SCANNING ELECTRON MICROSCOPIC STUDIES OF LEAF SURFACE IN SOME SPECIES OF *IPOMOEA*

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ABSTRACT

Most of the species of *Ipomoea* have thick cuticle and outlines of the underlying epidermal cells are usually not visible. Stomata may be sunken or raised. The cuticular striations form distinct pattern in different species and hence they can be used to distinguish various species.

INTRODUCTION

Ipomoea is a large genus of flowering plants with over 500 species distributed throughout the tropical and warm temperate regions of the world. About 50 species have been reported from Indian sub-continent by HOOKER (1875) and since then many have been introduced as ornamentals. The genus is economically important and many species are cultivated in this country for their food, ornamental and medicinal value.

In view of the importance of this genus, the identification of various species, especially those not in flower or used commercially only as vegetative material, becomes significant. The only report on the study of epidermal features in *Ipomoea* is by SINGH *et al.* (1974), who studied sixteen species of the genus under light microscope. The present study deals with the leaf surface configuration of eight species of *Ipomoea* under scanning electron microscope.

MATERIAL AND METHOD

The dried foliar material was collected from Coimbatore Herbarium of Botanical Survey of India. Some of the specimens were also collected from the garden of the National Botanical Research Institute, Lucknow.

Preparation of material for SEM study

One cm^2 pieces of dried plant leaves were dipped in 2 per cent KOH for 24 hrs. They were then washed with water and dehydrated in alcohol-series from 5 to 100 per cent ethyl alcohol. The leaf pieces were placed on slides to remove excess alcohol by blotting paper and then pressed between two slides with the help of gem clips. The slides were placed in an oven at 60°C for about two hrs. After drying, small pieces of leaf were cut from the strips. Two pieces of the material, one side lower surface and the other side upper, were mounted side by side on the stubs, using double-sided adhesive tape. The material was then coated with a thin film of gold in an ion sputter coater (JEOL-JFC-1100) and studied with a JEOL-JSM 35C scanning electron microscope at a voltage of 10 kv and at an angle of 45° to the electron beam and aperture 100 μm. The magnification was same in all the photographs (×700), and photographs were taken on ORWO 120 films using 100 seconds scan time.

OBSERVATIONS

Ipomoea staphylina Roem & Schult

Lower surface(Pl. 1, Fig. 1)—Cuticular striae all over the surface, highly thick-

ened and radiating from stomata. Stomata elliptical, raised, opening wide. *Upper surface* (Pl. 1, Fig. 2)—Cuticular striae less conspicuous. Glandular hairs present.

I. pes-tigridis Linn.

Lower surface (Pl. 1, Fig. 3)—Striae scattered all over the surface, very thin. Stomata raised with single rim, elongate, aperture narrow. *Upper surface* (Pl. 1, Fig. 4)—Striae irregular, scattered all over the surface, some striae radiating from stomata. Stomata elongate, aperture narrow with raised rim.

I. laciniata C. B. Clarke

Lower surface (Pl. 1, Fig. 5)—Cuticular striations prominent. Stomata elliptical with raised rim, aperture wide. *Upper surface* (Pl. 1, Fig. 6)—Cuticular striations inconspicuous. Stomata elongate with narrow aperture.

I. muricata Facq. Hort. Schoem

Lower surface (Pl. 1, Fig. 7)—Cuticular striations thin, showing irregular pattern. Stomata deeply sunken and funnel like. *Upper surface* (Pl. 1, Fig. 8)—Striations thin in nature, pattern same as on lower surface. Stomata sunken and aperture narrower.

I. nil (Linn.) Roth.

Lower surface (Pl. 2, Fig. 9)—Striations all over the surface. Epidermal cells outline slightly visible, cells straight-walled. Stomata oval with narrow apertrure. *Upper surface* (Pl. 2, Fig. 10)—Cuticular striations covering the whole surface, wavy in nature.

I. obscura Ker-Gawl.

Lower surface (Pl. 2, Fig. 11)—Cuticular striations scattered all over the surface, forming concentric rings around stomata. Stomata elliptical and aperture narrow with raised rim. *Upper surface* (Pl. 2, Fig. 12)—Surface covered with thick, closely packed netted striations.

