

Notes on the Flora of Taiwan (34) — *Trigonella hamosa* Forssk. (Leguminosae)

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ABSTRACT: *Trigonella hamosa* Forssk., a legume species, was recently found in eastern Taiwan. It represents a new generic record to the flora of Taiwan. The present study gives a taxonomic description, illustrations and SEM micrographies of pollen grains and seeds.

KEY WORDS: Leguminosae, Pollen morphology, Seed morphology, Taiwan, Taxonomy, *Trigonella hamosa*.

INTRODUCTION

Genus *Trigonella* L. is a legume genus composed of about eighty species that are chiefly natives of Mediterranean and Caucasian regions. Others are natives of S. Africa, N. India, S.W. China and S. Australia (Heyn, 1981; Sirjaev, 1928). The genus is similar to *Medicago* L.; for example, both have pinnate-trifoliolate leaves. In general, they can be distinguished by the straight pods in the former and coiled pods in the latter; however, some species are controversial (Baum, 1968). Urban (1873, cited by Baum, 1968) characterized them by the base of the petiolar structure of the cotyledons. In *Trigonella*, the base is swollen; in *Medicago*, it is not. Baum (1968) also determined differences in the morphology of the androecium. For example, the filament base of the four alternate stamens are enlarged in *Medicago*, whereas in *Trigonella* the base of at least the two middle stamens is not enlarged.

Sirjaev (1928) treated *T. obcordata* Wall. and *T. glabra* Thunb. as varieties of *T. hamosa* L., which was considered as *T. hamosa* Forssk. (Lassen, 1978). Therefore, three varieties are included in *T. hamosa* Forssk., i.e., var. *hamosa* (as var. *typica*), var. *obcordata* (Wall.) Sir. and var. *glabra* (Thunb.) Sir. The first is native to the S.E. coast of the Mediterranean, the second to N. India, and the third to S. Africa. Lassen (1978) confirmed that *T. hamosa* var. *glabra* is a synonym of *T. hamosa*. However, the disjunct distribution of the infraspecific taxa as well as the different pod morphology among populations (Table 1) make his conclusion suspect. In this paper, the infraspecific taxa of *T. hamosa* will not be treated until more sufficient materials are available for our study. Recently, *T. hamosa* (Fig. 1) was found, probably introduced and naturalized in disturbed areas in eastern Taiwan. It represents a new record of the genus to the flora of Taiwan. The scanning electron microscope was used to study both seed and pollen morphology to provide data for further study of the infraspecific taxa when possible.

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Table 1. Comparison among varieties of *Trigonella hamosa* based on Sirjaev (1928).

Characters\varieties	var. <i>hamosa</i>	var. <i>glabra</i>	var. <i>obcordata</i>
leaf length (mm)	12-15(20)		3-5(6)
peduncle length (mm)	15-40		6-7
flower number	6-18	6-8	3-8(10)
calyx length (mm)	2		1.5
corolla length (mm)	4-5		3
pod length (mm)	7-10(12)	(12)15-16	6-8
pod shape	semicircular curved	slightly curved	slightly curved
exocarp nervation	transverse	oblique	transverse
distribution	S. E. coast of and Mediterranean	S. Africa	N. India

Fig. 1. Habitat of *Trigonella hamosa* Forssk., Wu 2624.

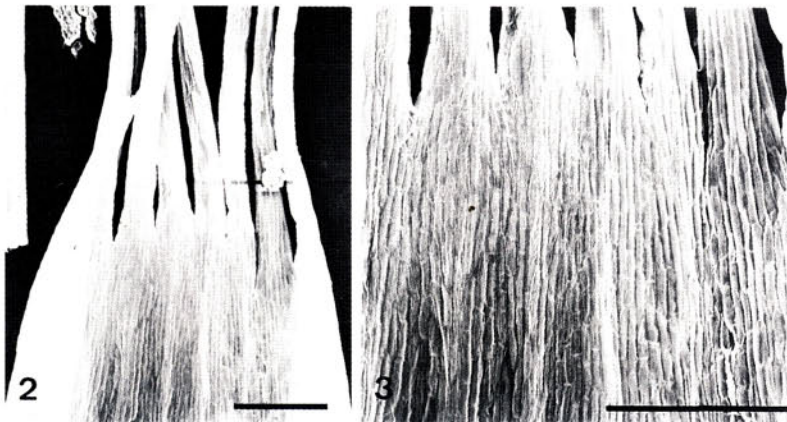
MATERIALS AND METHODS

The flowers, seeds and fruit exocarps were picked from dried specimens of *T. hamosa* which were deposited in TAI-herbarium. These were put into 70% alcohol for rehydration. Then, after an alcohol series dehydration, they were transferred to 100% acetone for critical point drying (CPD). Finally, they were fixed on aluminum stubs and were coated with gold for microscopy by a Hitachi S-520 scanning electron microscope (SEM). Pollen grains were treated by acetolysis method (Erdtman, 1952), via an alcohol series dehydration and then gold-coating for SEM.

