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Foliar Epidermal Studies, Organographic Distribution and Taxonomic Importance of Trichomes in the Family Solanaceae

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Abstract: The leaf epidermal and organographic distribution of trichomes studies were carried out on nine species in four genera in the family Solanaceae. Distinctive anatomical characters which indicate close inter-relationship amongst the genera and species include presence of trichomes on leaf epidermal surfaces, petiole, stem, pedicel, sepal and petal surfaces, amphistomatic leaf surfaces, anisocytic to anomocytic stomatal types, polygonal, occasionally irregular epidermal cell shape on the adaxial epidermal surfaces and generally lower number of stomata on the adaxial surface. Some characters can be used to separate the genera within the family and also the species within each genus. These include anticlinal walls on the adaxial and abaxial epidermal surfaces, stomatal types in addition to the basic anisocytic to anomocytic stomatal complex types. *S. nigrum* in the genus *Solanum* has the highest number of stomatal types. Noteworthy is the presence of protrusions on the stomata of the species in the genus *Lycopersicon* which is absent in the species of the other genera. The different trichome types have differing organographic distributions within the same species and within the same genus in the family. This can be useful in the identification of the species and even their corresponding organs such as leaf, stem, petiole, etc. which would be of interest to pharmacognosists, archaeobotanists, palaeobotanists and agronomists. *Capsicum annum* can be separated from *C. frutescens* and *C. chinense* on the basis of the organographic distribution of the trichomes. *Solanum torvum* is the only species in the genus *Solanum* and in the species of the family Solanaceae studied with stellate non-glandular trichomes on the adaxial and abaxial epidermal surfaces. The spine-like non-glandular trichome type observed in *Lycopersicon pimpinellifolium* was completely absent in all the plant parts of *Lycopersicon lycopersicum* cv Roma VF. This can be used to delimit the two species in the genus. The unique bicellular to multicellular stalk glandular trichomes of *Nicotiana tabacum*, a mono-species genus in Nigeria are reported. They are believed to be responsible for the unique smell that emanates from *N. tabacum*. The genus *Nicotiana* is the only genus in the family with multicellular stalk glandular trichomes.

Key words: Solanaceae, *Lycopersicon*, Trichomes, multicellular stalk, stomatal types

INTRODUCTION

Only eight genera of the family Solanaceae are reported in West Africa and in Nigeria (Hutchinson and Dalziel, 1958). Generally, the family is herbaceous or woody. Many plants in the family are economically important. Products include potato and eggplant (*Solanum* sp.) and tomato (*Lycopersicon lycopersicum* Linn.). Edible fruits can be found in the genus *Physalis* (Cape gooseberry, Jamberry, Sugar cherry, Chinese lantern etc., according to the species and variety), *Capsicum* (sweet and chilli peppers), etc. Most produce poisonous alkaloids and some are commercially important in this connection (*Nicotiana*, *Datura*).

The taxonomic value of epidermal morphology is well documented in botanical literature, Dilcher (1974), Jayeola *et al.* (2001), Adedeji and Faluyi (2001), Adedeji

(2004) and Adedeji and Illoh (2004). Metcalfe and Chalk (1950) gave some description of the general anatomy of the family Solanaceae. Since then there has been no additional anatomical work on the family in Nigeria.

Trichomes have long been of considerable importance in comparative investigations in angiosperms. They are frequently present, easily observable and have often been found to have variation patterns which correlate with other features of the taxa under investigation (Cutler, 1969). Rao and Ramayya (1977) used the structure and distribution of trichomes to separate two species of *Malvastrum* in India. Inamdar *et al.* (1990) also reported the structure, ontogeny, organographic distribution and taxonomic significance of trichomes in the family Cucurbitaceae. There is no report on the organographic study of trichomes in the family Solanaceae.

To redress the scanty information available, the observations on the foliar epidermal anatomy and organographic trichome distribution of the family Solanaceae are reported.

MATERIALS AND METHODS

For the purpose of this research, nine species in four genera in the family Solanaceae were collected. *Capsicum frutescens* Linn., *Lycopersicon pimpinellifolium* (Jusl.) Mill., *Solanum macrocarpon* Linn., *Solanum torvum* Sw., *Solanum nigrum* Linn. and *Nicotiana tabacum* Linn. were collected from the wild in Ile-Ife, Osun State, Nigeria. The cultivated species *Capsicum chinense* Jacq., *Capsicum annuum* Linn. and *Lycopersicon lycopersicum* cv. Roma VF Linn. were collected from Nigeria Horticultural Institute (NIHORT), Ibadan, Oyo State, Nigeria.

