

タネツケバナ属の新帰化植物 *Cardamine hirsuta* L. ミチタネツケバナ

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Hiroshi KUDOH*, Yoshio ISHIGURI** and Shoichi KAWANO*** :
Cardamine hirsuta L., a New Ruderal Species
Introduced into Japan

工藤 洋*・石栗義雄**・河野昭一*** : タネツケバナ属の
新帰化植物 *Cardamine hirsuta* L. ミチタネツケバナ

Abstract

In April, 1988, *Cardamine hirsuta* L., a typical winter green annual ruderal of the Cruciferae, was recorded for the first time in Toyama Prefecture, Japan. Subsequent field surveys and examinations of herbarium specimens revealed that this species also occurs in several other localities in Honshu. Judging from the sporadic distribution of *C. hirsuta* in Japan, this species is regarded to be introduced into Honshu, Japan, in rather recent years. Detailed morphological features of this species and its distribution and ecology are described.

Key Words: *Cardamine flexuosa*—*Cardamine hirsuta*—Cruciferae—Introduced ruderal—Winter green annual

Peculiar *Cardamine* (Cruciferae) plants which are similar to *C. flexuosa* WITH. but previously unknown in Japan were recently collected in Toyama Prefecture. After detailed examination, this plant turned out to be *Cardamine hirsuta* L., which is a cosmopolitan ruderal species (e. g., BUSCH, 1939; FERNALD, 1950; JONES, 1964; HEDGE, 1968; CHEO, 1987; JONSELL, 1988; KHATRI, 1989). Since this discovery, we have surveyed some other areas in Japan, and also re-examined herbarium specimens deposited in KANA, KYO, MAK, TI, TNS, and TUS. We found that plants referable to *C. hirsuta* also occur in several other localities in Japan, much more abundantly than expected. Since *C. hirsuta* is very similar to *C. flexuosa*, which is one of the most common and widely spreading *Cardamine* species in Japan, it has often been misidentified as *C. flexuosa*. During a course of the present study, we have also noticed that MATSUMURA (1895) noted the occurrence of *C. hirsuta* in Japan based on a specimen collected from Nikko (Jigokusawa, collector unknown, in TI). This specimen was

obviously annotated by MATSUMURA himself, but it was turned out to be not *C. hirsuta* by our re-examination, but a perennial *Cardamine* species very similar to *C. scutata* THUNB. (KUDOH *et al.*, unpubl.). This paper reports the detailed morphological characteristics, distribution and habitats of *C. hirsuta* in Japan.

Cardamine hirsuta L., Sp. Pl. 1. ed. II. 655 (1753); O. E. SCHULZ in Engl. Not. Jahrb. 32; 464 (1903).

Winter green annual; stem glabrous, 10-30 cm high; leaves rosetted, lower cauline leaves pinnate with 1-3 pairs of leaflets, petioles ciliate near the base, leaflets of the radical leaves petioled, suborbicular-ovate, the apical larger than the lateral; upper leaves usually 2-4, leaflets oblong-linear. Flowers minute; sepals 1.5 mm long; petals white, narrowly oboval-cuneate, 2-3 mm long; stamens 4; pedicels and siliques ascending; siliques 17-25 mm long.

Type "Hab. in Europae areis, hortis arvis" (LINN, fot. 835-13!)

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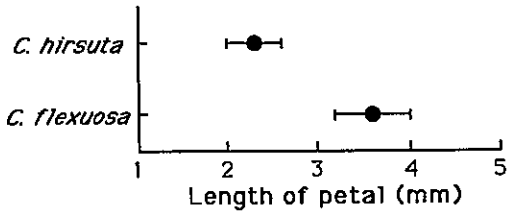


Fig. 1. Means and standard deviations of petal length in *Cardamine hirsuta* and *C. flexuosa*. Data were obtained in the field from 60 flowers from twenty plants (three flowers per plant) collected from the adjacent populations of the two species in the Toyama plains (Toyama Pref.: Kamijima, Namerikawa-shi).

Jap. nom. Michi-tanetsukebana (nom. nov.).

