

Shinobu AKIYAMA\* & Hideaki OHBA\*: **Studies on hybrids in the genus *Lespedeza* sect. *Macrolespedeza* (1)\*\* A putative hybrid between *L. Buergeri* Miq. and *L. cyrtobotrya* Miq.**

秋山 忍\*・大場秀章\*: ハギ属ヤマハギ節の雑種について (1)  
キハギとマルバハギの雑種

The *Macrolespedeza*, one of the two sections of the genus *Lespedeza* (Leguminosae), is distributed in the region from Himalaya to Japan. In Japan, the sect. *Macrolespedeza* is usually recognized 6 (Ohwi 1965) or 7 species (Kitamura & Murata 1961, Murata 1978, Ohashi 1982). All the species, excepting *L. Buergeri*, have a similar preference to their habitat: *L. Buergeri* extends to grow on shady and/or rocky places, but it sometimes appears together with other species of the *Macrolespedeza* especially in newly opened area.

There has been noticed the widespread existence of the intermediate plants in populations consisting of two or more species. As the result of our observation some intermediate plants are considered to be interspecific hybrids. Then, this and forthcoming papers will describe and discuss on the intermediate plants.

We wish to express our gratitude to Professor Hiroyoshi Ohashi, Tohoku University, for his kind advice and encouragement. We desire to express our thanks to Mr. Gen Murata, Kyoto University, for his valuable suggestion. We are also grateful to the curators of the herbaria: KAG, KYO, L, LE, MAK, TI, TNS, TOFO & TUSG.

1) A putative hybrid between *Lespedeza Buergeri* Miq. and *L. cyrtobotrya* Miq.

Recently we found some populations including intermediate plants between *Lespedeza Buergeri* and *L. cyrtobotrya*. Then, we made field observations at Tokisaka, Itsukaichi-shi, Tokyo and Mt. Izugatake, Hanno-shi, Saitama Pref. At Tokisaka, *L. Buergeri* and *L. cyrtobotrya* and only an intermediate plant

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grow at both sides of a newly constructed road where is sunny and dried. *L. cyrtobotrya* and the intermediate plant are in full bloom in late August to early September and at the time *L. Buergeri* is still flowering. The last species usually flowers from the middle of June to the end of September. All the well-grown individuals of which the populations are consisting were collected for further studies at both places. Floral and vegetative features and pollen fertility were investigated upon the collections and the herbarium specimens.

Flower. The flowers of *L. Buergeri*, *L. cyrtobotrya* and the intermediate are illustrated in Fig. 1. The standard of the intermediate is different from both species in shape and colour. The standard of the intermediate is not apparently clawed; the lamina is usually broadly to very broadly oblong or

