## 日本産サギゴケ属の新種

著者	Yonezawa Nobumichi		
著者別表示	米澤 信道		
journal or	The journal of phytogeography and taxonomy		
publication title			
volume	48		
number	1		
page range	1-9		
year	2000-08-31		
URL	http://doi.org/10.24517/00055276		

# Nobumichi Yonezawa : Mazus quadriprotuberans N. Yonezawa (Scrophulariaceae), a new species from Kyoto, Japan

Kyoto Seian Senior High School, Kitamonjen-cho, Shokokuji, Kamigyo-ku, Kyoto 602-0898, Japan

#### Abstract

A new species, *Mazus quadriprotuberans* N. Yonezawa was described from Kyoto Prefecture, Japan. The species is similar to *M. miquelii* Makino but clearly distinguished by having 4 protuberances extending from lower lip to corolla tube and corolla tube notably longer than lower lip.

Key words: Mazus, Mazus quadriprotuberans, Scrophulariaceae.

In May 1998, I found a small population of a *Mazus* species so far unknown in the national garden in Kyoto Prefecture, Honshu. It resembles *Mazus miquelii*, but is clearly distinguishable by having long tubular corolla. After that, the habitat had been completely mown and the plants were extinct.

In April 1999, I often visited there and searched for the plants. On April 20, I could find a population of this interesting plants again, which was only about 200 meters far from the first habitat. As the result of the taxonomic studies, I have recognized these plants as a new species.

Since the second habitat was mown twice in autumn, the plants conspicuously decreased in number. I hope that conservation effort will be made to protect this critically threatened species.

Mazus quadriprotuberans N. Yonezawa, sp. nov. (Figs. 1, 2 A, 3, 4 A)

Haec species *Mazo miquelio* affinis est, sed ex basibus labiis ad tubis corollis quadriprotuberantibus et tubis corollis quam labiis notabiliter longioribus facile distinguitur.

Perennial herb. Rhizome short, thin. Radical leaves alive and rosulate in anthesis, oblanceolate or obovate, serrate, pinnatilobate often with flexuous lobes, cuneate and alate at base, 2.5–4.0 cm long, 0.7–1.5 cm wide. Stolons 5–20 cm long in and after anthesis. Leaves of stolon opposite, obovate or rhombical, serrate, often flexuous,

cuneate at base, 1-2 cm long, 0.5-1.0 cm wide. Stem erect, 3-10 cm tall. Inflorescence racemose. Bracts obovate or oblanceolate, 4-15 mm long, cuneate at base, acute and spinescent at apex. Pedicels 7-25 mm long, hairy with mingled glandular hairs. Calyx sparsely hairy with glandular hairs, 5-parted, 7-10 mm long; tube campanulate, 2.7-4.7 mm long; lobe lanceolate, 4.3-6.3 mm long, longer than tube. Corolla tubular and bilabiate, sparsely covered with glandular hairs outside, pale purpule, 17-25 mm long; upper lip 2.5-5.6 mm long, bilobed at apex; lower lip trilobate, 4.0-9.7 mm long, 8.3-14.1 mm wide, protuberant from lower lip to tube; protuberances 4, white, parallel to each other, dotted with yellowish brown macules and clavate hairs; corolla tube much longer than lower lip. Stamens 4, didynamous; filaments combined with tube at base; lower filaments 2, 5-6 mm long; upper filaments 2, 4-5 mm long; anthers bilocular, 1.0 -1.2 mm long. Pistil 10-12 mm long; ovules oviform, glabrous, about 1.5 mm long; style filiform, 8.5-10.5 mm long; stigma geminate, flabellate. Capsule spheroid enclosed with persistent viridescent calyx. Seeds ellipsoidal, compressed, reticular on surface, fulvescent, 0.4-0.6 mm long. Flowering period: April-May.

Japanese name. Kawasemi-so, nom. nov.

Type. Japan, Honshu, Kyoto Prefecture, Kyoto City, 50 m alt., on grassy field, Apr. 22, 1999, N. Yonezawa 25700 (Holotype in KANA, Isotype in KYO).



Fig. 1. Mazus quadriprotuberans, showing habitat.

