



INVESTIGATION OF IMPACT OF AIR POLLUTANTS ON CHLOROPHYLL CONTENTS OF SOME MEDICINAL PLANTS AROUND INDUSTRIAL BELT OF AMRAVATI (M.S).INDIA

More K.C¹., Gawande. P.A*², Manik V. S³ and Likhari N.D⁴

^{1,2,4}Department of Botany, Sant Gadge Baba Amravati University, Amravati (MS) India

³Department of Environmental Science, Gramgeeta Mahavidyalaya, Chimur Dist. Chandrapur (M.S). India

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ABSTRACT

The present findings has been undertaken to explore the impact of air pollutants on chlorophyll contents of some medicinal plants species around industrial belt of Amravati city. The four different plant species were selected from industrial belt area namely *Azardirachta indica*, *Polyalthia longifolia*, *Ficus benghalensis* and *Datura stramonium*. The higher chlorophyll-a content of controlled area were observed in leaves of *Ficus benghalensis* and it was found to be 1.980 mg/ 0.1g tissue, whereas, in leaves of *Ficus benghalensis* belonging to industrial belt area shows reduction in chlorophyll contents i.e. 1.370mg/0.1g tissue. The chlorophyll contents among all plant under studies were found to be reduced in industrial belt area as Compared to controlled area. The reduction in chlorophyll content has been used as an indicator of air pollution due to its sensitivity towards air pollutants. Exposure to particulate deposition may alter plant growth and its physiology without physical damage to the plants.

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INTRODUCTION

The increased demand of food and goods required for mankind creates the enormous pressure on industrial sectors for its continual growth that leads to deteriorating the air quality and found to be a big impact on life cycle of organisms. Due to increasing level of air pollutants from industrial and automobile sectors, the plants are getting adversely affected in the form of reduction in photosynthesis. It is reported that the reduction in chlorophyll contents in plants which are grown in polluted zones (Nithamathi, C. P., and Indir A, V, 2005). Pollutants affect on the carbon absorption capacity of plants which alters the physiological functionality of the plants. There is a common air pollutants are carbon monoxide, lead, oxides of nitrogen (NO_x), volatile organic compounds (VOCs), sulfur dioxide (SO₂), carbon dioxide (CO₂), fine particles and other toxic chemicals shows its impact on growth of plants (Wittenberghe *et al.* 2013). The pollution level can be monitored by using plants biochemical profiling, these plants act as biomitigators by which researchers can mitigate and monitors the level of pollutants in respective areas. (Kapoor CS and Chittora AK, 2016).

Most of the cities in India facing pollution as a big environmental problem because of increasing industrial zones. Epidemiological research conducted in the world showing strong resemblance between urban pollution and human diseases. (Dockery DW *et al.*, 1993).

MATERIAL AND METHOD

Sample Collection

The healthy leaves samples of medicinal plants viz *Azardirachta indica*, *Polyalthia longifolia*, *Ficus benghalensis* and *Datura stramonium* were collected from the polluted site of M.I.D.C area Amravati (M.S) India. For the control sites the area near to Sant Gadge Baba Amravati University campus was selected.

Extraction and determination of Chlorophyll contents

Chlorophyll 'a', 'b' and total chlorophylls were extracted from the leaves of medicinal plants selected for study (Maclachlan and Zalik 1963). One gram of fresh leaf samples were macerated in 10ml of 80% (v/v) acetone and centrifuged at 1000 rpm for 10 minutes to clear the suspension supernatant, which contained soluble pigment and was used for the determination of chlorophylls. One ml of solution was used for detection of chlorophyll content by spectrophotometer;

*Corresponding author: Gawande. P.A

Department of Botany, Sant Gadge Baba Amravati University, Amravati (MS) India

absorbance of the extract was recorded at 663 and 645nm on spectrophotometer against 80% (v/v) acetone blank.

