

## Taxonomic Studies of *Cirsium* (Asteraceae) in Japan XXIII. A New Species from Hachiôji, Tokyo Prefecture, Central Japan

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**Abstract** A new species, *Cirsium tamastoloniferum* Kadota is described from a small marshy land in Hachiôji, Tokyo Pref., central Honshu, Japan, as a member of subsect. *Reflexae* (the *Cirsium kagamontanum* group), sect. *Onotrophe* of the genus *Cirsium*. *Cirsium tamastoloniferum* is similar to *C. tenuipedunculatum* Kadota described from Yamanashi Pref., Chubu District, central Honshu, in having hardly glutinous involucre and paniculate inflorescence with small, numerous heads, however, the former is distinguished from the latter by gynodioecy, subterranean stolons, ovate to broadly ovate cauline leaves with ascending lobes and inner and involucral phyllaries with short-recurved apices in hermaphrodite plants or with short-ascending apices in female plants. *Cirsium tamastoloniferum* is a dweller of marshy lands exceptionally in the *Cirsium kagamontanum* group and occurs in Tokyo and Kanagawa Prefs., Kanto District, central Honshu, Japan.

**Key words**: *Cirsium tamastoloniferum*, *Cirsium tenuipedunculatum*, Japan, new species, wetland.

This is part of a revisional work on Japanese *Cirsium* (Asteraceae) (Kadota, 1989–2011; Kadota and Nagase, 1988). In this paper a new species of subsect. *Reflexae* (Kitam.) Kadota of sect. *Onotrophe* (Cass.) DC. from the suburbs of Tokyo Metropolitan City will be described.

Sect. *Onotrophe* subsect. *Reflexae* (the *Cirsium kagamontanum* group) of the genus *Cirsium* is characterized by the absence of radical leaves at anthesis, nodding, small, numerous capitula, narrowly cylindrical involucre and the ploidy level of  $2n = 2x = 34$  and is morphologically diversified in Honshu and Shikoku, Japan (Kadota, 1995a, 1995b, 2007b, 2009a, 2009c, 2011). The members of the *Cirsium kagamontanum* group mostly occur in and along the edges of summer-green forests.

In January 2011 specimens and images of a thistle collected from Hachiôji, Tokyo Pref., central Honshu, Japan, were sent to me by Mr.

Hideshige Uchino, Nagaike Park Nature Center, Hachiôji. This thistle seemed to be included in the *Cirsium kagamontanum* group because it had paniculate compound inflorescences with small, numerous heads and narrowly cylindrical involucre. Then I asked Mr. Uchino to send living rhizomes to me. Next I transferred the rhizomes to Prof. Dr. Tsunehiko Nishikawa, Hokkaido University of Education, Asahikawa, to count chromosome numbers. Later Dr. Nishikawa clarified that this thistle has a chromosome number of  $2n = 2x = 34$  (a diploid). Therefore it was concluded that the thistle in question belongs to the *Cirsium kagamontanum* group due to the chromosome number and the morphological attributes. After the herbarium examinations it was recognized that the same thistles were collected from also Ayase-shi, Kanagawa Pref. neighboring to Tokyo Pref., central Honshu, Japan. The Kanagawa specimens have stolons as already

annotated by the collector, Mr. Hideo Takahashi. Any stoloniferous species are hitherto not reported within the *Cirsium kagamontanum* group.

In October 2011 field survey was executed in Hachiôji under the guidance of Mr. Uchino. The thistle was found among the Tama Hills, in the western suburbs of Tokyo Metropolitan City. The habitat of the thistle was located around the upper stream of a small valley where marshy lands were found. Such a landscape is called "Yato (Yatsu)" in Kanto District, central Honshu. There usually exist damp places at Yato and several endangered plants are frequently found there; *Rotala mexicana* Cham. & Schldtl. (Lythraceae), *Lysimachia vulgaris* L. var. *davurica* (Ledeb.) R. Knuth (Primulaceae), *Nabalus tanakae* Franch. & Sav. ex Y. Tanaka & Ono (Asteraceae), etc. (Uchino, pers. comm.). As a result of the field observations it was confirmed that the thistle is stoloniferous (Fig. 4). Furthermore it was also shown that the thistle is gynodioecious since female plants were additionally found there (Fig. 3C).

In this way this thistle is unique among the species of the *Cirsium kagamontanum* group in having stolons and the occurrence in marshy lands. The thistle is consequently described here as a new species, *Cirsium tamastoloniferum*.

### Taxonomic treatment

Genus *Cirsium* Mill.

