Research Paper Botany

Response of *Cassia obtusifolia* To Auto- Exhaust Emission.

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ABSTRACT

The paper deals with the study of response of ***Cassia obtusifolia*** a seasonal road side growing plant to auto- exhaust emission. Study was conducted in city Ghaziabad and for study purpose three sites were selected i.e HPA (Highly Polluted Area), MPA (Medium Polluted Area) and FA (Fresh Area) as control. Epidermal traits were studied and analysis of data revealed that the stomatal frequency and stomatal index increased on both upper and lower surface of leaf samples collected from polluted sites. Whereas , reduction was recorded in length and breadth of stomata at polluted sites. Changes are more drastic at HPA site than MPA site. ***Cassia obtusifolia*** appeared to be sensitive and this plant has developed certain adaptations to cope up with the stressed condition of pollution.

KEYWORDS ***Cassia***, Epidermis, Stomata, Auto exhaust.

INTRODUCTION

There has been tremendous progress in the field of science and technology. This advancement has added to the human comfort by giving us automobiles, air ways and industrilization etc. but it has also disbalanced the atmosphere although causing a very serious problem- Pollution, which is global and nobody has been spared by it and thus "Pollution is a necessary evil." A perusal of literature reveals that automobile fleet of country emit over 1.8 million tonnes of air pollutants, of which more than 80% are released in cities [Ahmad et al., 1989]. There are variety of plants growing along the road sides, but little attention has been given to the wild plants to assess their response to the stress of auto exhaust emission. All plants play important role, as they are part of bio-diversity, therefore without any discrimination attention should be given to all the plants. So, for present study an annual herb- ***Cassia obtusifolia*** Linn. (commonly called as Chakunda), belongs to family Caesalpiniaceae has been selected.

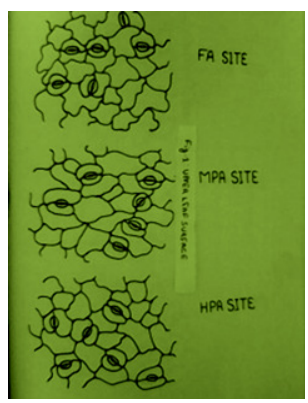
MATERIALS AND METHODS

Present study was conducted in industrial town Ghaziabad. Three sites were selected i.e. Highly Polluted Area (HPA), Medium Polluted Area (MPA) and Fresh Area (FA). Those areas which have high traffic density were treated as Highly Polluted Area and internal roads passing through the city having lesser traffic density were treated as Medium Polluted Area and control area is named as Fresh Area. For study purpose leaf samples of ***Cassia obtusifolia*** were collected from all the selected Sites, and Thoroughly, washed with the water and then immediately fixed in F.A.A Solution. Epidermal peels were obtained and after staining them with safranin they were examined under 400X magnification with the help of compound microscope. The number of stomata and epidermal cells were counted per microscopic field area. Length & breadth of stomata measured with help of ocular & stage micrometer. Stomatal index was calculated according to Salisbury (1927), Viz. STOMATAL INDEX = 100S/E+S , Where:- S = No. of stomata, E = No. of epidermal cells.

RESULTS AND DISCUSSION

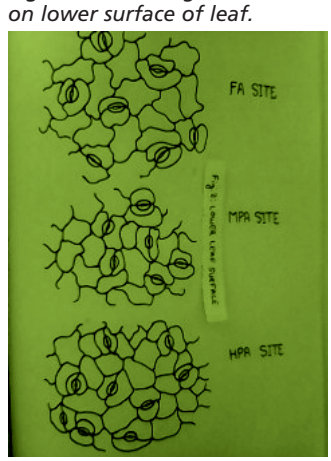
Observations are listed in Table 1 and Figure 1 & 2.

Figure 1*: Showing stomata of* ***Cassia obtusifolia*** *found on upper surface of leaf.*



UPPER LEAF SURFACE: Perusal of Table:1 indicates that the number of epidermal cells in upper leaf surface of ***Cassia obtusifolia*** showed decreased by 2.06% at MPA site, however with the change of site i.e. HPA, in the same species number of epidermal cells increased by 0.77%, though insignificant value, was recorded. Stomatal frequency increased by 1.41% and 10.95% at MPA & HPA sites, respectively. Dimensions of stomata reduced at polluted sites, but reductions were more drastic at HPA than MPA site leaf samples. Increase was recorded in stomatal index (2.81% at MPA site & 7.95% at HPA site).

