Chromosome Numbers and Distributions of Oenanthe javanica (Umbelliferae) in Japan

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Naohiro Naruhashi and Yoshikane Iwatsubo : **Chromosome Numbers and Distributions of *Oenanthe javanica* (Umbelliferae) in Japan**

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Abstract

Chromosome counts of 893 individuals of *Oenanthe javanica* collected in 893 localities of Japan showed 2n=20, 2n=42 and 2n=63 cytotypes. Previously other authors reported 2n=22 and 2n=42 chromosomes for this species. The chromosome number 2n=22 could not be verified by us, and 2n=63 reported in this paper is the first record for the species. The plants with 2n=20 are distributed in warmer places near seashore in Ryukyu, Kyushu, Shikoku and southern part of Honshu. The plants with 2n=42 and 2n=63 are widely distributed, and the latter with 2n=63 is thought to show the tendency of being distributed in central Japan.

Key words : chromosome number, distribution, polyploidy, *Oenanthe javanica.*

Seri, *Oenanthe javanica* (Blume) DC. belonging to Umbelliferae, is one of a few important vegetables seen in Japan. It is also one of the Japanese traditional "Seven Spring Herbs." Japanese people eat wild plants for vegetable as well as a few cultivated races of the species.

Oenanthe javanica is widely distributed in Indonesia, Formosa, China, Korea and Japan (Hiroe and Constance 1958). The plants also occur throughout Japan from Okinawa to Hokkaido.

Hiroe and Constance (1958) reported only one species in the genus *Oenanthe* without subdivision in their revision of Umbelliferae of Japan. Kitamura and Murata (1961) recognized two varieties, var. *javanica* and var. *japonica* in the species, and Murata (1973) divided the species into three subspecies and two varieties. In contrast to these two reports, recent books on Japanese flora (Kitagawa 1981 ; Ohwi 1965 ; Ohwi and Kitagawa 1983 ; Ono *et al.* 1989) treated it as a single taxon in the genus. In the present paper, the plants are treated as single taxon without any subdivision of the species.

The chromosome number of *O. javanica* was reported for the first time by Karasawa and Mitsukuri (1953) as 2n=22, using the plant material at Fujisawa, Kanagawa Prefecture, Japan. Working on Taiwanese plants, Bell and Constance (1960) and Liu *et al.* (1961) reported 2n=20. Nishikawa (1980) reported 2n=42 by using material from Hokkaido, Japan as a new number for the species.

The present research aims to clarify the chromosome numbers of the species and the distributions of their cytotypes.

Material and Methods

The present species reproduces vegetatively by means of rooting at nodes of creeping stems. A population often consists of individuals possessing the same genotype. The plants used in this study were collected as a single plant by random sampling from natural populations throughout Japan, from Okinawa to Hokkaido, and then cultivated at Toyama University, Toyama. Collection sites are 893 in total and are shown in Fig. 2.

For observation of chromosomes, root tips collected from potted plants were pretreated in a 2 mM 8–hydroxyquinoline solution for 1 h at room temperature, and subsequently held at 5℃ for 15 h. They were fixed in a glacial acetic acid and absolute ethanol mixture (1 : 3) for 1 h, and then soaked in 1 N HCl at room temperature for a few hours. After being hydrolyzed in 1 N HCl at 60℃ for 11.5 min, each sample was immersed in distilled water. Meristematic cells were stained in 1.5% lacto-propionic orcein, and the usual squashing method was applied for the examination of somatic chromosomes.

Voucher specimens are kept in the herbarium of the Toyama University.

Results and Discussion

Three different chromosome numbers, 2n=20, 2n=42 and 2n=63, were observed (Fig. 1). The chromosome number with 2n=63 is the first record, while 2n=22 reported before was not counted at all.

Forty four plants (4.93% of the examined plants) had a chromosome number of 2n=20. A chromosome number of 2n=63 was found in one hundred and two plants (11.43%). Seven hundred and forty seven plants possessed 2n=42 (83.65%) chromosome number. Collection sites of these cytotypes are illustrated in Fig. 2 and of 2n=20 and 2n=63 are listed in appendix.

