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EFFECT OF INDUSTRIAL POLLUTION (FROM CHEMBUR ON THE CHLOROPHYLL CONTENT OF WILD PLANTS–I

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Present paper deals with the effect of ambient air from Chembur on the chlorophyll content of plants such as *Amaranthus spinsous*, *Alternanthera sessilis*, *Aegerantum conyzoides*, *Blumea eriantha*, *Cassia tora*, *Euphorbia hirta*, *Eclipta erecta*, *Heliotropium indicum and Malachra capitata*. Ambient air of Chembur inhibited the Chlorophyll content such as chlorophyll—a, chlorophyll—b as well as total chlorophyll of all the species collected from less and highly polluted area, respectively.

Introduction

Pollution hazards as a result of increased industrialization is by now a well known fact. The air pollutants are found to be interferring with the normal functioning of plant body as a result of which loss in production leading to death may take place. A study carried out in Bombay has brought out the following facts. The Chembur-Trombay area, where industries are concentrated, showed three to five times higher values of pollution than the rest of the city. Although in the city as a whole average content of the SO_2 was not very high, there were pockets of higher concentrations in some areas. Plants get affected by air pollution due to sublethal levels of air pollutants which contribute to eventual distribution of the plants, physiological life process affecting the growth, productivity and quality of the vegetation.

Material and Methods

The effect of ambient air (from Chembur) on the chlorophyll content was studied on the following nine species which were collected from highly polluted area of R.C.F. complex of the major pollution causing source. The less polluted area was Ghatala and R.C.F. colony and other clean area of Bombay (Coloba). Fresh collections were made from all the above said sites.

Following species were studied : *Alternanthera sessilis*, *Amaranthus spinosus*, *Aegerantnm conyzoides*, *Blumea eriantha*, *Cassia tora*, *Euphorbia hirta*, *Eclipta erecta*, *Heliotropium indicum and Malachra capitata.*

Chlorophyll was estimated from the 5th leaf from apex of each species. The chlorophyll estimation was done following the method given by Arnon (1949). Leaf material (0.5 gm) was ground with 80% Acetone and a pinch of $MgCO_3$ powder in a mortor and pestile. The extract was centrifuged and supernant was collected. The clear extract then made to a known volume. Readings were taken immediately at 663 and 645 nm. Total chlorophyll was calculated using the formula given by Arnon (1949). Chlorophyll 'a' and 'b' contentents were calculated following the formula of Machlachlan and Zalick (1963), a modification of the original equation of Arnon (1949).

Result and Discussion

Sulphur dioxide forms the cheif constituent of air pollution around Thermal plants which consume low grade coal for power generation (Hesketh, 1973). Air pollutants enter leaves through stomata and then pass into the intercelluler spaces of mesophyll tissue causing various kinds of foliar injuries, such as necrosis, chlorosis, curling and stippling (Crittenden and Read, 1978).

Industrial air pollution inhibited the chlorophyll-a, b and total chlorophyll content of all the species studied. As highlos 50.00%, and as low as 3.12% inhibition in chlorophyll-a was caused by industrial pollution in *A. spinosus*. As high as 50.00%, 47 61%, 38.46%, 28 12%, 26.92%, 21.62%, 20.83% and 18.75% inhibition in chlorophyll-a was observed in *A. sessilis*, *E. hirta*, *A. conyzoides*, *M. capitata*, *B. eriantha*, *C. tora*, *E. erecta* and *H. indicum*, respectively (Table 1). Chlorophyll-b also shows inhibition, due to industrial pollution, upto 80.00%, 42.10% 41.66%, 28.57%, 27.27%, 26.60%. 17.85%, 17.64% and 13.63% in *A. spinosus*, *A. canyzoides*, *E. erecta*, *B. eriantha*, *M. capitata*, *C. tora*, *H. indicum*, *E. hirta*, respectively.

According to Rabe and Kreb (1979), chlorophyll contents in plants indicate the pollution level. There is a connection between the level of pollution and the reduction of compounds in the plant tissue. Mamilton (1987), showed that there was chlorophyll variance in periphyton communities after herbicide exposure. Maston *et al* (1972) showed that there was inhibition of biosynthesis of chlorophyll in fresh water algae growing in polluted water. Due to water pollution there is adverse effect on chlorophyll content of the plant species (Shetye, 1982).

