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EFFECT OF ENVIRONMENTAL POLLUTION ON ROAD SIDE PLANTS IN INDORE CITY.(M.P.) INDIA

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ABSTRACT

Our environment is consisting of atmosphere, earth, water and space. Environment mainly Centre's around this man- made world and its environment as created by human agency. Industrial revolution is aimed at improving and maintains human existence, in increasing comfort, and safeguarding national interests. Green revolution is geared to the elimination of poverty and hunger , progress in transport and communication technology , to making life more comfortable .By the many activities of man, the composition and complex nature of environment gets changed. These activities include industrialization, population explosion construction, and transportation. Such activities, are necessary for human development and welfare,.

Keywords: Environmental Pollution, Nerium Indicum Optical Density, Pollutants, Abernamontana Diverticum

I. INTRODUCTION

Environment pollution is a worldwide problem and its potential to influence the health of human populations is great (Fereidoun et al, 2007(1) Progressive Insurance, 2005.).(2)According to Mishra (2003) 3.rapid growth in urban population, rapidly industrialization, and more demands for energy , motor vehicles are responsible for detioration of environmental pollution levels. The other factors, like poor environmental regulation, less efficient technology of production, congested roads, and poor maintenance of vehicles, further problem is that air pollution caused of ill health and death by natural and man-made sources of air pollution .,Major man-made sources of ambient air pollution include tobacco smoke, combustion of solid fuels for cooking, heating, home cleaning agents, insecticides industries, automobiles, power generation, poor environmental regulation, less efficient technology of production, congested roads, and age and poor maintenance of vehicles. Sources of Environmental pollution. are burning of coal and coke, industrial emissions, commercial activities, and transportation. Air pollution is caused by burning sulphur containing fuels. Though wood causes zero pollution, its calorific value is poor, while fuel oil produces pollution due to SO2 but it has high calorific value

II. STUDY AREA

Indore district lies in the heart of Malwa Plateue. Indore is located geographically between 23° 37' 29° 66' N 75° 46'86" E and 22° 48'34" N 75° 56'32" E at an average altitude of 553 meters from the sea level and densely populated commercial capital of Madhya Pradesh with a Population of over 3,276,697 lakh and Density 839 per Sq. Km. (Reported in the year 2011). Indore is located in the western region of Madhya Pradesh on the

southern edge of the Malwa plateau. It has an average elevation of 553.00 meter above mean sea level. It is located on an elevated plain, with the Vindhya range to the south

III. MATERIAL AND METHODS

3.1 Sample Collection

In our investigation, study of two dominated plant species *Nerium indicum,* and *Tebernamontana diverticum* were selected and sample randomly collected 10 replicates of leaves which continuously exposed to polluted site (Pologround industrial area) and the another sample of leaves were collected from non-polluted site Govt. Maharani Laxmi Bai Girls P. G. College campus , Fort Indore which recorded as a control site. It is a covered area and away from road side ,noted as non-polluted site. The study was carried out during year 2013. Leaf samples of shrubs like *Nerium indicum* and *Tebernamontana diverticum* plant species grown road side (pologround). polluted site and non-polluted i.e., Botanical garden college campus as control site. leaves were collected from iso ecological conditions (light, water and soil) About 30 leaf samples were taken from each individual of a species plants. The leaf sample observed with the help of hand lens for studied visible injury necrosis, chlorosis, flecks, stipples, bronzing etc. Leaf lengths (cm), breadth (cm), area (cm2) were determined by using leaf area meter (CI-202, USA) and graph paper method. The biomass of leaf express in terms of weight per unit area, oven dry at 70^0C. The other selected parameters study in laboratory are pH of cell sap by digital pH Meter (MK-VI Systronic), electrical conductivity by digital conductivity meter (304 Systronic) The absorption spectra of leaf cell sap sample was taken of quantity 50 ml. leaf cell sap for optical density measure by preparing five solutions of different concentration and by the help of UV visible spectrophotometer we got absorbance value.