The plants with 2n=20 are morphologically identical to Kitamura and Murata's *Oenanthe javanica* (Blume) DC. var. *japonica* (Maxim.) Honda. The chromosome number with 2n=42 is believed to be amphidiploid originated by hybridization of plants with x=10 and x=11 (Bell and Constance 1960; Fedorov 1969). Chromosome number of 2n=63 is explained as triploid of 2n=42.

The cytotypes with 2n=20 are distributed in warmer places near seashore in Ryukyu, Kyushu, Shikoku and Honshu. In Honshu, the northern limitation of the distribution is Shimane Prefecture in Japan Sea side and Aichi Prefecture in Pacific side. The plants with 2n=42 are widely distributed throughout Japan. Our data suggest that the cytotype with 2n=63 is presumably distributed in central Japan, because of no occurrence in Ryukyu and Hokkaido. However, the distribution pattern of the cytotype is an unsettled question.

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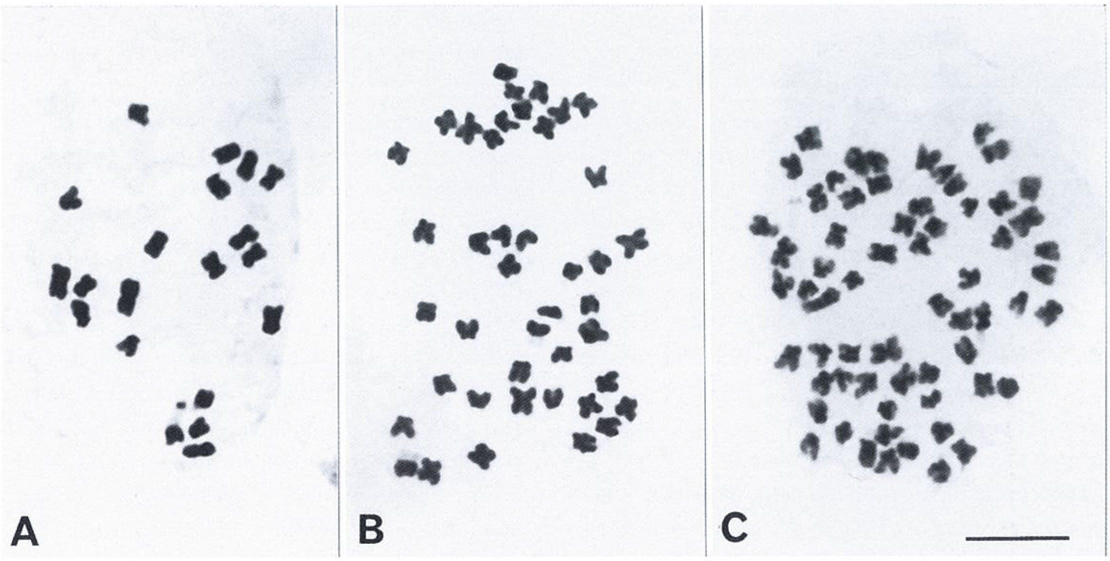

Fig. 1. Somatic metaphase chromosomes of *Oenanthe javanica*. A: 2n=20; B: 2n=42; C: 2n=63. Bar: 7 µm.

