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# A FOLIAR KEY TO THE FAMILY SOLANACEAE

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**Abstract**

A key, based on trichomes and stomatal composition of 18 including native and exotic species of Solanaceae, is presented.

## Introduction

While the classical taxonomy still has a place in science, modern times have added certain innovations, solving taxonomic problems on one hand and opening new horizons of research in taxonomy, leading to development of a new methodology on the other. Full plants with leaves, flowers, fruits, seed and even underground parts need to be examined for correct identification in the orthodox taxonomy. In the other-wise situation, plants in many herbaria all over the world have been lying unidentified now for centuries. The modern trends in plant taxonomy, however, require just fragments of leaves of species of known families for identification with the same accuracy.

Classical taxonomy no doubt provides multidirectional knowledge. It, however, simply fails when it comes to identification from leaves and leaf fragments when required. The same is true of animal diet plants, lying as leaf segments in crops of animals and insects. The taxonomic importance of foliar characters has long been recognized by a number of scientists (Cowan, 1950; Metcalfe and Chalk, 1950; Inamdar, 1967; Cotthom, 1970; Ramayya, 1972; Bendre, 1973; Ahmed, 1978; Stace,1984). In the past twenty years or so, probably more work has been carried out on stomatal trends than any other leaf character (Napp-Zinn, 1974; Wilkinson, 1979). Carlquist (1961) recognized a wide variety of trichomes in angiosperms, considering them an easily accessible taxonomic character, while Dilcher (1914) identified 31 types of stomata in vascular plants.

If the flora of an area, a rangeland or forest is known, identification technology can be developed through modern taxonomic methods whereby plants, actually consumed by the animals and insects can be identified from leaf segments to a high degree of accuracy. Accordingly, the investigation becomes of practical application in studies of food habits of animals for wildlife management.

In fact, a technique has already been evolved for studying the food habits and preference of grasshoppers (Mulkern and Anderson, 1959), based on foliar characteristics of leaves, following Isely and Alexander (1949). This was later on developed for the identification of grasses (Davies, 1959). The same pattern, for the charaterization of diet of grasshoppers, was adopted by Mulkern et al (1962) and Bailey and Mukerji (1976). Using

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this technology, it was possible to identify 40 species of grasses (Davies, 1959), 80 range plants (Brusven and Mulkern, 1960), 62 plants (Mulkern and Anderson, 1959) and 53 plant species (Riegret and Singh, 1982).

