

## Notes

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日本産カタバミ属 (カタバミ科) 3種の染色体数 (佐藤杏子<sup>a</sup>, 榎本良祐<sup>b,c</sup>, 熊谷大輔<sup>b,d</sup>, 山崎貴博<sup>e</sup>, 岩坪美兼<sup>b</sup>)

**Summary:** We examined the chromosome numbers of 669 individual plants from three Japanese *Oxalis* species (*Oxalidaceae*) including: *O. articulata*, *O. corymbosa*, and three forms of *O. corniculata*, f. *corniculata*, f. *rubrifolia*, and f. *tropaeoloides*. Findings showed *O. articulata* had  $2n = 14$  chromosomes and *O. corymbosa* had  $2n = 28$  chromosomes, while the three forms f. *corniculata*, f. *rubrifolia* and f. *tropaeoloides* in *O. corniculata* var. *corniculata* commonly showed  $2n = 48$  chromosomes, with the exception of one f. *corniculata* individual that showed a chromosome number of  $2n = 47$ . *Oxalis* is a polybasic genus with  $x = 5, 6, 7, 9$  and  $11$  (Darlington and Wylie 1955). Thus, the three forms of *O. corniculata* with  $2n = 48$  chromosomes are considered octoploids with  $x = 6$ , while the two species *O. corymbosa* with  $2n = 14$  chromosomes and *O. articulata* with  $2n = 28$  chromosomes are considered diploid and tetraploid based on  $x = 7$ , respectively.

The genus *Oxalis* L. (*Oxalidaceae*) is composed of approximately 850 species. *Oxalidaceae* exhibit worldwide distribution, though they are mainly localized in the tropical zones of both Africa and South America (Shimizu 1981). The following 13 species are found in Japan: *O. acetosella* L., *O. amamiana* Hatus., *O. articulata* Savigny, *O. bowieana* Lodd., *O. brasiliensis*, *O. corniculata* L., *O. corymbosa* DC., *O. dillenii* Jacq., *O. fontana* Bunge, *O. griffithii* Edgew. & Hook f., *O. obtriangulata* Maxim., *O. pes-caprae* L. and *O. purpurea* L. (Shimizu 1981, Konta 2003). Of these species, *O.*

*corniculata* is the most frequent, occurring as a common weed that thrives predominantly in man-made habitats, such as roadsides and cultivated fields, throughout Japan. Two varieties of this species are found in Japan, var. *corniculata* and var. *trichocaulon* H. Lév. Var. *corniculata* is variable and thus is usually divided into the following four forms: f. *corniculata*, f. *rubrifolia* (Makino) H. Hara, f. *tropaeoloides* (Schlachter) R. Knuth, and f. *plena* Satake (Shimizu 1981). These four forms are identified based on leaf color, number of sepals and petals, and presence or absence of dense short hairs on the leaf surface.

The present study aims to increase knowledge concerning the chromosomes of Japanese *Oxalis* and specifically examines the chromosome numbers of f. *corniculata*, f. *rubrifolia* and f. *tropaeoloides* in *O. corniculata* var. *corniculata*, along with two species introduced in Japan, *O. articulata* and *O. corymbosa*.

### Materials and Methods

We used three species and three forms of Japanese *Oxalis* in this study: *O. articulata*, *O. corymbosa*, *O. corniculata* f. *corniculata*, *O. corniculata* f. *rubrifolia*, and *O. corniculata* f. *tropaeoloides*.

We studied chromosome numbers from the somatic cells of 32 individuals of *O. articulata* collected from 20 localities, 100 individuals of *O. corymbosa* from 68 localities, 459 individuals of *O. corniculata* f. *corniculata* from 106 localities, 15 individuals of *O. corniculata* f. *rubrifolia* from 14 localities, and 63 individuals of *O. cornicu-*