RESULTS AND DISCUSSION

Androecia

The filaments are not enlarged at the base (Fig. 2). The tube of the androecium is homogeneous and flattened, and the filaments emerge from a truncate apex of the androecium (Fig. 3). These characters belong to the genus *Trigonella* (Baum, 1968).



Figs. 2 and 3. Androecium surface view of *Trigonella hamosa* Forssk. by SEM, Wu 2624. Fig. 2: Filament bases without enlargement, and Fig. 3: Flattened and homogeneous staminal tube. The bar scale is equal to 200 μm .

Pollen grains

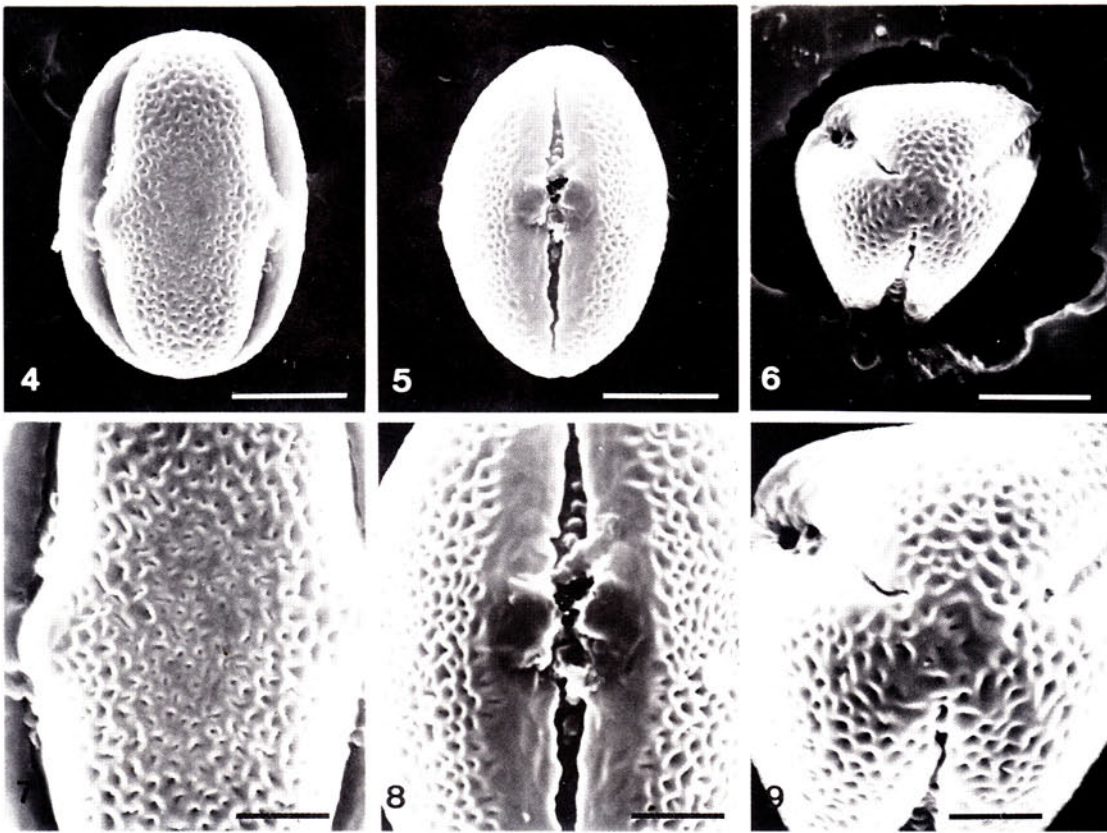
The pollen grains (Figs. 4-9) are 3-colporate with reticulate ornamentation, prolate, $15\text{-}15.5 \times 10\text{-}11.5 \mu\text{m}$, amb angular, with wide margo.