1. *Morphological differences between Cardamine hirsuta and a closely related species, C. flexuosa*

The important morphological characters distinguishing *C. hirsuta* from a closely related species, *C. flexuosa*, are as follows: (1) the number of stamens is usually four in *C. hirsuta*, but six in *C. flexuosa*; (2) the length of petals is 2-3 mm in *C. hirsuta*, while 3-4 mm in *C. flexuosa* (Fig. 1); (3) pedicels and siliques of *C. hirsuta* are more

ascending than those of *C. flexuosa*; (4) leaflets of the upper cauline leaves of *C. hirsuta* are more linear than those of *C. flexuosa*; (5) the number of cauline leaves on elongated stems is usually less than four in *C. hirsuta*, but more than six in *C. flexuosa*; (6) stems are less flexuous in *C. hirsuta* than in *C. flexuosa*; (7) stems are usually glabrous in *C. hirsuta*, but pubescent in *C. flexuosa*; (8) rosette leaves remain at the flowering stage in *C. hirsuta*, but not in *C. flexuosa*. Figure 2 illustrates the differences in these reproductive and vegetative characters.

The differences in stamen number (1) and pubescence (7), however, are not absolute as diagnostic characters (AL-SHEHBAZ, 1988). JASPARS-SCHRADER (1982) reported that the variabilities in stamen number (80% of plants examined possessed four stamens, 18% five and 2% six in *C. hirsuta*; while 97% had six stamens and 3% five in *C. flexuosa*) and in pubescence (89% were glabrous or nearly so and 11% densely pubescent in *C. hirsuta*; 87% were densely pubescent and 13% sparsely so in *C. flexuosa*) of both species. The characters (3) and (6) are clearly

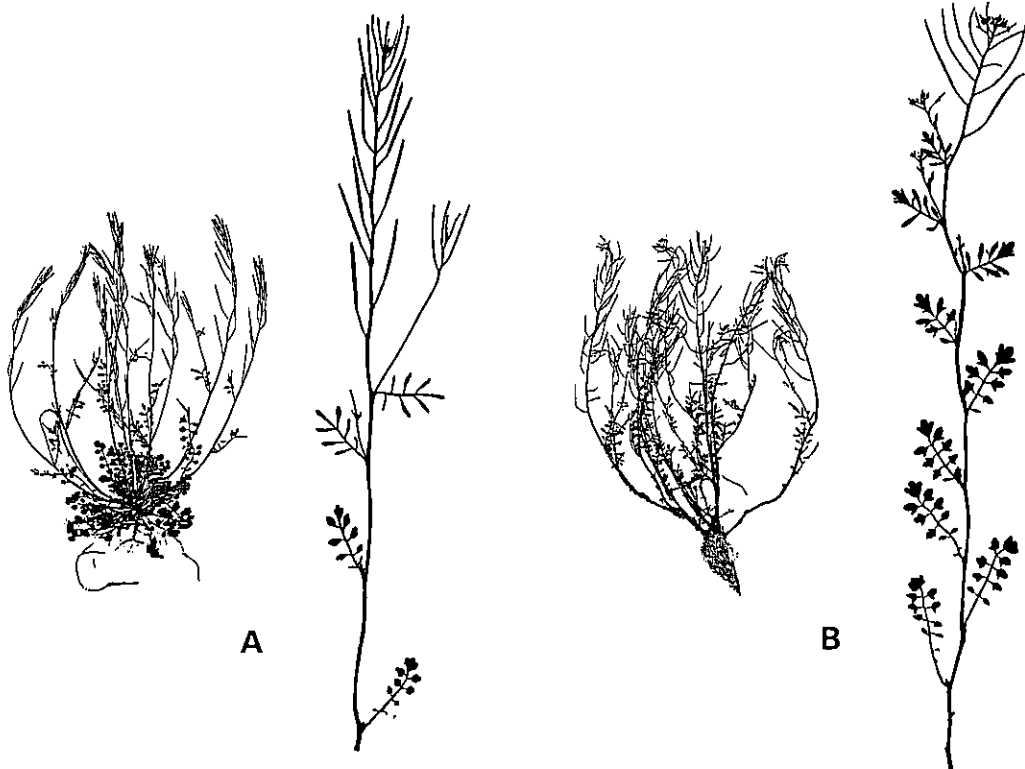


Fig. 2. The morphological differences between *Cardamine hirsuta* (A) and *C. flexuosa* (B).

diagnostic in living materials, but sometimes not clear in dried specimens. A combination of the above characters provides us a good key distinguishing *C. hirsuta* from *C. flexuosa*. The two species also exhibit a difference in flowering periods in Japan: *C. hirsuta* flowers in early March to April, slightly earlier than *C. flexuosa*, which blooms in late March to early May and again in August to early December.