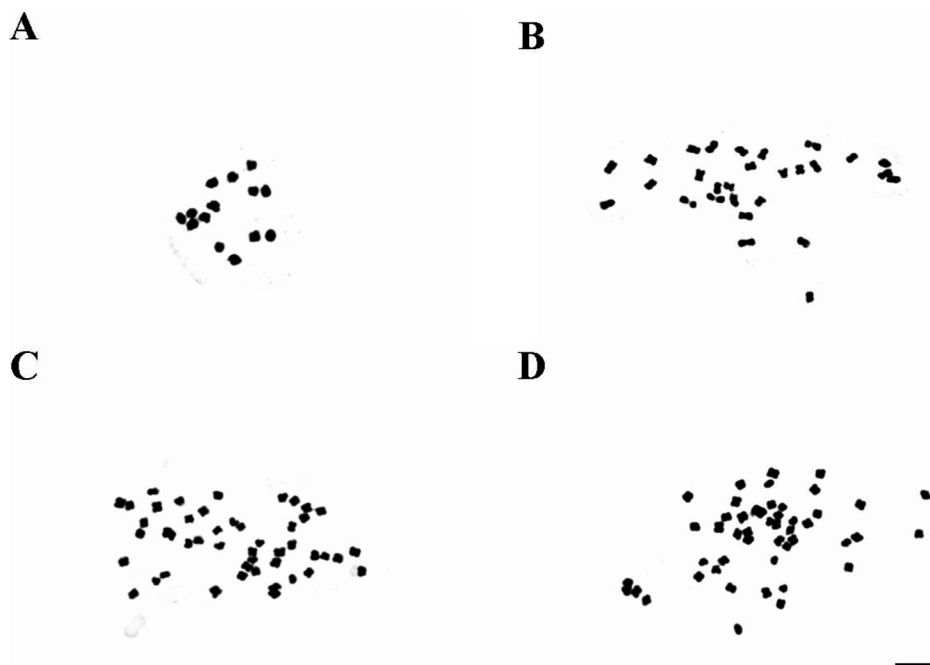


Fig. 1. Photographs of somatic metaphase chromosomes of *Oxalis* examined in this study. A. *O. articulata* ( $2n = 14$ ). B. *O. corymbosa* ( $2n = 28$ ). C. *O. corniculata* f. *corniculata* ( $2n = 47$ ). D. *O. corniculata* f. *corniculata* ( $2n = 48$ ). Bar represents 5  $\mu\text{m}$ .

*lata* f. *tropaeoloides* from 38 localities (Appendix). These plants were grown in plastic pots at the experimental garden of the University of Toyama. We examined their chromosome numbers in root tip meristematic cells with fully spread metaphase chromosomes.

Newly formed root tips collected from the potted plants were pretreated in 1.9 mM 8-hydroxyquinoline solution at room temperature for 1 to 1.5 h and then kept at ca. 5°C for 15 h. These root tips were fixed in a mixture of glacial acetic acid and absolute ethyl alcohol (1:3) at room temperature for 1 hour, macerated in 1 N hydrochloric acid at 60°C for 10 min, and then washed in tap water. Root tip meristems were stained in a drop of 1.5% lacto-propionic orcein on a glass slide and a common squash technique was applied in preparation.

## Results and Discussion

### 1. *Oxalis articulata* Savign. (Fig. 1A, Appendix)

We examined a total of 32 individuals collected from 20 localities throughout Hokkaido, Honshu, Shikoku and Kyushu. Each individual showed a chromosome count of  $2n = 14$ . This count is in accord with all previous reports of the chromosome numbers for this species (Heitz 1927, Marks 1956, Naranjo et al. 1982 (as  $n = 7$ ), and Azuke 2000).

### 2. *Oxalis corymbosa* DC. (Fig. 1B, Appendix)

We studied a total of 100 individuals collected from 68 localities throughout Honshu, Shikoku and Kyushu. Each individual had a  $2n = 28$  chromosomal count. In general, this species is known to have two chromosome races with  $2n = 14$  ( $n = 7$ ) chromosomes and

Table 1. The chromosome numbers reported previously of *Oxalis* taxa examined in this study

