Shinobu AKIYAMA* & Hideaki OHBA*: **Taxonomical notes on *Lespedeza satsumensis* Nakai and *L. formosa* var. *australis* Hatusima (Leguminosae)****

秋山 忍*・大場秀章*: サツマハギとナンゴクチョウセンヤマハギ

Lespedeza satsumensis was described by Nakai (1928) based on Doi's collection at Mt. Isomayama, Satsuma Prov. (Kagoshima Pref.), Kyushu, Japan. Nakai compared this with *L. floribunda* Bunge and distinguished from the latter by the dwarf habit with shorter stems, by the shorter racemes, and by the acute (not acuminate) calyx-lobes. Murata (1962) regarded *L. satsumensis* as a variety of *L. nipponica* Nakai and the spreading hairs on branches and inflorescence-axis as the characteristic distinguishing from var. *nipponica*. Later, Murata (1978) adopted Ohwi's treatment (Ohwi 1965) regarding this as a variety of *L. Thunbergii* (DC.) Nakai and referred to the necessity to make clear the relationship to *L. penduliflora* (Oudem.) Nakai (s. st.) known from China. Hatusima (1967) considered that *L. satsumensis* is a very distinct species restricted to Satsuma Province (cited Mt. Isomayama only) and does not resemble *L. floribunda* at all and that the treatment of *L. satsumensis* as a variety of *L. Thunbergii* or *L. nipponica* may be due to the misidentification of *L. formosa* (Vogel) Koehne var. *australis* Hatusima which occurs in the same province as *L. satsumensis*. While var. *australis* was described by Hatusima (1967) based on the collections from Mt. Noma (type locality) and other places in the south of the Satsuma peninsula and distinguished from var. *formosa* by the shorter racemes (generally 1-2 cm long) and patently villose hairs on branches, and, according to his key, from *L. satsumensis* by the hairiness on the upper surface of leaves.

However, investigating the herbarium specimens of these two Lespedezas, *L. satsumensis* and *L. formosa* var. *australis*, the authors became aware that they share the same expression in many morphological characters. Then, to make clear the entity and the systematic status of these two, we surveyed the living sites of both in southern parts of Kyushu including the Satsuma and the

* Department of Botany, University Museum, University of Tokyo, Hongo 7-3-1, Tokyo 113. 東京大学 総合研究資料館 植物部門.

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Ôsumi peninsulae.

Materials and methods Morphological variations were examined on both living (investigated in the field and at the Botanical Gardens, Koishikawa and Nikko, University of Tokyo) and herbarium materials in KAG, KYO, MAK, TI and TNS.

Flowers were dissected and drawn under a binocular microscope with camera-lucida. Surfaces of leaflets and inflorescence-axes were examined by the scanning electron microscope.

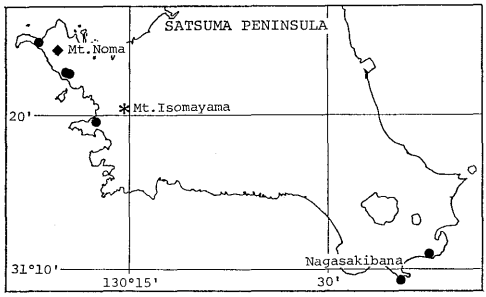

Fig. 1. Distribution map of *Lespedeza satsumensis* (●). The type localities of *L. satsumensis* (*) and *L. formosa* var. *australis* (◆).