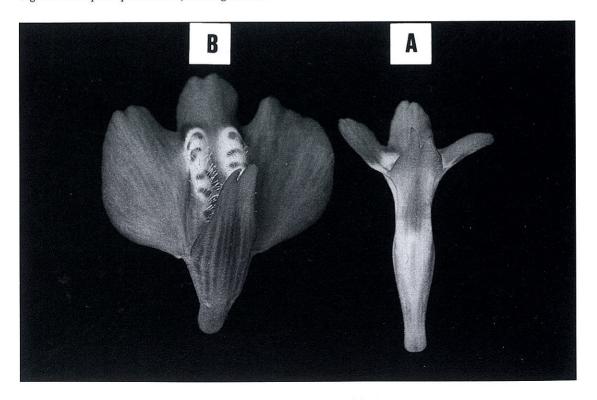


Fig. 2. Corollas of Mazus quadriprotuberans (A) and M. miquelii (B).

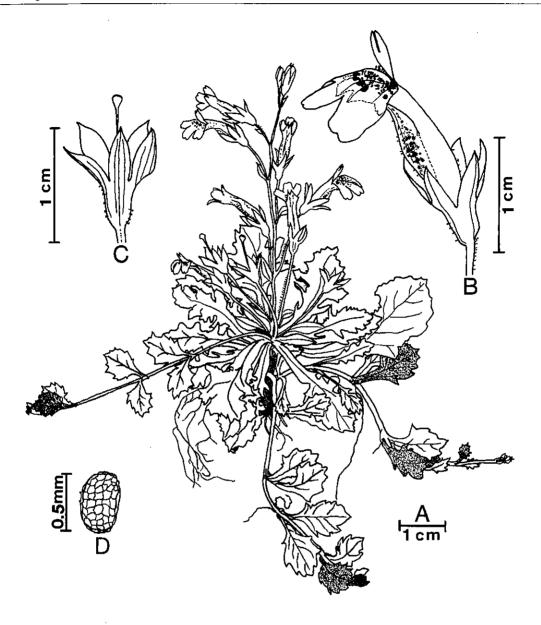


Fig. 3. Mazus quadriprotuberans. All drawn from the holotype.
A: Habit; B: Flower (side view); C: Calyx with pistil; D: Seed.

#### Discussion

The genus Mazus Lour. (Scrophulariaceae) (Loureiro 1790) consists of about 35 species of perennial or annual or biennial herbs growing in arable land or grassy field or moist place or valley or woods, from lowland to alpine regions. The distributional area of Mazus is from Asia to Oceania i.e. Amur, Ussuri, Mongolia, Korea, Japan,

China, Formosa, India, Pakistan, Afghanistan, Himalaya, Viet Nam, Laos, Thailand, Indonesia, Malaya, Philippines, New Guinea, Australia, Tasmania, New Zealand and Hawaii (Loureiro 1790; Hooker 1864, 1884; Maximowicz 1875; Forbes and Hemsley 1890; Makino 1902; Vaniot 1905; Bonati 1908; Merrill 1912; Cheeseman 1925; Handel-Mazzentti 1926;

Masamune 1930, 1940; Pennell 1943; Ohwi 1953; Tsoong 1954; Kitamura 1957; Yoon 1965; Hara 1966; Maheshwari 1968; Walker 1976; Li 1978; Hatushima and Nakajima 1979; Kitagawa 1979; Yang 1979; Yamazaki 1980, 1981, 1985; Hsieh and Huang 1998). Especially in China including Taiwan, about 22 species are known (Yang 1979).

The remarkable taxonomic characters of *Mazus* are herb length, stem features, presence or absence of stolon, pedicel length and hairiness of ovule. It was possible to classify *Mazus* into several groups by these characters. Bonati (1908) divided 25 species of *Mazus* including many new species into four sections. After that, the study of *Mazus* in China was advanced (Yang 1979). Consequently the sections were arranged as follows:

- Stem cylindric. Cauline leaves ovate or obovate or spatulate.
  - 2. Ovule hairy. Lower part of stem ligneous. Sect. *Trichogynus* Tsoong
    - —Sect. Annuae Bonati, 1908. Bull. Herb. Boiss. 2 (8). p. 527.
  - Ovule glabrous. Stem completely herbaceous.

