



ISSN : 0973-7057

Int. Database Index: 616 www.mjl.clarivate.com

Effect of automobile pollution on Chlorophyll content of road side herbs along NH-31 from Katihar to Purnea (Bihar)

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Received : 19th November, 2021 ; Revised : 9th January, 2022

Abstract- Automobile exhaust contains a large no. of air pollutants such as carbon monoxide, unburnt hydrocarbons, Sulphur and nitrogen oxide, tetraethyl lead and tetramethyl lead and several other lead compounds. These air pollutants adversely affect road side herbs by decreasing their chlorophyll content. In the present study, chlorophyll content of 10 herbs (*Catharanthus roseus*, *Ageratum conyzoides*, *Tridax procumbens*, *Acalypha indica*, *Phyllanthus nururi*, *Parthenium hysterophorus*, *Croton sparsiflorus*, *Euphorbia hirta*, *Emilia sonchifolia*, *Phyla noduliflora*) was estimated in road side plants and countryside plants i.e. one km away from the road side in summer season. The chlorophyll contents of road side herbs were less than those of countryside herbs.

Key words: Automobile exhausts, carbon monoxide, unburnt hydrocarbon, sulphur & nitrogen oxides, lead compounds

INTRODUCTION

Air pollution in India is quite a serious issue with the major sources being fuel wood and biomass burning, fuel adulteration, vehicle emission and traffic congestion. In autumn and winter months, large scale crop residue burning in agriculture fields - a low cost alternative to mechanical tilling - is a major source of smoke, smog and particulate pollution. India has low per capita emissions of greenhouse gases but the country as a whole is the third largest after China and the United States. Transport is the dominant source of emissions of Sulphur dioxide (SO₂), 57% of oxides of Nitrogen (NO_x), 80% of lead (pb) 81% of Carbon monoxide (CO) and 75% of hydrocarbon (HC) emissions.¹

A number of countries have targeted vehicles and associated sectors (such as fuel) to overcome the problem

of air pollution. Notable successful initiatives are: conversion of public transport from diesel to CNG, switching Vikrams (tuk-tuks) from diesel to electricity, shifting from leaded to unleaded gasoline in many countries etc. Still the pollution problem in urban cities is continued. The Air (Prevention and Control of Pollution) Act was passed in 1981 to regulate air pollution. Automobile exhaust emissions contribute significant air pollution.²⁻⁴

MATERIAL & METHOD

The study area was selected NH-31 from Katihar to Purnea, a total distance of 30km. 10 common herbs- *Catharanthus roseus*, *Ageratum conyzoides*, *Tridax procumbens*, *Acalypha indica*, *Phyllanthus nururi*, *Parthenium hysterophorus*, *Croton sparsiflorus*, *Euphorbia hirta*, *Emilia sonchifolia*, *Phyla noduliflora* were selected for study. All selected herbs were collected in summer season. Herbs one km. away from road side were also collected.

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Estimation of Chlorophyll:

Chlorophyll content of leaves from each plant was estimated in laboratory. 250 mg of fresh leaves were cut into small pieces and transferred in 25 ml 80% acetone. It was incubated in dark for 24 hrs. absorbance at the extract was taken at 645 nm and 663 nm with spectrophotometer. Chlorophyll was estimated by the formula.⁵

$$\text{Total Chlorophyll} \left(\frac{\text{mg}}{\text{gm}} \right) = \frac{20.2(A_{645}) + 8.02(A_{663})}{1000X Fw} \times V$$

- A₆₄₅ = Absorbance at 645 nm
- A₆₆₃ = Absorbance at 663 nm
- V = Volume of Chlorophyll extract
- Fw = Weight of fresh leaves

RESULT

In the present study, 10 herbs belonging to family Euphorbiaceae, 4 from family Compositae, 1 from Apocyanaceae and 1 from Verbinaceae were collected from road side of NH-31 (Katihar to Purnea) in summer season. Same herbs were also collected from one km away of road side. Chlorophyll pigment was estimated from each herb.

It was observed that the chlorophyll content in each herb of road side decreased in comparison to herbs from one km away of road side. The result is tabulated in table 1.

The chlorophyll content was highest in *Phyla noduliflora* (19.162) of family Verbinaceae followed by *Acalypha indica* of family Euphorbiaceae and minimum in *Ageratum conyzoides* of family Compositae (1.245).

CONCLUSION

Heavy traffic passes through NH-31 (Katihar to Purnea). A large no. of truck, bus, car, auto, tractor and several other heavy vehicles continuously passes through this road. The pollutant released from these vehicles adversely affect herbs present at the road side. These pollutants causes decrease in chlorophyll content of herbaceous plants. In summer season, the atmosphere remain dry due to which pollutants remain within air for a long time. The vehicular pollutants mostly contain carbon monoxide, unburnt hydrocarbons, Sulphur and nitrogen oxide, tetraethyl lead and tetramethyl lead and several other lead compounds. These pollutants are absent in countryside so the chlorophyll content of the countryside herbs is higher than those of road side herbs.

Table 1- Comparison of Chlorophyll content in road side plants and plants one km away from road side

S. No.	Name of Plant	Family	Chl. Content of road side plant	Chl. Content of plant one km away from road side
1	<i>Catharanthus roseus</i>	Apocyanaceae	5.423	6.432
2	<i>Ageratum conyzoides</i>	Compositae	0.984	1.245
3	<i>Tridax procumbens</i>	Compositae	7.563	8.236
4	<i>Acalypha indica</i>	Euphorbiaceae	13.945	15.678
5	<i>Phyllanthus nururi</i>	Euphorbiaceae	10.645	12.421
6	<i>Parthenium hysterophorus</i>	Compositae	4.213	5.641
7	<i>Croton sparsiflorus</i>	Euphorbiaceae	8.456	9.898
8	<i>Euphorbia hirta</i>	Euphorbiaceae	4.321	5.814
9	<i>Emilia sonchifolia</i>	Compositae	8.974	10.573
10	<i>Phyla noduliflora</i>	Verbinaceae	17.961	19.162

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