

IMPACT OF AUTO-EXHAUST LEAD POLLUTION ON VEGETATION

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Tetramethyl lead and tetraethyl lead, the antiknock additives to petrol causes of serious effects on human nervous system. There is an alarming high incident of mental retardation (upto 40%). They also cause anaemia. Amounts of lead injected into the atmosphere from burning petrol in driven vehicles, on sedimentation, contaminates the soil as well as vegetation. Interest has grown in recent years on the problem of effects on human health of environmental exposure to lead.

EXPERIMENT :

For this experiment ten different locations, each adjacent to a petrol pump, were selected. 'Balipan', 'Birikoli' and 'Maghi' varieties of (Piper betle *L*) were taken up for study. The otted plants with same variety of soil, were kept at those three locations and one was kept in the Ravenshaw College, Cuttack as control. Leaves were collected after 8 months of planting.

The leaves of the plant from ten locations was analysed in triplicate for lead content using mixture of nutric acid and sulphuric acid (Jackson, 1958). Then they were separately processed on atomic absorption spectrophotometer for the estimation of lead. The results are tabulated under Table 1. Maghi.

Leaves were estimated for chlorophyll content following Amon, 1949. Reducing sugars were estimated by Nelson's 1044 method and total sugar and starch by Yoshida's method, 1972. Nitrogen was estimated by microkjeldahl method.

Protein was calculated by using the conversion factor NX 6.25 (Jackson, 1958). Phenolic compounds were estimated following the procedure of Bray (1954), Vitamin-C by Mapson (1961) and total amino acids by Lee (1966) method.

DISCUSSION :

The lead content of plants from different locations are presented in Table 2. A, B and C. It is seen from the result that near the petrol pumps the lead content of plants is higher than that of controlled plants.

It is seen from the data, given under Table 2 A, B and C that there is a reduction in the contents of total chlorophyll, protein and amino acid of leaves than to the controlled plants.

The electronic configuration of lead is $6s^2, 6p^2$, it exhibits valency 2. The vacant s orbitals may be filled up with the formation of covalent bonds. It may combine with sulphur atoms in a protein in a biological system. Biochemical legends like amino groups, carboxyl groups, phenoxy groups and imidazole of biochemical molecules would be altered by lead and hence their biochemical roles would be altered by lead and hence their biochemical roles would be altered or destroyed.

TABLE 1 : Lead content in plants of the three different varieties of pan (Piper Betle *L.*) plant at ten different location (Mg/G dry wet of lead).

Locations	Lead Content		
	Balipan	Maghi	Birikoli
1. Ravenshaw College (Control)	140	147.63	155
2. Dolamundai	212	217	177.87
3. Jagatpur	220	173.53	187.973
4. Balikuda	306	312	309
5. Telengapentha	144.28	174.573	161.3
6. Fulnakhara petrol pump	311.5	316.65	318
7. Pahala petrol pump	331.873	337	323.5
8. Puri Main Canal (Balianta)	357	369.77	366
9. Rasulgarh	390	396.93	399.67
10. Vani-Vihar crossing	163.67	197.56	201
11. C.R.P.Square	199.789	186.79	147.873

TABLE: 2(A) : Biochemical contents in leaves of 'Balipan' (Average of 3 Replications)

	Location	Chlorophyll (%)			Sugar (%)			Phenolic compounds (%)	Vit-C mg/100 gm.	Total nitrogen (%)	Protein (%)	Amino acids (%)
		a	b	Total	Reducing	Total	Starch					
1.	Ravenshaw College (Control)	0.427	0.417	0.844	1.88	2.88	1.03	0.51	210.5	0.467	2.921	0.317
2.	Dolamundai	0.382	0.377	0.759	1.86	2.87	1.03	0.503	209.8	0.470	2.74	0.267
3.	Jagatpur	0.376	0.374	0.750	1.89	2.84	1.00	0.50	210.9	0.476	2.726	0.260
4.	Balikuda	0.359	0.361	0.720	1.89	2.86	1.00	0.50	211.0	0.468	2.692	0.249
5.	Telengapentha	0.361	0.386	0.747	1.79	2.79	1.009	0.446	198.0	0.476	2.975	0.327