Sect. Mazus

- -Sect. Annuae Bonati, 1908. l.c. p. 527.
- —Sect. Stoloniferae Bonati, 1908. l.c. p. 528.
- —Sect. Caespitosae Bonati, 1908. l.c. p. 528.
- Stem tetragonal. Cauline leaves lanceolate. Sect. Lanceifoliae Bonati, 1908. I.c. p. 529.

Yamazaki (1981) recognized three species of *Mazus* in Japan. These Japanese *Mazus*, i.e. *M. miquelii* Makino, *M. pumilus* (Burm.f.) Steenis and *M. goodenifolius* (Hornem.) Pennell are distributed abroad. Especially, *M. pumilus* is widely distributed in Asia and Oceania, and has a wide range of variation in size, shape of leaves and other features. Since these species and the present new species (Figs. 1,3) have cylindric and completely herbaceous stems and glabrous ovules, they belong to Sect. *Mazus*.

Mazus quadriprotuberans is similar to M. miquelii by having stolons, erect stems and con-

gested leaves at the base of stem, 1.7–2.5 mm long flowers, 7–10 mm long calyces, 4–6 mm long calyx lobes and 7–25 mm long pedicels. Mazus quadriprotuberans is 3–10 cm tall and lower than M. miquelii. The bracts of M. miquelii are small, narrowly triangular, thin and whitish green. In contrast, the bracts of M. quadriprotuberans are large, obovate or oblanceolate, thick and green. Moreover, M. quadriprotuberans differs notably from M. miquelii by having long tubular corolla.

The Chinese Mazus species belonging to Sect. Mazus, i.e. M. henryi Tsoong, M. longipes Bonati and M. surculosus D. Don have also stolons, erect stems and congested leaves at the base of stem (Yang 1979). So, they are in appearance similar to M. quadriprotuberans. But, they clearly differ from M. quadriprotuberans by having calyx lobes shorter than calyx tube and shorter tubular corolla.

Hsieh and Huang (1998) recognized five species of Mazus in Taiwan. These species, i.e. M. fauriei Bonati, M. alpinus Masamune, M. goodenifolius, M. pumilus and M. delavayi Bonati belong to Sect. Mazus. Mazus goodenifolius, M. pumilus and M. delavayi are annual or biennial and not stoloniferus. In contrast, M. fauriei and M. alpinus are perennial and stoloniferous and akin to M. miquelii in flower characters. But, M. fauriei differs from M. miquelii by having flower stem with small leaves. And M. alpinus differs from M. miquelii by having leaves with dense hairs. Mazus quadriprotuberans differs clearly from M. fauriei and M. alpinus by having long tubular corolla with four long protuberances and large bracts. M. simadai Masamune (Masamune 1940) is regarded as M. stachydifolius (Turct.) Maxim. (Maximowicz 1875) by having ovules with subdense hairs and semirosette and erect stems (Li 1978; Yang 1979). But, Hsieh and Huang (1998) treated M. stachydifolius (Sect. Trichogynus) as an uncertain species in Taiwan.

The Korean Mazus consists of only two species, i.e. M. pumilus (Sect. Mazus) and M. stachydifolius (Sect. Trichogynus) (Yoon 1965).

In the Japanese species, M. miquelii is a stoloniferous perennial, while M. pumilus and M. goodenifolius have no stolon and are annual or