Fresh specimens of all the species were used. The epidermal layers were isolated by maceration of leaf segments in Jeffrey's maceration mixture (10% chromic acid and bench concentrated hydrochloric acid). The isolated layers were rinsed in water, stained in 1% aqueous Safranin and mounted in glycerine for microscopic study.

Mature trichomes were studied in epidermal peels of different plant parts, stained with safranin and mounted in 70% glycerine.

RESULTS

***Capsicum chinense* Jacq.:** Epidermal cells polygonal to irregular in shape with undulating anticlinal walls on adaxial surface (Fig. 1A), irregular with sinuous anticlinal walls on the abaxial surface (Fig. 2A). Amphistomatic leaf surfaces, stomata largely anisocytic to anomocytic, occasionally brachy-paracytic (Fig. 3A, B and D), circular, occasionally elliptic in shape; stomatal size-adaxial $437.50-687.50 \mu\text{m}^2$, abaxial $450.10-675.75 \mu\text{m}^2$; stomatal index-adaxial 3.96-15.81%, abaxial 16.25-32.29%.

Trichomes: (Table 1; Fig. 4B, C, F, H and J, Fig. 6S₁): Epidermal surfaces-unicellular, bicellular non-glandular, stalked glandular; petiole-non-glandular bicellular, multicellular; stem- non-glandular bicellular, multicellular; pedicel-non-glandular multicellular; sepal-largely non-glandular bicellular, multicellular, stalked glandular; petal-largely unicellular and bicellular non-glandular.

***Capsicum annuum* Linn.:** Epidermal cells polygonal to irregular in shape with straight to wavy anticlinal walls on the adaxial surface (Fig. 1B), irregular with wavy

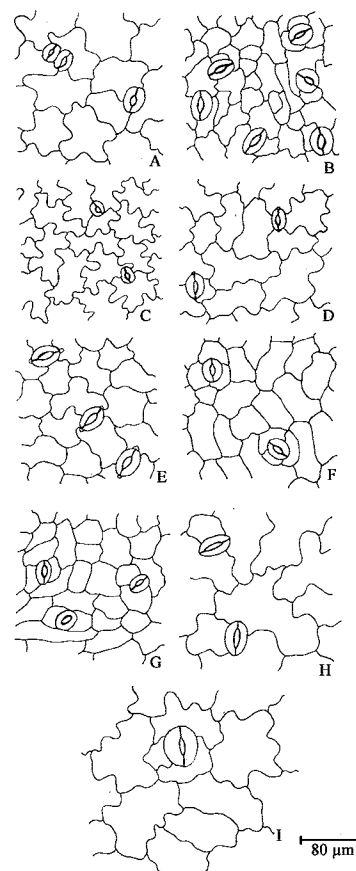


Fig. 1: Adaxial epidermal surface of the species of the family solanaceae studied. A: *C. chinense*, B: *C. annuum*, C: *C. frutescens*, D: *L. pimpinellifolium*, E: *L. lycopersicum* cv. Roma VF., F: *S. macrocarpon*, G: *S. torvum*, H: *S. nigrum* and I: *N. tabacum*

to slightly undulating walls $33.60-61.60 \mu\text{m}$ long and $22.40-42.00 \mu\text{m}$ wide on the abaxial surface (Fig. 2B). Amphistomatic, stomata anisocytic to anomocytic, occasionally brachy-paracytic (Fig. 3A, B and D), circular to elliptic in shape; stomatal size-adaxial $400.20-675.50 \mu\text{m}^2$, abaxial $350.50-618.75 \mu\text{m}^2$; stomatal index-adaxial 13.19-19.41%, abaxial 25.35-31.32%.

Trichomes: (Table 1; Fig. 4F, H and J, Fig. 6S_{4,6,9}): Epidermal surfaces- non-glandular trichomes absent, only stalked glandular trichomes with long unicellular stalks present; petiole-non-glandular bicellular, multicellular; stem-largely non-glandular multicellular; pedicel-non-glandular multicellular; sepal-stalked glandular largely, occasionally, non-glandular bicellular; petal-non-glandular bicellular, multicellular.