I. quinquefolia Linn.

Lower surface (Pl. 2, Fig. 13)—Striations very thick forming prominent ridges or radiating from stomata as extended lateral wings. Stomata lorge, aperture wide, showing two outer stomatal rims and stout peri-stomatal rim. *Upper surface* (Pl. 2, Fig. 14)—Striations irregular in nature and overlapping each other. Stomata elongate, slightly sunken, aperture narrow. Stomata smaller than lower surface.

I. maxima (Linn. f.) Don ex Sweet

Lower surface (Pl. 2, Fig. 15)—Cuticular striations prominent, forming a regular pattern. Stomata slightly sunken and elongate with wide aperture. *Upper surface* (Pl. 2, Fig. 16)—Epidermal cells visible. Striae sparse. Stomata elongate with narrow aperture. Stomatal pits prominent, ridges and rim present.

DISCUSSION

All the species investigated are characterized by a thick coating of cuticle, and the outlines of underlying epidermal cells are usually not visible. However, in *I. maxima* (Pl. 2, Fig. 16) cuticular layer is not very thick and the outline of epidermal cells (anticlinal walls) are visible. The different species can be distinguished by the presence or absence of the cuticular striations and the pattern formed by them. The striations form

concentric rings around stomata in *I. obscura* (Pl. 2, Fig. 11) and *I. maxima* (Pl. 2, Fig. 15), whereas they appear to radiate from stomata in *I. quinquefolia* (Pl. 2, Fig. 13). Stomata are typically sunken on both surfaces in *I. muricata* (Pl. 1, Figs. 7 & 8) and on upper surface only in *I. maxima* (Pl. 2, Fig. 15). Stomata are relatively big in *I. quinquefolia* (Pl. 2, Fig. 13) and *I. staphylina* (Pl. 1, Fig. 1). Stomatal aperture is quite narrow in *I. obscura* (Pl. 2, Fig. 11) and *I. pes-tigridis* (Pl. 1, Fig. 3) but relatively wide in *I. quinquefolia* (Pl. 2, Fig. 13) and *I. staphylina* (Pl. 1, Fig. 1). SINGH *et al.* (1974) reported that stomata are hemiparacytic in the species examined by them. Several stomatal abnormalities were observed in some species of *Ipomoea* by SHAH (1967) and INAMDAR (1969). The presence of hemiparacytic stomata or abnormal stomata could not be confirmed from the present study. It is clear from the above that SEM study of the leaf surface provides very useful information, which can be used as an important tool for diagnostic purposes.

ACKNOWLEDGEMENTS

The author wishes to thank Scientist-in-Charge, National Botanical Research Institute, Lucknow for providing the necessary facilities, and to Dr. K. J. Ahmad for going through the manuscript.

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EXPLANATION OF PLATES

(all SEMgs at ×700)

PLATE 1

1. *Ipomoea staphylina* Roem & Schult, lower surface.
2. Same, upper surface.
3. *I. pes-tigridis* Linn., lower surface.
4. Same, upper surface.
5. *I. laciniata* C. B. Clarke, lower surface.
6. Same, upper surface.
7. *I, muricata* Facq. Hort. Schoem, lower surface.
8. Same, upper surface.

PLATE 2

9. *I. nil* (Linn.) Roth., lower surface.
10. Same, upper surface.
11. *I. obscura* Ker-Gawl, lower surface.
12. Same, upper surface.
13. *I. quinquefolia* Linn., lower surface.
14. Same, upper surface.
15. *I. maxima* (Linn. f.) Don *ex* Sweet, lower surface.
16. Same, upper surface.


