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EFFECT OF AUTOMOBILE EXHAUSTS ON SOME PHYSICO-CHEMICAL CHARACTERISTICS OF ROAD SIDE SOIL AND PIPER-BETLE CROP

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The physico chemical characteristic of road side grown piper betle (L) plant parts and soil sample has been determined. High soil contents of toxic or total heavy metals have been observed in the proximity of road side grown as compared to plant grown piper betle (L) at 100 mt. distance away from road side. Likewise, level of total Nitrogen and phosphorous also showed variations in different plant samples depending upon the extent of automobile exhaust release along road side.

INTRODUCTION

In the last 2-3 decades concern about human health hazards associated with heavy metals in soil and plant has considerably increased (Azad *et al.,* 1984) (Zwart and Sloof, 1989). High soil contents of toxic total heavy metals have been observed along road side (Broad ford *et al.*, 1975; Rodrizuez and Rodriguez, 1982; Mehta and Barbate, 1991, Sarin 1996). Heavy metal contents in certain plants have been studied (Flemming and Parle, 1977). Similarly, the uptake of Nitrogen and Phosphorus in some crops has also been studied (Tondon 1982; Bhargava, 1995).

MATERIAL AND METHODS

Collection of Samples : In the month of June, 2014 and 2015 soil samples and piper betle (L) adult plant sample were collected from 3 sites on main NH (5) between Cuttack-Bhubaneswar high way, viz. 20 mt., 50 mt., and 100 mt. distance away from the road side. Samples were collected in polythene containers and washed with 1 per cent Nitric Acid and deionized water to avoid absorption of heavy metals on the walls of the container and also to preserve the samples for subsequent analysis of total heavy metals, Nitrogen and Phosphorous distribution in various parts. Like wise, soil samples were also collected from the same farm land.

BIOCHEMICAL TECHNIQUES

Total Nitrogen : For total nitrogen estimation, digestion will be done according to Snell and Snell (1954) and later estimation of the digest will be done colorimetrically.

The estimation of digest will be done with Nessler's reagent of Koch and Mc. Meekin's formula Oser, (1965). Amount of nitrogen will be calculated by using a calibration curve.

Total Phosphorus : For total phosphorus, digestion will be done by modified Allens method (Allen, 1940) with metol reagent (Oser, 1965). The digest of total phosphorous will be studied at 525 nm. (Allen, 1940). The amount of phosphate will then he quantitatively determined by using a calibration curve.

Total Heavy Mtals : For estimation of total heavy metals, dry samples are digested in a mixture of 60% perchloric acid and concentrated nitric acid and then it is heated to dryness. The dry residue is dissolved in ammonium citrate buffer. From this solution heavy metals can be extracted with the help of purified dithizone (Sandell, 1950). The quantities will be estimated with the help of standard and calibration curve based on the methods suggested by Sandell (1950).

RESULT AND DISCUSSION

Concentration of total heavy metals in the samples, collected from different distances along road side, is shown in Table 1. Similarly, total Nitrogen and Phosphorous contents are also shown in Table 2. Amount of total heavy metals are found more in the soil and piper betle plant parts growing in the proximity of road side as compared to those growing at 100 mt. distance away from the road. Thus, the data in Table 1 provide further evidence that the difference in heavy metals in road side crops is probably linked to the quantity of automobile exhaust pollutants or traffic density on the road side.

Table 1. Effect of automobile exhausts on the uptake and distribution of heavy metal (per plant) in road side piper betle (L)

	Total Heavy Metals Level In					
Month of study	Farm soil	Stem cover μmg/plant	Stem pith shoot	Leaves	Juice	Total heavy metal
Plants grown at 20 mt. distance away from road side (Experimental site I)						
June	0.558	0.1391	0.055	0.062	0.0311	0.022
Plants from at 50 mt. distance away from road side (Experimental site II)						
June	0.383	0.0388	0.0444	0.0468	0.0304	0.265
Plants grown at 100 mt. distance away from road side (Control site III)						
June	0.359	0.0316	0.0429	0.0403	0.0388	0.1921

Table 2 shows that Nitrogen and Phosphorus uptake and distribution in the piper betle plant parts of road side crop. Levels of both Nitrogen and Phosphorus do not show much variations in the samples collected from different distances away from road side. However, there is some decline in both these parameters from proximity to more distances away from road side. However, there is some decline in both these parameters from proximity to more distances away from road side.

Table 2. Some biochemical characteristics of soil and piper-betle plant parts of 3 study site and long side, affected by automobile exhaust pollutants

Distance away from road side	Farm soil	Steam cover	Stem pith	Leaves	Juice
	mg/gm dry weight				
Total Nitrogen					
20 mt. (Experimental Site-I)	0.44	19.44	20.7	27.0	33.87
50 mt. (Experimental Site II)	0.46	13.94	19.6	26.8	28.80
100 mt. (Control Site)	0.54	12.46	18.12	26.33	25.87
Total Phosphate					
20 mt. (Experimental Site-I)	0.12	3.99	0.683	6.85	6.85
50 mt. (Experimental Site II)	0.16	2.68	0.526	5.92	6.45
100 mt (Control Site)	0.24	3.68	0.512	5.10	7.50

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