Table 1: Organographic distribution of Trichomes in the species of the family solanaceae studied

Species	Lamina epidermal surface	Petiole	Stem	Pedicle	Sepal	Petal
<i>C. chinense</i>	B,C,F,S ₃	F,J	F,J	J	F,J,S ₅	B,H
<i>C. annum</i>	S _{4,6,9}	F,J	J	J	F,S ₄	H,J
<i>C. frutescens</i>	B,C,J,K,S _{4,5}	J	J,M,N,S _{3,4}	J	F,J	H,J
<i>L. pimpinellifolium</i>	A,C,D,F,I,S _{1,2,4}	F,J	F,J	J,S ₃	A,F,J,L	G,H,S _{5,5}
<i>L. lycopersicum</i> cv. Roma VF.	C,D,E,F,G,I,S ₃	B,C,J,S ₅	C,F,J,S ₃	F,J,S _{3,8}	F,J,S _{3,5}	B,H,J
<i>S. macrocarpon</i>	S ₃	C,S ₃	C,S ₃	B,C,J	B,C,S ₃	H,S _{3,5}
<i>S. torvum</i>	O,P,Q,R,S ₃	Q,R	P,Q,R,S ₃	P,Q,R	B,C,F,P,Q,R	B,H,P,Q,R
<i>S. nigrum</i>	S _{6,7}	C,F,J,S _{5,7}	C,F,J,S ₅	B,F,J,S ₅	B,C,F,J,S _{5,6}	B,H
<i>N. tabacum</i>	J,T _{1,5}	J,T ₅	J,T ₅	T _{1,5}	S ₄ ,S ₆ ,T _{1,6}	F,H,T _{3,5}

A- Spine-like non-glandular trichome; B- Unicellular short non-glandular trichome; C- Unicellular long non-glandular trichome; D- Unicellular hooked non-glandular trichome; E- Bicellular non-glandular trichome (basal cell big); F- Bicellular non-glandular trichome (basal cell normal); G- Bicellular non-glandular trichome (basal cell big, apical cell hooked and pointed); H- Bicellular non-glandular trichome often found on petals; I- Bicellular hooked non-glandular trichome; J- Multicellular non-glandular trichome; K- Multicellular non-glandular trichome (basal cell big, 2 cells shrivelled); L- Multicellular non-glandular trichome (topmost cell very narrow); M- Multicellular non-glandular trichome (middle cell shrivelled); N- Multicellular non-glandular trichome (one cell branching); O- Triradiate stellate non-glandular trichome; P- Tetraradiate or H-shaped stellate non-glandular trichome; Q- Multiradiate stellate non-glandular trichome; R- Multiradiate stellate non-glandular trichome; S₁₋₉- Unicellular stalk, unicellular to multicellular head; T₁₋₆- Bicellular to multicellular stalk, unicellular to multicellular head

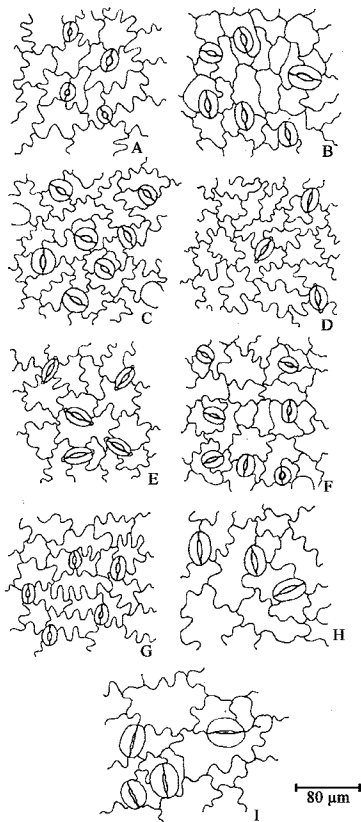


Fig. 2: Abaxial epidermal surface of the species of the family Solanaceae studied. A: *C. chinense*, B: *C. annum*, C: *C. frutescens*, D: *L. pimpinellifolium*, E: *L. lycopersicum* cv. Roma VF., F: *S. macrocarpon*, G: *S. torvum*, H: *S. nigrum* and I: *N. tabacum*

***Capsicum frutescens* Linn.:** Epidermal cells polygonal to irregular with sinuous anticlinal walls on the adaxial surface (Fig. 1C), irregular with sinuous anticlinal walls on