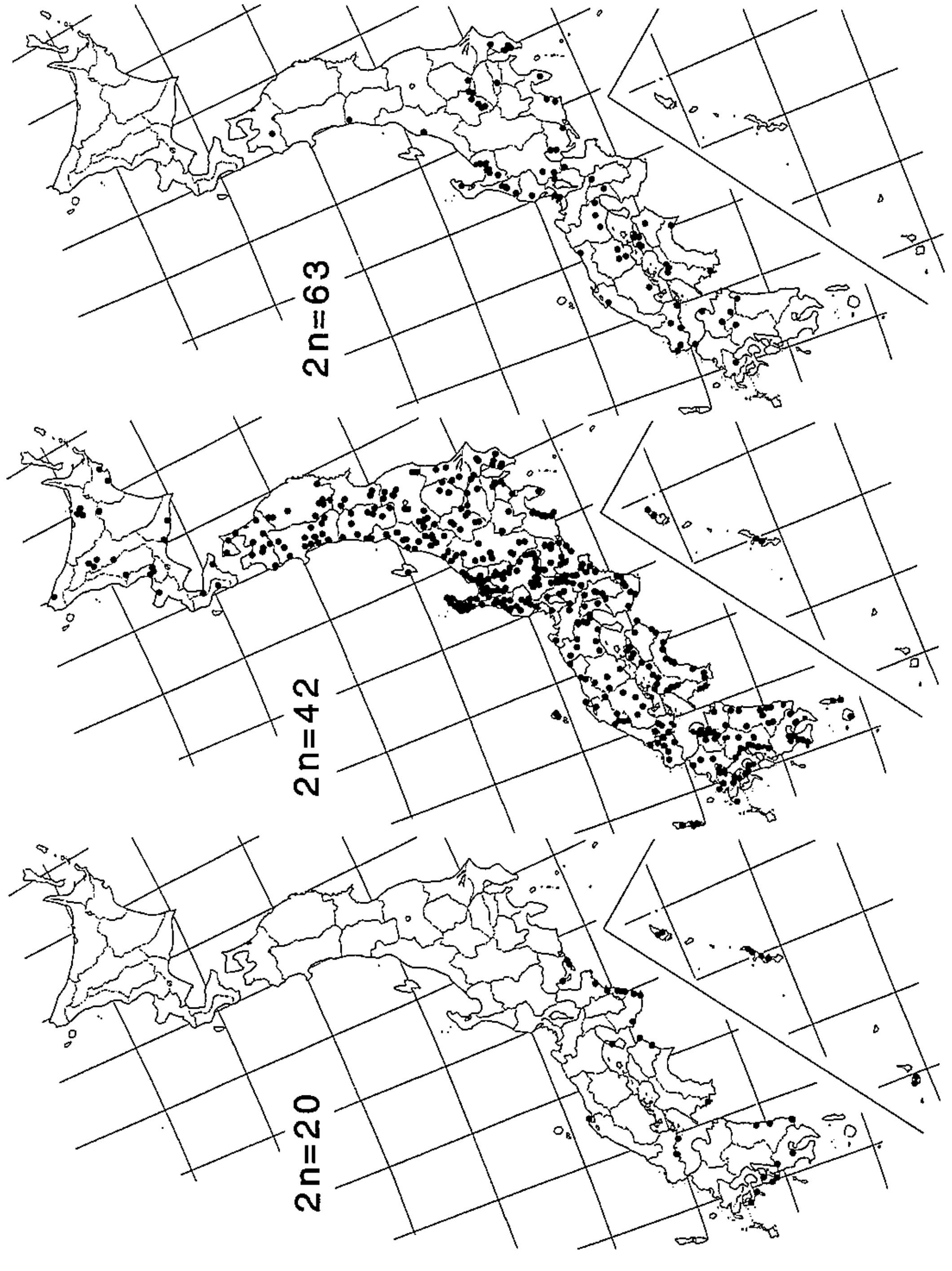

Fig. 2. Geographical distribution of three cytotypes of *Oenanthe javanica*.

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Appendix

Collection localities, altitude above sea level, collectors. Data of 2n=42 are completely omitted, because they are very common.