Results and discussion *Lespedeza formosa* var. *australis* was collected only from the south of the Satsuma peninsula (Fig. 1). A population consisting of a few individuals was found on a sunny path-side at Nagasakibana (Yamakawa-machi). Here it is about 1 m high in the largest, well branched, and puts forth shoots at or under the ground until flowering or even fruiting. The branch and inflorescence-axis have spreading to ascending hairs. The leaves are arranged spirally. The leaflet is elliptic with retuse or obtuse apex, up to 3(-3.5) cm long and 1.5(-2) cm wide, and has dense (to sparse) appressed hairs on the upper surface throughout. The flowers taken from this population (A & B) and the transplanted stocks in the Botanical Gardens, Koishikawa (Tokyo) (C & D) are illustrated in Fig. 2. These are as follows: Calyx 4-5 mm long, densely pubescent; the lateral lobes ca 2 times as long as the tube, elliptic to lanceolate with acute apex. Standard 9.5-11.5 mm long, as long as or shorter than keel-petal, clawed at the base; the lamina elliptic to broadly elliptic and the auricle narrowly to broadly lunate. Wings 9-9.5 mm long; the lamina 2-2.5 times as long as the claw, broadly to narrowly oblong to obovate. Keel-petal 11-12 mm long; the lamina 2.5-3 times as long as the claw, oblong to elliptic, the apical part not incurved with round tip. Fruit elliptic with acute apex, ca 10 mm long, ca 5 mm wide, densely to sparsely pubescent.

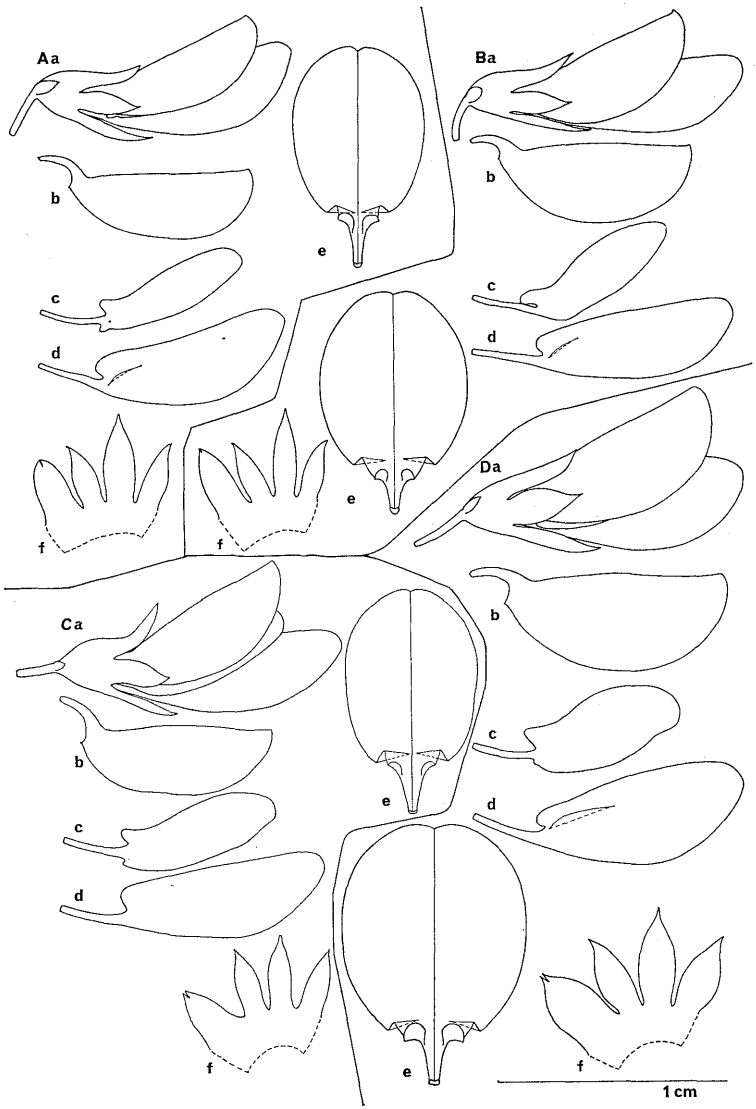

Fig. 2. Flowers of *Lespedeza satsumensis* collected at Nagasakibana. A. Ohba & Akiyama 806. B. O. & A. 807. C. Akiyama 205. D. Akiyama 216. All in TI. a: Flower (hairs of calyx are omitted). b: Standard, lateral view. c: Wing. d: Keel-petal. e: Standard, opened. f: Calyx, dissected. All ×3.