Taxon	n	2n	Previous report
<i>Oxalis articulata</i>		14	Heitz 1927
		14	Marks 1956
	7		Naranjo et al. (as var. <i>articulata</i> , var. <i>hirsuta</i> ) 1982
		14	Azuke (as subsp. <i>articulata</i> , subsp. <i>rubra</i> ) 2000
<i>O. corymbosa</i>		28	Heitz (as <i>O. violacea</i> L.) 1927
		28	Yamashita (as <i>O. violacea</i> L.) 1935
		28	Mathew (as <i>O. violacea</i> L.) 1958
	15	22, 28	Chatterjee and Sharma 1970
	14		Weller and Denton (as <i>O. violacea</i> L.) 1976
	7	14	Naranjo et al. 1982
		28	Roy et al. 1988
	14	Xu et al. (sec. Goldblatt and Johnson 1996) 1992	
<i>O. corniculata</i> f. <i>corniculata</i>		44	Wulff 1939
		24	Rutland 1941
		24	Heiser and Whitaker 1948
		48	Marks (as var. <i>tropaeoloide</i> Schlecht.) 1956
		48	Mathew 1958
		48	Sharma and Chatterji 1960
		28	Borgmann 1964
	22		Chatterjee and Sharma 1970
	22		Sharma (sec. Goldblatt 1981) 1970
		48	Murin and Sheikh 1971
		24	Hedberg and Hedberg 1977
		44	Bir and Sidhu (sec. Goldblatt 1984) 1979
		44	Bir and Sidhu 1980
		44	Sidhu (sec. Goldblatt 1984) 1979
	12		Sarkar et al. 1980, 1982
		44	Sidhu and Bir (sec. Goldblatt 1988) 1983
	22		Roy et al. 1988
24	48	Nair and Kuriachan 2004	
	48	Nishikawa 2004	
<i>O. corniculata</i> f. <i>rubrifolia</i>		48	Nishikawa 2004
<i>O. corniculata</i> f. <i>tropaeoloides</i>		48	Nishikawa 2004

2n = 28 (n = 14) chromosomes worldwide. However, there are reports of unique counts of n = 15 from Shillong, and 2n = 22 from Surel, in the Himalayas (Chatterjee and Sharma 1970). The present study, along with that of Yamashita (1935), indicates that the chromosome race with 2n = 28 chromosomes is naturalized exclusively in Japan.

### 3. *Oxalis corniculata* L. var. *corniculata* (1) f. *corniculata* (Figs. 1C–D, Appendix)

We studied a total of 459 individuals collected widely from 106 localities in Hokkaido, Honshu, Shikoku, Kyushu and

Okinawa-jima. In most cases, we observed 2n = 48 chromosomes, with the exception of one individual with 2n = 47 chromosomes. In this taxon, several chromosome counts (n = 12, 22; 2n = 24, 28, 44, 48) have been reported worldwide (Table 1). In these, the chromosome count of 2n = 24 is reported previously from UK (Rutland 1941), USA (Heiser and Whitaker 1948), Kenya and Tanzania (Hedberg and Hedberg 1977). The chromosome count of 2n = 48 found in this study is consistent with those reported previously from Hokkaido, Japan (Nishikawa 2004), India (Mathew 1958, Sharma and

Chatterji 1960, Nair and Kuriachan 2004), and Iraq (Murin and Sheikh 1971), while  $2n = 47$  chromosomes is a new count in the species. The individual with  $2n = 47$  chromosomes was collected at a site in Muroto City, Kochi Prefecture, together with three individuals with  $2n = 48$  chromosomes. Thus, the plant with  $2n = 47$  chromosomes is thought to be an accidental aneuploid plant that occurred incidentally in the progeny of normal individual with  $2n = 48$  chromosomes.

(2) f. *rubrifolia* (Makino) H. Hara (Appendix)

We obtained a chromosome count of  $2n = 48$  from all 15 individuals collected from the 14 localities listed in the Appendix. This chromosome count was consistent with the previous report from Hokkaido, Japan by Nishikawa (2004).

(3) f. *tropaeoloides* (Schlachter) R. Knuth (Appendix)

We studied a total of 63 individuals from 38 localities in Hokkaido, Honshu, Shikoku, and Kyushu. All showed a  $2n = 48$  chromosomal count, confirming the count reported previously from Hokkaido, Japan by Nishikawa (2004).

As shown in Table 1, three chromosome counts,  $2n = 24$  ( $n = 12$ ),  $2n = 44$  ( $n = 22$ ) and  $2n = 48$ , have been reported worldwide for *O. corniculata*. This study, along with those of Nishikawa (2004), shows that in the *O. corniculata* forms, f. *corniculata*, f. *rubrifolia*, and f. *tropaeoloides*, the chromosome form with  $2n = 48$  is distributed throughout Japan.

*Oxalis* is a polybasic genus with  $x = 5, 6, 7, 9$  and  $11$  (Darlington and Wylie 1955). Thus, the three forms of *O. corniculata* with  $2n = 48$  chromosomes are considered octoploids with  $x = 6$ . The two species of *O. corymbosa* with  $2n = 14$  chromosomes and *O. articulata* with  $2n = 28$  chromosomes are considered diploid and tetraploid based on  $x = 7$ , respectively.