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

Subsect. **Reflexae** (Kitam.) Kadota, Fl. Jap. IIIa: 148 (1995).

Ser. *Reflexae* Kitam. in Acta Phytotax. Geobot. 3: 5 (1934), p.p.

Ser. *Imbricatae* Kitam. in Acta Phytotax. Geobot. 3: 5 (1934), p.p.

***Cirsium tamastoloniferum*** Kadota, sp. nov.

[Figs. 1–3]

*Cirsium nipponicum* (Maxim.) Makino var. *incomptum* (Maxim.) auct. non Kitam. ex Kadota: Hideo Takahashi, Fl. Kanagawa 2001:

1328 (2001).

Differt ab *Cirsio tenuipedunculato*, habitu gynodioecio, cum longis stolonibus, foliis caulinis late ovatis et lobiis foliorum ascendentibus, phyllariis involucrium breviter patentibus vel recurvatis.

**TYPE:** JAPAN. Honshu, Tokyo Pref., Hachiôji-shi, Utsunuki-machi, Wadauchi, just below the Goten-tôge Pass, in a marshy place [35°37'11.7"N 139°20'11.3"E], alt. 146 m, hermaphrodite, 14 October 2011, Y. Kadota 1113001 (TNS 1134728–holotype; Fig. 1).

A gynodioecious, stoloniferous, perennial, herbaceous plant, ca. 2 m tall or taller. Rootstock tough and relatively short, horizontal, up to 3 cm in diameter, with cord-like roots; stolons 30 cm long or longer, branched. Stem erect sometimes declining due to dead weight of the inflorescences during growth, copiously branched from the middle part, leafy, sparingly arachnoid and covered with short brownish hairs chiefly in the upper part, with many fleshy roots just below the ground level (Fig. 4); branches elongated at an acute angle. Basal leaves have withered at anthesis. Middle cauline leaves dull green on the adaxial side, glaucous on the abaxial side, soft and slightly fleshy, semi-amplexicaul, not auriculate, shortly petiolate; blades ovate to broadly ovate in outline, 30–40 cm long, 10–26 cm broad, almost glabrous on both sides, deeply pinnatilobate to bipinnatilobate, 5–10-jugate; lobes narrowly ovate, 8–12 cm long, 1.5–3.5 cm broad, ascending at an obtuse angle, with weak, short spines 1–2 mm long; petioles 2–7 cm long. Middle and upper cauline leaves narrowly ovate in outline, shallowly pinnatilobate, subsessile. Flowers in late September to early November. Capitula in a loose panicle, nodding sometimes oblique or horizontal or erect in the case of short peduncles, with peduncles 1.5–3 cm long; subtending leaves ca. 3, linear, 5–20 mm long, with weak spines ca. 1 mm long. Involucre narrow cylindrical, 19–22 mm long, 5–6 mm (*in vivo*) and 15–18 mm (*in sicco*) in diameter, sparingly arachnoid. Phyllaries 8–9-seriate, shortly patent to shortly recurved in hermaphrodite plants (Figs. 1, 3B),



Fig. 1. Holotype of *Cirsium tamastoloniferum* Kadota (JAPAN, Honshu, Tokyo Pref., Hachiôji-shi, Utsunuki-machi, Wadauchi, in marsh, 14 Oct. 2011, Y. Kadota 1113001, TNS 1134728).



Fig. 2. Female plant of *Cirsium tamastoloniferum* Kadota (JAPAN, Honshu, Tokyo Pref., Hachioji-shi, Utsunuki-machi, Wadauchi, in marsh, 14 Oct. 2011, Y. Kadota 1113010, TNS 1134746).



Fig. 3. *Cirsium tamastoloniferum* Kadota. A. Habit. B. Hermaphrodite head. C. Female head. All photos taken at Wadauchi, Ustunuki-machi, Hachiôji-shi, Tokyo Pref., central Honshu, Japan, on 14 Oct. 2011.