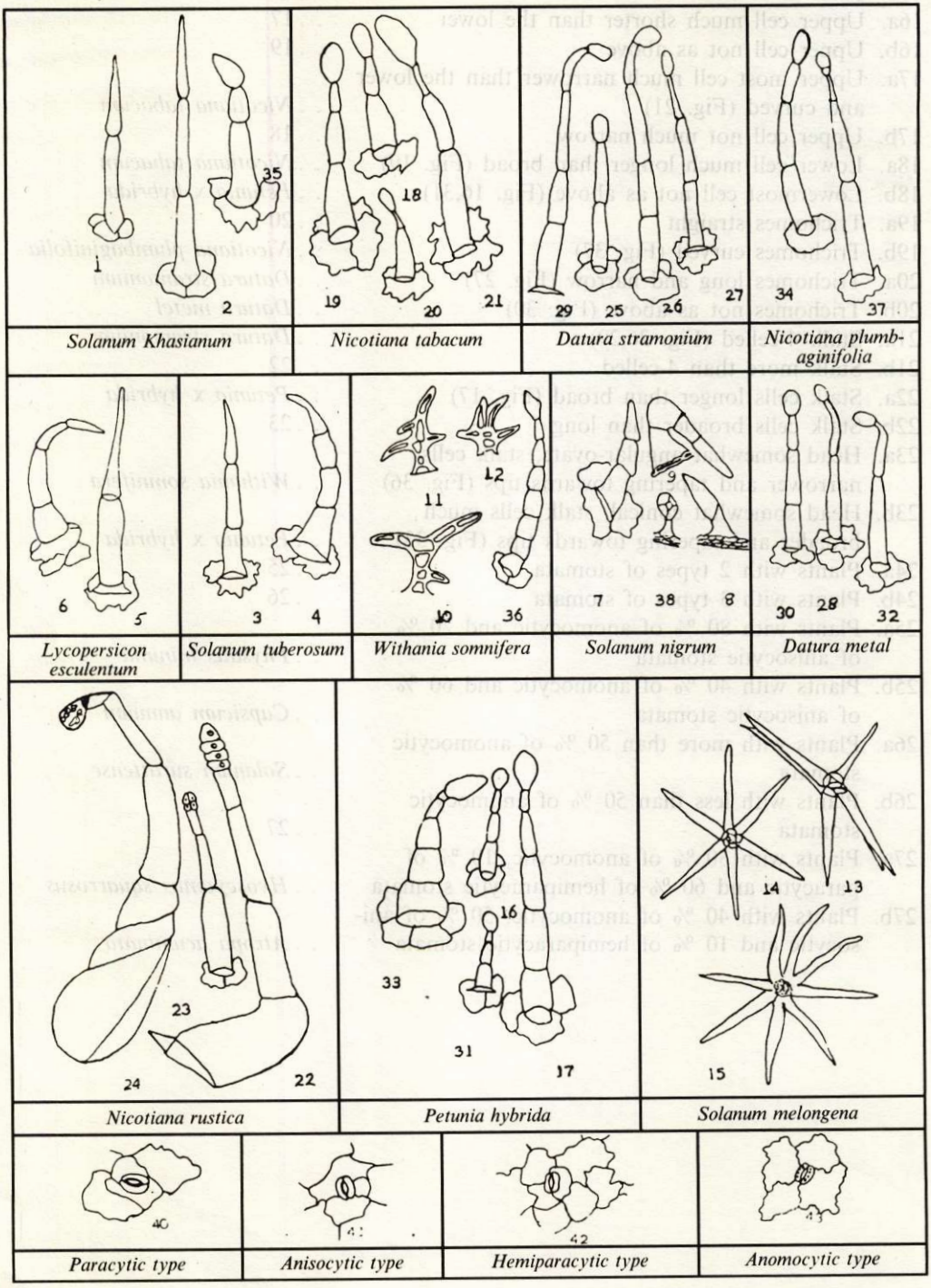
**Results**

In view of importance of the subject, an attempt is made to build up taxonomic knowledge on 2 foliar characters viz. trichomes and stomata, examining lower epidermis in 18 native and exotic species of family Solanaceae for the purposes of their identification and later development of technology for wild-life management. Camera lucida drawings were made. Nomenclature followed was after Nasir (1985).

Key to the species of Solanaceae based mainly on trichomes and partly on stomata

| | | |
|---|---|---|
| 1a. | Plants hypostomatic | . . *Cestrum nocturnum* |
| 1b. | Plants hypoamphistomatic | . . 2 |
| 2a. | Trichomes present | . . 3 |
| 2b. | Trichomes absent | . . 24 |
| 3a. | Trichomes non-glandular | . . 4 |
| 3b. | Trichomes glandular | . . 8 |
| 4a. | Trichomes simple | . . 6 |
| 4b. | Trichomes branched | . . 5 |
| 5a. | Trichomes stellate (Fig. 13,14,15) | . . *Solanum melongena* |
| 5b. | Trichomes not stellate (Fig. 10,11,12) | . . *Withania somnifera* |
| 6a. | Trichomes straight | . . 7 |
| 6b. | Trichomes curved (Fig. 7,8,9) | . . *Solanum nigrum* |
| 7a. | Upper cell curved (Fig. 3,4) | . . *Solanum tuberosum* |
| 7b. | Upper cell straight (Fig. 5,6) | . . *Lycopersion esculentum* |
| 8a. | Head multicellular | . . 9 |
| 8b. | Head unicellular | . . 11 |
| 9a. | Head 2-celled (Fig. 37) | . . *Nicotiana plumboginifolia* |
| 9b. | Head 4-5-celled | . . 10 |
| 10a. | Head 4-celled (Fig. 22,23,24) | . . *Nicotiana rustica* |
| 10b. | Head 5-celled (Fig. 38) | . . *Solanum nigrum* |
| 11a. | Stalk 2-celled | . . 12 |
| 11b. | Stalk more than 2-celled | . . 15 |
| 12a. | Stalk cells equal in size | . . 13 |
| 12b. | Stalk cells unequal in size | . . 14 |
| 13a. | Upper cell straight (Fig. 25) | . . *Datura stramonium* |
| 13b. | Upper cell curved (Fig. 28,32) | . . *Datura metel* |
| 14a. | Upper cell small and narrow | . . *Nicotiana tabacum* |
| 14b. | Upper cell large (Fig. 35) | . . *Solanum khasianum* |
| 15a. | Stalk 3-celled | . . 16 |