This study was carried out with the cooperation of many people to whom we wish to express our deepest thanks for collecting materials.

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- evidence of the evolution of *Oxalis corniculata* var. *atropurpurea* Planch. *Cytologia* **69**: 149–153.
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### Appendix

Chromosome numbers and locality of individuals of *Oxalis articulata*, *O. corymbosa*, and *O. corniculata*. The number in parentheses indicate those of individuals examined.

#### *Oxalis articulata* (2n = 14)

**Hokkaido Pref.:** Hanakawakita, Ishikari City (1). **Tochigi Pref.:** Ohdawa, Fujioka-machi, Shimotsugan (1). **Chiba Pref.:** Chuo-ku, Chiba City (1); Inage-ku, Chiba City (1). **Tokyo Pref.:** Kamisaginomiya, Nakano-ku (2); Shirasagi, Nakano-ku (3). **Kanagawa Pref.:** Hamanogo, Chigasaki City (1). **Niigata Pref.:** Bandai, Niigata City (1). **Toyama Pref.:** Arisawa,

Yamashita K. 1935. Zytologische Studien an *Oxalis* I. *Jpn. J. Genet.* **11**: 36 (in Japanese).

日本産カタバミ属3種2品種を対象に染色体の観察を行った。観察の結果、イモカタバミ *Oxalis articulata* は 2n = 14, ムラサキカタバミ *O. corymbosa* は 2n = 28, カタバミ *O. corniculata* f. *corniculata*, アカカタバミ f. *rubrifolia*, およびウスアカカタバミ f. *tropaeoloides* はいずれも 2n = 48 であった。なおカタバミには 2n = 47 の異数体も1個体だけ観察された。国外のムラサキカタバミには通常 2n = 14 (n = 7) と 2n = 28 (n = 14) の2つの染色体系統が知られているが、わが国には 2n = 28 だけが広く分布することが判った。国外ではカタバミ *O. corniculata* には 2n = 24 (n = 12), 44 (n = 22), 48 の染色体数の異なる3型が知られている。わが国のカタバミは北海道から沖縄島まで 2n = 48 だけが分布していることが判った。

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Toyama City (1); Gofuku, Toyama City (8); Sho, Shigawamachi, Tonami City (1); Suganuma, Nanto City (1); Yokoe, Tateyama-machi, Nakaniiikawa-gun (1). **Fukui Pref.:** Aoi, Obama City (1); Sakae, Maruokacho, Sakai City (3); Senda, Maruokacho, Sakai City (1). **Nagano Pref.:** Nishiwada, Nagano City (7); Sakurashinmachi, Nagano City (3). **Gifu Pref.:** Kano, Gifu City (1). **Kagawa Pref.:** Kawanishichominami, Marugame City (1). **Fukuoka Pref.:** Hakikugumiya, Asakura City (1).