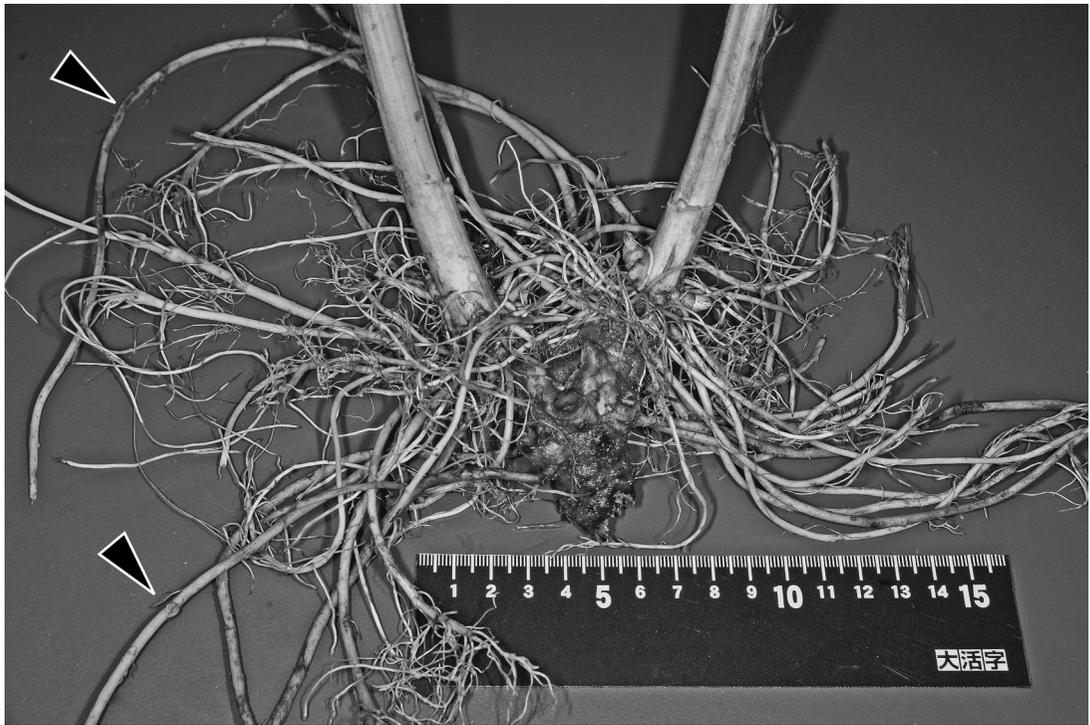


Fig. 4. Subterranean organ of *Cirsium tamastoloniferum* Kadota from Wadauchi, Utsunuki-machi, Hachiôji-shi, Tokyo Pref., central Honshu, Japan, on 14 Oct. 2011. Arrowheads indicate stolons.

ascending at an acute angle in female plants (Figs. 2, 3C); glandular bodies obovato-lanceolate on the inner and middle involucrel phyllaries in hermaphrodite plants, rudimental and degenerative, very slightly glutinous, hardly recognizable in female plants; innermost phyllaries narrowly ovato-lanceolate, 15 mm long; outer phyllaries narrowly ovate, 5 mm long, clearly shorter than the inner ones, herbaceous, acute at apex, terminated with weak, short spines ca. 1 mm long. Corollae pale pink in hermaphrodite plants, deep pink in female plants, 16–17 mm long; lobes 4 mm long; throats 5 mm long; tubes 7–8 mm long, longer than the throats. Achenes pale purplish brown to light brown with purplish lines, 4–4.5 mm long, ribbed, finely striate; pappus sordid, 10–12 mm long.

**Additional specimens examined:** JAPAN. Honshu, Tokyo Pref., Hachiôji-shi, Utsunuki-machi, Wadauchi [35°37'N 139°20'E], ca. 150 m, 1 Oct. 2008, S. Uchino A–B (TNS 1113845,

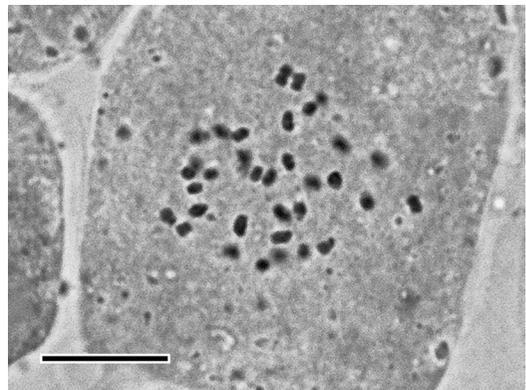


Fig. 5. Somatic chromosomes of *Cirsium tamastoloniferum* ( $2n = 2x = 34$ ). Scale = 10  $\mu$ m. Courtesy of Prof. Dr. T. Nishikawa.