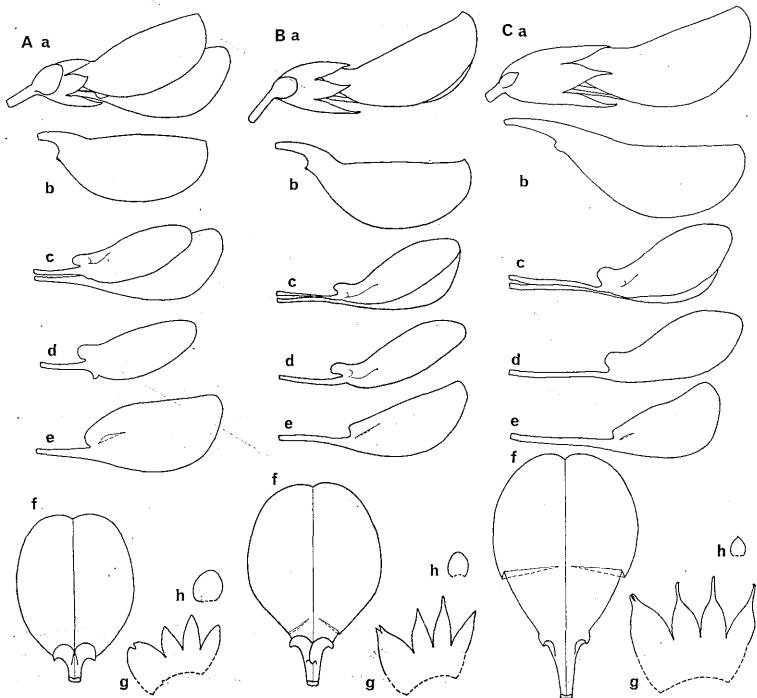


Fig. 1. A. *Lespedeza Buergeri* (Akiyama 295). B. The intermediate (Akiyama 279). C. *L. cyrtobotrya* (Akiyama 280). a: Flower. b: Standard, lateral view. c: Wing and keel. d: Wing. e: Keel. f: Standard, opened. g: Calyx, dissected. h: Bractiole. All  $\times 3$ .

rarely very broadly ovate or normally to broadly obovate; the auricles are usually large, and broadly lunate to lunate. In *L. Buergeri* that is clawed at the base; the lamina is very broadly oblong to round; the auricles are well developing and broadly lunate. In *L. cyrtobotrya* that is obovate to broadly obovate, attenuate at the base; the auricles are small and lunate. The colour of the standard of the intermediate is red-purple but paler than that of *L. cyrtobotrya* and greatly differs from that of *L. Buergeri* which is whitish

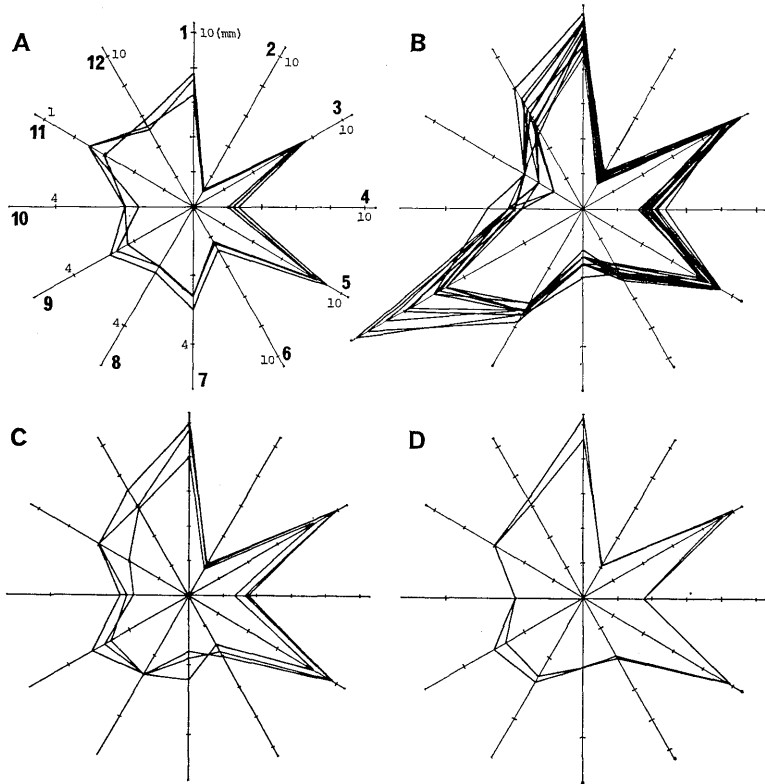


Fig. 2. Polygonal diagrams showing the variation in the flowers. A. *Lespedeza Buergeri*, 3 flowers (a flower per plant). B. *L. cyrtobotrya*, 12 flowers (a flower per plant). C. The intermediate, 3 flowers from a plant. D. The intermediate, 2 flowers from a plant. A, B & C. from Tokisaka. D. from Mt. Izugatake. 1. Length of standard. 2. Length of standard-claw. 3. Length of wing. 4. Length of wing-claw. 5. Length of keel. 6. Length of keel-claw. 7. Length of bractiole. 8. Length of calyx-tube. 9. Length of lateral calyx-lobe. 10. Width of lateral calyx-lobe. 11. Width of auricle of standard. 12. Width of standard.

yellow with purple patches at the base of the lamina. In the intermediate the lamina of wing is rather narrowly oblong than narrowly obovate.