IV. RESULT AND DISCUSSION

In assessing the source of pollution in this sub continent , the principal factor appears to be over population. Due to the enormous rate of increases in population , there has been a heavy demand on natural resources including the air, soil, water ; the floral and faunal wealth , resulting in serious dis balance in the ecological system . The tremendous increase in mobilization of human society has resulted in phenomenal rise in vehicular traffic on the major road ways. The vehicles discharge harmful gases like carbonmonoxide , sulphur-di-oxide, oxides of nitrogen etc large amount of exhaust emission.75% of the air pollution takes place through exhaust gases from automobiles (Chandra Bhora and Arvind Kumar,2004)[4] The most common effect of air pollution is the slow disappearance of chlorophyll and gradual yellowing of leaves, which may be decrease the capacity of photosynthesis Carreras et al.1996 5 Joshi, P.C. and A. Swami, 2007 .6. The study of two dominated road side plant showed impact of air Pollution. The result recorded in the data table No. 01 ,02,03 and 04 showed that the different physiological changes observed specially plant part leaf due to probably emission of SO_2 and NO_2 and other gases in the air . These gases deposited on the leaves so changes occur in pH and electrical conductivity of cell sap of leaves . These parameters compare with the two plant species. All the investigated parameters in the plants species of *Nerium indicum* and *Tebernamontana diverticum* at polluted site Pologround with respect to non-polluted site botanical garden, which might be due to heavy air pollution in the city. Similar observations were also reported by many other workers like Silva *et al.*, 2005 (7) Rao, 2006(8) Stevovic *et al.*, 2010.(9)

The data indicate that in Table No. 01 Nerium indicum the Non polluted site pH of cell sap towards neutral while in more polluted site the pH of cell sap towards acidic ,similarly the another plant species Tebernamontana diverticum the pH of cell sap trend towards acidic in polluted site than less polluted site. The parameters like pH of cell sap of sample leaves are given in table 1 and table 2. The data clearly indicate that pH of more polluted site are more acidic than non -polluted sample leaves. The effect of air pollution on the pH of cell sap of leaves supported by number of workers like Kumawat and Dubey 1988 10. Rao1977 11 the toxic gases, dust, smoke SO2, NO2 and SPM change the pH of cell sap which deposited on leaf surface In more polluted area. 6.28 pH recorded in Nerium indicum and 6.12 Tebernamontana diverticum Nerium indicum.> Tebernamontana diverticu

The leaf area of sample leaves of Nerium indicum. recorded (TABLE NO. 1) from non- polluted site is 36.95 $cm^2$and from more polluted site the leaf area recorded is 32.00 cm^2 so % reduction occur 13.39 while in another dominated shrub Tebernamontana diverticum the leaf area of sample leaves of recorded from non -polluted site is 28.15 and from more polluted site is 26.95 so % reduction occur 4.26 . (TABLE NO.2). The other parameters of biomass of leaves and their ratio recorded in (TABLE NO. 1) and (TABLE NO.2).The data showed that air pollution enhance the biomass of polluted site. The internal part of leaves affected by pollutants that deposited on the surface of leaves and leaf morphology changes. The experimental data indicates that the reduction in leaf area is due to air pollution. The parameter pH of leaf wash, pH of cell sap and electrical conductivity of leaf cell sap showed that air pollutant content like SO_2 and NO_2 and suspended particle matter affect the physiology of plants.

Leave morphology, visible injuries and vegetation affected by air pollutants etc. work have been done nationally and internationally by Naveed et al., 2010(12) Seyyed and Koochak 2011.(13) In India few works have been done by Tiwary et al., 2006 (14) Saquib et al., 2010;(15) Deepalakshmi, 2013(16) but many researchers have been documented on physico-chemical analysis of air pollutants, no one has tried to establish bioindicator study in relation to foliar morphology especially L, B and L/B ratio and visible injuries of leaves of four common trees near roadside at Kolkata, India.