2n=20

Aichi Pref.: Hinaga, Chita-shi, 3 m, K. Inami; Kumihara, Mutsure, Tahara-cho, Atsumi-gun, 3 m, M. Sugimoto; Maeyama, Nizaki, Tahara-cho, Atsumi-gun, 60 m, M. Sugimoto; Higasiakasawa-cho, Toyohashi-shi, 5 m, M. Sugimoto. **Mie Pref.**: Suwako, Kiinagashima-cho, Kitamuro-gun, 10 m, K. Seto; Shinden, Owase-shi, 6 m, K. Yamamoto; Ooike, Sugari-cho, Owase-shi, 0 m, K. Yamamoto; Hadasu-cho, Kumano-shi, 7 m, K. Hanajiri; Shihara-gawa, Kumano-shi, Shiharajiri, 5 m, K. Hanajiri; Nigishima-kaigan, Kumano-shi, 2–5 m, K. Inami; Ida, Kiho-cho, Minamimuro-gun, 5 m, K. Hanajiri; Kamiji, Mihama-cho, Minamimuro-gun, 10 m, K. Hanajiri. **Wakayama Pref.**: Kotachi, Nishiji, Taiji-cho, Higashimuro-gun, ca. 5 m, K. Kinoshita; Shionomisaki, Kushimoto-cho, Nishimuro-gun, 40 m, C. Suyama; Kuroiwayama, Nada-cho, Gobo-shi, 70 m, K. Kinoshita. **Hyogo Pref.**: Mukaidani, Ei, Ichinomiya-cho, Tsuna-gun, 60 m, N. Kurosaki. **Shimane Pref.**: Sai, Mihogaseki-cho, Yatsuka-gun, ca. 10 m, Y. Sugimura. **Yamaguchi Pref.**: Shirahama, Kasadojima, Kudamatu-shi, 0 m, H. Masaki; Tateiwainari, Mukosima, Bofu-shi, 0 m, H. Masaki. **Tokushima Pref.**: Gamoda-misaki, Anan-shi, 3-5 m, T. Tabuchi; Dewajima, Muki-cho, Kaifu-gun, 5 m, T. Tabuchi. **Ehime Pref.**: Kurosae, Nagamiyama, Uchiumi-mura, Minamiuwa-gun, 1.5 m, K. Hashigoe. **Nagasaki Pref.**: Yukimonogo, Yukiura, Ooseto-cho, Nishisonogi-gun, ca. 200 m, H. Nakanishi; Aikawa-cho, Nagasaki-shi, 10 m, H. Nakanishi. **Kumamoto Pref.**: Otomeja , Minami-machi, Hondo-shi, ca. 20 m, Y. Kobayashi; Ooe, Amakusa-machi, Amakusa-gun, 40–50 m, Y. Kobayashi; Shiroishi, Futaura-machi, Ushibuka-shi, ca. 20 m, Y. Kobayashi. **Miyazaki Pref.**: Shigino, Takanabe-cho, Koyu-gun, 8 m, I. Taki; Miyazaki-jingu, Miyamzaki-shi, 8 m, T. Minamitani; Ishinami, Ichiki, Kushima-shi, 100 m, T. Minamitani. **Kagoshima Pref.**: Bunka-cho, Izumi-shi, 20 m, S. Komura; Terayama, Yoshino-cho, Kagoshima-shi, ca. 400 m, S. Hosoyamada; Yamato-mura, Oshima-gun, 400 m, M. Hotta; Santarotoge, Nishinakama, Sumiyo-son, Oshima-gun, 260 m, M. Tabata. **Okinawa Pref.**: Kijoka, Oogimi-son, Kunigami-gun, 5 m, N. Naruhashi & K. Komesu; Yonaha-dake, Kunigami-son, Kunigami-gun, 350 m, N. Naruhashi & K. Komesu; Yagaji, Onna-son, Kunigami-gun, 5 m, T. Kanemoto; Iyu-dake, Kunigami-son, Kunigami-gun, 440 m, K. Komesu; Arakawagawa, Higashi-son, Kunigami-gun,180 m, K. Komesu; Moromisato, Okinawa-shi, 100 m, T. Kanemoto; Hoshidate, Taketomi-cho, Yaeyama-gun, ca. 10 m, M. Yokota; Komi, Taketomi-cho, Yaeyama-gun, ca. 5 m, T. Oohara.

