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EVALUATING DUST CAPTURING POTENTIAL OF SOME ROADSIDE PLANTS OF PURSURAH, HOOGHLY DISTRICT, WEST BENGAL (INDIA)

Animesh Maji[1], Moumita Das[2*], Ambarish Mukherjee[2]

1.Central National Herbarium, Botanical Survey of India, Botanic Garden, Howrah – 711103, India.

2.UGC Centre for Advanced Study (Phase II), Department of Botany, University of Burdwan, Burdwan-713104,India

ABSTRACT: The present work reveals the dust capturing potential of nine selected plant species which predominate in the Pursurah of Hooghly district in the West Bengal state of India with an objective to find their serviceable value in environmental optimization of the area and landscape designing for aesthetic rejuvenation. The highest and the lowest dust deposition rates were observed in *Pouzolzia hirta* and *Stephania japonica* respectively. Thus plants can be used in the appeasement of dust pollution by acting as natural filters.

KEYWORDS: Dust capturing potential, environmental optimization, natural filters.

***Corresponding Author: Moumita Das**

UGC Centre for Advanced Study (Phase II),

Department of Botany, University of Burdwan, Burdwan-713104,India.

* Email Address: moumitataxonomy@gmail.com

1. INTRODUCTION

Now a day's air pollution is one of the most challenging issue accepted globally. The major causes of air pollution are industrialization, unplanned urbanization, Burning Fossil Fuels, increasing population growth and vehicle number. There are several air pollutants among them these six pollutants are carbon monoxide, lead, ground-level ozone, nitrogen dioxide, particulate matter, and sulfur dioxide most important. The atmospheric dust particles perceive their way onto the leaf surfaces on the roadside either under gravity or firmly fixed due to wind. Evaluation of the dust

absorbed by the leaves as well as in the leaf tissues makes plants as suitable bio monitor of air pollution. Several researches going on the dust deposition/capture capacity of different plants species in urban areas and the vicinity of large industrial plants of world [1, 2, 3, 4, 6, 7] Dust capturing potential is directly proportion to pH whereas inversely proportion Relative Water Content and chlorophyll content [5]. The dust capturing potential is an important parameter for assessment to air pollution status in a locality that's why the present study was undertaken.

2. MATERIALS AND METHODS

2.1 Study site

The study area i.ePursurah in Hooghly district of West Bengal, India [Fig.1] possesses the latitudes 22.8385°N and longitudes 87.783292 °E covers the total area of 96.92 km^2. It is about 7 kilometers away from Tarakeswar. Pursurah block is bounded by Raina II Block, in Bardhaman district, in the north, Dhaniakhali, Tarakeshwar and Jangipara Blocks in the east, and Udaynarayanpur Block, in Howrah district, and Khanakul I and Khanakul II Blocks in the south and Arambagh Block in the west.

Figure 1: Pursurah in Hooghly district of West Bengal, India.

Source: http://www.hooghlydistrict.info/hooghly-district-Blocks.html

2.2 Dust retention evaluation/ Dust capturing potential

The 9 dominant plant species were selected for foliar dust retention evaluation. For each species, 5 leaves were randomly collected and Sampling was conducted 10 days after rain to avoid precipitation

interference. The leaves were subsequently placed in 100mL beakers filled with 50 mL deionized water, and shaken by a sonicator for 30 s. The procedure was repeated twice. The resulting solution was vacuum filtered through pre weighted filter paper with a pore size of 0.45 μm. The loaded filter paper was dried at 105°C in an oven to a constant weight. Dust retention was calculated based on weight differences between oven dried filter paper before and after filtrations [2,4,7]. Dust retention (g/cm) values were defined as dust weight divided by leaf area (cm2).

3. RESULTS AND DISCUSSION

We have measured the dust capturing potential of nine different plant genera occurred in the roadside area of Pursurah in Hooghly district of West Bengal.