6.	Fulnakhara petrol pump	0.367	0.392	0.759	1.81	2.67	1.06	0.492	217.0	0.388	2.425	0.317
7.	Pahala petrol Pump	0.301	0.480	0.781	1.69	2.91	0.978	0.511	213.9	0.350	2.187	0.303
8.	Puri main canal (Balianta)	0.383	0.411	0.794	1.82	2.88	0.11	0.509	208.6	0.298	1.862	0.207
9.	Rasulgarh	0.389	0.381	0.771	0.803	2.89	0.99	0.516	211.3	0.217	1.356	0.198
10.	Vani Vihar Crossing	0.307	0.392	0.699	1.709	2.99	1.02	0.499	198.9	0.428	2.675	0.301
11.	C.R.P. Square	0.397	0.303	0.700	1.8	3.0	1.08	0.52	1987.8	0.404	2.525	0.297

TABLE:2(B) : Biochemical contents in leaves of 'Maghi' (Average of 3 replications)

	Location	Chlorophyll (%)			Sugar (%)			Phenolic compounds' (%)	Vit. C mg/100 gm.	Total nitro-gen (%)	Pro-tein (%)	Amino acids (%)
		a	b	Total	Reducing	Total	Starch					
1.	Ravenshaw College (Control)	0.36	0.38	0.74	1.90	2.9	1.2	0.44	191.0	0.454	2.837	0.415
2.	Dolamundai	0.29	0.31	0.600	1.89	2.9	1.32	0.432	191.0	0.451	2.818	0.287
3.	Jagatpur	0.43	0.26	0.69	1.88	2.87	1.26	0.45	192.0	0.436	2.725	0.299
4.	Balikuda	0.32	0.352	0.672	1.94	2.79	1.187	0.46	186.0	0.344	2.15	0.311
5.	Telenga-pentha	0.42	0.231	0.651	1.94	2.92	1.192	0.446	188.0	0.427	2.668	0.413
6.	Fulnakhara petrol pump	0.387	0.239	0.626	1.93	2.91	1.22	0.436	189.0	0.363	2.268	0.352
7.	Pahala petrol Pump	0.313	0.298	0.611	1.888	2.93	1.22	0.432	188.0	0.329	2.056	0.317
8.	Puri main canal (Balianta)	0.32	0.31	0.630	1.921	2.89	1.19	0.448	192.0	0.261	1.631	0.222
9.	Rasulgarh	0.291	0.32	0.611	1.930	2.88	1.18	0.451	191.0	0.217	1.693	0.201
10.	Vani Vihar Crossing	0.31	0.333	0.643	1.907	2.93	1.16	0.45	189.0	0.407	2.543	0.345
11.	C.R.P. Square	0.30	0.31	0.610	1.908	2.9	1.22	0.438	193.0	0.425	2.656	0.414

TABLE: 2(C) : Biochemical contents in leaves of 'Birikoli' (Average of 3 replications)

	Location	Chlorophyll (%)			Sugar (%)			Phenolic compounds' (%)	Vit. C mg/100 gm.	Total nitro-gen (%)	Protein (%)	Amino acids (%)
		a	b	Total	Reducing	Total	Starch					
1.	Ravenshaw College (Control)	0.318	0.387	0.705	1.62	2.59	1.22	0.39	236.6	0.449	2.806	0.424
2.	Dolamundai	0.322	0.26	0.582	1.65	2.46	1.118	0.36	229.96	0.435	2.718	0.429
3.	Jagatpur	0.319	0.29	0.609	1.63	2.46	1.121	0.32	231.61	0.429	2.681	0.417
4.	Balikuda	0.37	0.30	0.670	1.64	2.54	1.23	0.40	230.02	0.361	2.256	0.356
5.	Telenga-pentha	0.318	0.30	0.618	1.64	2.56	1.26	0.39	235.0	0.419	2.618	0.401
6.	Fulnakhara petrol pump	0.318	0.37	0.688	1.69	2.61	1.21	0.38	243.3	0.357	2.231	0.349
7.	Pahala petrol Pump	0.322	0.37	0.692	1.68	2.59	1.22	0.38	233.09	0.343	2.143	0.336
8.	Puri main canal	0.31	0.38	0.690	1.68	2.54	1.19	0.37	236.00	0.329	2.056	0.317

	(Balianta)											
9.	Rasulgarh	0.32	0.29	0.610	1.68	2.56	1.18	0.40	234.00	0.225	1.406	0.219
10.	Vani Vihar Crossing	0.29	0.29	0.580	1.59	2.62	1.22	0.39	240.00	0.398	2.487	0.357
11.	C.R.P. Square	0.27	0.36	0.630	1.58	2.48	1.23	0.39	239.2	0.403	2.518	0.373

Therefore, it may evidently be concluded that the protein synthesis in leaves was depressed by lead, and the alternation in protein synthesis was due to alternation in the concentration of individual amino acids and it might inhibit the protein synthesis.

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