The calyx-lobe of the intermediate is longer than that of *L. Buergeri* and its shape is narrowly triangular to narrowly elliptic, but neither so acuminate nor extremely long like that of *L. cyrtobotrya*.

The length and width of parts of flowers are shown in Fig. 2. The relative length among standard, wings and keel-petal are nearly equal in a flower of the intermediate (i.e.  $S=W=K$ ), but in a flower of *L. Buergeri* the keel-petal is longer than the standard and the wings; and the standard is slightly longer than (or rarely as long as or a little shorter than) the wings (i.e.  $K > S \geq W$ ), while in that of *L. cyrtobotrya* the standard is apparently longer than the others and the wings are longer than the keel-petal (i.e.  $S > W > K$ ). The

Table 1. Pollen stainability.

Species	Locality	No. of counted pollen grains	Stainability (%)	Voucher
<i>L. Buergeri</i>	Tokyo, Tokisaka	613	100.0	Akiyama 294
	"	574	95.5	" 297
	Saitama, Mt. Izugatake	269	94.4	" 338
<i>L. cyrtobotrya</i>	Tokyo, Tokisaka	267	96.8	" 280
	"	725	98.2	" 281
	"	682	97.6	" 282
	"	922	95.4	" 284
	"	737	97.6	" 288
	Saitama, Mt. Izugatake	481	96.3	" 331
The intermediate	Tokyo, Tokisaka	521	61.8	" 279
	Saitama, Mt. Izugatake	791	75.5	" 327
	Saitama, Oku-musashi-kogen	327	10.4	Moriya s. n.
	Tokyo, Ogochi-toge	340	43.8	Ohba 1018
	Kanagawa, Jinmu-ji	268	68.7	Momiyama s. n.
	Yamanashi, Mt. Mitsu-toge	540	60.7	Okuyama 24077

length of wing-claw and keel-claw of the intermediate falls somewhere between that of *L. Buergeri* and *L. cyrtobotrya* respectively.

Vegetative characters. The leaflet of the intermediate is elliptic-ovate with acute apex like that of *L. Buergeri* or elliptic with obtuse-retuse apex