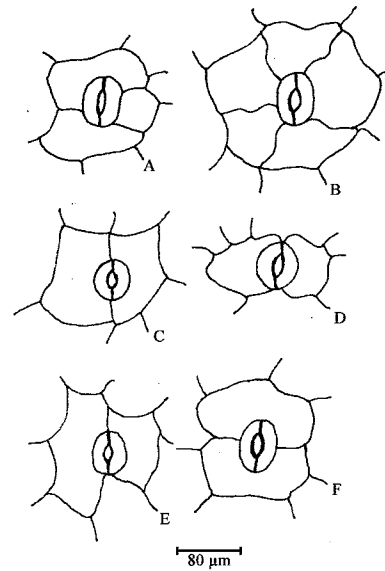


Fig. 3: Stomatal types in the family Solanaceae studied. A: Anisocytic, B: Anomocytic, C: Paracytic, D: Brachy-paracytic, E: Hemi-paracytic and F: Diacytic

the abaxial surface (Fig. 2C). Leaf surfaces amphistomatic, stomata largely anisocytic, occasionally anomocytic, (Fig. 3A and B), circular in shape; stomatal size-adaxial 405.20-902.41 μm², abaxial 505.21-812.50 μm², stomatal index-adaxial 9.09-20.26%, abaxial 23.33-37.30%.

Trichomes: (Table 1; Fig. 4B, C, F, H, J, K, M and N; Fig. 6S_{3,5}): Epidermal surfaces-non-glandular unicellular and multicellular, stalked glandular with long unicellular stalks; petiole- non-glandular multicellular; stem- non-glandular multicellular, stalked glandular occasionally; pedicel- non-glandular multicellular; sepal- non-glandular bicellular, multicellular; petal- non-glandular- bicellular, multicellular present.

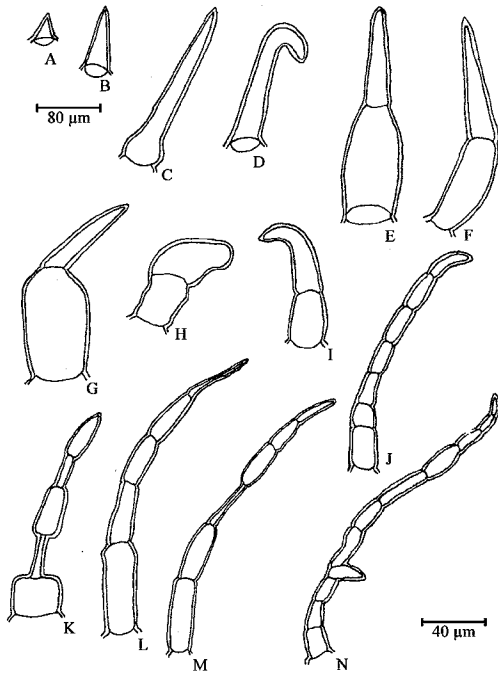


Fig. 4: Non-glandular unicellular, bicellular, multicellular trichomes in the family Solanaceae. A: Spine-like non-glandular trichome, B: Unicellular short non-glandular trichome, C: Unicellular long non-glandular trichome, D: Unicellular hooked non-glandular trichome, E: Bicellular non-glandular trichome (basal cell big), F: Bicellular non-glandular trichome (basal cell normal), G: Bicellular non-glandular trichome (basal cell big, apical cell hooked and pointed), H: Bicellular non-glandular trichome often found on petals, I: Bicellular hooked non-glandular trichome, J: Multicellular non-glandular trichome, K: Multicellular non-glandular trichome (basal cell big, 2 cells shrivelled), L: Multicellular non-glandular trichome (topmost cell very narrow), M: Multicellular non-glandular trichome (middle cell shrivelled) and N: Multicellular non-glandular trichome (one cell branching)

***Lycopersicon pimpinellifolium* (Jusl.) Mill:** Epidermal cells polygonal to irregular in shape with undulating anticlinal walls on adaxial surface (Fig. 1D), irregular with sinuous anticlinal walls on the abaxial surface (Fig. 2D). Amphistomatic leaf surfaces, stomata anomocytic to anisocytic (Fig. 3A and B); elliptic to circular in shape with small protrusions at both ends; stomatal size-adaxial $670.80-996.41 \mu\text{m}^2$, abaxial $485.65-1,005.74 \mu\text{m}^2$; stomatal index-adaxial 2.04-10.62%, abaxial 16.06-19.64%.

