Taxonomic Studies of *Cirsium* (Asteraceae) in Japan XV.
Four New Species from Western Japan

Yuichi Kadota

Department of Botany, National Science Museum, Tokyo
4–1–1 Amakubo, Tsukuba, 305–0005 Japan
E-mail: kadota@kahaku.go.jp

**Abstract**
A new subsection and four new species of the genus *Cirsium* in Japan are reported here. *Cirsium masami-saitoanum* Kadota is described from southern Kyushu and characterized by cylindrical involucres and recurved involucral phyllaries. *Cirsium pseudosuffultum* Kadota described from the Shikoku Mountains has been confused with *C. suffultum* (Maxim.) Matsum. from Kyushu and the former is distinguished from by having linear glandular bodies (vittae) as well as cylindrical involucres and recurved involucral phyllaries. *Cirsium ohminense* Kadota is described from the Kii Mountains and is characterized by having well branched stem, cylindrical involucres, recurved involucral phyllaries and lanceolate glandular bodies. A new subsection of sect. *Onotrophe* (Cass.) DC., subsect. *Suffulta*, is proposed for the four species above stated. The subsect. *Suffulta* also includes *C. chikushienense* Koidz. and *C. yakushimense* Masam. *Cirsium lucens* Kitam. var. *opacum* Kitam. is recognized as a distinct species, *C. opacum* (Kitam.) Kadota within the subsect. *Megaphylla* of sect. *Onotrophe*.

**Key words**: Honshu, Kyushu, new species, Shikou, subsect. *Suffulta*, subsect. nov.

**Introduction**
A part of the revisional work on the Japanese *Cirsium* (Asteraceae) I have reported some results based on both field and herbarium examinations (Kadota, 1989–2006; Kadota and Nagase, 1988). Here I will report four new species from western Japan.

*Cirsium suffultum* (Maxim.) Matsum. was believed to be distributed throughout Kyushu (e.g., Hara, 1952; Ohwi, 1953, 1965, 1984; Ohwi (Kitagawa), 1983; Kitamura, 1957, 1981; Masamune, 1974; Sugimoto, 1978; Kadota, 1989, 1995). In October of 2003 Messers. T. Minamitani, M. Saito and K. Kurogi introduced me to the localities of an unknown thistle. The thistle is significantly different from *C. suffultum* in having slender involucres with recurved phyllaries. This thistle will be described here as a new species, *C. masami-saitoanum*. From this time I started to revise taxonomically the *C. suffultum* group.

*Cirsium suffultum* was regarded to be distributed also in Shikoku (e.g., Hara, 1952; Ohwi, 1953, 1965, 1984; Ohwi (Kitagawa), 1983; Kitamura, 1957, 1981; Masamune, 1974; Sugimoto, 1978; Kadota, 1989, 1995). However, based on my examinations, the thistle from Shikoku is different from true *C. suffultum* from Kyushu and will be described here as *C. pseudosuffultum*. Similarly the thistle from the Ômine Mountains, central Honshu, will be described as *C. ohminense*. *Cirsium lucens* Kitam. var. *opacum* Kitam. is a representative of this subsection, is distributed in Hokkaido and Honshu (chiefly on the Japan Sea side; Fukui...
Prefecture and eastward). ‘Cirsium lucens Kitam. var. opacum Kitam.’ is known to be distributed in Shiga Prefecture neighboring to Fukui Prefecture (Kitamura, 1963, 1981). However, it is clarified that ‘C. lucens var. opacum’ is distinguished from C. lucens var. lucens on species level (Kadota, 1998a). It is accordingly appropriate that ‘C. lucens var. opacum’ should be treated as a distinct species and belongs to the subsect. Megaphylla of sect. Onotrophe.

**Taxonomic treatment**


Sect. **Onotrophe** (Cass.) DC., Prodr. 6: 644 (1837).


Subsect. **Suffulta** Kadota, subsect. nov.


Herba perennis, hermaphrodita vel gynodioecia, foliis basalibus emarcidis sub anthesin, eis caulinis infernus congesteratis in parte inferno caulis, capitulis nutantis vel raro obliquis, involucris crateriformibus vel campanulatis vel cylindricis, foliis subtentis prulibus foliaceis, numero chromosomatibus 2n = 4x = 68.

Type: **Cirsium suffultum** (Maxim.) Matsum.