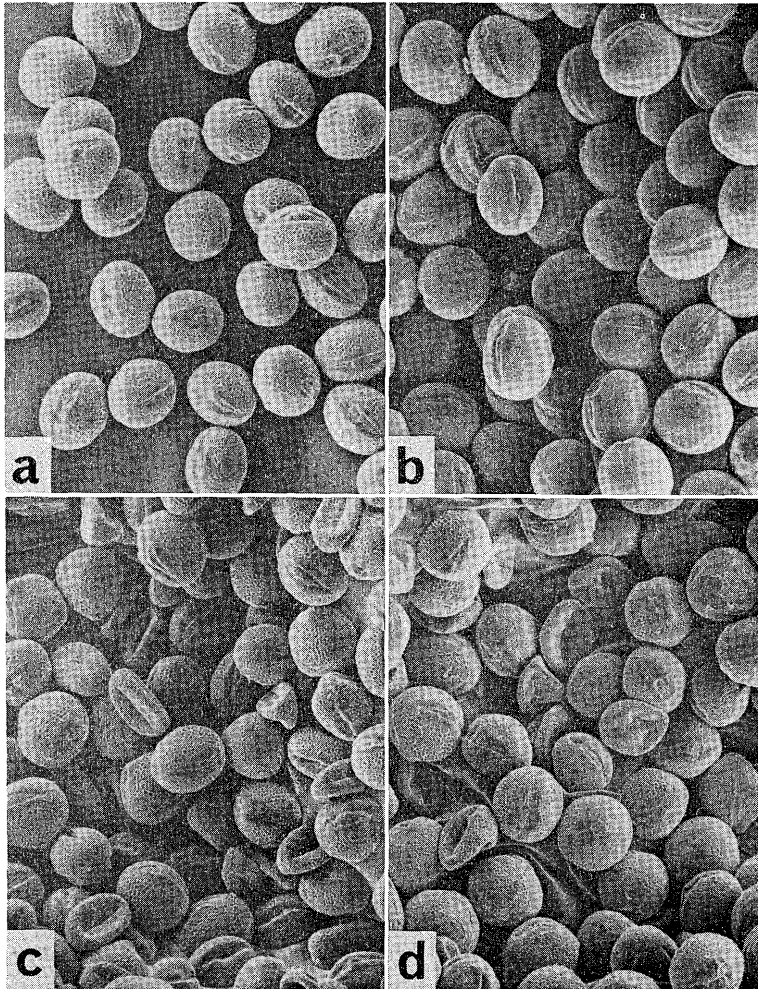


Fig. 3. Pollen grains a. *Lespedeza Buergeri* (Tokisaka, Akiyama 295). b. *L. cyrtobotrya* (Tokisaka, Akiyama 280). c. The intermediate (Tokisaka, Akiyama 279). d. The intermediate (Mt. Izugatake, Akiyama 327). All  $\times 600$ .

like that of *L. cyrtobotrya*. The phyllotaxy of the intermediate varies according to branch, in some branches it is approaching to 1/2 which is a characteristic of *L. Buergeri* and in other branches it is spiral as like as *L. cyrtobotrya*.

Pollen. For a study of pollen fertility, pollen from herbarium specimens was examined using photomicroscope with cotton blue-lactophenol solution and also scanning electron microscope.

The percentages of pollen stainability were determined for *L. Buergeri*, *L. cyrtobotrya*, and the intermediate. More than 250 grains were counted from a flower per plant. Those normalized grains taking a deep blue stain were stainable and therefore considered to be fertile. The other grains, which were shriveled, were unstainable and considered to be sterile. Table 1 summarizes the results. Pollen stainability is stable in both species but very variable among the individuals of the intermediate. The high stainability for the species (94.4-100.0%) and lesser stainability for the intermediate (10.4-75.5%) are considerable. The shape of pollen of *L. Buergeri*, *L. cyrtobotrya* and the intermediate are hardly distinguishable (Fig. 3). Many shriveled grains are recognized in the intermediate but not in *L. Buergeri* and *L. cyrtobotrya*.

Discussion. In the sect. *Macrolespedeza* Lie (1965) described some interspecific hybrids from Korea, but he mentioned no criteria to distinguish the hybrid from the species recognized as basic by him. However, in the sect. *Lespedeza* Clewell (1964, 1966) already revealed the intermediate appearance of morphological characters as well as cytological evidence and pollen stainability for detecting interspecific hybridization. Though we, at present, have no cytological data, the intermediate is considered to be a natural hybrid between *L. Buergeri* and *L. cyrtobotrya* because of the following reasons. 1) The rate of the abnormal pollens is higher compared with the putative parental species and other species of the sect. *Macrolespedeza*. The abnormality may be due to the irregular meiosis of the pollen mother cells. 2) At Tokisaka and Mt. Izugatake, only one intermediate was found respectively. At the place where the intermediate was found *L. Buergeri* and *L. cyrtobotrya* were growing together. 3) The intermediate is evidently provided approximately intermediate expression between the putative parents in many floral characters as well as vegetative ones. Generally interspecific hybrid is known to have a

tendency to show intermediate expression in many characters.