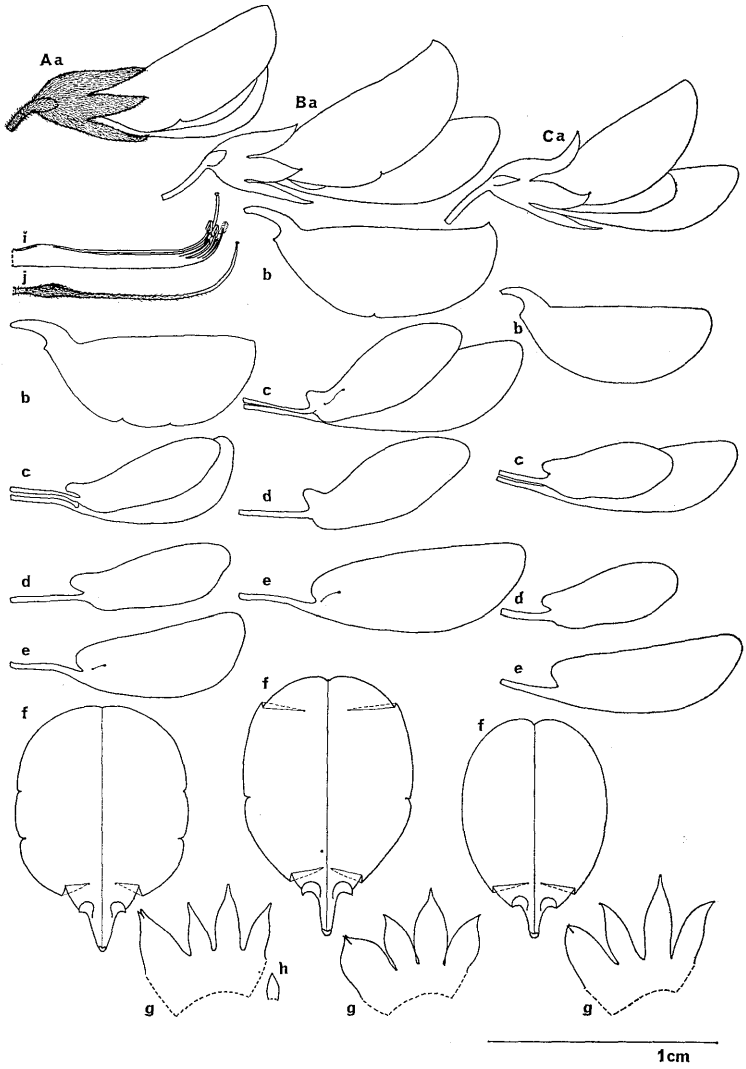

Fig. 3. Flowers of *Lespedeza satsumensis*. A. Type of *L. formosa* var. *australis*. Mt. Noma (Hatusima 16433, KAG). B. Kasasa-chô, Kurose (T. Sakata on Oct. 6, 1980, TI). C. Yamakawa-machi, Takeyama (Hatusima s.n. on June 23, 1957, KAG). a: Flower (hairs of calyx are omitted in B & C). b: Standard, lateral view. c: Wing and keel-petal. d: Wing. e: Keel-petal. f: Standard, opened. g: Calyx, dissected. h: Bracteole. i: Stamens and pistil. j: Pistil. All ×3.

The flowers from other places, e.g. Kurose (Kasasa-chô) (Fig. 3B) and Takeyama (Yamakawa-machi) (Fig. 3C), do not show any distinctness as well as vegetative features, such as the hairiness of the leaflet (Fig. 5E). The flower (Fig. 6C) of a specimen, which was taken from a transplanted stock from Mt. Isomayama to Kagoshima city, also falls into its variation range. So it is con-