Hermaphrodite or gynodioecious, perennial herbs. Basal leaves withering at anthesis. Lower cauline leaves crowded together in the lower part of stem. Capitula bowl-shaped to campanulate or cylindrical, nodding or rarely oblique (in the case of **C. ohiminense**; see below); subtending leaves several, foliaceous. Chromosome number 2n = 4x = 68.

**Key to the species of subsect. **Suffulta**

1A. Involucres not provided with glandular bodies (non-glutinous); plant hermaphrodite or gynodioecious

2B. Involucre phyllaries 6-seriate, coriaceous

3C. Involucres bowl-shaped to broadly campanulate or cylindrical, long-pedunculate; plant gynodioecious

4D. Involucres bowl-shaped to boddly campanulate; outer and middle phyllaries ascending...

4D. Involucres cylindrical; outer and middle phyllaries recurved...

3C. Involucres narrowly cylindrical, subssesile; hermaphrodite plant...

C. masami-saitoanum

2B. Involucre phyllaries 8–9-seriate, herbaeous; gynodioecious plant...

C. chikushienso

1A. Involucres provided with glandular bodies (glutinous); plant always hermaphrodite

2E. Tubes of florets clearly longer than the throats; stem simple, if branched, branches not elongated; glandular bodies frequently degenerated .

C. pseudosufflutum

2E. Tubes of florets slightly longer than the throats; stem well branched; branches elongated; glandular bodies well developed .

C. ohiminense

1. **Cirsium masami-saitoanum** Kadota, sp. nov. [Figs. 1–4]

Differt ab **Cirsio suffulto** involucris anguste cylindricibus, phyllariss involucrorum 9–10-seriatis in plantas hermaphroditias et phyllarias involucrorum mediis et extribus recurvatis; a **C. chikushienso** foliis subtentis paucibus et parvioribus, phyllarias involucrorum mediis et extribus recurvatis et achenis amplioribus.

**TYPE:** JAPAN: Kyushu; Miyazaki Pref., Miyazaki-gun, Tano-cho, Mt. Wanitsukayama, alt. 250 m, hermaphrodite, 28 Oct. 2003, Y.
Fig. 1. Habit of a hermaphrodite plant of *Cirsium masami-saitoanum* Kadota (Mt. Wanitsukayama, Miyazaki Pref., Kyushu). Right corner inset shows a capitulum.
Fig. 2. Holotype specimen of *Cirsium pseudosuffultum* Kadota (Mt. Wanitsukayama, Tano-cho, Miyazaki-gun, Miyazaki Pref., Kyushu, 28 Oct. 2003, Y. Kadota 034806, TNS 727861).
Fig. 3. Habit of a female plant of *Cirsium masami-saitoanum* Kadota (Mt. Wanitsukayama, Miyazaki Pref., Kyushu). Left corner inset shows a capitulum with semi-opened stigmata.
Fig. 4. Paratype specimen (female plant) of *Cirsium masami-saitoanum* Kadota (Mt. Wanitsukayama, Tano-cho, Miyazaki-gun, Miyazaki Pref., Kyushu, 28 Oct. 2003, Y. Kadota 034812, TNS 727847).
Kadota 034806 (TNS 727860-727862-holotype!). Miyazaki Pref., Miyazaki-gun, Tano-cho, Mt. Wanitsukayama, alt. 250 m, female, 28 Oct. 2003, Y. Kadota 034812 (TNS 727845-727847-paratype!)