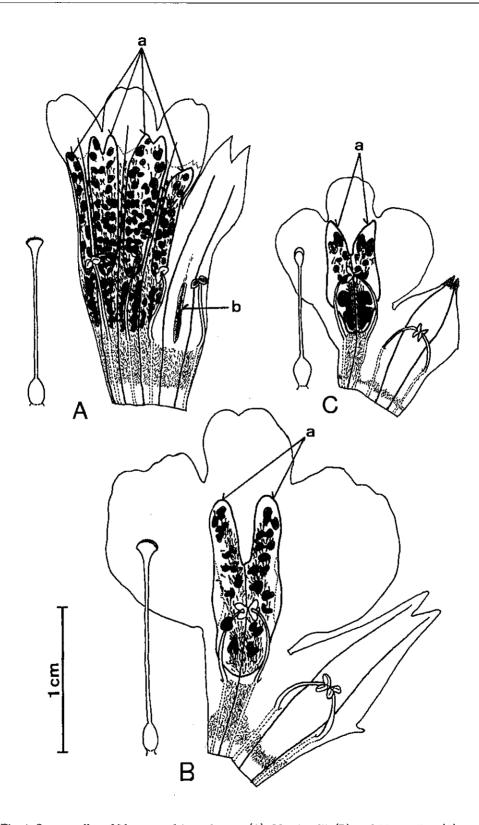


Fig. 4. Open corollas of  $Mazus\ quadriprotuberans\ (A)$ ,  $M.\ miquelii\ (B)$  and  $M.\ pumilus\ (C)$ . a: Protuberances; b: Long yellowish brown macules with trichomes.

biennial. *M. quadriprotuberans* is a stoloniferous perennial. In this respect, it resembles to *M. miquelii*.

However, M. quadriprotuberans is clearly distinguished from M. miquelii, by having four long protuberances extending from lower lip to tube. In M. miquelii, two protuberances are arranged on middle lobe of lower lip and extending to tube. While in M. quadriprotuberans, four protuberances are arranged on middle and lateral lobes of lower lip and extending to tube. And inner two protuberances of M. quadriprotuberans are broader than outer two protuberances. Moreover, M. quadriprotuberans is distinguished from M. miquelii, by having corolla tube notably longer than lower lip and style not exceeding from corolla tube. (Figs. 2, 4).

The habitat of *M. quadriprotuberans* is grassy field scattered with broad-leaved trees, Where *M. miquelii* and *M. pumilus* are also growing. So, I measured size of fifty fresh flowers of these three species for comparison. The results are shown in Table 1 and Figs. 5-8.

Figure 6 is a scatter diagram showing the relationships between flower length and lower lip length. There are high positive correlation between the two characters in each taxon. Mazus quadriprotuberans has same flower length as M.

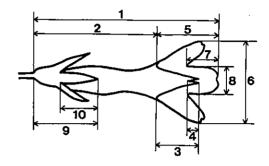


Fig. 5. The measurement parts of *Mazus* flower in Table 1.

- 1: Flower length; 2: Corolla tube length; 3: Upper lip length; 4: Incision length of upper lip; 5: Lower lip length; 6: Lower lip width;
- 7: Middle lobe length of lower lip;
- 8: Middle lobe width of lower lip; 9: Calyx length; 10: Calyx lobe length.

Table 1. Measurements of 10 morphological characters in three species of Japanese Mazus

	M. quadriprotuberans Mean±SD (Min-Max)	M. miquelii Mean±SD (Min-Max)	M. pumilus Mean±SD (Min-Max)
Flower length	20.77±1.98(16.7-25.0)	20.42±2.26(15.9-26.0)	13.30±1.22(7.0—15.5)
Corolla tube length	14.68±1.05(12.1-16.6)	7.74±0.83( 5.4- 9.2)	6.13±0.44(5.1- 7.1)
Upper lip length	3.90±0.83( 2.5- 5.6)	8.56±1.02( 7.1-11.6)	3.74±0.44(2.8- 5.2)
Incision length of upper lip	1.77±0.25( 1.2- 2.3)	2.02±0.43( 1.4- 2.9)	0.60±0.21(0.3- 1.3)
Lower lip length	6.09±1.37( 4.0- 9.7)	12.68±1.75(10.0-17.2)	7.15±0.91(4.8- 9.0)
Lower lip width	10.79±1.39( 8.3-14.1)	14.29±2.26( 9.8-20.0)	9.70±1.10(7.5-12.0)
Middle lobe length of lower lip	3.47±0.52( 2.4- 4.4)	4.05±0.59( 3.0- 5.2)	2.24±0.35(1.4- 3.2)
Middle lobe width of lower lip	3.47±0.49( 2.5- 4.5)	4.35±0.69( 3.0- 6.3)	2.96±0.49(1.9- 3.7)
Calyx length	8.42±0.70( 6.7-10.0)	7.80±0.66( 6.4- 9.2)	5.61±0.60(4.4- 7.0)
Calyx lobe length	4.72±0.51( 4.0- 6.3)	4.56±0.52( 3.3- 5.8)	2.90±0.45(1.9- 3.9)

In all taxa, fifty fresh flowers were used. Length in mm.

