STUDIES OF SCULPTURE PATTERNS IN SOME SPECIES OF *CROTALARIA* FAMILY: FABACEAE

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Abstract

Sculpture pattern present on wing petals of *Crotalaria* shows constancy within the group and helps in the separation of species from each other. The present study on *Crotalaria* analyses this character among different species and a key is provided for 13 species of C*rotalaria.*

Key words: sculpture, C*rotalaria*, wing petals

Introduction

Sculpture pattern present on the outer surface of wing petals of several Papilionaceous genera has been variously termed as wrinkles, lunae, cavae, rugae and lamellae. In India, Nair and Tewari (1978) and John Britto (1983) reported their occurrence and keyed them out accordingly. An extensive study undertaken by Stirton (1981) established the promising taxonomic potentiality in the sculpture pattern of wing petals. Information available in general and the genus C*rotalaria* in particular is scanty (John Britto, 2000). Therefore, the present study has been undertaken to give a comprehensive idea of the sculpture pattern of this genus and to prepare a key for the identification of the species studied.

Materials and Methods

A dried wing petal was removed from a Herbarium specimen (Rapinat Herbarium, St.Joseph's College) and boiled for 2-3 minutes in of distilled water till all the air bubbles were expelled and material sank to the bottom (John Britto, 2000). The sculpture pattern was described and illustrations were made using the pattern provided by Stirton (1981).

Results and Discussion

The sculpture pattern on the wing petal is represented in Table 2. On the basis of sculpture, the present species included in the genus fall into six groups (see Table 1). The Darkened region merely indicates the presence of lunae in respective regions. (The regions may have varying number of lunae and need not occupy the full area in a particular region.) In *Aspalathus* the sculpture pattern was always correlated to the shape of their petals, laxness or compactness of inflorescences (Stirton, 1981).

Applying the above observations to *Crotalaria* species groups I, II and III with lunae only up to lower central region may be considered to have reduced sculpture, and groups IV, V and VI with lunae in lower and upper regions to have elaborate sculpture. The former have lesser number of flowers (below 10),dense, in a cyme or a subcapitate cluster. The keel invariably shows twisting of the beak. Group IV, V and VI have copious (numerous) flowers loosely spread in racemes/panicles (except *C. pusilla*). In groups IV and VI keels are untwisted, with their beak deeply or faintly incurved except *C. verrucosa*. Thus *Crotalaria* species seem to corroborate further conclusions proposed by Stirton (1981).

Polhill, while evaluating the sections proposed for *Crotalaria* by earlier workers did not agree with the usage of leaf-character (simple or compound) for division of tribes. In his system, he based the primary divisions on the shape and position of standard appendages and the form of the beak in keels. The species of *Crotalaria* investigated in this study show that reduction of sculpture is associated with twisted in keel and elaborate sculpture by the absence of a twist. This conclusion seems to supportive character to Polhill's division (John Britto, 1983, 2000). In *Crotalaria* as well as in some other genera, the outer surface of wing

petals shows prominent folds or pockets. Correlation of sculpture with other floral features indicates that sculpture can be a taxonomic character and even used to solve the ambiguities of taxonomic schemes. On the basis of sculpture patterns a tentative key for the identification of these species of C*rotalaria* is suggested below.