#### *Oxalis corymbosa* (2n = 28)

**Saitama Pref.:** Iwasawa, Hanno City (1); Mayuzumi, Kamisato-machi, Kodama-gun (1). **Chiba Pref.:** Chuo-

ku, Chiba City (1); Inage-ku, Chiba City (1); Nakashizu, Sakura City (1); Takahama, Mihama-ku, Chiba City (1); Takiguchi, Shirahamacho, Minamiboso City (1). **Tokyo Pref.:** Igusa, Suginami-ku (1); Kamisaginomiya, Nakano-ku (1); Nishikasai, Edogawa-ku (2); Tatsumi, Koto-ku (2); Yumenoshima, Koto-ku (2). **Kanagawa Pref.:** Seya-ku, Yokohama City (1). **Toyama Pref.:** Chayamachi, Toyama City (3); Gofuku, Toyama City (4); Kurehamachi, Toyama City (2); Nishinkanomachi, Toyama City (1); Sannomachi, Toyama City (1). **Fukui Pref.:** Aoi, Obama City (2). **Nagano Pref.:** Ishiwata, Nagano City (1). **Shizuoka Pref.:** Iwabuchi, Fujikawa-cho, Ihara-gun (1); Nishikaizuka, Iwata City (1); Utsunoya, Suruga-ku, Shizuoka City (1). **Aichi Pref.:** Ashikome, Toei-cho, Kitashitara-gun (1); Atsuta-ku, Nagoya City (2); Higashimiyukicho, Toyohashi City (1); Nakagawa-ku, Nagoya City (1); Naka-ku, Nagoya City (1); Yata, Tokoname City (2); Yawatashinmachi, Chita City (1). **Kyoto Pref.:** Shimogyo-ku, Kyoto City (4). **Osaka Pref.:** Deyashikimotomachi, Hirakata City (1); Kiyotakinakamachi, Shijonawate City (1); Kobirao, Mihama-ku, Sakai City (3); Sakaecho, Kawachinagano City (1); Uenohigashi, Toyonaka City (1). **Hyogo Pref.:** Uozumimachi, Akashi City (2). **Hiroshima Pref.:** Asaminami-ku, Hiroshima City (1). **Yamaguchi Pref.:** Aokage, Shuho-cho, Mine-gun (3); Oh'uchimihori, Yamaguchi City (3). **Kagawa Pref.:** Hamarokubancho, Utazu-cho, Ayauta-gun (1); Ichibancho, Marugame City (1); Tomidanaka, Ohkawamachi, Sanuki City (1). **Kochi Pref.:** Marunouchi, Kochi City (1). **Fukuoka Pref.:** Hakikugumiya, Asakura City (1); Hakozaiki, Higashi-ku, Fukuoka City (1); Saifu, Dazaifu City (1). **Saga Pref.:** Kume, Mikatsukicho, Ogi City (1); Mimasaka, Yamauchicho, Takeo City (1); Nishikawanoboricho, Takeo City (2). **Nagasaki Pref.:** Uzumachi, Isahaya City (1); Kushima, Ohmura City (1). **Kumamoto Pref.:** Einoo, Shiranuhimachi, Uki City (2); Ezu, Kumamoto City (1); Honmaru, Kumamoto City (1); Ohno, Hikawa-cho, Yatsushiro-gun (1). **Oita Pref.:** Honjoinoue, Saiki City (1); Honjoonagara Saiki City (1); Mejima, Saiki City (1); Nagashimamachi, Saiki City (1); Nakaemachi, Saiki City (1); Naokawanitahara, Saiki City (1); Seikemachi, Oita City (1). **Miyazaki Pref.:** Funatsuka, Miyazaki City (2); Saiwaki, Hyuga City (1); Totoromachi, Nobeoka City (1). **Kagoshima Pref.:** Kamoike, Kagoshima City (8); Shukukubota, Makizonochi, Kirishima City (1).

*Oxalis corniculata* f. *corniculata* (2n = 47)

**Kochi Pref.:** Murotomisakicho, Muroto City (1).

*Oxalis corniculata* f. *corniculata* (2n = 48)