Trichomes: (Table 1; Fig. 4A, C, D, F, G, H, I and J; Fig. 6S_{1,5}): Epidermal surfaces- non-glandular spine-like, unicellular hooked and bicellular, stalked glandular; petiole- non-glandular bicellular, multicellular; stem- non-glandular bicellular, multicellular; pedicel- non-glandular multicellular largely, occasionally stalked glandular; sepal- short prickle-like, bicellular and multicellular non-glandular; petal- largely bicellular non-glandular and stalked glandular.

***Lycopersicon lycopersicum* cv. Roma VF. Linn.:** Epidermal cells polygonal to occasionally rectangular with wavy to undulating anticlinal walls on the adaxial surface (Fig. 1E), irregular with sinuous anticlinal walls on the abaxial surface (Fig. 2E). Leaf surfaces amphistomatic, stomata complex types anomocytic to anisocytic (Fig. 3A and B), elliptic to circular in shape with small protrusions; stomatal size-adaxial $702.12-1,408.02 \mu\text{m}^2$, abaxial $565.10-1,578.09 \mu\text{m}^2$; stomatal index-adaxial 8.57-14.81%, abaxial 17.19-28.87%.

Trichomes: (Table 1; Fig. 4B-H and J; Fig. 6S_{3,5,8}): Epidermal surfaces- non-glandular unicellular, unicellular hooked, bicellular, multicellular and stalked glandular; petiole- unicellular, multicellular non-glandular, stalked glandular occasionally; stem- non-glandular unicellular, bicellular, multicellular and stalked glandular; pedicel- non-glandular bicellular, multicellular occasionally stalked glandular; sepal- non-glandular, bicellular, multicellular occasionally stalked glandular; petal- non-glandular unicellular, bicellular and multicellular.

***Solanum macrocarpon* Linn.:** Epidermal cells polygonal in shape with straight to slightly wavy anticlinal walls on the adaxial surface (Fig. 1F), irregular with undulating to sinuous anticlinal walls on the abaxial surface (Fig. 2F). Amphistomatic leaf surfaces, stomatal type anisocytic to anomocytic, occasionally brachy-paracytic (Fig. 3A, B and D), largely circular in shape, occasionally elliptic; stomatal size-adaxial $393.73-520.50 \mu\text{m}^2$, abaxial $394.50-500.65 \mu\text{m}^2$; stomatal index-adaxial 13.53-16.23%, abaxial 22.57-30.20%.

Trichomes: (Table 1; Fig. 4B, C, H and J; Fig. 6S_{3,5}): Epidermal surfaces- stalked glandular only; petiole- stalked glandular largely, occasionally non-glandular unicellular; stem- unicellular non-glandular largely, stalked glandular occasionally present; pedicel- unicellular and multicellular non-glandular; sepal- unicellular, non-glandular and stalked glandular; petal- bicellular non-glandular and stalked glandular occasionally present.

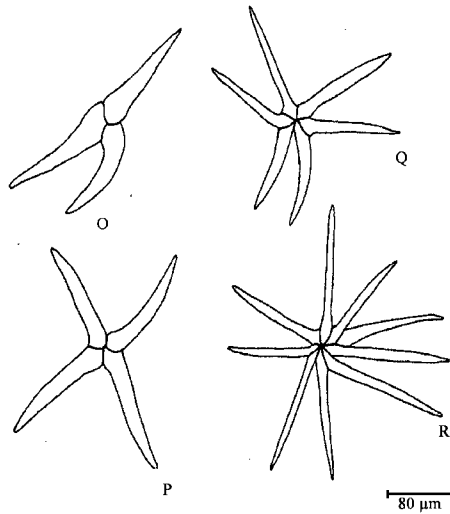


Fig. 5: Non-glandular stellate trichomes in the family solanaceae. O: Triradiate stellate non-glandular trichome, P: Tetradiate or H-shaped stellate non-glandular trichome, Q: Multiradiate stellate non-glandular trichome and R: Multiradiate stellate non-glandular trichome

***Solanum torvum* Sw.:** Epidermal cells polygonal to rectangular in shape with straight to wavy anticlinal walls on the adaxial surface (Fig. 1G), irregular with sinuous anticlinal walls on the abaxial surface (Fig. 2G). Amphistomatic; stomatal type largely anisocytic, occasionally anomocytic and brachy-paracytic (Fig. 3A, B and D), elliptic to occasionally circular in shape; stomatal size-adaxial 301.10-481.25 μm^2 , abaxial 295.67-458.25 μm^2 ; stomatal index-adaxial 2.01-7.40%, abaxial 4.88-18.63%.