1 Lunae present only in upper region of wing petal
  2 Highest number of lunae per row 5-8. Lunae present only in upper basal. *C. priestleyoides*
  2 Highest number of lunae per row above 8. Lunae extending to central and distal
    3 Sculpture spreading to distal *C. pallida*
    3 Sculpture spreading to central
      4 Length of sculpture zone less than 2 mm
        5 Wing lanceolate. Sculpture zone 0.6 mm long. *C. umbellata*
        5 Wing oblong. Sculpture zone 1.5 mm long. *C. prostrata*
      4 Length of sculpture zone 3-6 mm
        6 Lunae mostly intercostal *C. willdenowiana*
        6 Lunae mostly transcostal *C. speciosa*
1 Lunae present in lower and upper region of wing petal
  7 Sculpture area up to distal zone
    8 Length of sculpture zone less than 6 mm *C. verrucosa*
    8 Length of sculpture zone more than 8 mm
      9 Lunae intercostal and transcostal *C. shevaroyensis*
      9 Lunae intercostal *C. pulchra*
  7 Sculpture area up to central zone
    10 Wing more than 1 cm long. Sculpture zone more than 4.5 mm long
      11 Pocket or fold present
        12 Sculpture zone 7.5 mm broad *C. retusa*
        12 Sculpture zone 3 mm broad *C. semperflorens*
      11 Pocket or fold absent *C. paniculata*
    10 Wing less than 7 mm long. Sculpture zone less than 3 mm long *C. pusilla*

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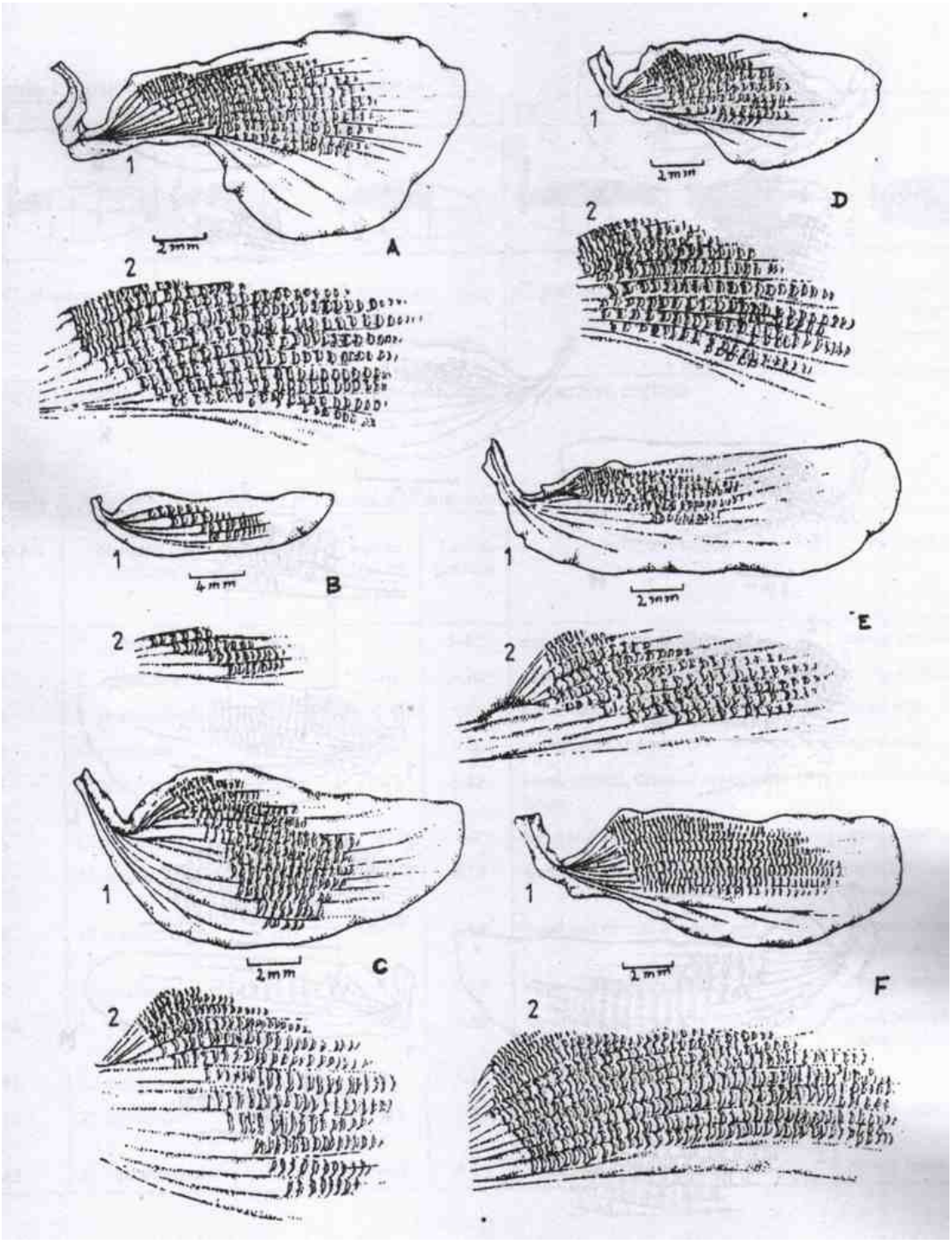


