STUDIES ON THE TRICHOME DEVELOPMENT AND DENSITY IN THE DIFFERENT POPULATIONS OF *CROTON* EXPERIENCING VARYING DEGREES OF AIR POLLUTION†

A. Z. AMANI*, S. H. ZAIDI*, A. K. M. GHOUSE*, AND M. H. FAROOQUI**

**Department of Botany, Aligarh Muslim University, Aligarh.*
***Biological Sciences Department, C.S.T. Port Harcourt, Rivers State, Nigeria*

ABSTRACT

The trichome size and density has been studied in different populations of croton (*Croton bonplandianus* Baill., collected at different localities exposed to different types and degrees of air pollution. It has been found that trichome types remained same in all populations selected for the study. However, the trichome size and its density have been found highly variable in different populations depending on the amount of pollutant prevailing in the atmosphere in which the particular population thrives. The observed variations show a direct relationship with the degree of pollution, i.e. higher the pollutants in the atmosphere, richer is the density and bigger is the size of the trichome.

INTRODUCTION

A number of investigations in the past have shown the effects of environmental pollution on plants and plant parts under natural and controlled environmental conditions. SCHEFFER AND HEDGCOCK's (1955) study of the forest of North-Western United States revealed the characteristic effects of sulphur-di-oxide injury on leaves. Collapse of spongy mesophyll and epidermis as affected by flouride and sulphur-di-oxide has been observed by SOLBERG AND ADAMS (1956). Several other studies reveal the usefulness of cuticular and morphological features in taxonomic interpretation. However, only few recent studies (SHARMA & BUTLER, 1973 ; SHARMA & TYREE, 1973 ; SHARMA & BUTLER, 1975 ; GHOUSE & KHAN, 1978) were devoted to the determination of the significance of leaf cuticular patterns as indicators of environmental pollution. In an earlier study (LEVIN, 1973), it has been opined that the trichomes may afford an outer line of physical defence against various pollutants to a plant body. In the present study an effort has been made to see the inter-relationship of trichome and the varying degree of air pollutants in a common weed, *Croton bonplandianus* Baill.

MATERIAL AND METHODS

Different samples of *Croton bonplandianus* Baill. were collected from three different sites (Table-1) experiencing varying types and degrees of air pollutants. The sites were then designated as A, B and C. Peelings of the matured leaves were obtained by the method described by GHOUSE AND YUNUS (1972). Trichome length and density were calculated for all the three sites and data were recorded and summarised in Table-2.

OBSERVATIONS

It is evident from the data collected that the trichome density per cm^2 increases with the increase in the degree of pollution. In the similar manner the trichome size also increases significantly.

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Table-1—Sites of collection of *Croton* and their environmental set-up

Population	Sites of collection	Types of Pollution	Source of Pollution
A	University Campus (open Field)	Domestic Coal and Fuel burning which is very rare (Presumably free of Pollutants)	
B	Railway Locoshed	SO_2, CO	Steam Engine, Diesel and Electric Engine.
C	Kasimpur Thermal Power Station.	SO_2, O_3, CO Particulate matters and other Oxidants	Vehicular Traffic, Thermal power Plant, Steam Engine, Domestic Coal and Fuel burning.

Table-2—Comparison of trichomes in *Croton* populations collected from different localities

Traits	Surface	Locations		
		A	B	C
Trichome Density Per CM^2	Upper	139.8	290.3	427.7
	Lower	..	..	..
Trichome Length (μm) ($\bar{X}$)	Upper	127.87	155.5	165.25
	(Range)	(61.5—200.0)	(90.0—250.0)	(112.5—275.0)
	Lower	..	..	..

($\bar{X}$)—,Mean

DISCUSSION

It is a safe assumption that population B and C were the product of highly polluted environment while the population A was from a less polluted locality. Since the trichome density was comparatively higher in all the samples of polluted environment and low in population A, it confirms the concept that trichomes may be effective as insulators and provide shade to the leaf surface, thus lowering the temperature and possibly slowing down the rate of chemical reaction harmful to plants (TRESHOW, 1970). The trichomes in population B and C were longer than the size found in population A. The longer trichomes may trap particulate matter and thus provide added protection and hence adaptation in a polluted environment. From the above it becomes clear that what Levin (1973) opined about tricnomes as affording an outer line of physical defence against various physical particulate matters as well as pollutants of chemical origin, is true. However, it will be premature to say that epidermal features may serve as indicator of environmental pollution, untill and unless more such studies are made under laboratory conditions to substantiate this idea.

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