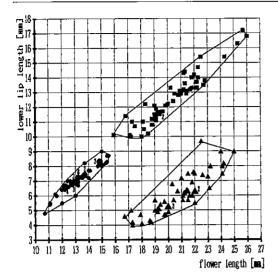


Fig. 6. Scatter diagram showing the relationships between flower length and lower lip length.

📤 : Mazus quadriprotuberans ; 🔳 : M. miquelii ;

: M. pumilus.

Some numbered larger points overlap the smaller points.

miquelii, but has fairly short lower lips 4 to 10 mm long. Moreover, M. quadriprotuberans has lower lips mostly as long as those of M. pumilus, but has fairly long, 17 to 25 mm long flowers. So, their variations are clearly distinguished.

Figure 7 is a scatter diagram showing the relationships between corolla tube length and lower lip length. There is a fairly low positive correlation between these two characters in each taxon. Mazus quadriprotuberans differs from M. miquelii by having long corolla tubes and short lower lips. Their variations are far apart and clearly distinguished. Mazus quadriprotuberans has mostly lower lip as long as that of M. pumilus, but has long corolla tubes 12 to 17 mm long. So, their variations are far apart and clearly distinguished, too.

Figure 8 is a scatter diagram showing the relationships between upper lip length and calyx lobe length. There is a fairly low positive correlation between these two characters in each taxon.

Mazus quadriprotuberans differs from M. miquelii by having short and from 2.5 to 5.6 mm long upper lips. So, their variations are far apart and clearly distingushed. Mazus quadriprotuberans has mostly same in upper lip length as M. pumilus, but has long, 4.0 to 6.3 mm long calyx

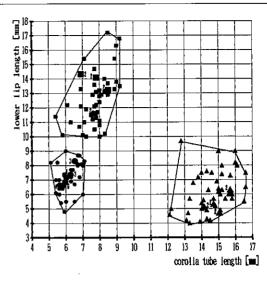


Fig. 7. Scatter diagram showing the relationships between corolla tube length and lower lip length.

▲ : Mazus quadriprotuberans ; ■ : M. miquelii ;

● : M. pumilus.

Some numbered larger points overlap the smaller points.

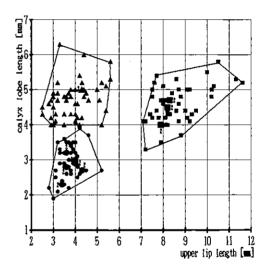


Fig. 8. Scatter diagram showing the relationships between upper lip length and calyx lobe length.

▲ : Mazus quadriprotuberans ; ■ : M. miquelii ;

: M. pumilus.

Some numbered larger points overlap the smaller points.

lobes. So, their variations are clearly distinguished, too.

In addition, *M. quadriprotuberans* has long yellowish brown macules with trichomes (Fig. 4 A) inside of middle and upper part of corolla tube. Moreover, *M. miquelii* (Fig. 4B), *M. pumilus* 

(Fig. 4 C), and *M. goodenifolius* have elongating styles from corolla tube, but *M. quadriprotuberans* (Fig. 4 A) has styles enclosed in corolla tube. These points are remarkable differences between *M. quadriprotuberans* and other three taxa.

A key to the species belonging to Japanese *Mazus* is as follows:

### Key to the species

- A. Herb perennial, stoloniferous in and after flowering period. Flower 1.6-2.6 cm long.
  - B. Corolla with two long protuberances from lower lip to tube.

Corolla tube fairly shorter than lower lip. Upper lip 7.1–11.6 mm long. Style exceeding corolla tube.

······M. miquelii

B. Corolla with four long protuberances from lower lip to tube.

Corolla tube notably longer than lower lip. Upper lip 2.5-5.6 mm long. Style not exceeding corolla tube.

······M. quadriprotuberans

- A. Herb annual or biennial and not stoloniferous. Flower 0.7–1.6 cm long.
  - B. Leaves borne from base to middle of stem and obscurely serrate.