Plate 1: Sculpture patterns of wing petals of different *Crotalaria* spp.
(A). *C. pulchra* (B). *C. pusilla* (C). *C. retusa* (D). *C. paniculata*
(E). *C. semperflorens* (F). *C. shevaroyensis*

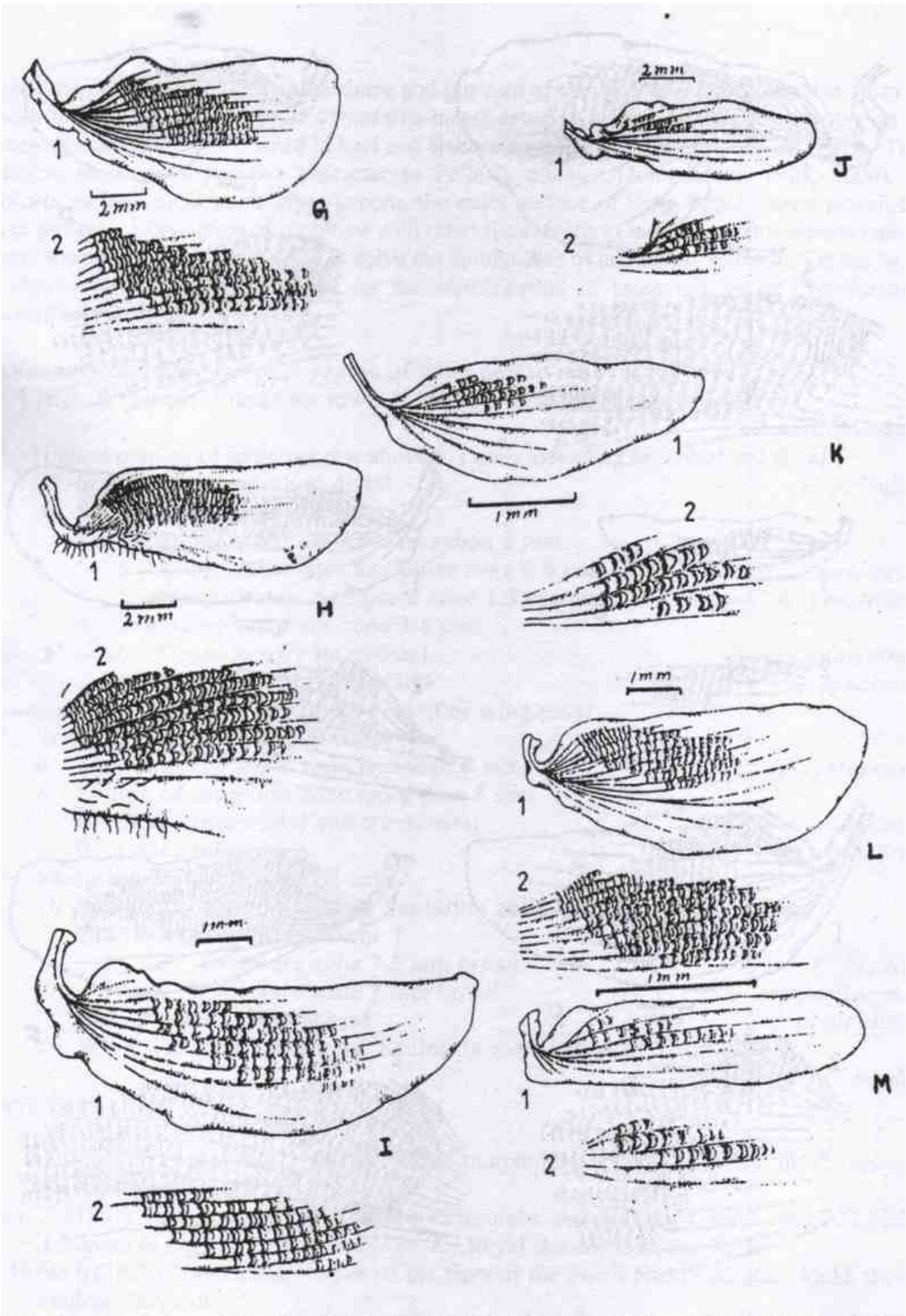
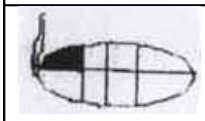
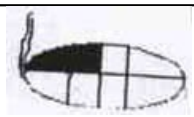
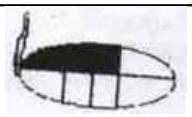
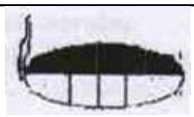