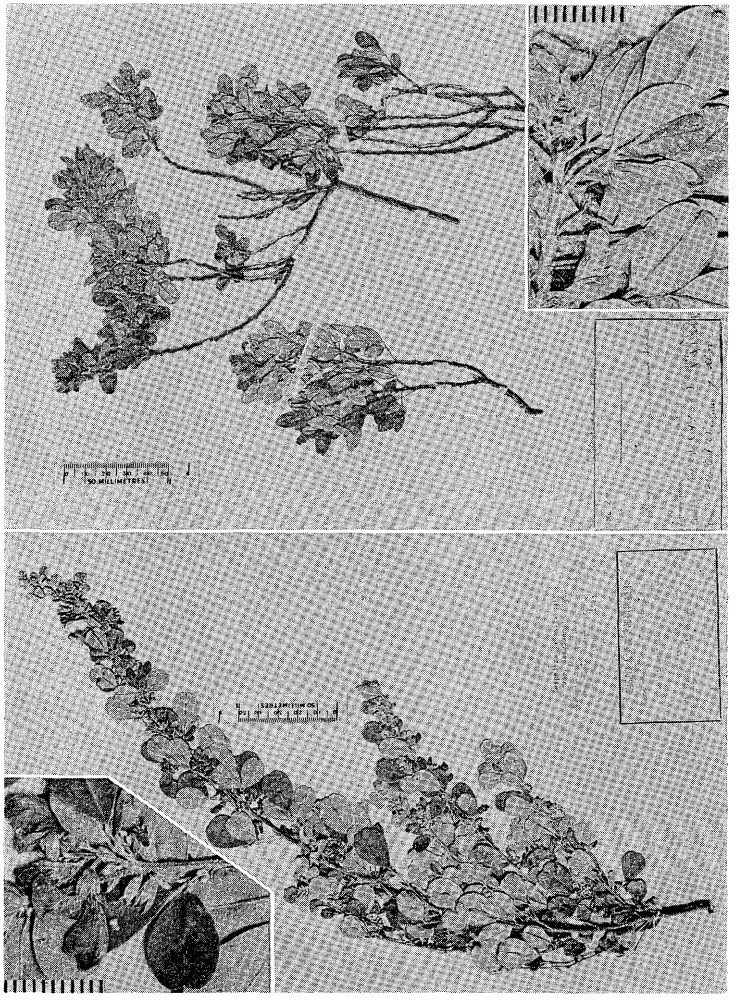

Fig. 4. Types of *Lespedeza satsumensis* (upper) and *L. formosa* var. *australis* (lower).

sidered that Mt. Isomayama is included the range of *L. formosa* var. *australis*.

While, the type of *L. formosa* var. *australis* (Fig. 4) is vegetatively characterized by the broadly obovate leaflet with retuse apex and dense appressed hairs on the upper surface (Fig. 5D) and by the branch and inflorescence-axis (Fig. 5G) with spreading hairs. As compared with other individuals, the flower of the type (Fig. 3A) shows slightly different expressions. This has a standard which is apparently longer than keel-petal, long wings, and triangular calyx-lobes. Its leaflet is broadly obovate with retuse apex. These features give the impression that the type might be a representative influenced by *L. cyrtobotrya* Miq. which grows together abundantly in this region. But, it seems now to be difficult to segregate the type from the others clearly.

On the other hand, there are five authentic specimens of *L. satsumensis* in TI (4 sheets) and KYO (1 sheet). Among them two (TI; KYO), collected on Oct. 23, 1927, are in flowering stage, and the rests, Nov. 1933, are in fruiting stage. One (TI) of these two in flowering is quite reasonable to be regarded as the holotype of *L. satsumensis*, written on the label as "*Lespedeza satsumensis* Nakai" and "*L. floribunda* Bunge affinis" in Nakai's own hand, though it was not designated as the type (Fig. 4). This specimen is consisting of three branches with full blooming flowers. These three branches (and also those of KYO's specimen) seem to be collected from the same plant. The vegetative features as hairs on inflorescence-axis (Fig. 5F) were well described by Nakai (1928). However, it is doubtful whether the stipule is biennial or not. The upper surface of the leaflet is not glabrous as described, but pubescent even at fruiting (Fig. 5A & B) like that of *L. formosa* var. *australis* (Fig. 5D & E), though sometimes the hair breaks at the base (Fig. 5C) and it looks glabrous. The floral features were mostly remained uncertain, so the shape of the floral parts are examined (Fig. 6A & B)[1].