Table: Meteorological data for determination of dust capturing potential

Name of Plant	No. of replica	W_1 (g)	W_2 (g)	L (cm)	B (cm)	$W_1 - W_2$ (g)	L X B (cm^2)	DC(g/cm^2)	DC_A (g/cm^2)
***Clerodendrum indicum* (L.) Kuntze**	1	2.45	2.00	13	8.9	0.45	115.7	0.0039	**0.00228**
	2	3.61	3.51	13.2	9	0.10	118.8	0.0008	
	3	3.37	3.28	12	8.9	0.09	106.8	0.0008	
	4	1.26	1.09	8.5	5	0.17	42.5	0.0040	
	5	0.72	0.66	7.3	4.4	0.06	32.12	0.0019	
***Ficus recemosa* L.**	1	3.34	2.27	19	10.9	1.07	207.1	0.0052	**0.00212**
	2	3.35	2.91	20	10.1	0.44	202	0.0022	
	3	3.17	3.05	15.8	8.7	0.12	137.46	0.0009	
	4	3.33	3.06	19	11	0.27	209	0.0013	
	5	3.47	3.25	19.1	10.9	0.22	208.19	0.0010	
***Glycosmis pentaphylla* (Retz.) DC.**	1	0.78	0.72	11.4	4.3	0.06	49.02	0.0012	**0.00176**
	2	0.40	0.33	7.6	3	0.07	22.8	0.0031	
	3	1.22	1.13	13.2	5.4	0.09	71.28	0.0013	
	4	0.41	0.35	8.5	3.1	0.06	26.35	0.0023	
	5	0.4.	0.38	7.5	3	0.02	22.5	0.0009	
***Heliotropium indicum* L.**	1	0.21	0.19	4	2.3	0.02	9.2	0.0022	**0.00152**
	2	0.25	0.23	5.5	2.5	0.02	13.75	0.0015	
	3	0.15	0.14	4	2.1	0.01	8.4	0.0012	
	4	0.27	0.24	5.8	2.6	0.03	15.08	0.0019	

	5	0.20	0.19	4.8	2.7	0.01	12.96	0.0008	
***Mikania micrantha* Kunth**	1	1.51	1.42	7.1	7	0.09	49.7	0.0018	
	2	2.02	1.95	10	7.2	0.07	72	0.0010	
	3	1.65	1.60	8.3	7.8	0.05	64.74	0.0008	**0.00112**
	4	2.60	2.53	9	7.9	0.07	71.1	0.0010	
	5	1.30	1.26	6.5	5.8	0.04	37.7	0.0010	
***Pouzolzia hirta* Blume ex Hassk.**	1	0.06	0.05	2.4	1.9	0.01	4.56	0.0022	
	2	0.18	0.15	4	2.5	0.03	10	0.0030	
	3	0.15	0.14	4.2	2.6	0.01	10.92	0.0009	**0.00236**
	4	0.12	0.11	3.5	2	0.01	7	0.0014	
	5	0.08	0.06	2.5	1.8	0.02	4.5	0.0044	
***Solanum diphyllum* L.**	1	0.71	0.67	12.1	4.4	0.04	53.24	0.0008	
	2	0.55	0.52	9.8	3.7	0.03	36.26	0.0008	
	3	0.41	0.39	8	3.3	0.02	26.40	0.0007	**0.00088**
	4	0.39	0.36	8.5	3.2	0.03	27.2	0.0011	
	5	0.28	0.26	7	2.9	0.02	20.3	0.0010	
***Stephania japonica* (Thunb.) Miers**	1	0.53	0.49	5.9	5.6	0.04	33.04	0.0012	
	2	0.62	0.58	6.6	6.5	0.04	42.9	0.0009	
	3	0.51	0.49	6	5.9	0.02	35.4	0.0006	**0.00010**
	4	0.40	0.37	5.5	4.8	0.03	26.4	0.0011	
	5	0.21	0.19	4	4.1	0.02	16.4	0.0012	
***Trema orientalis* (L.) Blume**	1	0.40	0.38	8.1	3.9	0.02	31.59	0.0006	
	2	0.33	0.31	7.3	3.8	0.02	27.74	0.0007	
	3	0.69	0.64	9	5.7	0.05	51.3	0.0010	**0.00084**
	4	0.52	0.49	9	3.9	0.03	35.1	0.0009	
	5	0.39	0.36	7.7	3.8	0.03	29.26	0.0010	