Total chlorophyll was also inhibited in the species under investigation due to industrial air pollution. As high as 46.34%, 43 13%, 30.43%, 30.23%, 29.16%, 29 03%, 26 66%, 21.42% and 20.33% inhibition was observed in *A. spinosus*, *A. conyzoides*,

Table 1 : **Effect of Industrial Pollution (From Chembur) on the Chlorophyll content of wild Plants-I**
(Values given are mean ± SE of 20)

Species	Sites	Chlorophyll 'a'		Chlorophyll 'b'		Total Chlorophyll		Ratio a/b	
		P	%DFC	P	%DFC	P	%DFC	P	C
A. sessilis	I	0.34±0.004	05.88	0.29±0.002	03.44	0.62±0.009	04.83	1.17±0.010	1.20±0.010
	II	0.26±0.002	38.46	0.20±0 001	50.00	0.46±0.007	30.43	1.30±0.013	
A. spinosus	I	0.32±0.003	03.12	0.26±0.003	03.84	0 56±0.006	07.14	1.22±0.015	1 22±0.009
	II	0.22±0 002	50.00	0.19±0.001	42.10	0.41±0.003	46.34	1.13±0.009	
A. conyzoides	I	0.37±0.003	05 40	0.32±0.002	06·25	0.69±0.007	05.99	1.15±0.011	1 14±0.013
	II	0.29±0.002	34.48	0.24±0.001	41.66	0.51±0.004	43 13	1.20±0.010	
B. eriantha	I	0.30±0.003	10.00	0.26±0.003	07.69	0.56±0.008	10.71	1.14±0 007	1 22±0.012
	II	0.26±0.001	26.92	0.22±0.003	27.27	0.48±0.003	29.16	1.18±0.012	
C. tora	I	0.42±0.003	07.14	0.38±0.004	05.26	0.78±0.005	08.97	1.08±0.018	1.12±0.007
	II	0.37±.0.002	21.62	0.34±0.003	17.64	0.70±0.003	21.42	1.07±0.013	
E. hirta	I	0.29±0.003	06.89	0.24±0.002	04.16	0.52±0.006	07.69	1.20±0.015	1.24±0.011
	II	0.21±0.004	47·61	0.22±0.001	13.63	0.43±0.003	30.23	0.93±0.012	

Table 1. (*Continued*)

Species	Sites	Chlorophyll 'a'		Chlorophyll 'b'		Total Chlorophyll		Ratio a/b	
		P	%DFC	P	%DFC	P	%DFC	P	C
E. erecta	I	0.27±0.003	07.40	0.25±0.001	08.00	0.50±0.002	14.00	1.060.±010	1.07±0.008
	II	0.24±0.002	20.83	0.21±0.003	28.57	0.45±0.003	26.66	1.12±0.008	
H. indicum	I	0.36±0.002	05.25	0.32±0.002	03.12	0.69±0.007	04.41	1.11±0.009	1.15±0.012
	II	0.32±0.003	18.75	0.28±0.003	17.85	0.59±0.009	20.33	1.13±0.012	
M. capitata	I	0.39±0.002	07.69	0.36±0.004	05.55	0.74±0.010	08.10	1.08±0.013	1.10±0.010
	II	0.33±0.004	28.12	0.30±0.003	26.66	0.62±0.007	29.03	1.10±0.007	

C, control; DFC, difference from control; P, polluted; —, inhibition.

A. sessilis, *E. hirta*, *B. eriantha*, *M. capitata*, *E. erecta* and *C. tora*, respectively.

SO_2 sbsorbed by a lichen thallus causes degradation of chlorophyll-a, due to the destructive tendency of sulphur dioxide towards the photosynthetic pigments of the algal components of Lichens (LeBlank and Rao, 1966). The size of the leaves was smaller in the polluted area when compared to clear areas. Similar observations were made by Martin and Clements (1935) in wind exposed plants. It is often observed that stress situation like wind or pollutants affects cell formation and cell expansion adversely.

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