2. Habitats

The habitats of *C. hirsuta* in the Toyama plain were investigated in spring of 1989. It was found that this species widely occurs in Toyama Prefecture (Fig. 3). The habitats are disturbed open sites, such as trails or ridges between paddy fields, roadsides, margins of playing fields or unpaved parking lots, river banks and sandy seashores. It suggests that this species is a typical ruderal. The habitats of *C. hirsuta* are drier than those of *C. flexuosa*, a common indigenous weed species in paddy fields in Japan. A notable fact is that *C. hirsuta* is totally absent within paddy fields, even though the plants often grow abundantly just beside the fields. There is no doubt that seeds of *C. hirsuta* are frequently dispersed into paddy fields, but they may not be able to survive under submerged conditions during rice cultivation in summer.

3. Distribution in Japan

In spring of 1990, field surveys were conducted from Fukui to Yamagata Prefecture along the Japan Sea coast, and also from Osaka to Miyagi Prefecture along the Pacific coast. On this field trip, we collected *C. hirsuta* in Shiga, Niigata, Yamagata and Miyagi Prefectures as well as Toyama. We also investigated specimens kept in the Herbaria of Kanazawa University (KANA), Kyoto University (KYO), Tokyo Metropolitan University (MAK), University of Tokyo (TI), National Science Museum (TNS) and Tohoku University (TUS). No specimens of *C. hirsuta* from Japan were found in MAK and TI. Figure 4 shows the localities of *C. hirsuta* confirmed in the present field and herbarium investigations. All collection sites are located on the Japan Sea side of Honshu except for Sendai in Miyagi Prefecture.

This unexpectedly wide distribution of *C. hirsuta*, in spite of its very recent discovery, poses

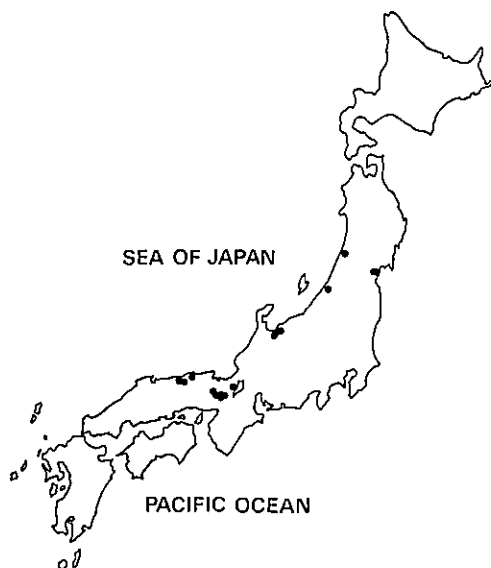


Fig. 4. Distribution of *Cardamine hirsuta* in Japan confirmed from field and herbarium investigations.

some interesting questions as to its origin, or introduction. For two reasons, we suppose that *C. hirsuta* was introduced into Japan recently. One is that the all specimens we investigated were collected in recent years, the earliest in 1974 from Tottori Prefecture. The second is its sporadically disjunct distribution pattern. In our 1990 field investigation along the Sea of Japan, from Fukui to Yamagata Prefecture, it was easily found around Toyama City (Toyama Pref.), Seiro-machi (Niigata Pref.) and Sakata City (Yamagata Pref.), all three localities situated near harbors. In other areas, however, we could not find *C. hirsuta*, although there are many suitable habitats in which this species can be established. This current sporadic distribution pattern of *C. hirsuta* is hardly explicable in terms of the past geological history of the Japanese Islands, changes in climatic factors as well as human occupation in the islands, if *C. hirsuta* is a native ruderal plant.

Specimens identified as *Cardamine hirsuta* L.