A gynodioecious, perennial, herbaceous plant, 0.7–2.2 m tall. Rootstock stout, horizontal, up to 3 cm in diameter, with cord-like thin roots. Stem sulcate, suberect, well branched from the lower part, sparingly arachnoid. Basal leaves withering at anthesis. Lower cauline leaves dull green above, coriaceous to subcoriaceous, sometimes subcarnose, elliptic to narrowly elliptic in outline, deeply to medially pinnatilobate or rarely simple and coarsely serrate, 20–40 cm long, almost glabrous on both sides; petioles 3–5 cm long, glabrous, slightly auriculate, not decurrent; lobes 4–9-jugate, ovate, 2–9 cm long, ascending. Upper cauline leaves similar to the lower in shape but smaller. Flowers in September to November. Capitula 2–5 in a compact corymb or aggregated, nodding; peduncels (0–)1.5–3.0 cm long, densely arachnoid; subtending leaves 3–5, narrowly lanceolate to narrowly ovate-lanceolate, foliaceous, 0.7–2.5 cm long, provided with sharp spine 1–2 mm long. Involucres cylindrical, non-glutinous, 16–21 mm long, 8–14 mm (in hermaphrodite plant; in vivo) and 6–7 mm (in female plant; in vivo), and 1.5–3 cm (in sicco) in diameter, densely arachnoid. Phyllaries 9–10-seriate (in hermaphrodite plant) or 6–7-seriate (in female plant), herbaceous, terminated with sharp spines 1 mm long; glandular bodies absent; inner phyllaries linear-lanceolate, ca. 14 mm long, erect; outer ones broadly ovate with caudate tips ca. 6 mm long, strongly to gently recurved. Corollae violet to pale violet (in hermaphrodite plant) or deep pink (in female flower), 13–20 mm long; lobes 3–4 mm long; throats 5–6 mm long; tubes 6–9 mm long, about two times longer than the throats. Achenes grayish brown, ca. 4 mm long, ribbed; pappi sordid, 10–15 mm long.

Chromosome number: 2n = 4x = 68 (present paper).

Japanese name: Hyûga-azami (nov.).

Distribution and habitat: Kyushu (the Wanitsuka Mountains; Miyazaki and Kagoshima Prefs.). Growing along evergreen woodlands.


The specific epithet ‘masami-saitoanum’ is dedicated to Mr. Masami Saitô, who have contributed to the study of the flora of Miyazaki Prefecture, Kyushu, Japan.

Cirsium masami-saitoanum is discriminated from C. suffultum (Maxim.) Matsum. by having cylindrical involucres, 9–10-seriate involucral phyllaries in female plants and recurved medial and outer onvolucral phyllaries, and from C. chikushiense Koidz. by having fewer and shorter subtending leaves, recurved medial and outer onvolucral phyllaries and larger achenes.

Gynodioecy in the Japanese Cirsium was stud-
ied for the first time by Kawakubo (1994, 1995). He observed the degree of degeneration of ‘synangia’ (integrated anthers) and the presence or absence of pollen grains as markers of male sterility with herbarium specimens kept at KYO. As a result he reported that the male sterility (gynodioecy) was confirmed in more than 40 percent of the Japanese species. He additionally stated that the difference between hermaphrodite and female plants was observed in the size of heads except for the degeneration of anthers and the absence of pollen grains; female plants had heads smaller than those of hermaphrodites.

With respect to the differences between hermaphrodite and female plants I made field observations on natural populations of *C. masamisaitoanum* and the related species in Kyushu during 2003–2005. It was consequently revealed that there were some additional differences between both kinds of plants; in female plants, 1) heads were more in number, 2) florets were deeper, 3) stem was well branched and the branches were elongated, 4) styles of florets turned out to be slightly open. The items 1), 2) and 4) might have close relationships with pollination syndrome. It thought to be important to understand how the unclosed styles do function for pollination because the genus *Cirsium* is characterized by having unopend styles together with the genera *Carduus* and *Breea* (e. g., Kitamura, 1957, 1981).

2. *Cirsium pseudosuffultum* Kadota, sp. nov. [Figs. 5–6]


Haec species affine *Cirsio suffulto*, sed involucris cylindricis, phyllariis involucrorum 9–10-seriatis mediis et extrioribus recurvatis vel paten-
tibus, vittis linealibus vel anguste lanceolatis et flosculis omnibus hermaphroditibus differt.


