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Forsythia Vahl (Oleaceae), a small genus with six or seven species (Lim and Ko 1989), is composed exclusively of deciduous shrubs and is distributed in East Asia, with the exception of *F. europaea* Degen et Bald., which occurs in Albania in southwestern Europe (Mabberley 1997). Ripe fruits of *F. suspensa* (Thunb.) Vahl and *F. viridissima* Lindl. have been used medicinally in China, Korea and Japan. These two species, together with *F. ×intermedia* Zabel (*F. suspensa* × *F. viridissima*), are also grown as ornamental shrubs due to the yellow flowers which emerge in early spring.

In Japan, *F. japonica* Makino var. *japonica* and *F. togashii* H. Hara occur spontaneously and *F. suspensa* and *F. viridissima* are widely cultivated as bedding woody plants. New cultivars are often created through crossbreeding, and information regarding chromosome number is critical to improve breeding of cultivated plants. The present study aimed to record chromosome numbers of the four species of *Forsythia* in Japan.

Materials and methods

We used *F. japonica* var. *japonica*, *F. suspensa*, *F. togashii* and *F. viridissima* var. *koreana* Rehder, all of which are conserved species at the experimental station for medical plant research at the Faculty of Pharmaceutical Science, University of Toyama, Japan. Chromosome numbers were determined in meristematic cells ob-

tained from root tips.

Newly-formed root tips harvested from potted plants were pretreated in a 2 mM 8-hydroxyquinoline solution at room temperature (ca. 25 °C) for 1 h, and then kept at ca. 6 °C for 15 h. Root tips were fixed with a mixture of glacial acetic acid and ethyl alcohol (1 : 3) for 1 h, soaked in 1 N hydrochloric acid at room temperature for several hours, macerated in 1 N hydrochloric acid at 60 °C for 10 min, 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 used for preparation.

Results and discussion

Chromosome numbers of the *Forsythia* species studied were as follows :

(1) *F. japonica* var. *japonica* (Fig. 1 A)

This species had 2n=28 chromosomes. This is the first reported chromosome count for this species.

(2) *F. suspensa* (Fig. 1 B)

This species had 2n=28 chromosomes, which corresponded to earlier reports of n=14 (O'Mara 1930 ; Sax and Abbe 1932) and 2n=28 (Sax and Abbe 1932 ; Taylor 1945 ; Weng and Zhang 1992). It was inconsistent with the reported 2n=26 by Sugiura (1931, 1936).

(3) *F. togashii* (Fig. 1 C)

This species had 2n=28 chromosomes. This is the first reported chromosome count for this spe-