Exocarps

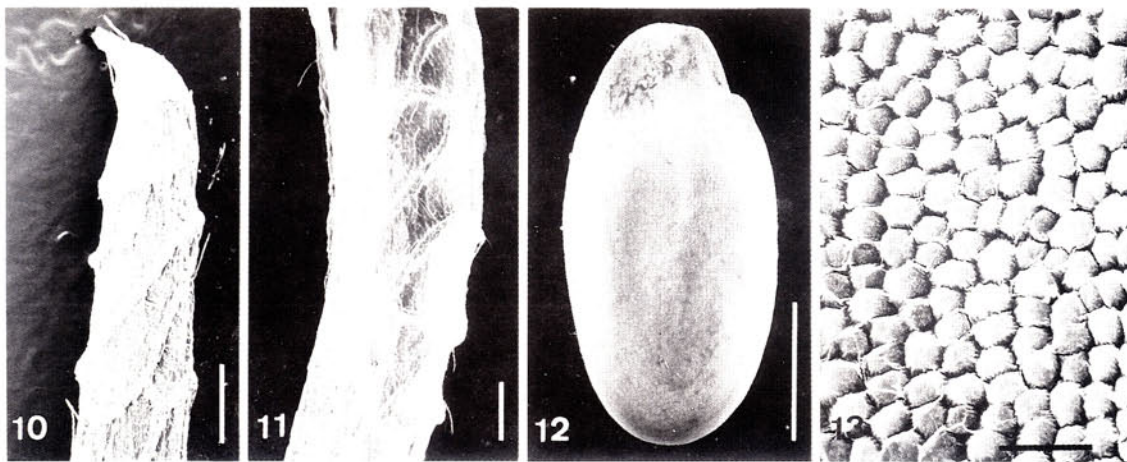
The exocarps have elevated oblique nervations (Figs. 10 and 11). This character represents *T. hamosa* var. *glabra*, and differs from the transverse nervations in *T. hamosa* var. *hamosa* (Sirjaev, 1928, as var. *typica*).

Seeds

The seeds have a smooth seed coat at low magnification (Fig. 12), as shown in a previous study (Small *et al.*, 1990, Fig. 41). However, a higher magnification reveals an areolate seed coat (Fig. 13).



Figs. 4-9. SEM photographs of the *Trigonella hamosa* Forssk. pollen grains, *Wu* 2624. Figs. 4 and 7: Prolate, reticulate in equatorial view; Figs. 5 and 8: Long colpi in equatorial view; Figs. 6 and 9: Angular apertures in polar view. The scale is equal to 5 μm in white bars and 2 μm in black bars.



Figs. 10-13. Pod and seed surface view of *Trigonella hamosa* Forssk. by SEM. *Wu* 2624. Fig. 10: The pod base with calyx removed; Fig. 11: The lower portion of the pod; Fig. 12: Side view of the seed; Fig. 13: The higher magnified seed coat. The scale is equal to 0.5 mm in white bars and 10 μm in black bar.

TAXONOMIC TREATMENT

Trigonella hamosa Forssk., Fl. Egypt.-Arab. 141. 1775; Sirj. in Spisy Prirod. Fak. Masaryk Univ. 102: 43. 1928. Tab. II. fig. 33, *non* L. 1759. 彎果胡蘆巴 Figs. 1 and 14

T. hamosa L. var. *glabra* (Thunb.) Sirj. in Spisy Prirod. Fak. Masaryk Univ. 102: 44. 1928. Tab. II. fig. 36.

A prostrate herb, 30 cm high. Stem branched, pubescent on the young branches. Leaves pinnately 3-foliolate; stipules hemi-sagittate, 7-8 mm long, toothed at base; petioles 10-15 mm long; the terminal leaflet obovate, 12-15 mm long, 7-9 mm wide, glabrous above, pubescent beneath, cuneate at base, truncate and mucronate at apex, the margin above the middle denticulate, veins prominent. Racemes head-like, flowers (3)7-18, axillary, the peduncles 1-1.5 cm long, elongated to 3.5 mm during fruiting. Flowers yellow, 4-5 mm long, the pedicel 1 mm long; calyx 5-toothed, sparsely pilose, the lobes subequal, 0.8-1 mm long; standard obovate, emarginate or obtuse at apex, 5 mm long, 3.5 mm wide; wings 4 mm long, 0.8 mm wide; keel 4 mm long, 2 mm wide; stamens diadelphous, filaments filiform; ovary hairy, style filiform. Pods straw-colored, linear, curved, sparsely pilose, 10-15 mm long, 2 mm wide, reflexed, with persistent corolla at the tips, dehiscent, 5-8 seeded, exocarps with prominent oblique nervation or reticulate sculpture. Seeds chrome yellow, 0.8 mm long, 1.5 mm wide.

This species is distributed in Sudan, Egypt, Arabian Peninsula, north to Syria and east to Iraq, S. Iran, N. India and S. Africa (Lassen, 1987). In Taiwan, it occurs in sunny waste places in Hualien in the eastern part of the island, and was probably introduced.

Notes: The name *T. hamosa* L., long used for this species, has been rejected and *T. hamosa* Forssk. is now accepted as the correct name (Lassen, 1987; Greuter, *et al.*, 1994). The morphological data of Taiwanese *Trigonella* are identical to those of S. Africa, except the flowers in the inflorescence number 3-18 in the former and 6-8 in the latter.

