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IMPACT OF QUARRY DUST POLLUTION ON FOLIAR EPIDERMICS OF FIVE SPECIES GROWING NEAR STONE CRUSHING INDUSTRY

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ABSTRACT

Quarry dust is known to alter the stomatal index of most of the plants studies. But in some plants the stomatal index remains unaffected or undergo little changes. Study carried out on selected plant species growing in the vicinity revealed foliar epidermal responses to quarry dust pollution which differed from species to species. The data obtained from the seasonal study revealed the impact of crushing acivity, which has resulted in the alternation of anatomical features in various plant species.

INTRODUCTION

Due to unscientific and unplanned crushing activitylarge scale fine dust particles are released in to the atmosphere which has the potential to alter the anatomical charateristics of the plants species growing in the near vicinity. The dust particles fall heavily on the near by vegetation which bring about changes in the anatomical features. Foliar epidermal responses to suspended particulate matter are worked out by various scientists (Gouse *et al.* 1972, Sharma *et al.* 1973, 1975, Gouse, *et al.* 1978, Rajachidambaram *et al.*). Recent attempts have shown that epidermis responds to various pollutants and therefore can be employed as a biological indicator to measure the levels of atmospheric pollution (Sharma, *et al.* 1973). The present work deals with the foliar epidermal responses of different species growing near stone crushing industry.

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Table 1. Foliar epidermal variations of five different plant species from polluted and unpolluted quarry area.

Plant species						(Values are Mean ± S.D.)					
Slno		Calotropis gigantea		Eucalyptus globulus		Psidium gujava		Muntingia calabura		Croton sparsiflorus	
		UE	LE	UE	LE	UE	LE	UE	LE	UE	LE
Stomal index	P	4.6±1.12	6.8±2.12	7.1±1.17	9.8±1.74	8.0±2.16	9.2±2.16	7.9±2.10	9.1±1.73	6.8±2.1	8.7±1.35
1 MM 2	U	8.4+2.16	7.2+10.42	6.7+1.72	7.9+1.67	8.2+1.36	9.5+1.92	7.5+1.32	8.9+2.16	6.9+1.1	9.4+12.0
	P										
Length of	P	215.5+24.7	215.0+22.6	228.1+11.2	229.0+10.9	123.2+12.3	123.0+12.10	141.0+40.2	140.0+40.2	210.2+18.2	211.0+18.2
guard cells in µ	U	256.2+15.1	256.0+25.5	220.0+20.7	223.2+20.0	120.5+11.12	12.0+11.3	139.+21.2	139.0+21.2	221.1+22.6	220.0+12.5
	P										
Width of guard	P	52.5+21.5	65.6+14.9	63.8+7.0	63.8+7.0	60.8+5.72	60.8+5.72	52.12+5.12	52.10+5.11	60.4+10.5	63.0+13.02
cell in µ	U	80.5+13.8	82.5+13.1	60.7+6.11	60.7+6.10	61.4+6.27	61.4+6.27	49.18+5.10	49.18+5.10	62.5+8.16	62.5+8.19
P											
Length stomata	P	141.5+30.6	141.6+18.1	154.6+20.2	154.6+20.2	98.0+7.60	101.2+9.52	84.6+10.2	84.0+10.0	115.9+10.2	14.9+10.18
pore in µ	U	155.4+20.7	156.0+20.7	150.2+5.28	150.2+5.27	95.9+5.70	95.9+6.23	80.7+11.3	80.5+11.0	122.6+18.8	122.2+18.0
P											
Width of	P	19.7+5.72	19.7+5.36	64.0+6.80	63.0+8.22	23.2+6.21	23.0+6.23	20.8+6.28	20.7+6.28	24.8+8.70	23.7+6.70
stomatal pore	U	26.5+5.2	27.7+6.4	60.7+8.42	60.7+8.39	24.8+4.94	24.6+4.90	20.4+6.46	20.3+6.40	20.1+5.28	20.1+5.28
in µ	P										

Note: P - Polluted, UP - Unpolluted, UE - Upper epidermis, LE - Lower epidermis

MATERIALS AND METHODS

Leaves of *Calotropis gigantea, Eucalyptus guajava, Muntingia calabura* and *Croton sparsiflorus* were collected near stone crushing site. 25 samples were collected randomly from each site. For herbs 5th leaf from base of the plants of uniform size were collected. For herbs, shrubs or trees leaves from 2 mts height were collected. Leaves were immediately fixed in the F.A.A. solution. For unpoluted controls leaves of same species were collected 25km away from the quarry area. Stomatal index was calculated as per Salisbury, (1928). Epidermal peels of the leaves were obtained by hot sulphuric acid treatment (Gouse *et al.* 1972).

RESULTS AND DISCUSSION

Stomatal index, length and width of guard cells, length and width of stomatal pore were decreased in *Calotropis gigantea* species in both upper and lower epidermis. In *Eucalyptus globules, Psidium guajava* and *Muntingia calabura* plant species, stomatal index was more in polluted leaves, but the other parameters showed a decrease. In *Croton sparsiflorus* species polluted and inpolluted leaf epidermis showed littel variations. Similar results were reported by Krishnamurthy *et al.* (1980). The results obtained depicts the gloomy picture of the crushing activity and its impact on stomatal index and other epidermal variations of the plant species studied.

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