As mentioned in the introduction, the species of the sect. *Macrolespedeza* have a preference to newly opened habitat. The available space is soon occupied by *L. cyrtobotrya*, *L. Buergeri* and other plants; and two or more years later the subsequent generation of *Lespedeza* will fill the remaining available space. The number of individual is few so that the seeds of the hybrid may be far fewer than those of the parental species. It is disadvantageous for the hybrid to compete with many seeds of the parental species<sup>1)</sup>. And much later generation will not invade the space which has been shaded by their progenitors and other woody plants. *L. Buergeri* will survive after the place is shaded by trees but *L. cyrtobotrya* and the hybrid will not be able to survive and disappear.

***Lespedeza* × *cyрто-Buergeri*** S. Akiyama et H. Ohba, hybr. nov.

Planta inter *L. Buergeri* Miq. et *L. cyrtobotrya* Miq. quasi intermedia et versimiliter ex hybridatione harum specierum orta, ab ambobus antheris pollina irregularia et haud tingenda 24.5-89.6% continentibus et vexilla alas carinamque vulgo aequante non eis brevior nec longior, basi nec conspicue attenuato nec apparenter unguiculato, in colore perpellide purpureo nec luteolo nec saturate purpureo differt.

Frutex ad 2 m altus, trunco usque ca 1 m alto, erecto, diametro vulgo 3-4 cm, vene ramoso. Ramus elongatus maxime ca 1 m longis, diffusus sed per et post anthesin dependens, saepe ramulosus, sub anthesi sparse adpresse pilosus, hieme parte apicali emortuus; ramulis gracilibus. Stipulae lineari-triangularis, 3-6 mm longae. Foliola elliptici-ovata vel elliptica, 1-5 cm longa 1-2.5 cm lata, superne acuta vel obtusa (apice ipso cuspidato), sub anthesi supra glabrescentia, infra adpresse ciliata (pilis ca 0.5 mm longis), petiolulata. Inflorescentiae axillares in quaque axilla 1(-3), 1-4(-6) cm longae; axibus veltinis. Bractee late

1) It is uncertain whether backcrossing occurs or not. Some specimens (e.g. Momiya 8 Sept. 1938 (TOFO); Okuyama 1 Sept. 1934 (TNS), both collected at Mt. Kiyosumi, Chiba Pref.) are suggestive of the backcrossing between the hybrid and one of the putative parents. For a study of the fertility of the hybrid, seeds of the intermediate were collected at Tokisaka and Mt. Izugatake and 50 of them from Mt. Izugatake were sowed in the Botanical Gardens, University of Tokyo in 1979. Two of them germinated but until now their fertility can not be examined.

ovatae-±circulares, 0.5-0.7 mm longae; secundariae illas primarias simulant. Pedunculi 1-2 mm longi, veltini. Bractcolae late ovatae-±circulares, 0.7-1 mm longae et latae. Calyx 3-3.5 mm longus, ad medium 4-fidus, pilosus; lobis ca 1.5 mm longis, anguste triangularibus-anguste lanceolatis, apice acutis, lobo dorsale bicuspidato. Vexillum pallide purpureum, alas carinamque aequans sed raro eis pauxillum longius, 8-10 mm longum 6-7 mm latum, basi nec attenuatum nec unguiculatum, apparenter auriculatum; lamina vulgo late-latissime oblonga vel raro latissime ovata vel vere-late obovata, apice retusa; auricula inflaxa, late vel vere lunata, 0.6-0.8 mm lata. Alae purpureae, carinam circiter aequantes, 8-10 mm longae 2-2.5 mm latae, unguiculae; lamina anguste oblonga; ungue 2.5-3.5 mm longo. Carina albo-purpurascens, 8-10 mm longa ca 2.5 mm lata, unguiculata; lamina semicirculari; ungue 3-4 mm longo. Antheriae ovatae, apice retusae, ca 0.5 mm longae, ante anthesin luteae; pollina irregularia et haud tingenda continentia. Discus 0.1 mm longus, glandulifer. Ovarium dense veltinum, stylo versus apicem glabrescenti, stigmatibus capitato. Legumen compressum rotundatum vel oblongum, 0.8-0.9 cm longum ca 0.5 cm latum, indehiscens. Semen ca 3.5×2.5 mm magnum, laevigatum, compressum.