1113850–1113851); Hachiôji-shi, Utsunuki-machi, Wadauchi, 26 Nov. 2010, S. Uchino C–D (TNS 1113846–1113849); Hachiôji-shi, Utsunuki-machi, Wadauchi, alt. 146 m, hermaphrodite, 14 Oct. 2011, Y. Kadota 1113008–1113009

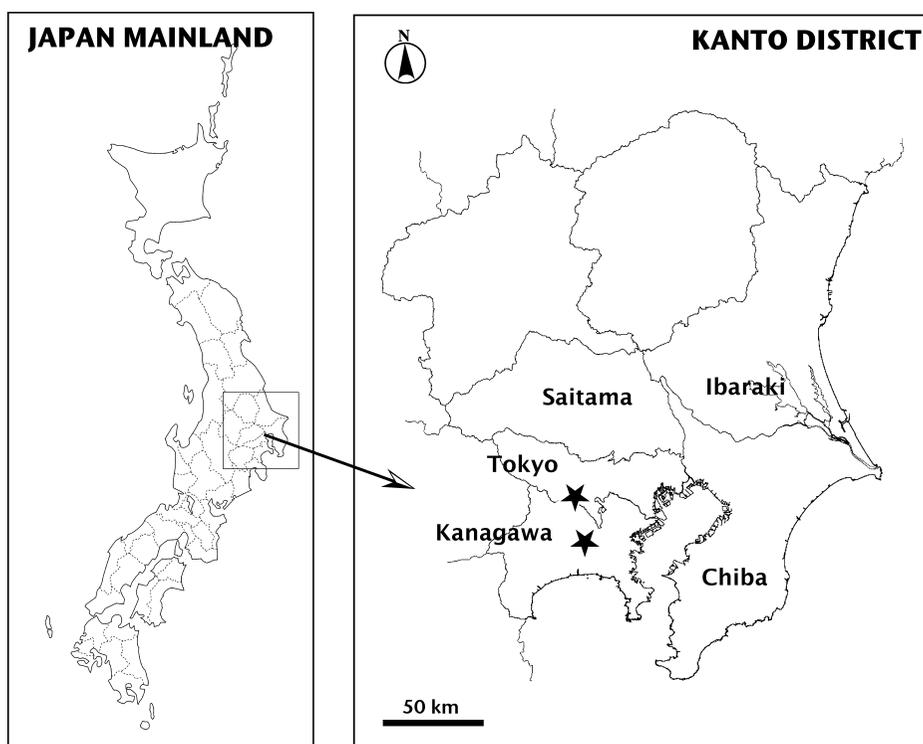


Fig. 6. Distribution of *Cirsium tamastoloniferum* Kadota.

(TNS 1134712–11134733); Hachiôji-shi, Utsunuki-machi, Wadauchi, alt. 146 m, female, 14 Oct. 2011, Y. Kadota 1113002–1113007 (TNS 1134749–11134754). **Kanagawa** Pref., Ayase-shi, Yoshioka, Kitayama, 18 Oct. 1999, H. Takahashi s.n. (KPM NA 117040–117041, 117047–117048).

Chromosome number:  $2n = 2x = 34$  (Fig. 5).

Japanese name: Hachiôji-azami (nom. nov.).

Etymology: The word “tama” of the specific name means a regional name, the Tama area, in which the type locality of this new thistle, Hachiôji City, is located.

Distribution: Central Honshu (Tokyo and Kanagawa Prefs.; Fig. 6). Endemic to Japan.

Note: Within the *Cirsium kagamontanum* group *C. tamastoloniferum* resembles *C. tenuipedunculatum* Kadota [*C. effusum* auct. Jpn., cf. Kadota, 1993; Fig. 7] described from the Misaka Mountain Range, Yamanashi Pref., Chubu District, central Honshu, Japan, in having hardly

glutinous involucre and paniculate inflorescence with small, numerous heads. However, *C. tamastoloniferum* is distinguished from *C. tenuipedunculatum* by gynodioecy, the presence of subterranean stolons, narrowly ovate to oblong-ovate leaves with lobes ascending at an obtuse angle and inner and involucre phyllaries with strongly recurved, caudate tips. Furthermore *C. tamastoloniferum* grows in marshy lands of lower elevation while *C. tenuipedunculatum* occurs in herbal stands and along the edges of summer-green woodlands in the montane zone (the *Fagus crenata* zone). In *C. tenuipedunculatum* plants of northern populations tend to be provided with glutinous involucre with well developed glandular bodies on the inner and middle phyllaries (Kadota, 2009d).