A hermaphrodite, perennial, herbaceous plant, 0.4–1.4(–2.0) m tall. Rootstock stout, horizontal, up to 2 cm in diameter, with cord-like thin roots. Stem sulcate, suberect, 2–3 times branched in the upper part, sparingly arachnoid. Basal leaves withering at anthesis. Lower cauline leaves dull green above, sometimes variegate, coriaceous to subcoriaceous, elliptic in outline, deeply to medi-
ally pinnatilobate, 20–40 cm long, 9–16 cm wide, provided with strong spines 3–7 mm long, glabrous on both sides, shortly petiolate, slightly auriculate, not deccurent; lobes 6–8-jugate, ovate, 2–9 cm long. Upper cauline leaves similar to the lower in shape but smaller. Flowers in Au-
gust to October. Capitula several in a corymb or aggregated, nodding; peduncels (0–)2–15 cm long, densely arachnoid. Subtending leaves 3–5, narrowly lanceolate to narrowly ovate-lanceolate, foliaceous, 2–5 cm long, provided with sharp spine 1–2 mm long. Involucres cylindrical, slightly glutinous or non-glutinous, 16–23 mm long, 8–12 mm (in vivo) and 2–4 cm (in sicco) in diam-
eter, scarcely arachnoid. Phyllaries 9–10-seriate, herbaceous, terminated with sharp spines 1–3 mm long; gildandul bodies linear to narrowly lanceolate on middle and inner ones; inner phyl-
laries linear-lanceolate, ca. 15 mm long, erect; outer ones broadly ovate with caudate tips ca. 6 mm long, recurved or patent. Corollae violet to
Fig. 5. Habit of *Cirsium pseudosuffultum* Kadota (Tengu-no-Mori, Shikoku Karst, Kochi Pref., Shikoku). Left corner inset shows a capitulum. Arrow shows a glandular body.
Fig. 6. Holotype specimen of *Cirsium pseudosuffultum* Kadota (Tengu-no-Mori, Shikoku Karst, Tsuno-cho, Takaoka-gun, Kochi Pref., Shikoku, 11 Oct. 2004, Y. Kadota 045031, TNS 744300).
pale violet, 18–20 mm long; lobes 4 mm long; throats 5–6 mm long; tubes 9–10 mm long, about two times longer than the throats. Achenes grayish brown, ca. 5 mm long, ribbed; pappi sordid, (13–)18–21 mm long.

Chromosome number: \(2n=4x=68\) (present paper).

Japanese name: Nise-tsukushi-azami (nov.).

Distribution and habitat: Shikoku (the Shikoku Range; Mt. Tsurugisan and its vicinity, the Shikoku Karst and Mt. Onigajō-san; Fig. 0). Growing along the margin of summer-green woodlands and grassland, usually on calcareous soils: alt. 400–1700 m.

Cirsium pseudosuffultum is so-called ‘C. suffultum in Shikoku’ and is distinguished from C. suffultum by having cyrindrical involucres, 9–10-seriate, recurved or patent involucral phyllaries, linear to narrolwy lanceolate glandular bodies (vittae) on the inner and/or middle involucral phyllaries and hermaphrodite florets.

The presence of this species in Mt. Onigajō-san (Ehime Pref.) was confirmed by Mr. S. Miya, however, there are no voucher specimens.


3. **Cirsium ohminense** Kadota, sp. nov.  

Differt ab *Cirsio suffluto* caule multo ramoso, vittis lanceolatis et tubis floscilorum faucibus plus minusve longioribus.

**TYPE:** JAPAN: HONSHU; Nara Pref., Yosin-gun, Kami-Kitayama-mura, Wasamata Ski Slope, alt. 1090 m, 30 Sept. 2003, Y. Kadota 033501 (TNS 727675-727677-holotype !).

A hermaphrodite, perennial, herbaceous plant, 0.7–1.8 m tall. Rootstock stout, horizontal, up to 2 cm in diameter, with cord-like thin roots. Stem sulcate, suberecet, well branched from the lower part, sparingly arachnoid. Basal leaves withering at anthesis. Lower cauline leaves dull green above, coriaceous, frequently variegated, broadly elliptic in outline, deeply pinnatilobate, 22–40 cm long, 15–22 cm wide, provided with strong spines 3–12 mm long, pubescent with brownish multicellular short hairs on the adaxial side, arachnoid on the abaxial side, subsessile, slightly auriculate, not decurrent; lobes 6–9-jugate, narrowly ovate, 3–12 cm long, subpatent. Upper cauline leaves similar to the lower in shape but smaller. Flowers in September to October. Capitula 3–5, aggregated or in a compact corymb, nodding; peduncles 0.2–6.5 cm long, densely arachnoid; subtending leaves several, linear to narrowly ovate-lanceolate, foliaceous, 1–8 cm long, provided with sharp spines up to 10 mm long. Involucres cylindrical, glutinous, 20–24 mm long, 8–12 mm (*in vivo*), and 2–3 cm (*in sicco*) in diameter, arachnoid. Phyllaries 9–10-seriate, herbaceous, terminated with sharp spines 1–3 mm long; glandular bodies lanceolate on the middle and inner phyllaries; inner phyllaries linear-lanceolate, ca. 19 mm long, erect; outer ones ovate with caudate tips ca. 6 mm long, strongly recurved. Corollae violet to pale violet, 18–22 mm long; lobes 4–5 mm long; throats 6–7 mm long; tubes 8–9 mm long, slightly longer than the throats. Achenes grayish brown, 4–5 mm long, non-ribbed; pappi sordid, 12–15 mm long.

