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STUDIES IN CYPERACEAE.
VII. NEW EVIDENCES FOR THE REVALIDATION OF FIMBRISTYLIS VELATA

E. GOVINDARAJALU

Department of Botany, Presidency College, Madras 5, India

SUMMARY

Anatomical and palynological evidences are advanced in addition to the morphological characters for the revalidation of *Fimbristylis velata* R. Br., which often has been recognized only as varieties of *F. squarrosa* Vahl or other species. A full description of this taxon is presented.

A specimen collected by Robert Brown at Port Jackson (near Sydney), Australia was baptized by him in 1810 as *Fimbristylis velata*. Another very closely related species, *F. propinqua*, was described by Robert Brown in the same year. These two taxa had been accepted with the original circumscription as representing two species by Kunth (1837) and Steudel (1855), but a critical study reveals that both are conspecific, and the binomial *F. velata* has been accepted.

Subsequently *F. velata* has been reduced to a varietal rank by later authors, choosing altogether a different epithet. Makino (1903) was the first person who considered *F. velata* as nothing but a variety of *F. squarrosa* Vahl on the basis of the presumed paucity of differentiating characters. According to him the only dependable character between these two taxa was the presence of squarrose glumes in *F. squarrosa* and the non-squarrose glumes in *F. velata*, and consequently he named the latter as *F. squarrosa* var. *esquarrosa*. This conclusion has also been accepted by Kern (1955, 1961) on the same ground. Although Koyama (1961) also considered *F. velata* only as a variety, contrary to the treatment of Makino and Kern he treated this as a variety of *F. aestivalis* (Retz.) Vahl but retaining the same varietal epithet.

Without any prior knowledge of the existence of *F. velata* Fischer (1931) described the variety *F. dichotoma* (L.) Vahl var. *villosa* Fischer, and in 1935 another variety was described and named as *F. bisumbellata* (Forsk.) Bub. var. *hirstistyla* Fischer. The important character of these varieties was said to be the presence of villous hairs at the base of the style, resembling those of *F. squarrosa*. When I examined the very same

specimens described by Fischer I found they were nothing but *F. velata.*

The critical comparative examination of the specimens belonging to *F. velata* and *F. squarrosa* indicates clearly that the character of their glumes provides excellent distinguishing features. In *F. squarrosa* the glumes are conspicuously squarrose, elliptic-oblong, relatively narrow (Fig. 1 g) while in the *F. velata,* they are esquarrose, ovate and rather broad (Fig. 1 c). In addition to the above mentioned character, there are certain other characters which can be used to distinguish these two species. In *F. velata,* the bracts usually are as long as or slightly longer than the inflorescence, with oblong-cylindric, subacute-obtuse spikelets, and has larger, broader (1—1.1 mm), ovate glumes, glabrous basal glumes, less prominent keel, wingless rachilla, longer anthers and hairy style (Fig. 1 a-e). On the other hand, *F. squarrosa* is characterized by longer bracts, with ovate-elliptic, acute spikelets, and has smaller, narrower (0.6—0.7 mm), elliptic-oblong glumes, hairy basal glumes, more prominent keel, shortly winged rhachilla, shorter anthers and glabrous style (Fig. 1 f-i). It is interesting to observe that although one can find the characteristic long pendent hairs covering ½—¾ of the nuts in *F. velata* and almost completely covering the entire nuts in *F. squarrosa,* a critical examination reveals different modes of attachment of hairs in each. In the former, they are not only attached basally but also supprabasally to the style thereby extending upwards ⅓—¾ of the length from the stylar base (Fig. 1 e) while in *F. squarrosa* they are just confined to the stylar base only and the style remains almost glabrous upwards (Fig. 1 i).