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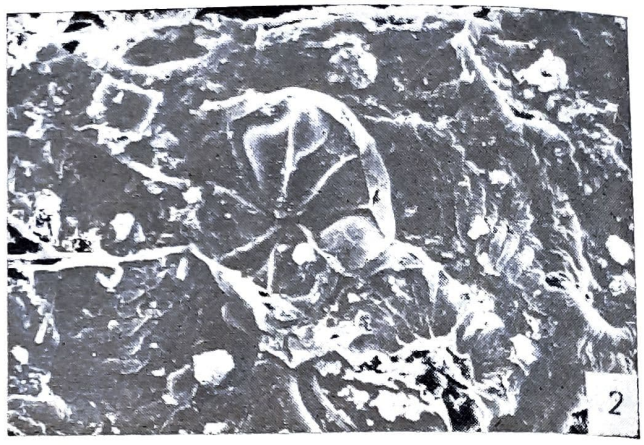
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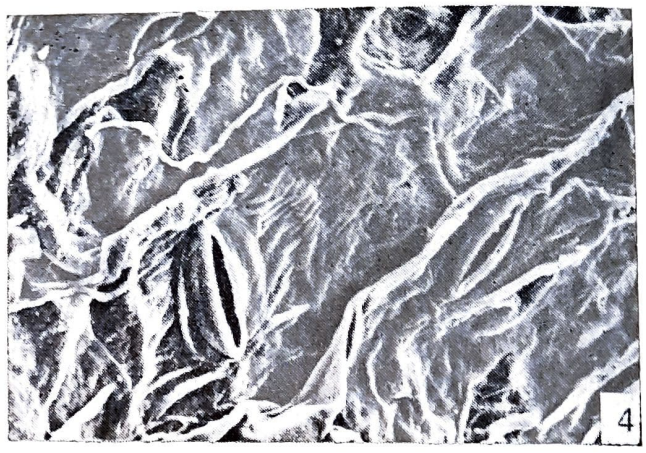
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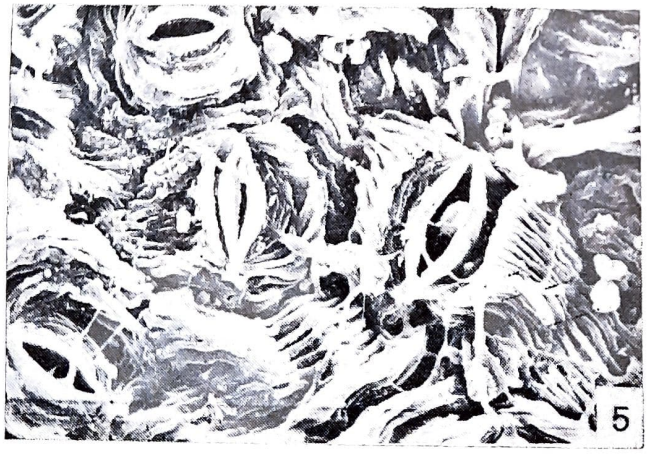
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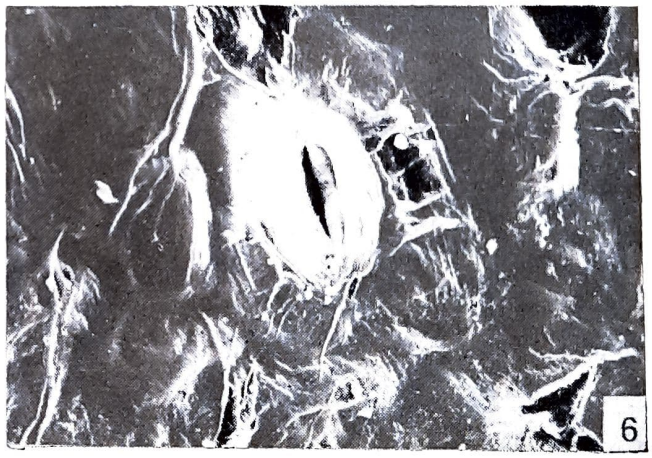
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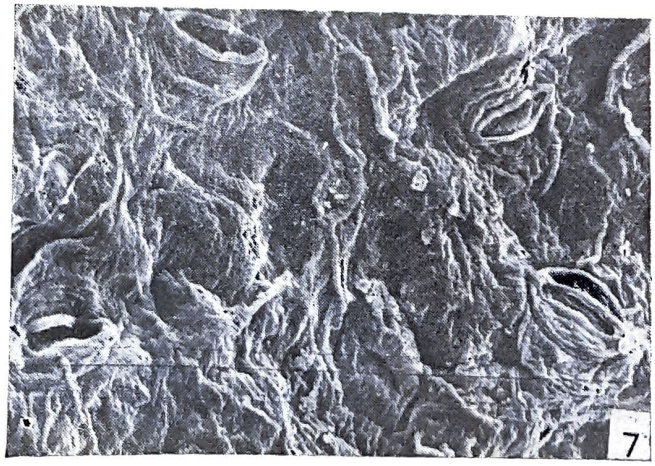