Plate 2: Sculpture patterns of wing petals of different *Crotalaria* spp. (contd.)
(G). *C. verrucosa* (H). *C. speciosa* (I). *C. pallida* (J). *C. priestleyoides*
(K). *C. umbellate* (L). *C. willdenowiana* (M). *C. prostrata*

Table 1. Position of sculpturing in *Crotolaria*

I	II	III	IV	V	VI
					
C. riestleyoides	*C. umbellata*	*C. prostrata* *C. speciosa* *C. willdenowiana*	*C. pallida*	*C. paniculata* *C. retusa* *C. pusilla* *C. semperflorens*	*C. pulchra* *C. shevaroyensis* *C. verrucosa*

Note: Darkened area indicates the presence of lunae in respective regions

Table 2. Analysis of Sculpture in *Crotalaria* species

Sp.No.	Name of the Species	Sculpture zone (mm)	Lunae (no. of rows)	Lunae per row	Sculpture region	Sculpture pattern
1.	*C. pallida*	4.2	6-7	5-12	upper basal, central to distal	mostly intercostal
2.	*C. paniculata*	4.5	9-10	3-20	basal and central of upper and lower	mostly intercostal
3.	*C. priestleyoides*	0.8-1.0	3	5-8	upper basal	intercostal
4.	*C. prostrata*	1.5	3	3-8	upper basal and central	intercostal
5.	*C. pulchra*	8.0	10-12	8-12	basal, central, distal of upper and lower	mostly intercostal
6.	*C. pusilla*	0.8	4	4-7	basal and central of upper and lower	mostly intercostal
7.	*C. retusa*	6.0	14	4-17	basal and central of upper and lower	transcostal and intercostal
8.	*C. semperflorens*	6.0	9 or 10	3-18	basal and central of upper and lower	transcostal and intercostal
9.	*C. speciosa*	4.2	7	7-17	upper basal and central	mostly transcostal
10.	*C. shevaroyensis*	8.0	11-13	7-30	basal central distal of upper and lower	intercostal and transcostal
11.	*C. umbellata*	0.6	4	5-10	upper basal and central	mostly intercostal
12.	*C. verrucosa*	5.5-6.0	8 or 9	3-17	basal central and distal of upper and lower	mostly intercostal
13.	*C. willdenowiana*	3.0	8 or 9	5-15	upper basal and central	mostly intercostal