[1] The flower of *L. satsumensis* Nakai is described as follows: Calyx 4–4.5 mm long with dense appressed hairs; the lateral lobes nearly 2 times as long as the tube, lanceolate to narrowly elliptic with acute apex. Standard 8–9 mm long, apparently shorter than keel-petal, but longer than wings, clawed at the base; the lamina elliptic to obovate, the auricle narrowly lunate. Wings 7–8 mm long, clawed; the lamina oblong, ca 2.5 times as long as the claw. Keel-petal ca 10–11.5 mm long, clawed; the lamina 3.5–4 times as long as the claw, oblong to elliptic, the apical part not incurved with round tip. Ovary densely pubescent. Fruit (based on Doi in Nov. 1933) densely to sparsely pubescent, ca 7–8 mm long, 3–4 mm wide, elliptic with acute apex.

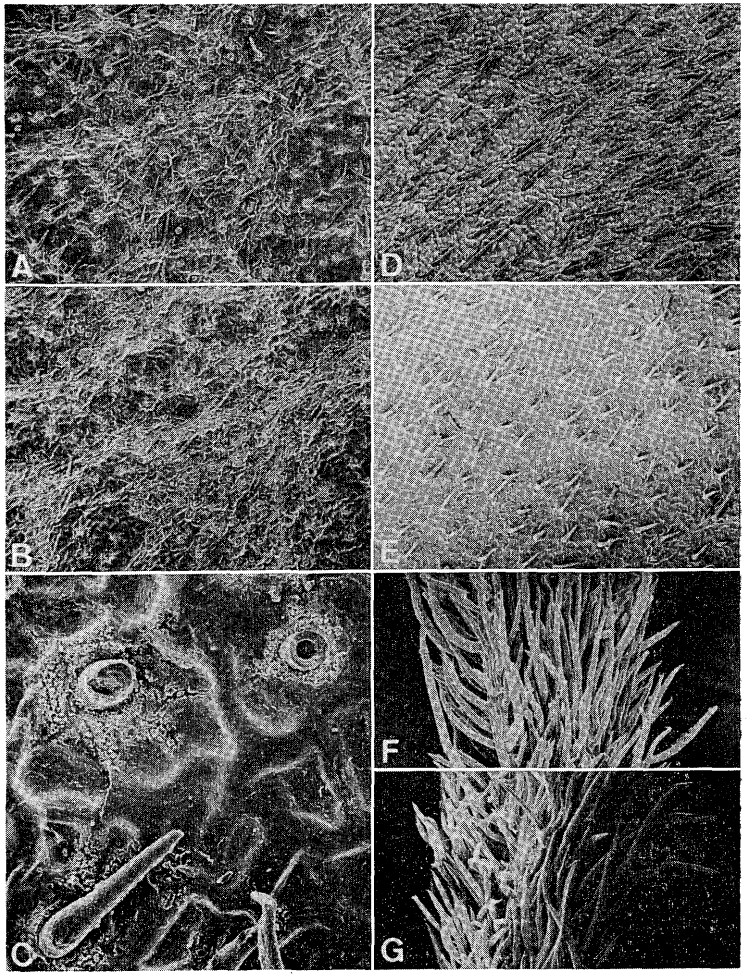

Fig. 5. Indumenta of *Lespedeza satsumensis*. A, C & F. Type of *L. satsumensis*. B. Y. Doi in Nov. 1933. D & G. Type of *L. formosa* var. *australis*. E. T. Sakata on Oct. 25, 1930. A, B, D & E: Upper surfaces of leaflets (× ca 60). C: Hairs and scars (× ca 600). F & G: Inflorescence-axes (× ca 150).