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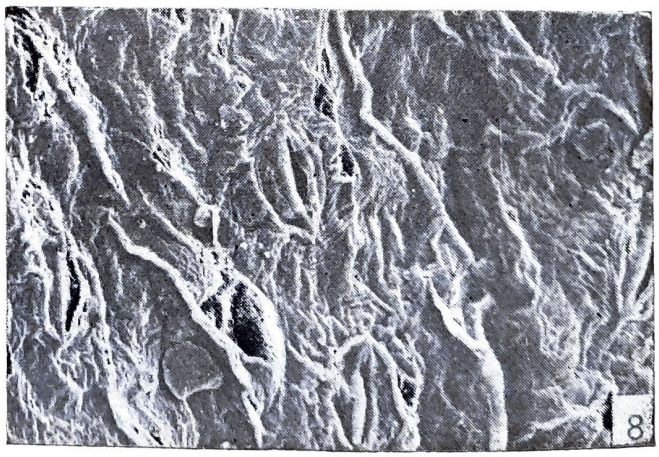
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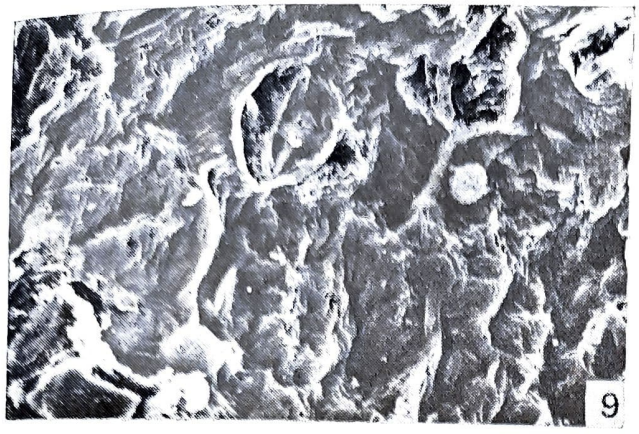
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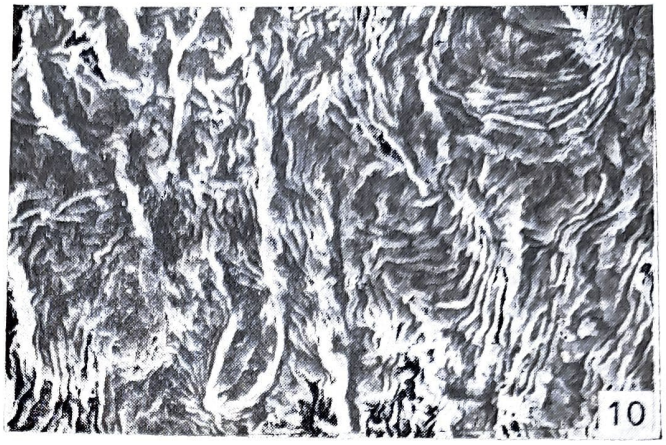
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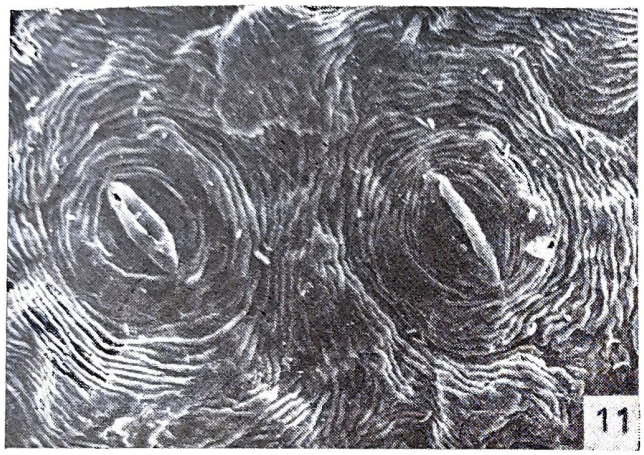