Miyagi Pref.: Aobayama, Sendai-shi, Apr. 20, 1983, T. NAGAYAMA, M. MIENO & T. WAKASUGI 471 (TUS); Katahira, Sendai-shi, Apr. 19, 1991, H. KUDOH 32, 33, 34, 35, 36, 37 (KYO); Kawachi, Sendai-shi, Apr. 24, 1991, H. KUDOH 76, 77, 78, 79 (KYO). Yamagata Pref.: Fujizuka, Sakata-shi,

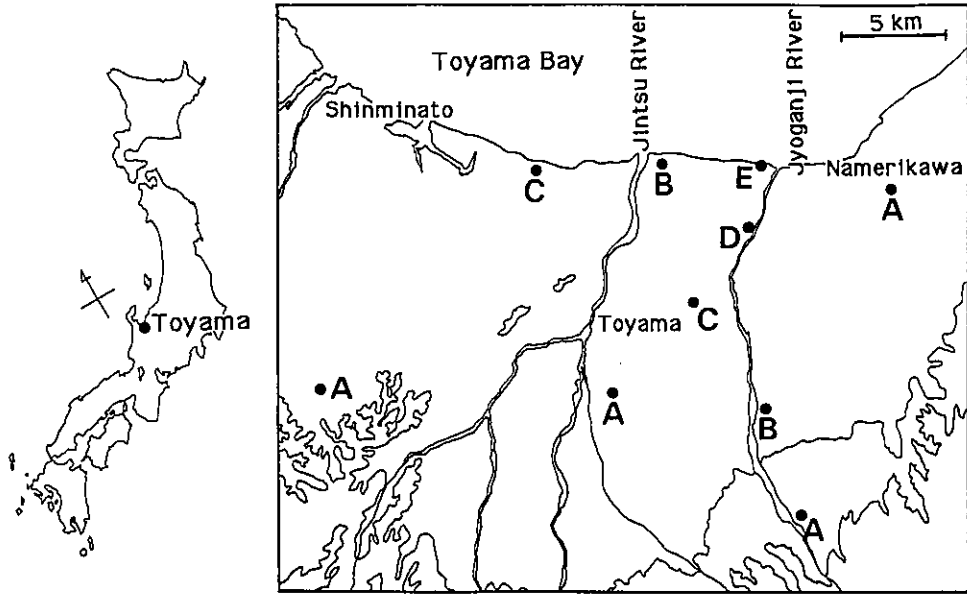


Fig. 3. Map showing the habitats of *Cardamine hirsuta* in the Toyama plains. Letters indicate the habitat types as follows: A, trail or ridge between the rice paddy field; B, roadside; C, margin of a playing field or unpaved parking lot; D, river bank; E, sandy seashore.

Apr. 21, 1990, H. KUDOH, Y. ISHIGURI & A. HIRATSUKA 314, 315 (KYO). Niigata Pref.: Kurohimeyama, Oumi-machi, Nishikubiki-gun, Apr. 21, 1975, T. AJIMA 4672 (KANA); Ajirohama, Seiro-machi, Kitakanbara-gun, Apr. 20, 1990, H. KUDOH, Y. ISHIGURI & A. HIRATSUKA 312, 313 (KYO). Toyama Pref.: Teramachi, Toyama-shi, Apr. 18, 1988, H. KATO & S. KAWANO 88-001, 88-002 (KYO), Mar. 5, 1989, H. KUDOH 286, 287 (KYO); Hamakurosaki, Toyama-shi, Apr. 18, 1988, H. KATO & S. KAWANO 88-003, 88-004, 88-005, 88-006 (KYO), Mar. 5, 1989, H. KUDOH 288, 289, 290, 291, 292, 293, 294, 295 (KYO); Kamijima, Namerikawa-shi, Mar. 30, 1989, H. KUDOH 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308 (KYO), Apr. 18, 1990, H. KUDOH, Y. ISHIGURI & A. HIRATSUKA 310, 311 (KYO). Shiga Pref.: Nojiri, Kutsukimura, Takashima-gun, Apr. 17, 1990, H. KUDOH, Y. ISHIGURI & A. HIRATSUKA 309 (KYO). Kyoto Pref.: Kitahozu, Hozu-cho, Kameoka-shi, Apr. 6, 1991, S. TSUGARU 13983, 13984 (KYO); Hozu river, Hozu-cho, Kameoka-shi, Apr. 12, 1991, S. TSUGARU & M. SAWADA 14038, 14051 (KYO); Senbonmatsu, Kameoka-shi, Apr. 21 1989, S. TSUGARU & T. TAKAHASHI 12831 (KYO, TNS); Kokubu, Chitose-cho, Kameoka-shi, Apr. 9, 1991,