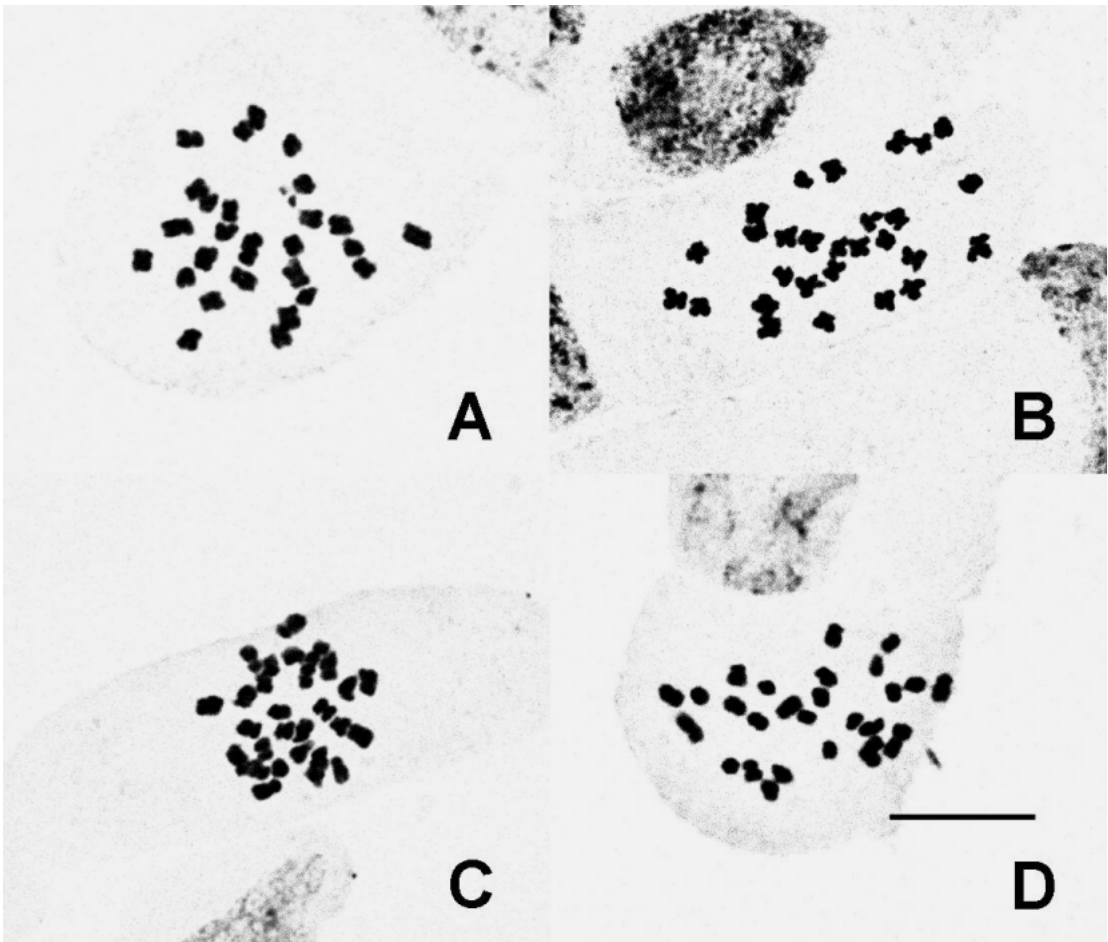


Fig. 1. Photographs of somatic metaphase chromosomes of four taxa of *Forsythia* examined in this study. A: *F. japonica* var. *japonica* ($2n=28$). B: *F. suspensa* ($2n=28$). C: *F. togashii* ($2n=28$). D: *F. viridissima* var. *koreana* ($2n=28$). Bar indicates 10 μm .

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(4) *F. viridissima* var. *koreana* (Fig. 1 D)

This plant had $2n=28$ chromosomes, consistent with all previous reports for this taxon (O'Mara 1930, as $n=14$; Taylor 1945; Lim and Ko 1989, as *F. koreana* Nakai and *F. ovata* Nakai; Weng and Zhang 1992, as *F. koreana*).

Within the *Forsythia*, chromosome numbers of *F. europaea* (O'Mara 1930, as $n=14$), *F. densiflora* Nakai (Lim and Ko 1989), *F. giraldiana* Lingelsh. (Weng and Zhang 1992), *F. ×intermedia* (O'Mara 1930, as $n=14$; Sax and Abbe 1932; Taylor 1945), *F. viridissima* var. *viridissima* (O'Mara 1930, as $n=14$; Sax and Abbe 1932, as $n=14$ and $2n=28$; Taylor 1945; Lim and Ko 1989; Weng and Zhang 1992) and *F. japonica*

var. *saxatilis* Nakai (Lim and Ko 1989, as *F. saxatilis* Nakai) are also $2n=28$. Chromosome numbers reported thus far for this genus are all $2n=28$ ($n=14$), with the exception of $2n=26$ chromosomes, reported by Sugiura (1931, 1936) for *F. suspensa*.

As the basic chromosome number of the genus is known to be $x=14$ (Taylor 1945), we conclude that all species including the Japanese species examined in this study are diploids. *Forsythia suspensa* examined by Sugiura (1931, 1936) is considered to be a hypo-diploid plant.

The present study demonstrates that *Forsythia* species have the same chromosome number, which suggests that polyploidization has not caused the speciation of this genus.

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モクセイ科レンギョウ属には6種または7種が知られている。そのうちの1種 *Forsythia europaea* だけがヨーロッパに自生する。わが国には、中国原産のレンギョウ (*F. suspensa*)、シナレンギョウ (*F. viridissima* var. *viridissima*)、チョウセンレンギョウ (*F. viridissima* var. *koreana*) が薬用および花木として栽培され、ヤマトレンギョウ (*F. japonica* var. *japonica*) とシヨウドシマレンギョウ (*F. togashii*) の2種が自生している。

レンギョウ、チョウセンレンギョウ、ヤマトレンギョウ、シヨウドシマレンギョウの4分類群について染色体数を調べた結果、いずれも $2n=28$ であった。レンギョウとチョウセンレンギョウでは過去の報告と一致し、ヤマトレンギョウとシヨウドシマレンギョウでは染色体数が初めて明らかになった。シナレンギョウ、*F. europaea*、*F. giraldiana*、*F. ×intermedia* および *F. japonica* var. *saxatilis* もすべて $2n=28$ であることが知られている。レンギョウ属の染色体基本数は $x=14$ (Taylor 1945) であることから、この属はすべて二倍体 ($2n=28$) であることが判った。

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