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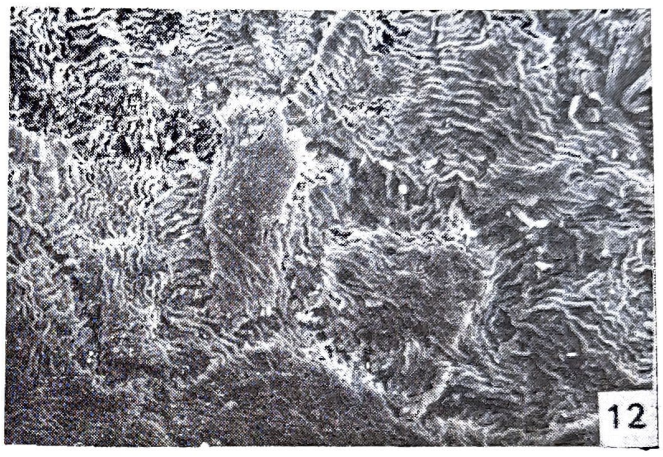
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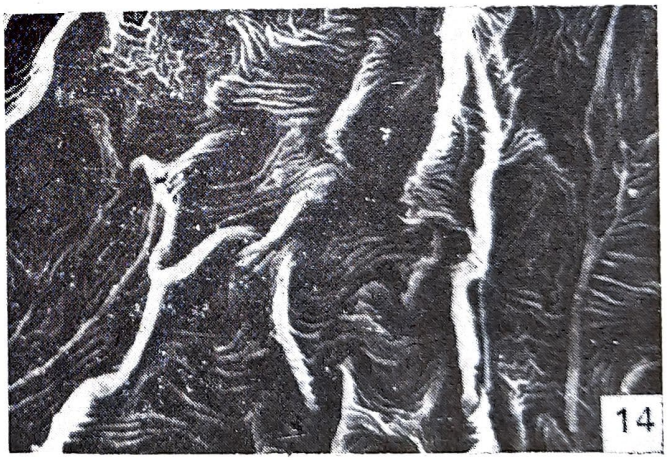
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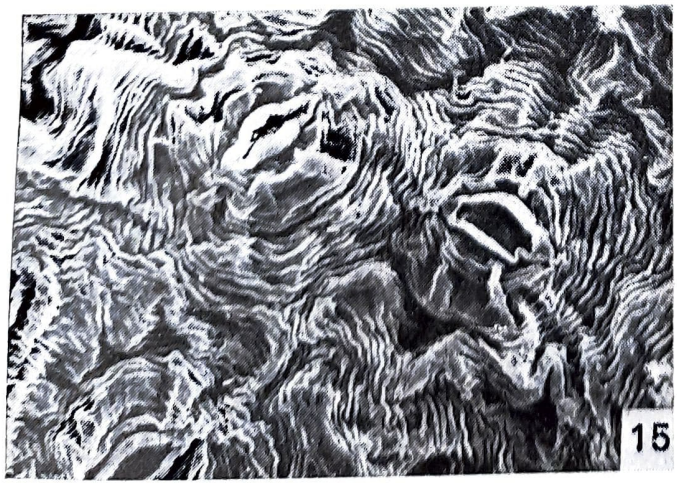
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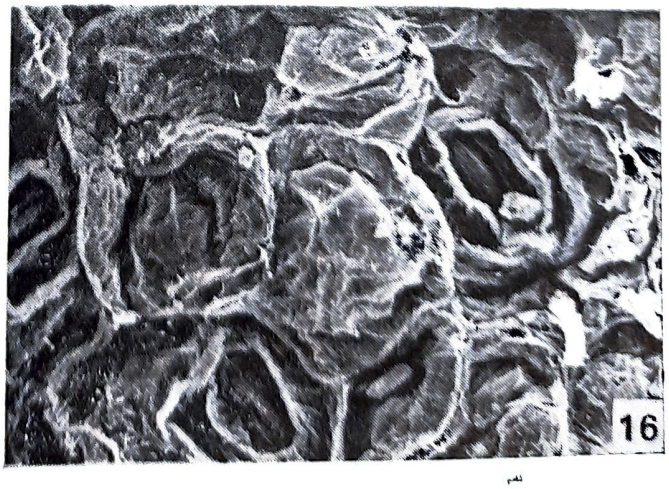
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