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Observation Table

Table No. 1Different Parameters of Leaves of Nerium indicum

S.N.	Parameters	Non polluted site (NPS)	polluted Site (PS)	Percentage reduction %
1.	pH cell sap	6.80	6.28	7.64
2.	Electrical conductivity Of cell sap micromohs	0.51	0.22	56.86
3.	Leaf area cm^2	36.95	32.00	13.39
4.	Biomass gm/m^2	23.766	26.800	12.766
5.	Leaf area Biomass ratio	1.554	1.194	23.166

Table No. 2 Different Parameters of Leaves of Tebernamontana Diverticum

S.N.	Parameters	Non polluted site (NPS)	polluted Site (PS)	Percentage reduction %
1.	pH cell sap	6.20	6.12	1.29
2.	Electrical conductivity Of cell sap micromohs	0.38	0.19	50.00
3.	Leaf area cm^2	28.15	26.95	4.26
4.	Biomass gm/m^2	21.966	24.310	10.671
5.	Leaf area Biomass ratio	1.281	1.108	13.505

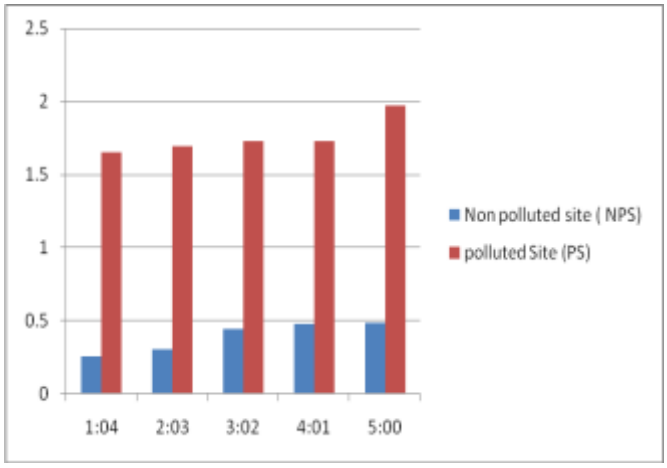

Fig. 1 Absorbance of Cell Sap of Nerium Indicum In Methanol

Standared Deviation (σ) = 0.094

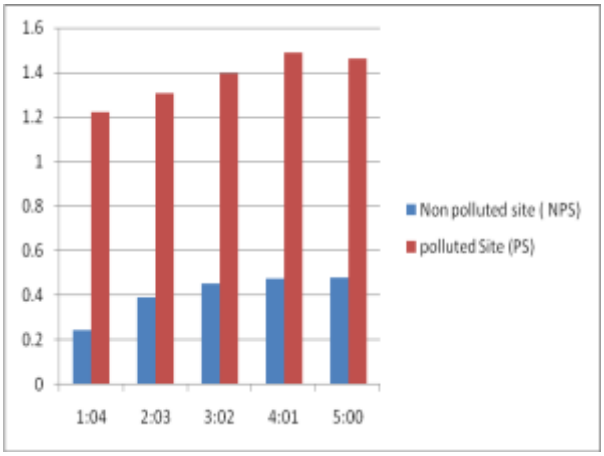

Fig. 2 Absorbance of Cell Sap of Tebernamontana diverticum in methanol

Standared Deviation (σ) = 0.101

Table No. 3 Absorbance of Cell Sap of Nerium Indicum In Methanol

S.No.	Concentration of cell sap and distilled water	Non polluted site (NPS)	polluted Site (PS)
1	1:4	0.256	1.652
2	2:3	0.308	1.697
3	3:2	0.442	1.727
4	4:1	0.481	1.732
5	5:0	0.489	1.973

Standared Deviation (σ) = 0.094

Table No.4 Absorbance of Cell Sap of Tebernamontana Diverticum in Methanol

S.No.	Concentration of cell sap and distilled water	Non polluted site (NPS)	polluted Site (PS)
1	1:4	0.244	1.222
2	2:3	0.389	1.307
3	3:2	0.453	1.394
4	4:1	0.475	1.488
5	5:0	0.479	1.462

Standared Deviation (σ) = 0.101