The type of *L. satsumensis* is different from *L. formosa* var. *australis* (s. lat.) in having extremely shorter standard. Such shorter standard is never seen in *L. formosa* var. *australis* (s. lat.) as far as hitherto examined. At present,

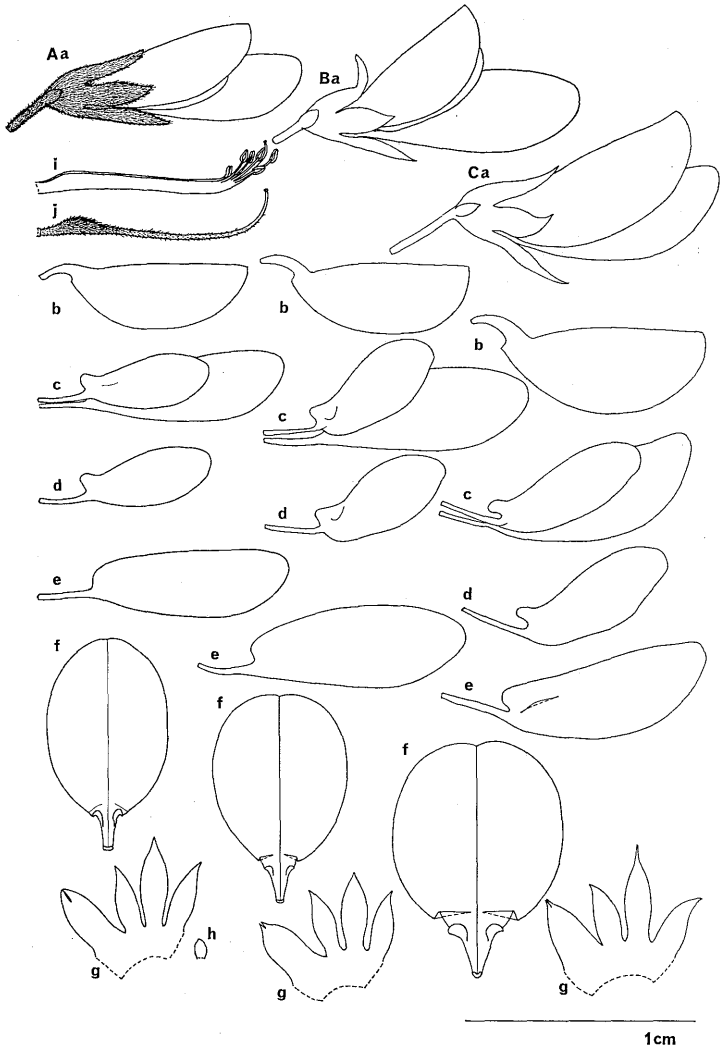

Fig. 6. Flowers of *Lespedeza satsumensis* collected at Mt. Isomayama. A. Holotype of *L. satsumensis* (Y. Doi, TI). B. Isotype of *L. satsumensis* (Y. Doi, KYO). C. Transplanted from Mt. Isoma to Kagoshima city (Hatusima on Nov. 2, 1969, KAG). a: Flower (hairs of calyx are omitted in B & C). b: Standard, lateral view. c: Wing and keel-petal. d: Wing. e: Keel-petal. f: Standard, opened. g: Calyx, dissected. h: Bracteole. i: Stamens and pistil. j: Pistil. All ×3.

however, the type of *L. satsumensis* is better to be recognized as an extreme representative of *L. formosa* var. *australis* (s. lat.). Because the other significant features are quite identical with those of the latter.

This *Lespedeza* (including both *L. satsumensis* and *L. formosa* var. *australis*) is very similar to *L. kiusiana* Nakai in floral characters and in the hairiness on the upper surface of the leaflet. But in *L. kiusiana* any form having spreading hairs on the branch and inflorescence-axis is not yet found, though Hatusima (1967) described a form having patent hairs on the branch and inflorescence-axis under the name of *L. formosa* as f. *sericea*[1]. Since geographically this *Lespedeza* is well isolated from *L. kiusiana* distributed in western Honshu and northern Kyushu, it may be regarded as the local variety of that species. Hatusima (1967) treated this (excl. *L. satsumensis* (s. s.)) as a variety of *L. formosa* (Vogel) Koehne from S. China and *L. kiusiana* as a synonym of that species. The relationship between *L. formosa* and *L. kiusiana* is thought to be as yet not fully explained, because the variation of *L. formosa* in China remains uncertain. So, in consideration of the taxonomic status, this *Lespedeza* is better to be treated tentatively as a distinct species, *L. satsumensis* Nakai, until *L. kiusiana* and its allied species (*L. japonica* L. H. Bailey, *L. formosa*, *L. viatorum* Champ., *L. Thunbergii*, *L. nipponica*, *L. penduliflora*, etc.) are much more studied.