W_1= Weight of Leaf with dust, W_2= Weight of Leaf without dust,L= Length of the leaf, B= Breadth of the leaf, L X B= Total leaf area, $W_1 - W_2$= Weight of the dust, DC= Dust Capturing Potential, DC_A= Average of DC

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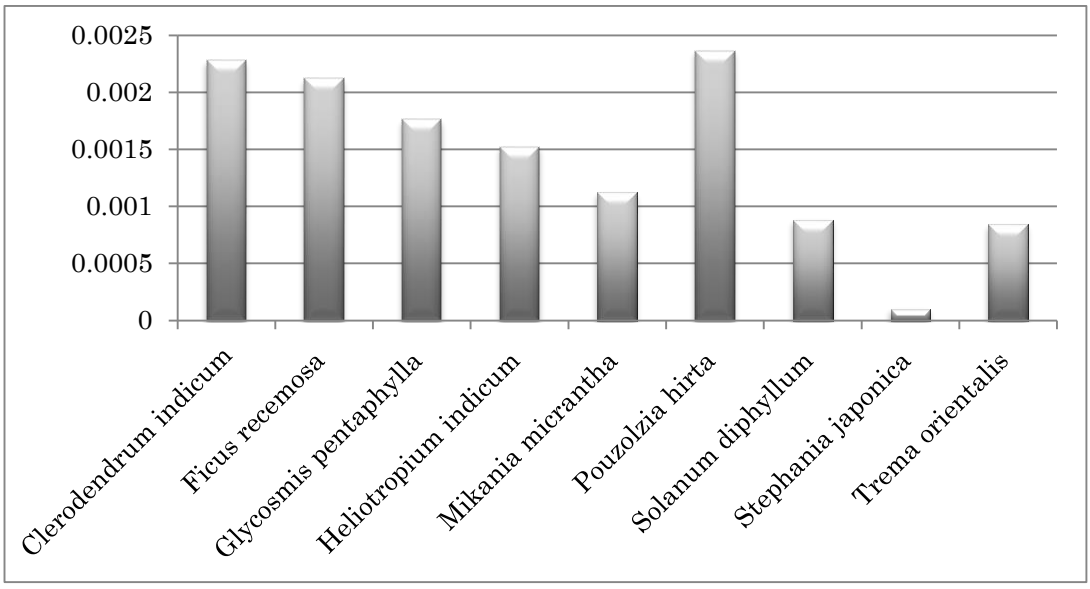

Fig 2: Bar graph representing the Dust Capturing Potential of Plant species.

Dust capturing potential of the plants varies from species to species and the results speaks that highest dust capturing potential having plant is *Pouzolzia hirta* followed by *Clerodendrum indicum* and *Ficus recemosa* whereas lowest potential having plant is *Stephania japonica* (Table 1 and Fig 2).

4. CONCLUSION

From the findings of the present work it is clear that dust capturing potential varies from species to species, the best in the act being Pouzolziahirta successively followed in order of merit by *Clerodendrum indicum, Ficus recemosa, Glycosmispentaphylla, Heliotropiumindicum, Mikaniamic rantha, Solanum diphyllum, Tremaorientalis, Stephania japonica*. While summing up it can be said that the present work offers, recommendation for planting in parks or garden especially in urban or industrial areas by these plant species.

CONFLICT OF INTEREST

The authors have no conflict of interest.

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