2n=63

Aomori Pref.: Koganezaki, Hirosaki-shi, 70 m, Y. Horii. **Yamagata Pref.**: Ishitsuji, Yusa-cho, Akumi-gun, 15 m, S. Kato. **Niigata Pref.**: Yahiko-yama, Yahiko-mura, Nishikanbara-gun, 120 m, S. Ishizawa. **Tochigi Pref.**: Kashima, Fujioka-cho, Shimotsuga-gun, 17 m, S. Takagiwa. **Gunma Pref.**: Myogi-machi, Kanra-gun, 270 m, T. Satomi; Shimokosaka, Shimonita-cho, Kanra-gun, 260 m, T. Satomi; Shimogokan, Annaka-shi, 200 m, T. Satomi; Kamiaonashi-machi, Maebashi-shi, ca. 200 m, T. Niwa; Hashie-cho, Isesaki-shi, 75 m, S. Miyazaki; Anbori-cho, Isesaki-shi, 70 m, S. Miyazaki; Kitanagaoka, Oota-shi, 75 m, S. Miyasaki. **Chiba Pref.**: Yoshinoda, Sodegaura-shi, 14 m, T. Kawana; Oomiya-cho, Chiba-shi, 11 m, M. Tanaka; Utougi, Futtsu-shi, 100 m, T. Kawana; Ichiihara, Kyonan-machi, Awa-gun, 60 m, T. Kawana. **Tokyo Pref.**: Yokozawa, Akiruno-shi, Nishitama-gun, ca. 200 m, Y. Hasegawa. **Shizuoka Pref.**: Rokugo, Shimoda-shi, 40 m, K. Hashimoto; Aonaguchi, Amagiyugashima-cho, Takata-gun, 400 m, I. Sasamoto; Mochikoshi, Amagiyugashima-cho, Takata-gun, 500 m, I. Sasamoto; Isshiki, Yaidu-shi, 8-10 m, A. Iwai; Soemon, Yaidu-shi, 8 m, A. Iwai. **Aichi Pref.**: Ishimakionoda-cho, Toyohashi-shi, ca. 20 m, C. Suyama; 1-chome, Wakamiya-cho, Seto-shi, 120 m, H. Takano; Uedayama, Nagoya-shi, 30 m, H. Takano. **Toyama Pref.**: Hida, Kurobe-shi, 3 m, N. Naruhashi & T. Suzuki; Fukuhara, Kurobe-shi, 200 m, N. Naruhashi & T. Suzuki; Iwakurano, Tateyama-machi, Nakaniikawa-gun, 180 m, N. Naruhashi & Y. Iwatsubo; Enoki, Tateyanra-machi, Nakaniikawa-gun, 78 m, H. Ishikawa & H. Okamoto; Oiwa, Kamiichi-machi, Nakanikawa-gun, 180 m, N. Naruhashi & H. Ishikawa; Onagawa, Kamiichi-machi, Nakaniikawa-gun, 30 m, N. Naruhashi & H. Ishikawa; Shinbori, Toyama-shi, Mizuhashi,11 m, N. Naruhashi; Hariwara, Toyama-shi, 11 m, N. Naruhashi & K. Hashimoto; Kamikutsuwada, Huchu-machi, Nei-gun, 16 m, N. Naruhashi & K. Hashimoto; Gejo, Kosugi-machi, Imizu-gun, 7 m, N. Naruhashi; Minodani, Johana-machi, Higashitonami-gun, 100 m, N. Naruhashi; Sakuragaike, Johana-machi, Higashitonami-gun, 250 m N. Naruhashi. **Ishikawa Pref.**: Umenoki, Noto-machi, Fugeshi-gun, 20 m, N. Naruhashi & M. Sugimoto; Kikusui, Kanazawa-shi, 300 m, H. Furuike; Komagaeri-cho, Kanazawa-shi, 180 m, H. Furuike; Obara-cho, Kanazawa-shi, 180 m, N. Naruhashi; Nakashirominami, Kaga-shi, 9 m, N. Naruhashi & M. Sugimoto; Tsukihashi, Tsurugi-machi, Ishikawa-gun, 80 m, N. Naruhashi & M. Sugimoto; Tsubono, Tatsunokuchi-cho, Ishikawa-gun, 100 m, H. Furuike. **Fukui Pref.