Figure 2: *Showing stomata of* ***Cassia obtusifolia*** *found on lower surface of leaf.*



LOWER LEAF SURFACE:As noted in upper leaf surface, similar mixed trend was also found in number of epidermal cells in lower leaf surface of ***Cassia*** i.e reduction of 5.03% at MPA site, followed by slight increased by 4.09% at HPA site. Stomatal frequency also followed the mixed trend of decrease i.e 1.64% at MPA site & significant increase of 22.77% at HPA site. Like upper leaf surface decline was also recorded in dimensions of stomata at lower leaf surface in the samples of polluted area. Increase was recorded in stomatal index (2.73% at MPA site & 13.17% at HPA site).

TABLE 1: Values of parameter studies (No. of epidermis, stomatal frequency, length & breadth of guard cell, stomatal index) in upper & lower surface of *Cassia obtusifolia* leaf. [*values are in mean (n=25) with S.D.***]**

SITES→ ATTRIBUTES↓	FA	MPA	HPA
No. of epidermal cells (per field area of microscope) –U.S	77.60 ±9.80	76.00 ±9.81	78.20 ±8.80
No. of epidermal cells (per field area of microscope) –L.S.	87.92 ±6.98	83.50 ±7.00	91.52 ±6.54
Stomatal frequency (per field area of microscope) –U.S.	19.72 ±2.80	20.00 ±2.80	21.88 ±2.98
Stomatal frequency (per field area of microscope) –L.S.	27.40 ±4.00	26.95 ±3.78	33.64 ±4.10
Length of stomata(µ) -U.S.	17.18 ±1.83	16.20 ±1.80	16.00 ±1.80
Length of stomata(µ) -LS.	17.84 ±1.54	16.54 ±1.62	15.45 ±2.20
Breadth of stomata(µ) -U.S	08.52 ±1.60	08.50 ±1.58	07.90 ±1.50
Breadth of stomata(µ) -L.S	08.94 ±1.50	08.50 ±0.90	08.00 ±1.51
Stomatal index-U.S	20.26	20.83	21.87
Stomatal index-L.S	23.75	24.40	26.88

Stomata are the main portals for gaseous exchange, but this exchange get hampered due to pollutants thereby causing peculiar changes in the micromorphological attributes of leaf. Appreciable reduction was noticed in length & breadth of stomata on both upper & lower surface of leaves in ***Cassia obtusifolia,*** collected from polluted areas. Similar observations were made by Trivedi & Singh, 1990; Kulshreshtha et al.,1994a; Sharma & Roy,1995; Aggrawal,2000; Kaur, 2004; Lata et al.,2010; Pawar, 2016. The reduction in dimensions of stomata was probably a type of adaptation in the plant to cope up with the stressed conditions of auto-exhaust pollution. Smaller the size of stomata lesser the space available for the entry of pollutants inside the leaf. Increase was recorded in stomatal & epidermal cell frequency and stomatal index of ***Cassia,*** similar results were reported by other workers also [Yunus et al, 1982; Kumar & Jaishree, 1989; Pal et al., 2000 and Raina & Sharma, 2003]. Most of the gaseous exchange for photosynthesis and respiration takes place through these micropores i.e stomata. Some plants by increasing stomatal frequency have fulfilled their requisite demand of fresh air for their survival and to maintain better exchange of gases with the atmosphere. Another reason for increased stomatal frequency was deposition of thick layer of dust and pollutants on leaf surface, this might have caused hinderance in proper gaseous exchange. So, by increasing stomatal frequency , the plant tried to be best suited to cope up with the stressed condition of pollution. So, present findings indicates that auto-exhaust emission have impact on the micromorphology of ***Cassia obtusifolia***, but this plant has developed certain adaptations to survive in those stressed conditions of pollution.

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