In lowlands of Kanto District, central Honshu, Japan, another species, *C. tonense* Nakai [= *C. nipponicum* (Maxim.) Makino var. *incomptum* (Maxim.) Kitam. ex Kadota], is predominant in



Fig. 7. *Cirsium tenuipedunculatum* Kadota. Left. Habit. Right. Head. Photos taken at Mt. Mitsutôge-yama, Yamanashi Pref., central Honshu, on 14 Oct. 2010.

the genus *Cirsium* and has been frequently confused with *C. tamastoloniferum*. *Cirsium tonense* is a member of the tetraploid species group ( $2n = 2x = 68$ ) and is morphologically different from *C. tamastoloniferum* by the inflorescence shape (racemose vs. paniculate), the involucre shape and size (cylindrical and thicker vs. narrowly cylindrical and thinner), the direction of outer and middle involucre phyllaries (strongly long-recurved to long-spreading vs. shortly recurved in hermaphrodite plants and ascending in female plants). *Cirsium tonense* prefers drier habitats (e.g., along the edges of ever-green and summer-green woodlands) and does not occur in marshy places.

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## References

- Kadota, Y. 1989. *Cirsium*. In: Ono, M., Ohba, H. and Nishida, M. (eds.), Makino's New Illustrated Flora of Japan. pp. 799–807. Hokuryukan, Tokyo (in Japanese).
- Kadota, Y. 1990. Taxonomy and distribution of *Cirsium brevicaule* A. Gray and its related species (Asteraceae). *Memoirs of the National Science Museum* 23: 51–61.
- Kadota, Y. 1991. Taxonomic studies of *Cirsium* (Asteraceae) of Japan I. Alpine species of central Honshu — the *Cirsium fauriei* group. *Bulletin of the National Science Museum, Series B* 17: 123–139.
- Kadota, Y. 1993. Lectotypification of six species and a new species of Japanese *Cirsium* (Asteraceae). *Bulletin of the National Science Museum, Series B* 19: 45–57.
- Kadota, Y. 1995a. Genus *Cirsium* (Asteraceae). In: Iwatsuki, K., Yamazaki, T., Boufford, D. E. and Ohba, H. (eds.), *Flora of Japan new English ed.*, 2nd ed. IIIb: 119–151. Maruzen, Tokyo.
- Kadota, Y. 1995b. Taxonomic studies of *Cirsium* (Asteraceae) of Japan II. Three new species and a new variety of *Cirsium nipponicum* (Maxim.) Makino from central Honshu. *Bulletin of the National Science Museum, Series B* 20: 13–27.
- Kadota, Y. 1996. *Cirsium abukumense* — a new species of *Cirsium* (Asteraceae) from the Abukuma Mountains, northeastern Japan. *Memoirs of the National Science Museum* 29: 93–98.
- Kadota, Y. 1997a. Taxonomic studies of *Cirsium* (Asteraceae) of Japan III. *Cirsium occidentalinipponense*, sp. nov. with special reference to the lectotypification of *Cirsium borealinipponense* Kitam. *Bulletin of the National Science Museum, Series B* 23: 115–125.
- Kadota, Y. 1997b. Genus *Cirsium*. In: Shimizu, T. (ed.), *Flora of Nagano Prefecture*, pp. 1127–1140. Shinano Mainichi Shinbunsha, Nagano (in Japanese).
- Kadota, Y. 1998a. Taxonomic studies of *Cirsium* (Asteraceae) of Japan IV. Notes on *Cirsium lumens* Kitam. from southwestern Japan. *Memoirs of the National Science Museum* 30: 65–71.
- Kadota, Y. 1998b. Taxonomic studies of *Cirsium* (Asteraceae) of Japan V. *Cirsium umezawanum*, a new species from Island Rishiri, Hokkaido and a new white-flowered form of *Cirsium amplexifolium* Kitam. *Bulletin of the National Science Museum, Series B* 24: 147–156.
- Kadota, Y. 1999. Taxonomic studies of *Cirsium* (Asteraceae) of Japan VI. Two new species, *Cirsium hidakamontanum* and *Cirsium zawoense* from northern Japan. *Bulletin of the National Science Museum, Series B* 25: 95–105.
- Kadota, Y. 2000. Taxonomic studies of *Cirsium* (Asteraceae) in Japan VII. Notes on *Cirsium congestissimum* Kitam. and *Cirsium tenue* Kitam. and the identity of *Cirsium tenue* Kitam. var. *ishizuchiense* Kitam. *Memoirs of the National Science Museum* 32: 127–134.
- Kadota, Y. 2002a. Taxonomic studies of *Cirsium* (Asteraceae) in Japan VIII. *Cirsium shidokimontanum*, a new species from middle Honshu. *Bulletin of the National Science Museum, Series B* 28: 99–106.
- Kadota, Y. 2002b. Taxonomic studies of *Cirsium* (Asteraceae) in Japan IX. On the entity of *Cirsium yatsugatakense* Nakai. *Memoirs of the National Science Museum* 38: 110–118.
- Kadota, Y. 2003. Taxonomic studies of *Cirsium* (Asteraceae) in Japan X. Species described by Franchet and Savatier. *Bulletin of the National Science Museum, Series B* 29: 45–64.
- Kadota, Y. 2004a. Taxonomic studies of *Cirsium* (Asteraceae) in Japan XI. A new subsection and two new species belonging to the subsection, from southern Kyushu. *Bulletin of the National Science Museum, Series B* 30: 63–69.
- Kadota, Y. 2004b. Taxonomic studies of *Cirsium* (Asteraceae) in Japan XII. Subsect. *Nipponensia* subsect. nov. and a new species, *C. hachimantaiense*, belonging to the new subsection. *Bulletin of the National Science Museum, Series B* 30: 117–133.
- Kadota, Y. 2004c. Classification of the genus *Cirsium* (Asteraceae) in Japan. *Bulletin of the Fukui Botanical Garden* 2: 1–6 (in Japanese).
- Kadota, Y. 2005. Taxonomic studies of *Cirsium* (Asteraceae) in Japan XIII. Three new species from Tohoku District, northern Japan. *Bulletin of the National Science Museum, Series B* 31: 35–47.
- Kadota, Y. 2006a. Taxonomic studies of *Cirsium* (Asteraceae) in Japan XIV. Notes on *Cirsium hachijoense* Nakai. *Memoirs of the National Science Museum* 42: 89–98.
- Kadota, Y. 2006b. Taxonomic studies of *Cirsium* (Asteraceae) in Japan XV. Four new species from western Japan. *Bulletin of the National Science Museum, Series B* 32: 85–101.
- Kadota, Y. 2007a. Taxonomic studies of *Cirsium* (Asteraceae) in Japan XVI. A new subsection and four new species from the Tohoku District, northern Japan. *Bulletin of the National Museum of Nature and Science, Series B* 33: 29–45.
- Kadota, Y. 2007b. Species diversification of genus *Cirsium* (Asteraceae) in Japan. *Korean Journal of Plant Taxonomy* 37: 335–349.
- Kadota, Y. 2008a. Taxonomic studies of *Cirsium* (Asteraceae) in Japan XVII. Two new species from Hokkaido and Kyushu. *Bulletin of the National Museum of Nature and Science, Series B* 34: 31–41.
- Kadota, Y. 2008b. Taxonomic studies of *Cirsium* (Asteraceae) in Japan XVIII. A new subsection and four new species from Kyushu, southern Japan. *Bulletin of the National*