S. TSUGARU 14011 (KYO); Kawarajiri, Kawarabayashi-cho, Kameoka-shi, Mar. 25, 1991, S. TSUGARU 13911 (KYO), Apr. 9, 1991, S. TSUGARU 13911 (KYO), Apr. 9, 1991, S. TSUGARU 14020 (KYO); Oiwake-cho, Kameoka-shi, Apr. 26, 1991, S. TSUGARU & T. TAKAHASHI 14121 (KYO); Kamiyada, Kameoka-shi, Apr. 19, 1988 T. TAKAHASHI 913 (KYO, TNS); Tano, Ayabeshi, Apr. 1, 1991, S. TUGARU & T. TAKAHASHI 13950 (KYO); Totsugawa, Mizuho-cho, Funai-gun, Apr. 1, 1991, S. TSUGARU & T. TAKAHASHI 13976 (KYO); Tono, Hiyoshi-cho, Funai-gun, Feb. 27, 1989, H. KUDOH 285 (KYO). Hyogo Pref.: Kutoyama, Hamasaka-cho, Mikata-gun, Apr. 5, 1989, G. MURATA 68345 (KYO). Tottori Pref.: Suetsune, Tottori-shi, Apr. 14, 1974, A. TANAKA 17435 (KYO); Machiya, Kokubu-cho, Iwami-gun, Apr. 12, 1986, A. TANAKA 34083 (KYO).

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of Herbaria (KANA, MAK, TI, TNS and TUS) for their kind permission to examine *Cardamine* specimens deposited in their Herbaria.

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摘 要

1988年、富山県において、タネツケバナ属の1種 *Cardamine hirsuta* L. を採集した。この種は世界に広く分布する雑草性の冬緑一年草である。その後の野外調査および標本調査の結果、この種は富山県のみならず、鳥取、京都、滋賀、新潟、山形、宮城の各府県にも分布していることが明かとなった。和名はミチタネツケバナ（新称）と呼ぶことにしたい。ミチタネツケバナの生育環境は、路傍、農道、畔、河川の土手などであり、雑草性の人里植物である。国内で採集された標本はすべて最近のものであること、また、野外調査において見出された“飛び石状”の不連続な分布をもあわせて考えると、この種は近年、日本に帰化したと推定される。ミチタネツケバナは在来の雑草性の一年草であるタネツケバナ *Cardamine flexuosa* WITH. によく似ているが、花弁の長さが2-3mmであり、雄ずいが4本である点などにより明瞭に区別することができる。

なお、1895年に松村（植物学雑誌9:308）が *Cardamine hirsuta* L. にケタネツケバナの和名を与えている。しかし、この記載の元になったと思われる標本（“*Cardamine hirsuta* L.!, stamens 4! 日光地獄沢 Aug. 1, 1885.”: TI）の植物は、現地調査の結果、*Cardamine hirsuta* L. とは異なるものであることが判明した。この植物はオオバタネツケバナ *Cardamine scutata* THUNB. に近縁の溪流に生育する多年生草本であり、その正確な分類学的帰属については現在検討中である。以上の理由から、*Cardamine hirsuta* L. にケタネツケバナの和名を使用することは混乱の元となるので、新称ミチタネツケバナを与えた。(Received December 20, 1991, Revised August 20, 1992)

○日本新産植物5種（初島住彦*）Sumihiko HATUSIMA*: Five Species Newly Found in Japan

1. チョクザキミズ 本種はイラクサ科の1年草で従来台湾、南支、印度支那、ビルマ、ヒマラヤ、印度、ジャワ、比島などに知られていたが、栃木県の採集家古瀬 義氏によって1990年日本ではじめて熊本県阿蘇の蘇陽町長崎で発見された。その後阿蘇高森町在住の佐藤武之氏に阿蘇方面の調査方を依頼したところ阿蘇の外輪山方面、高森町の大分県境、小国町、矢部町、宮崎県の高千穂峡で発見された。更に大分県別府市の荒金氏は大分県直入郡萩町白水の滝と竹田市出合で発見された。今後調査が進めば九州の中央山脈に広く分布することがわかるかも知れない。本種は滝の周辺の水しぶきのあたる所、湧水地の崖などに生え一見アオミズに似ているので従来見すごされたものと思う。しかし花序は直径1~2cmの球状で長柄(2~5cm位)を有するので直に区別できる。

2. セッカヤマネギ 本種は従来欧州からモンゴル、満州、朝鮮、ウスリー、シベリア方面に知られていた