While working on the systematic anatomy of Indian species of *Fimbristylis,* I observed that a comparison of the vegetative anatomy of these two species did not fail to show the exisence of a large number of differences of taxonomic importance between them. They are tabulated as follows:

F. velata R. Br.	*F. squarrosa* Vahl
Epidermis of lamina, surface view	
1. Abaxial epidermal cells thick - walled	Abaxial epidermal cells thin-walled
2 Subsidiary cells triangular	Subsidiary cells low dome shaped
3. Cone shaped silica bodies per cell 4 in number	Cone shaped silica bodies per cell 3-8 in number
4. Prickles 126 — 129 μm, present on the abaxial surface only	Prickles 75—90 μm, present on both surfaces
Transection of lamina	
5. Adaxial epidermal cells larger than those of the abaxial	Abaxial and adaxial epidermal cells similar in size
6. Sclerenchyma strands rectangular to subrectangular	Sclerenchyma strands pulviniform
Epidermis of culm, surface view	
7. Cells moderately thick-walled, smooth	Cells thin-walled, sinuous

8. Subsidiary cells triagular	Subsidiary cells parallel sided
Transection of culm	
9. Hypodermis absent	Hypodermis present and chlorenchymatous
10. Bundle sheath: outer sclerenchymatous complete, inner parenchymatous incomplete	Bundle sheath: outer parenchymatous, inner sclerenchymatous, both complete
11. Tannin abundant in lamina and culm	Tannin less abundant in lamina and culm.

The pollen grains of these two species also show some differences. The pollen grains of *F. velata* are 30.6—32.4 × 25.2 μm and possess a finely reticulate exine while those of *F. squarrosa* are 27 × 21.6 μm with a coarsely reticulate exine. In this connection, it is appropriate to repeat the remark of Cramwell (N. Zeal. Pollen Stud. — Monocot, 1953) that the pollen grains of *F. squarrosa* var. *velata,* which is considered here a synonym of *F. velata,* are "quite distinct from any in the family". Furthermore there is a mark cytological distinction, because the chromosome number of *F. velata* is said to be 2n = 24 while that of *F. squarrosa* is 20 (Ohwi 1944).

In conclusion it may be said that in the light of the differences between *F. velata* and *F. squarrosa* emphasized earlier from the standpoint of anatomical, cytological and palynological findings and from that of certain overlooked morphological characters it becomes clear that *F. velata* is a species distinct from but related to *F. squarrosa.* The nomenclator and a description of this species is given below.

FIMBRISTYLIS VELATA R. Br.

Fimbristylis velata R. Br., Prodr. Nov. Holland. 227. 1810; Kunth, En. Plant. 2: 243. 1837; Steud., Syn. Glum. 2: 121. 1855.

F. squarrosa Vahl var. *esquarrosa* Makino *in* Bot. Mag., Tokyo 17: 47. 1903; Kern *in* Blumea 8: 143. 1955, *in* Reinwardtia 6: 49. 1961. — *F. aestivalis* (Retz.) Vahl var. *esquarrosa* (Makino) Koyama *in* Journ. Fac. Sci. Univ. Tokyo III, 8(3): 116. 1961.

F. dichotoma (L.) Vahl var. *villosa* Fischer *apud* Gamblle, Fl. Pres. Madras 9: 1658. 1931.

F. bisumbellata (Forsk.) Bub. var. *hirtistyla* Fischer *in* Kew Bull. 150. 1935.

Annual. Culms few, tufted, obliquely stiff and erect, glabrous, smooth, 8—15 cm × 0.5—0.6 mm. Leaves few-many, linear, stiff, erect, setaceus, acute, hirsutely hairy, eligulate, involute-inrolled, canaliculata, shorter than culms, 5—10 cm × 0.5—0.6 mm; sheaths all laminiferous, hirsutely hairy, obliquely truncate. Inflorescence simple-compound, umbelliform, consisting of 5—10 spikelets, 2—3 × 1.5—3 cm; involucral bracts usually as long as or sometimes slightly longer than inflorescence, rigid, erect, ovate-lanceolate, sparsely hirsute. Spikelets oblong-cylindric, solitary, glabrous, ferrugineous brown, sub-acute-obtuse, terete, many flowered,

