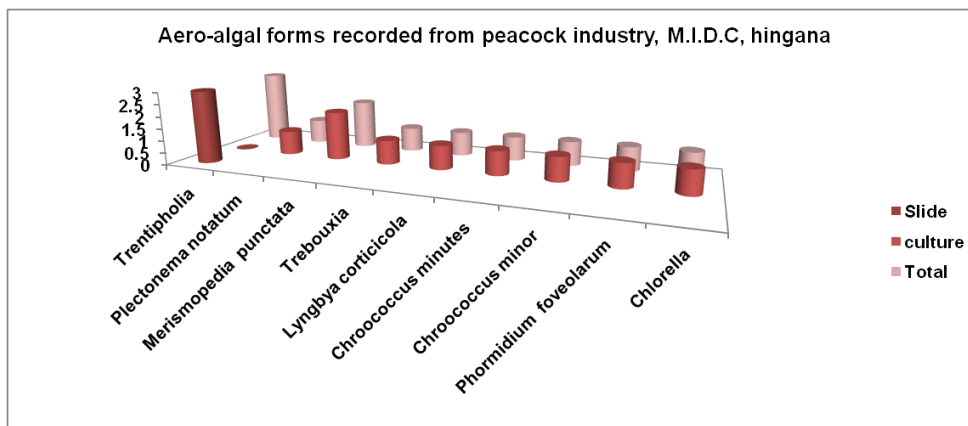
S. No.	Particulars	Slide	Culture	Total
1	Number of samples	2	2	4
2	Total algal forms	3	9	12
3	Cyanophyta	Nil	7	7
4	Cocoid cyanophyta	Nil	4	4
5	Filamentous cyanophyta	Nil	3	3
6	Chlorophyta	3	2	5
7	Bacillariophyta	Nil	Nil	Nil
8	<i>Trentipholia</i>	3	Nil	3
9	<i>Plectonema notatum</i>	Nil	1	1
10	<i>Merismopedia punctata</i>	Nil	2	2
11	<i>Trebouxia</i>	Nil	1	1
12	<i>Lyngbya corticicola</i>	Nil	1	1
13	<i>Chroococcus minutes</i>	Nil	1	1
14	<i>Chroococcus minor</i>	Nil	1	1
15	<i>Phormidium foveolarum</i>	Nil	1	1
16	<i>Chlorella</i>	Nil	1	1

Table 2: Aero-algal forms recorded from paper products, M. I.D. C, wadi

S. No.	Particulars	slide	Culture	Total
1	Number of Samples	1	1	2
2	Algal Forms Recorded	2	4	6
3	Cyanophyta	Nil	4	4
4	Cocoid Cyanophyta	Nil	2	2
5	Filamentous Cyanophyta	Nil	2	2
6	Chlorophyta	1	Nil	1
7	Bacillariophyta	1	Nil	1
8	<i>Trentipholia</i>	1	Nil	1
9	<i>Chroococcus minor</i>	Nil	1	1
10	<i>Merismopedia punctata</i>	Nil	1	1
11	<i>Lyngbya lagerhaimii</i>	Nil	1	1
12	<i>Microcoleus acutissimus</i>	Nil	1	1

Graph-I: Comparative account of aero-algal forms observed





RESULTS AND DISCUSSION

Aero-algal sampling from cooling tower vicinity was done for the first time. All the three samples collected recorded positive for air borne algae (Observation Table-I and II). Cyanophyta was found to be dominant followed by chlorophyta and bacillariophyta respectively (Graph-II). Most of the aero-algal forms encountered have been reported earlier from Nagpur [30-33], Chalisgaon [21,22], Calcutta Metropolis [34,35], Jabalpur [36], Imphal, [23], Bareilly: [37], Pune: [26-28]. Some of them have also been reported from Cairo Districts of Egypt: [38], Mexico: [39, 40]. Some of the recorded forms like *Phormidium*, *Lyngbya*, *Chlorella* and *Microcoleus* reported to be allergenic has been encountered, [11,13, 20,40-43].

Total 18 aero-algal forms were recorded belonging to 9 genera out of which 10 were identified upto species level (observation table-I and II). Only one form, *Trentipholia* a member of chlorophyta group was reported from slide scanning. Remaining all the forms such as *Plectonema*, *Merismopedia*, *Lyngbya*, *Chroococcus*, *Phormidium*, *Microcoleus*, *Trebouxia* and *Chlorella* were recorded from culture only (Graph-I).

CONCLUSION

Presence of cooling tower results into manipulation of the climatic factors, such as temperature and humidity percentage. The high humidity percentage act as an unfavorable condition for the surviving of aero-algal forms

results into sporulation, as also reported by Rosas et al. [39] on variation of airborne algae in Mexico and Evans [44] indicated the survival of certain algae due to modification of vegetative cells during unfavorable condition.

This spores required some incubation period under favorable condition to undergo for its vegetative development. This knowledge can be used as a possible solution for the allergenic patients. This can be achieved by manipulating the humidity percentage at both intramural as well as extramural sites. Manipulation of climatic factors can be done both at intramural as well as extramural sites by using water coolers, A. C, introducing water falls etc. It can be considered as possible manageable solution for patient suffering from allergy due to aero-biological pollutants. This is just a preliminary study with respect to the occurrence of aero-algal forms in two different industrial premises and the effect of cooling tower as a manipulating factor of temperature and humidity percentage on the distribution of aero-algal counts. A further study with respect to suggested possible manageable solution has to be done as a remedy for patients suffering from allergy due to presence of various aero-biological allergens.

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