Calculation of chlorophyll contents

The amount of chlorophyll i.e. Chlorophyll a, Chlorophyll b and total Chlorophyll was calculated according to Arnon D. I. (1949) by using following formula:

$$\text{Chlorophyll (a) in mg/g tissue} = 12.7 (A663) - 2.69 (A645) \times V / 1000 \times W$$

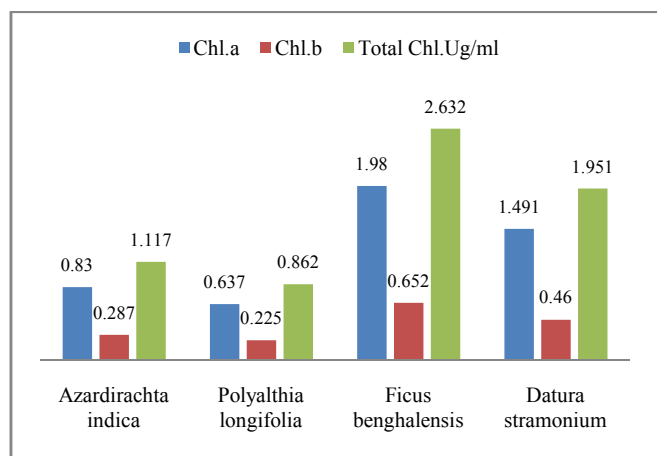
$$\text{Chlorophyll (b) in mg/g tissue} = 22.9 (A645) - 4.68 (A663) \times V / 1000 \times W$$

$$\text{Total chlorophyll (mg per g tissue)} = 20.2 (A645) + 8.02(A663) \times V / 1000 \times W$$

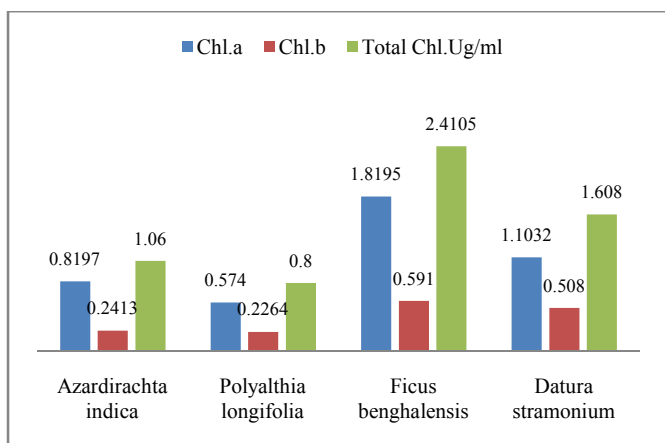
OBSERVATION AND RESULTS

Table 1 Spectrophotometric determination of Chlorophyll ‘a’, Chlorophyll ‘b’ and total chlorophyll in ug/ml from control site (Non Polluted) and polluted site under study

Sr.No	Name of plant	Non Polluted Site (Control)			Polluted Site		
		Chl.a	Chl.b	Total Chl.Ug/ml	Chl.a	Chl.b	Total Chl.ug/ml
1	<i>Azadirachta indica</i>	0.830	0.287	1.117	0.8197	0.2413	1.060
2	<i>Polyalthia longifolia</i>	0.637	0.225	0.862	0.574	0.2264	0.800
3	<i>Ficus benghalensis</i>	1.980	0.652	2.632	1.8195	1.515	2.298
4	<i>Datura stramonium</i>	1.491	0.460	1.951	1.1032	0.508	1.608



Graph 1 Variation in chlorophyll content from non polluted site in ug/ml



Graph 2 Variation in chlorophyll content from polluted site in ug/ml.

DISCUSSION

The present work was conducted for preliminary investigation of impact of air pollutants released from the M.I.D.C zone of Amravati (M.S.). India, for comparative assessment the plants near to Sant Gadge Baba Amravati University campus were taken as a control. The physiological parameters like Chlorophyll ‘a’ b’ and total chlorophyll of plants namely *Azadirachta indica*, *Polyalthia longifolia*, *Ficus benghalensis* and *Datura stramonium* were studied. From the observations it was revealed that the chlorophyll contents belonging to non Polluted (Control) zone of plants under study were found to be higher in leaves of *Ficus benghalensis* i.e. 1.980 mg/ 0.1g tissue (table no.1),whereas, in leaves of *Ficus Benghalensis* belonging to industrial belt area shows reduction in chlorophyll contents i.e. 1.370mg/0.1g tissue (table no. 2). The concentration of Chl ‘a’ in the leaves of *Azadirachta indica* were reduced due to roadside vehicular exposure reported by Sumitra Giri *et al.*,(2013). Moreover, the chlorophyll content was found to be reduced in the samples of plants derived from polluted sites. The *Polyalthia longifolia* chlorophyll ‘a’ was found to more susceptible as compare to its chlorophyll ‘b’. The continuous deposition of air pollutants and particles on leaves of plants leading to decreasing its productivity and hampering the growth and life cycle of the plants. The pollutants adversely affects on the photosynthesis of plants which are grown near to industries and road sites (Chauhan and Joshi, 2008).

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