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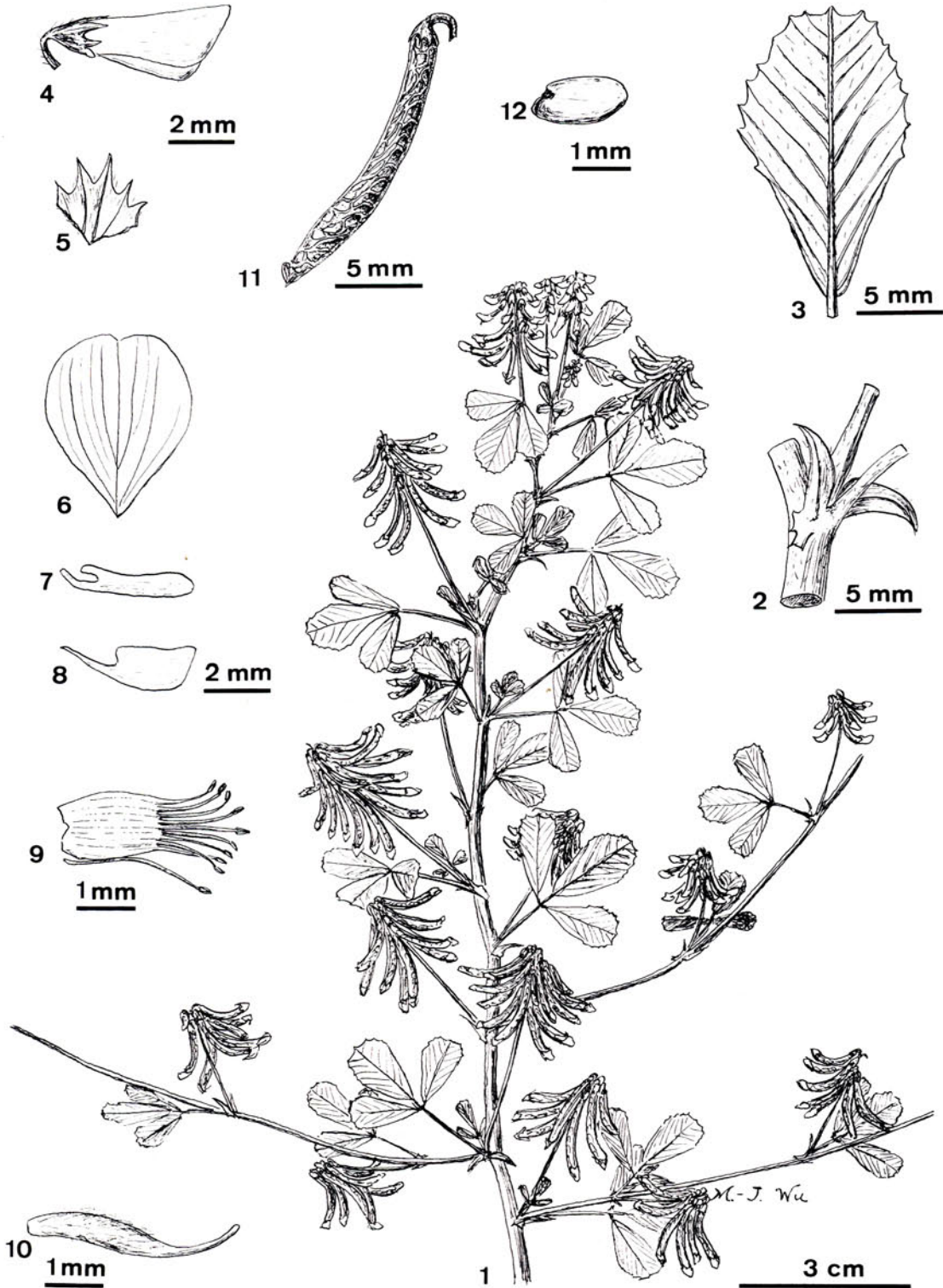


Fig. 14. *Trigonella hamosa* Forssk., Wu 2624. 1: habit; 2: stipules on the leaf base; 3: the lower side of the terminal leaflet; 4: flower; 5: dissected calyx; 6: standard; 7: wing; 8: keel; 9: stamens; 10: pistil; 11: pod with persistent corolla at the tip; 12: seed.

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臺灣植物誌之觀察—豆科植物彎果胡蘆巴

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摘 要

彎果胡蘆巴(新擬中名)—*Trigonella hamosa* L. 為豆科植物，新近發現於臺灣東部，為臺灣植物誌增添一屬。本文提供本種之分類特徵描述、繪圖與花粉粒及種子之掃描式電子顯微鏡照片。

關鍵詞：豆科、花粉形態、種子形態、臺灣、分類學、彎果胡蘆巴。

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