Trichomes: (Table 1; Fig. 4B, C and F; Fig. 5O-R; Fig. 6S₁₋₉): Epidermal surfaces- stellate non-glandular (triradiate, tetradiate or H-shaped and multiradiate types), short stalked glandular; petiole- stellate non-glandular; stem- stellate non-glandular, occasionally stalked glandular; pedicel- stellate non-glandular; sepal- unicellular, bicellular non-glandular occasionally, largely stellate; petal- largely stellate, occasionally unicellular, bicellular non-glandular.

***Solanum nigrum* Linn.:** Epidermal cells polygonal with undulating anticlinal walls on the adaxial surface (Fig. 1H), irregular with sinuous anticlinal walls on the abaxial surface (Fig. 2H). Amphistomatic; stomatal type largely anisocytic occasionally paracytic, diacytic, hemi-paracytic and anomocytic (Fig. 3A, B, C and F), largely elliptic occasionally circular in shape; stomatal size-adaxial 700.50-937.60 μm^2 , abaxial 375.50-787.50 μm^2 ; stomatal index-adaxial 12.16-22.51%, abaxial 24.48-33.54%.

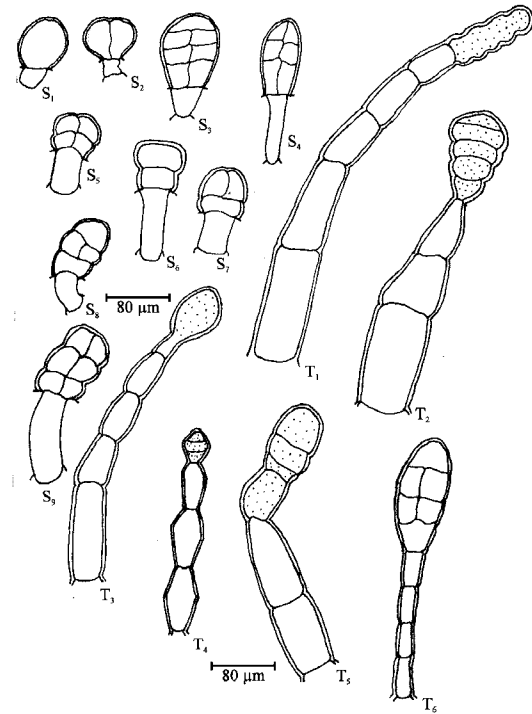


Fig. 6: Stalked glandular trichomes in the family Solanaceae. S₁₋₉: Unicellular stalk, unicellular to multicellular head and T₁₋₆: Bicellular to multicellular stalk, unicellular to multicellular head

Trichomes: (Table 1; Fig. 4B, C, F, H and J; Fig. 6S₁₋₉): Epidermal surfaces- largely stalked glandular; petiole- unicellular, bicellular and multicellular non-glandular, occasionally stalked glandular; stem- unicellular, bicellular, multicellular non-glandular and stalked glandular; pedicel- unicellular, bicellular, multicellular non-glandular and stalked glandular occasionally; sepal- unicellular, bicellular, multicellular non-glandular and stalked glandular; petal- largely unicellular and bicellular non-glandular trichome types.

***Nicotiana tabacum* Linn.:** Epidermal cells polygonal to irregular with straight to undulating anticlinal walls on the adaxial surface (Fig. 1I), irregular with sinuous anticlinal walls on the abaxial surface (Fig. 2I). Amphistomatic; stomatal type anisocytic to anomocytic (Fig. 3A and B), largely circular occasionally elliptic in shape; stomatal size-adaxial 675.00-962.50 μm^2 , abaxial 624.20-897.65 μm^2 ; stomatal index-adaxial 7.41-11.68%, abaxial 10.38-20.68%.