**Hokkaido Pref.:** Akankoonsen, Akancho, Kushiro City (1); Asahi, Rubeshibecho, Kitami City (2); Esancho, Hakodate City (1); Hanakawakita, Ishikari City (1); Horomuikita, Iwamizawa City (8); Kabutonuma, Toyotomi-cho, Teshio-gun (2); Kitayonjonishi, Chuo-ku, Sapporo City (8); Maeda, Teine-ku, Sapporo City (12); Misonocho, Mikasa City (3); Okushiri, Okushiri-cho, Okushiri-gun (2); Takinoyu, Rubeshibecho, Kitami City (2); Tenzoan, Abashiri City (5). **Aomori Pref.:** Kurosaki, Fukauramachi, Nishitsugaru-gun (5). **Akita Pref.:** Kosagawa, Kisakatamachi, Nikaho City (6). **Yamagata Pref.:** Kamabuchi, Mamurogawa-machi, Mogami-gun (4). **Gunma Pref.:** Shimodawamachi, Takasaki City (8). **Ibaraki Pref.:** Ohnukicho, Oh'arai-machi, Higashiibaraki-gun (2). **Saitama Pref.:** Yanase, Nagatoro-machi, Chichibu-gun (1). **Chiba Pref.:** Tateyama, Tateyama City (3). **Kanagawa Pref.:** Isogodai, Isogo-ku, Yokohama City (5). **Niigata Pref.:** Ichiburi, Itoigawa City (1); Okanomachi, Kiyosato-ku, Joetsu City (3); Sekiyamatsunamicho, Niigata City (14). **Toyama Pref.:** Aimotochin, Unazukimachi, Kurobe City (3); Ao, Himi City (1); Gofuku, Toyama City (21); Hakanoki, Nyuzen-machi, Shimoniikawa-gun (5); Higashi-ebisaka, Takaoka City (5); Himimachi, Himi City (1); Hirazakura, Oyabe City (1); Horinji, Nanto City (3); Ikeda, Tateyama-machi, Nakaniikawa-gun (1); Ikeda, Toyama City (36); Inami, Nanto City (15); Kanaya, Shogawamachi, Tonami City (5); Katakake, Toyama City (11); Kitayashiro, Himi City (1); Kozakai, Himi City (3); Kurakawa, Himi City (2); Maruyama, Kamiichi-machi, Nakaniikawa-gun (2); Miyada, Himi City (1); Miyano, Kurobe City (2); Miyazaki, Asahi-machi, Shimoniikawa-gun (1); Nakanami, Himi City (1); Nakanoban, Ohyama-machi, Kaminiikawa-gun (4); Ogawaji, Uozu City (2); Ohiwa, Kamiichi-machi, Nakaniikawa-gun (8); Ohta, Takaoka City (1); Sakai, Asahi-machi, Shimoniikawa-gun (1); Sasagawa, Asahi-machi, Shimoniikawa-gun (1); Shimomukuta, Fukuokamachi, Takaoka City (2); Suguzaka, Toyama City (3); Suwamachi, Yatsuomachi, Toyama City (3); Tsubono, Tonami City (2); Ushigamase, Toyama City (10); Waki, Himi City (2); Yamadaakamedani, Toyama City (3); Yamadashozu, Toyama City (3); Yamadayu, Toyama City (1); Yokoe, Tateyama-machi, Nakaniikawa-gun (4); Yotsuya, Namerikawa City (1). **Ishikawa Pref.:** Hiramamachi, Hakusan City (13); Kamiaraya, Kanazawa City (6); Torigoe, Taubata-machi, Kahoku-gun (8). **Fukui Pref.:** Aoi, Obama City (10); Makidani, Nanjo-cho, Nanjo-gun (2). **Yamanashi Pref.:** Nakano, Nanbu-cho, Minamikoma-gun (2); Narushima, Nanbu-cho, Minamikoma-gun (1); Senzuwa, Hayakawa-cho, Minamikoma-gun (1).

**Nagano Pref.:** Hongo, Iijima-machi, Kamiina-gun (1); Kamisatoiinuma, Iida City (1); Katagiri, Nakagawamura, Kamiina-gun (1); Nagiso-machi, Kiso-gun (3); Nakagawa-mura, Kamiina-gun (1). **Gifu Pref.:** Nakaaso, Hichiso-cho, Kamo-gun (1). **Shizuoka Pref.:** Ohkawa, Hamamatsu City (15); Uchiurashigedera, Numazu City (1). **Shiga Pref.:** Asahigaoka, Otsu City (5); Katsuno, Takashima City (1). **Kyoto Pref.:** Kamadanishimo, Kyotanba-cho, Funai-gun (2). **Osaka Pref.:** Katayamacho, Suita City (1). **Hyogo Pref.:** Gomyo, Yamasakicho, Shiso City (2); Iwaya, Awaji City (13); Kamikariya, Ako City (1); Kuwama, Sumoto City (5); Ohkubocho, Akashi City (5); Tamatsucho, Nishi-ku, Kobe City (1); Wakasanocho, Aioi City (8); Yagi, Minamiawaji City (5). **Tottori Pref.:** Shinhonjicho, Tottori City (3). **Shimane Pref.:** Kizukihigashi, Taishacho, Izumo City (9). **Okayama Pref.:** Tamashimamichiguchi, Kurashiki City (2). **Hiroshima Pref.:** Korenaga, Okimi-cho, Saeki-gun (4); Takayacho, Higashihiroshima City (1). **Yamaguchi Pref.:** Hirai, Yamaguchi City (11); Tsubaki, Hagi City (7). **Tokushima Pref.:** Ichibacho, Awa City (1). **Kagawa Pref.:** Ushikawa, Ayagawacho, Ayauta-gun (10). **Kochi Pref.:** Murotomisakicho, Muroto City (3); Urado, Kochi City (2). **Fukuoka Pref.:** Kokubu, Dazaifu City (4); Nishikaigan, Mojo-ku, Kitakyushu City (6). **Kumamoto Pref.:** Kayano, Misato-machi, Shimomashiki-gun (2). **Miyazaki Pref.:** Shiomi, Hyuga City (1). **Kagoshima Pref.:** Nishino, Minamitane-cho, Kumage-gun (2). **Okinawa Pref.:** Izumizaki, Naha City (2); Uehara, Nishihara-cho, Nakagami-gun (1).