- Museum of Nature and Science, Series B 34: 135–151.
- Kadota, Y. 2009a. Taxonomic studies of *Cirsium* (Asteraceae) in Japan XIX. Two new species from Honshu, central Japan. Bulletin of the National Museum of Nature and Science, Series B 35: 41–49.
- Kadota, Y. 2009b. Taxonomic studies of *Cirsium* (Asteraceae) in Japan XX. *Cirsium shimaie*, a new species from Tsugaru Area, Aomori Prefecture, northern Japan. Bulletin of the National Museum of Nature and Science, Series B 35: 105–112.
- Kadota, Y. 2009c. Taxonomic studies of *Cirsium* (Asteraceae) in Japan XXI. Four new species from Honshu, central Japan. Bulletin of the National Museum of Nature and Science, Series B 35: 189–203.
- Kadota, Y. 2009d. *Cirsium tenuipedunculatum* and *C. gratiosum* (Asteraceae). Bulletin of the Botanical Society of Yamanashi 22: 8–13 (in Japanese).
- Kadota, Y. 2011. Taxonomic studies of *Cirsium* (Asteraceae) in Japan XXII. Four new species from Honshu, central Japan. Bulletin of the National Museum of Nature and Science, Series B 37: 31–45.
- Kadota, Y. and Nagase, H. 1988. A new species of *Cirsium* (Asteraceae: Cynareae) from Hida Province, central Japan. Memoirs of the National Science Museum 14: 9–20.
- Takahashi, H. 2001. *Cirsium*. The Flora-Kanagawa Association, Flora of Kanagawa 2001. pp. 1326–1333. The Kanagawa Museum of Natural History, Odawara (in Japanese).