Trichomes: (Table 1; Fig. 4F, H and J; Fig. 6T₁₋₆): Epidermal surfaces- multicellular non-glandular and special type of long bicellular to multicellular stalk glandular trichomes; petiole- multicellular non-glandular

and stalked glandular; stem- multicellular non-glandular present largely, very occasionally stalk glandular; pedicel-bicellular to multicellular stalk glandular trichome present in abundance; sepal- multicellular stalk glandular trichome present; petal- bicellular non-glandular and long stalked multicellular trichome types present.

DISCUSSION

Metcalf and Chalk (1950) gave sparse report on the foliar epidermal anatomy of the family Solanaceae. Since then, there has been no additional study on the foliar anatomy of the family and none also on the organographic distribution of trichomes. This study is aimed at redressing the aforementioned knowledge gaps.

On the adaxial surface, the epidermal cell shape is generally polygonal, occasionally irregular to rectangular in all the species studied. Anticlinal cell wall pattern on the adaxial surface can be used to separate the species within each genus studied. Within the genus *Capsicum*, it is undulating in *C. chinense*, straight to wavy in *C. annuum* and sinuous in *C. frutescens*. In the genus *Lycopersicon*, while it is undulating in *L. pimpinellifolium*, it is wavy to undulating in *L. lycopersicum* cv. Roma VF. Within the genus *Solanum*, it is straight to wavy in *S. macrocarpon* and *S. torvum* while it is undulating in *S. nigrum*. The anticlinal wall of the epidermal cells of *Nicotiana tabacum* a mono-species genus in Nigeria, is straight to slightly undulating. However, on the abaxial surface, the epidermal cells are generally irregular with sinuous anticlinal walls except in *C. annuum* where the anticlinal wall is wavy to undulating.

The leaves are amphistomatic. Generally the stomata are more on the abaxial surface than on the adaxial surface. Stomatal complex types are generally anisocytic to anomocytic, though more anisocytic to anomocytic in the species within the genera *Solanum* and *Nicotiana*. In addition to these two stomatal types, some other stomatal types were observed occasionally. Brachy-paracytic stomatal complex type was observed occasionally in *C. chinense*, *C. annuum* and *S. macrocarpon*, paracytic in *S. torvum* and *S. nigrum* only. Diacytic and hemi-paracytic stomatal types were observed in *S. nigrum* which happens to be the species with the highest number of stomatal types. Stomatal size, although quantitative is quite diagnostic. On the adaxial and abaxial surfaces, it is highest in the species within the genus *Lycopersicon* and lowest in *Solanum torvum*. Stomatal index is highly constant for a certain species and can be used for species delimitation (Olatunji, 1983). This may be due to the presence of a high density of stellate trichomes. Stomatal

index is lowest on the adaxial and abaxial surfaces of *S. torvum*. Stomatal shape is also of diagnostic importance. It is largely circular, occasionally elliptic in the *Capsicum* genus, largely elliptic, often circular too in the *Lycopersicon* genus, circular to occasionally elliptic in the genus *Nicotiana*. In the genus *Solanum*, it is largely elliptic, occasionally circular in *S. torvum* and *S. nigrum* while it is largely circular, occasionally elliptic in *S. macrocarpon*. Small protrusions on the stomata of the species in the genus *Lycopersicon* separate the genus from the other genera in the family.

Trichomes are found in all the species of the family Solanaceae studied. They have been of considerable importance in comparative investigations in angiosperms. They are frequently present, easily observable and have often been found to have variation patterns which correlate with other features of the taxa under investigation (Cutler, 1969). Isawumi (1992) in his study on the genus *Hibiscus* used the structure and distribution of trichomes to classify the West African species of *Hibiscus*. Rao and Ramayya (1977) studied the organographic distribution of trichomes in two Indian species of the genus *Malvastrum* and used this to separate the two species.

In this study, a study of the organographic distribution of the trichomes of the species of the family Solanaceae show that both the types of trichomes and their distribution vary in the species within each genus. Basically two types occur, the stalked glandular and the non-glandular trichome types. The different types of trichomes have differing organographic distributions within the same species and within the genera in the family.

All the three species in the genus *Capsicum* are included in this study. In the genus, *Capsicum annuum* can be separated from *Capsicum frutescens* and *Capsicum chinense* on the basis of the organographic distribution of the trichomes. Whereas *C. frutescens* and *C. chinense* have both non-glandular and glandular trichome types on the adaxial and abaxial epidermal surfaces, *Capsicum annuum* has largely only the glandular trichome types.