Lespedeza satsumensis Nakai in Bot. Mag. Tokyo **42**: 456 (1928)—Makino & Nemoto, Nippon-Shokubutsu-Sôran (Fl. Jap.) 2nd ed., 582 (1931)—Doi, Fl. Satsumensis **2**: 65 (1931)—Hatusima in Mem. Fac. Agr. Kagoshima Univ. **6**: 10 (1967); in Ann. Rep. Yokosuka City Mus. no. 14, 5 (1969); List Pl. Kagoshima, 70 (1978).

L. nipponica Nakai var. *satsumensis* (Nakai) Murata [in Kitamura & Murata, Colour. Ill. Herb. Pl. Jap. **2**: 99 (1961), nom. nud.] in Act. Phytotax. Geobot. **20**: 198 (1962).

L. Thunbergii (DC.) Nakai var. *satsumensis* (Nakai) Ohwi, Fl. Jap. rev. ed., 791 & 1438 (1965)—Murata in Act. Phytotax. Geobot. **29**: 105 (1978)—Ohashi in Satake et al., Wild Flowers of Japan **2**: 205 (1982).

L. formosa (Vogel) Koehne var. *australis* Hatusima in Mem. Fac. Agr.

[1] The type of *L. formosa* f. *sericea* Hatusima (KAG) is quite identical with *L. patens* Nakai itself.

Kagoshima Univ. **6**: 8 (1967); in Ann. Rep. Yokosuka City Mus. no. 14, 4 (1969), **syn. nov.**

L. japonica L.H. Bailey var. *australis* (Hatusima) Murata in Act. Phytotax. Geobot. **29**: 101 (1978)—Ohashi in Satake et al., Wild Flowers of Japan **2**: 205 (1982).

L. formosa (Vogel) Koehne var. *austrosatsumensis* Hatusima, List Pl. Kagoshima, 70 (1978), nom. nud.

Specimens examined of *L. satsumensis* Nakai: Japan. Kyushu: Kagoshima Pref., Kawanabe-gun, Mt. Isomayama [Ôura-machi] (Y. Doi on Oct. 23, 1927, fl., TI—Holotype of *L. satsumensis* Nakai, KYO—Isotype; in Nov. 1933, fr., TI); loc. cit., transplanted to Kagoshima city (Hatusima on Nov. 2, 1969, fl., KAG); Mt. Noma [Kasasa-chô] (Hatusima 16433, fl., KAG—Holotype of *L. formosa* var. *australis* Hatusima); Noma-ike [Kasasa-chô] (Sugimoto on Oct. 25, 1934, fl., KYO); Kasasa-chô, Kurose (Ohba & Akiyama 2609, st., TI; T. Sakata on Oct. 6, 1980, fl. and on Oct. 25, 1980, fr., TI; [from cultivated stock (Ohba & Akiyama 2609) in Tokyo] Akiyama 370, fl., TI); Bônotsu-chô, Imadake (S. Sako 3564, fr., KAG); Ibusuki-gun, Yamakawa-machi, Nagasakibana (Hatusima, Sako & Kawanabe 22177, fl., KAG; Ohba & Akiyama 806-809, fl., TI; [from cultivated stocks in Tokyo] Akiyama 205 & 216, fl., TI); loc. cit., transplanted to Kagoshima city (Hatusima 16731, fl., KAG); Takeyama (Hatusima 20917 and s.n. on June 23, 1957, fl., KAG).

Literature cited

Hatusima, S. 1967. Mem. Fac. Agr. Kagoshima Univ. **6**: 1-15, Pl. 1 & 2. Murata, G. 1962. Act. Phytotax. Geobot. **20**: 198. —— 1978. Act. Phytotax. Geobot. **29**: 95-105. Nakai, T. 1928. Bot. Mag. Tokyo **42**: 456-457. Ohwi, J. 1965. Flora of Japan, rev. ed., 788-792 & 1438.