| | | |
|---|---|---|
| 15b. | Stalk more than 3-celled | . . 21 |
| 16a. | Upper cell much shorter than the lower | . . 17 |
| 16b. | Upper cell not as above | . . 19 |
| 17a. | Upper most cell much narrower than the lower and curved (Fig. 21) | . . *Nicotiana tabacum* |
| 17b. | Upper cell not much narrow | . . 18 |
| 18a. | Lower cell much longer than broad (Fig. 19) | . . *Nicotiana tabacum* |
| 18b. | Lowermost cell not as above (Fig. 16,31) | . . *Petunia* x *hybrida* |
| 19a. | Trichomes straight | . . 20 |
| 19b. | Trichomes curved (Fig. 37) | . . *Nicotiana plumbaginifolia* |
| 20a. | Trichomes long and narrow (Fig. 27) | . . *Datura stramonium* |
| 20b. | Trichomes not as above (Fig. 30) | . . *Datura metel* |
| 21a. | Stalk 4-celled (Fig. 26,29) | . . *Datura stramonium* |
| 21b. | Stalk more than 4-celled | . . 22 |
| 22a. | Stalk cells longer than broad (Fig. 17) | . . *Petunia* x *hybrida* |
| 22b. | Stalk cells broader than long | . . 23 |
| 23a. | Head somewhat angular-ovate, stalk cells narrower and tapering towards tips (Fig. 36) | . . *Withania somnifera* |
| 23b. | Head somewhat conical, stalk cells much broader and tapering towards tips (Fig. 33) | . . *Petunia* x *hybrida* |
| 24a. | Plants with 2 types of stomata | . . 25 |
| 24b. | Plants with 3 types of stomata | . . 26 |
| 25a. | Plants with 80 % of anomocytic and 20 % of anisocytie stomata | . . *Physalis minima* |
| 25b. | Plants with 40 % of anomocytic and 60 % of anisocytic stomata | . . *Capsicum annuum* |
| 26a. | Plants with more than 50 % of anomocytic stomata | . . *Solanum surattense* |
| 26b. | Plants with less than 50 % of anomocytic stomata | . . 27 |
| 27a. | Plants with 30 % of anomocytic, 10 % of paracytic and 60 % of hemiparacytic stomata | . . *Hyoscyamus squarrosus* |
| 27b. | Plants with 40 % of anomocytic, 50 % of anisocytic and 10 % of hemiparacytic stomata | . . *Atropa acuminata* |


1
35
2
Solanum Khasianum
18
19
20
21
Nicotiana tabacum
29
25
26
27
Datura stramonium
34
37
Nicotiana plumb-aginifolia
6
5
Lycopersicon esculentum
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4
Solanum tuberosum
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12
10
36
Withania somnifera
9
7
38
8
Solanum nigrum
30
28
32
Datura metal
23
24
22
Nicotiana rustica
16
33
31
17
Petunia hybrida
14
13
15
Solanum melongena
40
Paracytic type
41
Anisocytic type
42
Hemiparacytic type
43
Anomocytic type

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