**: Ootaniji, Asahi-cho, Nyu-gun, 120 m, T. Wakasugi; Koochigawa, Koochi, Kaminaka-cho, Onyu-gun, 230 m, T. Wakasugi & N. Naruhashi; Myojindani, Koochi, Kaminaka-cho, Onyu-gun, 240 m, T. Wakasugi & N. Naruhashi; Baba, Shinjo, Mihama-cho, Mikata-gun, 100 m, T. Wakasugi & N. Naruhashi; Ikenokouchi, Obama-shi, 90 m, T. Wakasugi & N. Naruhashi. **Gifu Pref.**: Higashiitaya, Neo-mura, Motosu-gun, 200 m, H. Takano; Hitotunoki, Sekigahara-cho, Huwa-gun, ca. 120 m, K. Hashimoto. **Shiga Pref.**: Kotsubara, Ibuki-cho, Sakata-gun, 598 m, T. Murase. **Mie Pref.**: Nishinojiri, Fujiwara-cho, Inabe-gun, 192 m, H. Katsurayama. **Nara Pref.**: Ishiki-cho, Nara-shi, 70 m, K. Seto. **Osaka Pref.**: Takidani, Tondabayashi-shi, 100 m, A. Furuya. **Hyogo Pref.**: Ooharano, Takarazuka-shi, ca. 200 m, I. Yamazumi; Takino, Takino-cho, Kato-gun, 60 m, M. Hashimoto; Yumesaki-cho, Shikama-gun, 110 m, M. Chikamori. **Tottori Pref.**: Fukube-son, Iwami-gun, 70 m, Y. Oonishi. **Shimane Pref.**: Tobisu, Izumo-shi, ca. 10 m, Y. Sugimura. **Okayama Pref.**: Kanda, Sanyo-cho, Akaiwa-gun, 50 m, S . Hihara; Otani, Kamogawa-cho, Mitsu-gun, 100 m, S. Hihara; Obara, Kurashiki-shi, 30 m, S . Hihara; Tsuchigahara, Tamano-shi, 5 m, S. Hihara. **Hiroshima Pref.**: Shitami, Saijo-cho, Higashihiroshima-shi, 220 m, K. Naito & N. Iiyama. **Yamaguchi Pref.**: Iwaya, Hikari-shi, 30 m, H. Masaki; Ikadaba, Komatsubara, Kumage-cho, Kumage-gun, 20 m, H . Masaki; Okunoharabashi, Ikaji, Tokuji-cho, Saba-gun, 50 m, H. Masaki; Migita , Hofu-shi, 5 m, H. Masaki. **Ooita Pref.**: Omoto, Mikita, Kokonoe-cho, Kusu-gun, 500 m, M. Sato; Kunishige, Tsugikura, Takeda-shi, 420 m, H. Tonai. **Kumamoto Pref.**: Inubaru, Shimoyaku, Kurokawa, Aso-machi, Aso-gun, 500 m, N. Otaki. **Miyazaki Pref.**: Nagai, Kitagawa-machi, Higashiusuki-gun, 11 m, I. Taki; Shushida, Kobayashi-shi, 249 m, T. Shushida.

鳴橋直弘・岩坪美兼：セリの染色体数とその分布

セリ科セリ属セリ（*Oenanthe javanica*）の染色体数を，日本全土（沖縄から北海道まで）から無作為に1地点1個体ずつ採集した植物で調査した。採集したサンプルは893ヵ所である。

その結果，セリには2n=20（調査地の4.93%），2n=42（83.65%），および2n=63（11.43%）のサイトタイプが見られた。このうち，2n=63は新発見である。

唐沢・箕作（1953）が報告した2n=22は，まったく発見されなかった。

2n=42は2n=20と2n=22から起源した複2倍体（西川　1980）と考えられているが，2n=63はその3倍体と考えられる。

2n=20は暖地の海岸近くでみられ，その北限は日本海側では島根県，太平洋側では愛知県であった。これは北村・村田（1972）のサケバゼリといわれる植物に相当する。2n=42は広く分布したが，2n=63は主に北九州から関東にかけて見られ，沖縄や北海道では見つからなかった。

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