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中井教授がサツマハギ (*L. satsumensis* Nakai) を記載したのは「萩類ノ研究」(1927) を纏めた翌年のことである。磯間山で土井美夫氏が採集したこのハギの標本は5点あり，そのうち3点 (TI) は発表後の1933年11月に採集された果実の標本である。他の2点は東大と京大にあり，共に1927年10月23日に採集された花期の標本で，ラベルに *"Lespedeza satsumensis* Nakai" 等と中井教授自筆の書き込みがある東大の標本が正基準標本と考えられる。その後，サツマハギはニシキハギ (*L. nipponica* Nakai) の変種(村田

1961, 62), あるいはミヤギノハギ (*L. Thunbergii* (DC.) Nakai) の変種 (大井 1965, 村田 1978, 大橋 1982) とする説が出されている。一方で, 初島博士はこれを磯間山に固有な種とし, ニシキハギあるいはミヤギノハギの変種にする見解は, ナンゴクチョウセンヤマハギを混同したためであろうとした。ナンゴクチョウセンヤマハギは, チョウセンヤマハギ (*L. formosa* (Vogel) Koehne; ビッチュウヤマハギ, ニシキハギはこれに含まれるとした) の, 薩摩半島南端に特産する変種 (var. *australis* Hatusima) として初島博士が記載したもので, 母変種とは枝や花序軸に立毛を有し, 花序が葉より短い等の違いが認められ, サツマハギとは葉の表面に宿存性の毛があることで区別された。

本研究は, はたしてサツマハギとナンゴクチョウセンヤマハギが分類学的に異なるものかについて, これまで行った腊葉標本と野外観察の結果をまとめたものである。薩摩半島南端には点々と問題のハギが分布しているが, サツマハギのタイプ標本と一致するような個体は他に見出せなかった。しかし, サツマハギのタイプ標本は旗弁が著しく短いことの他は, ナンゴクチョウセンヤマハギと区別することはできない。これまで論議のあった葉の表面の毛は, サツマハギの原記載では無毛 (glabra) と記されているが, タイプ標本の葉の表面を走査型電子顕微鏡で調べたところ, ナンゴクチョウセンヤマハギ(図 5D, E) と同様に短い伏毛があることが判った (図 5A)。ただ標本では, 基部附近で折れている毛 (図 5C) が多く, これがこれまでの誤った観察を生む原因となっていたと思われるが, この毛は明らかに果実期まで落ちることなく存続している (図 5B)。従って, サツマハギのタイプ標本はナンゴクチョウセンヤマハギと呼ばれているハギの旗弁が極端に短い個体にすぎないと結論される。

ナンゴクチョウセンヤマハギを含むこの広義のサツマハギは花の形質や葉の表面の毛といった点で, 中部・近畿・中国地方と北九州に分布するビッチュウヤマハギに極めてよく似ている。ビッチュウヤマハギには未だ, 枝や花序軸に立毛を生ずる型は知られていない (タチゲチョウセンヤマハギ *L. formosa* f. *sericea* Hatusima はケハギ *L. patens* Nakai そのものである)。サツマハギはビッチュウヤマハギに形態的には似ている点が多いが, 地理的に不連続な分布をしているので, 地理的変異として扱うのがよいと思われる。しかし, ビッチュウヤマハギとその近縁種群の変異や相互の関連がよく解明されていない現況を考慮すると, 暫定的であるが, *L. satsumensis* Nakai の学名を採用しておくほうがよりよいと思う。和名にはサツマハギを選びたい。

本研究では, 村田 源(京都大学), 迫 静男(鹿児島大学)の両先生からは貴重なご助言をえた。また, 野外調査では加世田市在住の 佐方敏男氏ならびに 柿沼好子博士(鹿児島大学) に多大のご援助をいただいた。ここに上記の方々ならびに標本の利用を許された KAG, KYO, MAK, TNS の関係者に深く謝意を表します。