In the genus *Solanum*, *Solanum torvum* is the only species with stellate non-glandular trichomes on the leaf adaxial and abaxial epidermal surfaces. Infact, it is the only species in the family that has stellate non-glandular trichomes on the adaxial, abaxial epidermal surfaces and other plant parts. Within the genus, *S. macrocarpon* and *S. nigrum* leaf epidermal surfaces are also characterized by presence of stalked glandular trichome largely. In the genus *Lycopersicon* on the other hand, *L. lycopersicum* cv. Roma VF and *L. pimpinellifolium* can be separated

from each other on the basis of the type of and organographic distribution of the trichomes found in them. On the adaxial and abaxial leaf epidermal surfaces of *L. pimpinellifolium*, for the non-glandular trichome type, only the spine-like, unicellular and bicellular types can be found, multicellular non-glandular trichomes were completely absent whereas the multicellular non-glandular trichome type was found occurring in *L. lycopersicum* cv. Roma VF leaf epidermal surfaces. On the other hand, the organographic study of trichomes on other plant parts revealed that the multicellular non-glandular trichome type absent on the leaf epidermal surfaces of *L. pimpinellifolium* were found occurring in other parts like the petiole, stem, pedicel, sepal and petal. The spine-like non-glandular trichome type was completely absent in all the plant parts of *Lycopersicon lycopersicum* cv. Roma VF.

The trichome types of the species within each genus as noticed from their distribution are useful in distinguishing the species and even their corresponding organs such as leaf, stem etc. which would be of interest to pharmacognosists, archaeobotanists, palaeobotanists and agronomists. Unique abundant bicellular to multicellular stalk glandular trichomes were observed in *N. tabacum*, a mono-species genus in Nigeria. They are believed to be responsible for the unique smell of *N. tabacum*.

REFERENCES

- Adedeji, O. and J.O. Faluyi, 2001. Foliar epidermal studies of thirty-five accessions of *Panicum maximum* Jacq. in Nigeria. *New Botanist*, 28: 145-167.
- Adedeji, O., 2004. Leaf epidermal studies of the species of *Emilia* Cass. (Senecioneae, Asteraceae) in Nigeria. *Botanica Lithuanica.*, 10: 121-133.
- Adedeji, O. and H.C. Illoh, 2004. Comparative foliar anatomy of ten species in the genus *Hibiscus* Linn. in Nigeria. *New Botanist*, 31: 147-180.
- Cutler, D.F., 1969. Juncales. In: *Anatomy of the Monocotyledons*. Metcalfe, C.R. (Ed.), Clarendon Press, Oxford.
- Dilcher, K.L., 1974. Approaches to the identification of Angiosperm leaf remains. *Bot. Rev.*, 40: 2-157.
- Hutchinson, J. and J.M. Dalziel, 1958. *Flora of West Tropical Africa*, 2nd Edn., Vol. 1, Crown Agents, London.
- Inamdar, J.A., M. Gangadhara and K.N. Shenoy, 1990. Structure, Ontogeny, Organographic Distribution and Taxonomic Significance of Trichomes and Stomata in the Cucurbitaceae. In: *Biology and Utilization of the Cucurbitaceae*. Bates, D.M., R.W. Robinson and C. Jeffrey (Eds.), Cornell University Press, London.
- Isawumi, M.A., 1992. Structure, distribution, classification and taxonomic importance of trichomes in the West African species of *Hibiscus* L. (Malvaceae). Seminar paper delivered at Obafemi Awolowo University, Ile-Ife, Nigeria.
- Jayeola, A.A., J.R. Thorpe and J.A. Adenegan, 2001. Macromorphological and micromorphological studies of the West African *Rhizophora* L. *Feddes Repertorium*, 112: 349-356.
- Metcalfe, C.R. and L. Chalk 1950. *Anatomy of the Dicotyledons*, Vol. 1, Oxford.
- Olatunji, O.A., 1983. Department practical manual for plant anatomy, Obafemi Awolowo University, Ile-Ife, Nigeria (unpublished).
- Rao, S.R.S. and N. Ramayya, 1977. Structure, distribution and taxonomic importance of trichomes in the Indian species of *Malvastrum*. *Phytomorphology*, 27: 40- 44.