Chromosome number: 2n = 4x = 68 (present paper).

Japanese name: Ômine-azami (nov.).

Distribution and habitat: Honshu, Kii Mountains (the Ômine Range and Ôdaigahara Mountains; Nara Pref.). Growing along the margin of summer-green woodlands: alt. 1000–1400 m.


*Cirsium ohminense* is distinguished from *C. suffluto* by having well branched stem with elongated branches, lanceolate glandular glandular bodies on the middle and inner involucral phyllaries and floret tubes slightly longer than the throats and from *C. nipponicum* var. *yoshinoi* (Nakai) Kitam. ex Kitam. & Murata by having larger, more lower cauline leaves and subtending leaves and lanceolate glandular bodies on the middle and inner involucral ohyllaries.


Lectotype (Kadota, 2006): *Cirsium yezoense* (Maxim.) Makino.
Fig. 7. Habit of *Cirsium ohminense* Kadota (Wasamata Ski Area, Kami-Kitayama-mura, Yoshino-gun, Nara Pref., Honshu). Left corner inset shows a capitulum. Arrows show glandular bodies.
Fig. 8. Holotype specimen of *Cirsium ohminene* Kadota (Wasamata Ski Area, Kami-Kitayama-mura, Yosino-gun, Nara Pref., Honshu, 30 Sept. 2003, Y. Kadota 033501, TNS 727676).


   [Kadota, 1988a; Fig. 2]

   A hermaphrodite, perennial, herbaceous plant, 0.7–2.0 m tall. Rootstock stout, horizontal, up to 3 cm in diameter, with cord-like thin roots. Stem sulcate, suberect, well branched from the middle part, arachnoid. Basal leaves withering at anthesis. Lower cauline leaves dull yellowish green above, somewhat carnose, broadly elliptic in outline, deeply to medially pinnatilobate, 30–50 cm long, 14–26 cm wide, provided with strong spines 2–7 mm long, pubescent with brownish, multicellular, short hairs on the adaxial side, arachnoid on the abaxial side, sessile or 3–6 cm long, clearly auriculate, not decurrent; lobes 4–7-jugate, narrowly ovate, 2–12 cm long, ascending. Upper cauline leaves similar to the lower in shape but smaller, sessile. Flowers in September to November. Capitula several in a loose corymb, nodding; peduncles 3–18 cm long, densely arachnoid. Subtending leaves several, linear to narrowly ovate-lanceolate, foliaceous, 1–5 cm long, provided with sharp spines 1–5 mm long. Involucres bowl-shaped to campanulate, no-glutinous, 22–25 mm long, 1.5–2 cm (in vivo), and 3.5–4.5 cm (in sicco) in diameter, arachnoid. Phyllaries 8–9-seriate, herbaceous, terminated with weak spines ca. 1 mm long; glandular bodies absent; inner phyllaries linear-lanceolate, ca. 20 mm long, erect; outer ones ovate with acuminate tips, ca. 5 mm long, one-forth of the inner ones, ascending. Corollae violet to pale violet, 21–22 mm long; lobes 3–5 mm long; throats 7–8 mm long; tubes 9–10 mm long, slightly longer than the throats. Achenes white-yellowish brown, ca. 4.5 mm long, minutely striate; pappi sordid, 14–19 mm long.


   Chromosome number: unknown.


   Distribution and habitat: Honshu (along the upper streams of the River Adogawa; Shiga Pref.). Growing along the margin of summer-green woodlands: alt. 300–400 m. Endemic.

   *Cirsium lucens* Kitam. is different from *C. opacum* in having yellowish white flowers and outer involucral phyllaries with ascending caudate tips up to 10 mm long (Kadota, 1998a). The locality of *C. lucens* (Kuma-mura, Kumamoto Pref., Kyushu) is distant from that of *C. opacum* by more than 600 km in beeline distance. It is therefore appropriate that the two entities are different on specific level.

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References