.....M. pumilus

B. Leaves almost congested at base of stem and pinnatilobed.

·····M. goodenifolius

#### References

- Bonati, G. 1908. Contribution a L'etude du genere *Mazus* Lour. Bull. Herb. Boiss. **2** (8) : 525-539.
- Cheeseman, T. F. 1925. Manual of the New Zealand flora. 2 nd ed. p. 772. W. R. B. Oliver, Wellington.
- Forbes, F. B. and Hemsley, W. B. 1890. Scrophularineae. Journ. Linn. Soc. Bot. 26: 177-220.
- Handel-Mazzentti, H. 1926. Mazus Lour. Sitz. ber. Akad. Wien. 63: 3-4.
- Hara, H. 1966. The flower of eastern Himalaya. p.288. University of Tokyo, Tokyo.
- Hatushima, S. and Nakajima, K. 1979. Flowers of Ryuku Islands. p. 300, pl. 127. Kodansha,

- Tokyo, (in Japanese)
- Hooker, J. D. 1864. Handbook of the New Zealand flora. pp. 202-203. L. Reeve, London.
- Hooker, J. D. 1884. Flora of British India Vol. IV. pp. 259-260. L. Reeve, London.
- Hsieh, T. H. and Huang, T. C. 1998. Mazus Lour. Huang, T. C. (ed.). Flora of Taiwan 2 nd ed. Vol. 4, pp. 609-612. Editional Committee of the Flora of Taiwan, Department Botany, National Taiwan University, Taipei.
- Kitagawa, M. 1979. *Mazus* Loureiro. Neolineamenta florae Manshuricae, p. 565. J. Cramer, Hirschberg.
- Kitamura, S., Murata, G. and Hori, M. 1957.
  Coloured illustrations of herbacceous plants of Japan (Sympetalae). pp. 129, 152, pl. 46.
  Hoikusha, Osaka. (in Japanese)
- Li, H. L. 1978. Mazus Lour. Li, H. L., Liu, T. S., Huang, T. C., Koyama, T. and Devol, C. E. Flora of Taiwan. pp. 571-575. Epoch, Taipei.
- Loureiro, J. de. 1790. Flora cochinchinensis. Vol.2, p. 385. Ulyssipone, Berlin.
- Maheshwari, J. K. 1968. The flora of Delhi. p. 252. Council of Scientific and Industrial Research, New Delhi.
- Makino, T. 1902. Observation on the Flora of Japan. Bot. Mag. Tokyo. 16: 153-162.
- Masamune, G. 1930. Contribution to our knowledge of the flora of the southern part of Japan. II. J. Soc. Trop. Agric. 2: 151-153.
- Masamune, G. 1940. Miscellaneous notes on the flora of the eastern Asia XVI. Trans. Nat. Hist. Soc. Formos. 30: 34-38.
- Maximowicz, C. J. 1875. Diagnoses plantarum novarum Japoniae et Mandshuriae 19. Bull. Acad. Sci. St. Petersb. 20: 430-472.
- Merrill, E. D. 1912. A flora of Manila. pp. 423–424. Bureau of Science, Manila.
- Ohwi, J. 1953. Flora of Japan. pp. 1189-1190. Shibundo, Tokyo. (in Japanese)
- Pennell, F. W. 1943. A second summary of the Scrophulariaceae of New Guinea. Journ. Arn. Arb. 24: 243-274.
- Tsoong, P. C. 1954. Some new species of Scrophulariaceae from Eastern Asia. Kew Bull. 3: 443-450.
- Vaniot, M. E. 1905. Plantae Bodinierianae. Scrophulariaceae. Bull. Acad. Geog. Bot. 15: 85-88.

Walker, E. H. 1976. Flora of Okinawa and the southern Ryukyu Islands. p.926. Smithsonian Institution, Washington.

Yamazaki, T. 1980. New or noteworthy plants of Scrophulariaceae from Indo-China (4). Journ. Jpn. Bot. 55: 1-13.

Yamazaki, T. 1981. *Mazus* Lour. Satake, Y., Ohwi J., Kitamura S., Watari S. and Tominari, T. (eds.). Wild flowers of Japan, herbaceous plants (including dwarf subshrubs) II, pp. 97, 103-104, pl. 88. Heibonsha, Tokyo. (in Japanese)

Yamazaki, T. 1985. Mazus Loureiro. Leroy, J. – F. (ed.). Flore du Cambodge, du Laos et du Viet-nam. 21 Scrophulariaceae, pp. 42-46. Museum National Histoire Naturelle, Paris.