Hab. Japan. Honshu: Saitama Pref., Hanno-shi, Mt. Izugatake (H. Ohashi et al., 26 Oct. 1978; S. Akiyama 327, TI), Okumusashi-kogen (Iruma-gun) (T. Moriya, 22 July 1961, TNS); Tokyo, Itsukaichi-shi, Tokisaka (S. Akiyama 279, TI-Type), Nishitama-gun, Hinohara-mura, Ogochi-toge (H. Ohba 1018, TI, det. *L. Buergeri* × *L. cyrtobotrya* var. *kawachiana* by S. Kurata); Chiba Pref., Awa-kominato-machi, Mt. Uchiurayama (H. Ohba et al. 6808013, TI); Kanagawa Pref., Jinmu-ji (Zushi-shi) (Y. Momiyama, 29 Aug. 1932, TI); Yamanashi Pref., at the foot of Mt. Mitsu-toge (S. Okuyama 24077, TNS).

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ハギ属ヤマハギ節では、2種以上からなる集団で、中間形とみられる個体があり、一部は種間雑種と推定される。本論文ではキハギとマルバハギの中間形で両種の雑種と推定されるものについて検討した。この形はすでに一部の研究者に注目されていたことが標本ラベルの書き込みなどから判る、東京都五日市市時坂と埼玉県飯能市伊豆ヶ岳の集団で野外調査を行なった。中間形の個体では変形した花粉がキハギやマルバハギなどの場合と比べて多く、稔性は10.4~75.5%と低かった。*Lespedeza* × *cyрто-Buergeri* (オクタマハギ, 新称) の名を与えた。キハギとマルバハギが同所的に分布する各地に個体数は少ないものの広く存在するものと考えられる。

□大場達之・平野隆之：フィールド百花、野の花 1 155 pp. 1982. 山と溪谷社，東京。¥1,700. 野の花と山の花をその生態を40に区分して全六冊に組み立てたその第一巻である。生態図鑑と唱っているだけあって本書では野の花を、畔道や路傍に咲く、雑草の花・畑，雑草の花・水田，踏まれて生きる，都市に生える，雑草の花・庭，河原を彩ると区別し，各プレートも被写体を広くとってその有様を図示したのはよい。ただたとえばツユクサやミゾカクソのようにその植物が背景の中に収まり切ってしまっはつきりしないのは少々物足りない気がする。また少し違うが，都市に生えるの集の中でオオケタデが新穂高温泉で撮られているのも少々場所が違うようで惜しい。しかし全体として新しい立場から編集されたことに意義を感じ，引きつづく編集に大いに期待するものである。第一巻に6冊の索引がのっているのも珍しい。(前川文夫)

□宇都宮貞子：植物と民俗 285+20 pp. 1982. 岩崎美術社，東京。¥2,200. 宇都宮貞子さんについては多言を要しない。その著者が日頃から注意して集めてきた信越の故老の体験を整理してまとめたもので，信仰，禁忌，縁起，諺，村の話，子供の遊び，いろいろな唄，食べもの，薬染料，衣類と付属品，農事年中行事と分類して載せてある。文章も例に依って似ていて，たとえば「白いウツギの木を一寸ばかりに切って糸を通し，首に掛けてるとはやり風邪やバヒフ(ジフテリア)にかからんというう。魔除けずらよ]という風でまことにいわれぬ味がある。単に沢山集まっているだけでなく，著者が植物に詳しいので一層親しみが湧いてくる。主に長野北半と新潟西部，それに大和の明日香地方を扱っている。終りに民俗語彙と地域語を含めた植物名の細かい語彙がのっているのもまことにありがたい。(前川文夫)