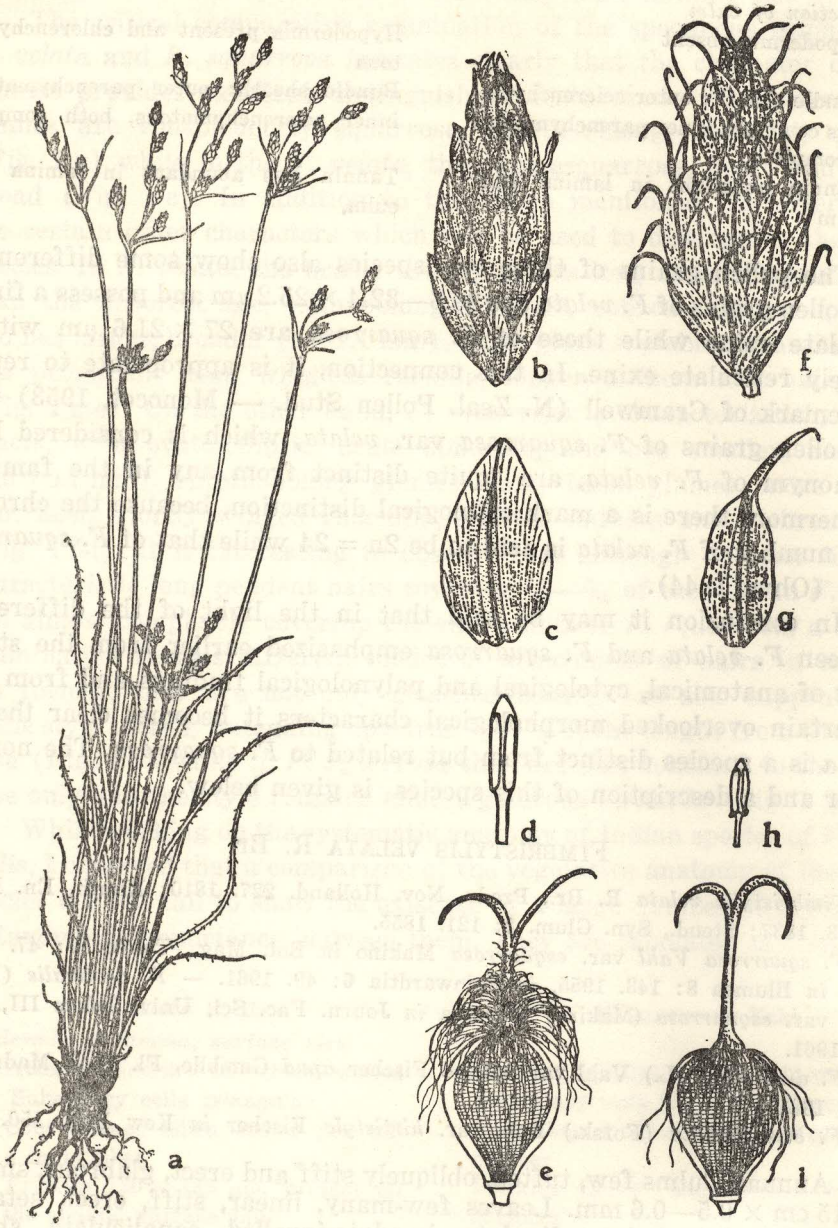

Fig. 1. a-e. *Fimbristylis velata* R. Br. a. habit; b. spikelet; c. glume; d. stamen; e. nut (excl. style), — f-i. *Fimbristylis squarrosa* Vahl. f. spikelet; g. glume; h. stamen; i. nut (excl. style).

up to 6 mm long, 1.6—1.8 mm broad. Rhachilla excavated, smooth. Glumes ovate, brown streaked with tannin, membranous, glabrous, minutely mucronate, esquarrose, erect, hyaline margined, 1.8—1.9 × 1—1.1 mm; keel 3-nerved, less prominent. Stamen 1; anther linear, acute, 0.6—0.75 mm long. Style flat, dilated at base, hairy throughout, upto 1 mm long; base possessing long, colourless pendent hairs; hairs arising both basally and suprabasally from the style; stigma 2, glabrous, much shorter than style. Nut obovoid, cuneate at base, yellowish brown, crystalline, distinctly margined, biconvex, shining, umbonulate, stipitate, 0.8 (inc. stipe) × 0.5—0.6 mm; outer cells in upper half transversely elongated hexagonal, somewhat distinct in 13—15 regular vertical rows on each face.

The distribution of *F. velata* covers Australia, Java, Philippines and Sumatra at an altitude of 1000—1500 m and flowering in May—June. In South India this species is not common and seems to be also restricted to higher altitude (1200—1300 m) at Kodia kanal. As a species this taxon is a new record to Indian flora.