*Oxalis corniculata* f. *rubrifolia* (2n = 48)

**Hokkaido Pref.:** Hanakawakita, Ishikari City (1); Kitayonjonishi, Chuo-ku, Sapporo City (1). **Aomori Pref.:** Kurosaki, Fukauramachi, Nishitsugaru-gun (1). **Toyama Pref.:** Gofuku, Toyama City (2); Ikeda, Toyama City (1); Maruyama, Kamiichi-machi, Nakanikawa-gun (1); Nakagawara, Namerikawa City (1); Tatenoharagashi, Nanto City (1); Waki, Himi

City (1); Yamadayu, Toyama City (1). **Ishikawa Pref.:** Hirakamachi, Hakusan City (1). **Osaka Pref.:** Katayamacho, Suita City (1); Senri, Suita City (1). **Hiroshima Pref.:** Takayacho, Higashihiroshima City (1).

*Oxalis corniculata* f. *tropaeoloides* (2n = 48)

**Hokkaido Pref.:** Hanakawakita, Ishikari City (3); Kitayonjonishi, Chuo-ku, Sapporo City (4); Minami-shokancho, Mashike-cho, Mashike-gun (1); Misono-cho, Mikasa City (1). **Aomori Pref.:** Kurosaki, Fukaura-machi, Nishitsugaru-gun (1). **Yamagata Pref.:** Kamabuchi, Mamurogawa-machi, Mogami-gun (1). **Saitama Pref.:** Yanase, Nagatoro-machi, Chichibu-gun (1). **Kanagawa Pref.:** Isogodai, Isogoku, Yokohama City (3). **Niigata Pref.:** Sekiyama-tsunamicho, Niigata City (2); Hanazono, Niigata City (1). **Toyama Pref.:** Gofuku, Toyama City (2); Higashiebisaka, Takaoka City (2); Himimachi, Himi City (1); Hirazakura, Oyabe City (2); Kozakai, Himi City (1); Nakanoban, Toyama City (1); Suwamachi, Yatsuomachi, Toyama City (3); Ushigamase, Toyama City (1); Yokoe, Tateyama-machi, Nakanikawa-gun (1). **Ishikawa Pref.:** Hirakamachi, Hakusan City (2); Kamiaraya, Kanazawa City (1). **Fukui Pref.:** Aoi, Obama City (1); Honmachi, Sabae City (1). **Nagano Pref.:** Tomikusa, Anan-cho, Shimoina-gun (1). **Gifu Pref.:** Sakanohigashi, Shirakawa-cho, Kamo-gun (1); Nakaaso, Hichiso-cho, Kamo-gun (1). **Shizuoka Pref.:** Ohkawa, Hamamatsu City (6). **Shiga Pref.:** Asahigaoka, Otsu City (1). **Osaka Pref.:** Nishinakajima, Yodogawa-ku, Osaka City (1); Senri, Suita City (2). **Hyogo Pref.:** Wakasanocho, Aioi City (1). **Okayama Pref.:** Tamashimamichiguchi, Kurashiki City (2). **Yamaguchi Pref.:** Hirai, Yamaguchi City (1). **Tokushima Pref.:** Nakao, Nishiiyamamura, Miyoshi City (1). **Kagawa Pref.:** Ushikawa, Ayagawacho, Ayauta-gun (1). **Kochi Pref.:** Urado, Kochi City (2). **Fukuoka Pref.:** Nishikaigan, Mojo-ku, Kitakyushu City (3). **Kagoshima Pref.:** Nishino, Minamitane-cho, Kumage-gun (2).

## 正誤

## Errata

巻号 (Vol. No.)	ページ (Page)	行 (Line)	誤 (For)	正 (Read)
83(2)	Inside front cover (new name)	↓ 3	<i>telphusaiformis</i>	<i>telphusiformis</i>
	113, 115	all	<i>telphusaiformis</i>	<i>telphusiformis</i>
	113	all	<i>fischerii</i>	<i>fischeri</i>
83(3)	174	↓ 16	3: 21	3: 32
	174	↑ 6	3: 47	3: 29