Yang, H. P. 1979. Mazus Lour. Tsoong, P. C. and Yang, H. P. (eds.). Flora reipublicae popularis sinicae Tomus 67 (2), pp. 172-196. Science Press, Beijing. (in Chinese)

Yoon, C. J. 1965. Illustrated encyclopedia of fauna and flora of Korea Vol. 5 Tracheophyta. pp. 1056-1057. Samhwa, Seoul. (in Korean) (Received August 23, 1999; accepted March 18, 2000)

#### 米澤信道:日本産サギゴケ属の新種

Mazus Loureiro (サギゴケ属) 植物は、アジアからオセアニアにかけての広い地域に分布し、約35種が知られている。とりわけ中国(台湾を含む)には、多くの種を産し、約22種が知られている。主な分類形質は、多年生か否か、草丈と茎の形状、走出枝の有無、花茎の形状、葉の形状とつき方、花や萼の形態、花柄長、子房の毛の有無などである。これらにより、グループ分けが可能である。Bonati (1908) は、自らも多くの種を記載し、当時25種を4節にグループ分けした。その後、中国での研究が進み、次の3節に整理された(Yang 1979)。

Sect. Trichogynus (茎は円柱形,子房は被毛,茎の下部は木質化)

Sect. Mazus (茎は円柱形,子房は無毛,茎は完全な草質)

Sect. Lanceifoliae (茎は四角形, 茎生葉は披針

形)

日本に産するムラサキサギゴケ M. miquelii, ト キワハゼ M. pumilus, ヒメサギゴケ M. goodenifolius の3種は国外にも産し、とりわけ、トキワハ ゼは広域分布する種で、変異が大きく、いくつかの 種内分類群が記載されている。これら3種に今回 報告する新種カワセミソウ Mazus quadriprotuberans N. Yonezawa を加えた 4 種は、いずれも茎 が円柱形で、子房に毛がなく Sect. Mazus に属す る。カワセミソウは、走出枝があり、直立する花茎 があり、葉は密集してつくこと、萼のサイズが似て いること、花柄が萼より長いことなどの点で、最も ムラサキサギゴケに近縁であることが判明した。し かし、カワセミソウは草丈がムラサキサギゴケより さらに小さく矮小で、花茎の苞が大きく顕著であり 異なる。さらに、カワセミソウは長い管状の花冠を もっており、ムラサキサギゴケとは明瞭に異なる。

また、中国産の Sect. Mazus に属する M. henryi, M. longipes, M. surculosus とも走出枝、直立する花茎と花茎の基部に集まる葉をもつ点で似ている。しかし、上記 3 種とも、萼裂片が萼筒より短く、また、長い管状の花冠をもたないので、カワセミソウとは明らかに異なる。

日本産 Mazus 属植物の中では、カワセミソウと ムラサキサギゴケは、走出枝を出す多年草であるの に対して、トキワハゼ (1年草または越年草) やヒ メサギゴケ(越年草)は走出枝を出さない。また、 カワセミソウは花の形態に於いて、ムラサキサギゴ ケ、トキワハゼ、ヒメサギゴケのいずれとも多くの 差異をもつ。つまり、ムラサキサギゴケ、トキワハ ゼ、ヒメサギゴケが下唇中央裂片から花筒内にかけ て2本の隆起帯をもち、花筒は下唇とほぼ同長か または明らかに短く、柱頭は花筒の外に超出するの に対して、カワセミソウは下唇中央及び左右裂片か ら花筒内にかけて4本の隆起帯(内側の2本が外 側の2本より幅広い)をもち、花筒が下唇より著 しく長く、柱頭は花筒内に在る。加えて、カワセミ ソウは, 花筒の中央部背側の内面に, 毛を散生する 細長い黄褐色の斑をもつ。和名は, 花の形が野鳥の カワセミの姿を連想させることによる(「翡翠草」)。 (〒602-0898 京都市上京区相国寺北門前町 京都 成安高等学校)