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Karyological investigations on *Erigeron canadensis* L. and *E. annuus* (L.) Pers. from natural stands in Poland

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Abstract

The number of chromosomes in metaphases root meristems of *Erigeron canadensis* L. (2n= 18) and *E. annuus* (L.) Pers. (2n=27) was determined. The chromosomes of both species showed a morphological differentiation — they were heterobrachial or isobrachial; *E. annuus* had an additional unpaired isobrachial chromosome.

INTRODUCTION

The purpose of the present work was to perform katyological investigations on two species of the genus *Erigeron*, namely *Erigeron canadensis* L. and *E. annuus* (L.). Pers.

Results of such investigations are available for these species from Japan, India, North America, the USRR (Uzbekistan Republic), Sweden, Western Germany. None are avaiable for material from Poland.

Karyological investigations on these species have been performed by the following workers: on *E. canadensis* — Okabe (1934), Tschler (1934), Cooper, Mahony (1935), Rohweder (1937), Heiser, Whitaker (1948), Harling (1951), Huziwara (1955, 1958), Mulligan (1957), Arano (1965), Gadella, Kliphnis (1966) and Chuksanova, Svyeshnikova, Aleksandrova (1968), and on *E. annuus* — Tahara (1915, 1921), Holmgren (1919), Okabe (1934), Bergman (1944), Huziwara (1955, 1958), Montgomery, Yang (1960), Solbring, Anderson, Kyhos, Raven, Rüdenberg (1964), Arano (1965) and Mehra, Gill, Mehta, Sidhu (1965).

Our goal was to determine whether the plants from natural stands in Poland have the same numbers of chromosomes as plants from other region or whether they are different in the this respect.

MATERIAL AND METHODS

The material was collected from natural stands in Poland (Table 1) in the years 1968–1971.

Tabela 1

List of habitats *Erigeron canadensis* L. and *E. annuus* (L.) Pers.

Species	Place of origin	
Erigeron canadensis L. (2n = 18)	Kończyce Małe	Cieszyn*
	Istebna	,,
	Działdowo	Działdowo*
	Olsztyn-Kortowo	Olsztyn*
	Puszcza Piska	Pisz*
	Wolin	Wolin*
	Szczecin	Szczecin*
	Gdynia	Orłowo*
Erigeron annuus (L.) Pers. (2n = 27)	Kończyce Wielkie	Cieszyn*
	Wisła	Cieszyn*
	Pszczyna	Pszczyna*
	Olsztyn-Kortowo	Olsztyn*
	Puszcza Piska	Pisz*
	Elbląg	Elbląg*

*) District.

Root meristems of flowering plants were fixed in the field with 50% Nawashin's fixative. Roots which germinated on Petri dishes in the laboratory proved to be a more convenient material.

Specimens 10 μm thick were stained with 1% Gentian violet, and differentiated using a solution of phenol in xylene (1:3).

The drawings were made from samples observed under an Amplival microscope vatith and objective magnification 100× and an eyepiece magnification 20×.

RESULTS

Numbers of chromosomes

The numbers of chromosomes were determined in metaphases of the meristems of roots.

E. canadensis L. (2n=18)

In the plants of *E. canadensis* from natural stands in Poland the number of chromosomes 2n=18 was observed (Fig. 1, 3). The chromosomes were morphologically differentiated into 5 pairs of isobrachial and 4 pairs of heterobrachial ones (Figs. 3). Particular pairs corresponded to each other by their length and shape.

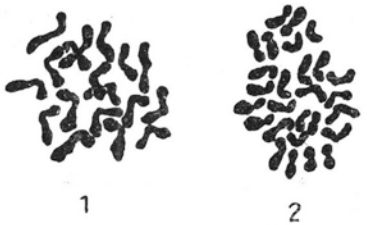

Fig. 1–2 Root-tip metaphyses. 1 — *Erigeron canadensis* L. (2n = 18), 2 — *E. annuus* (L.) Pers. (2n = 27) (×2400)

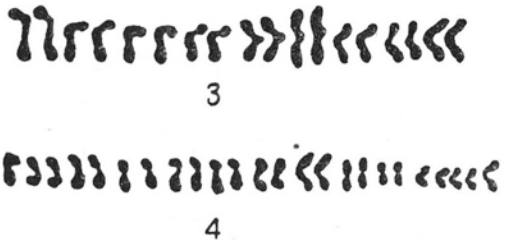

Fig. 3–4 Chromosomes from plate 1 and 2 drawn separately. 3 — *Erigeron canadensis* L. (2n = 18), 4—*E. annuus* (L.) Pers. (2n = 27) (×2400)

(Fig. 3). The length of the isobrachial chromosomes was 2.16–3.06 μm, and of heterobrachial ones 2.34–3.06 μm (Table 2).

Erigeron annuus (L.) Pers (2n=27)

Karyological investigations showed that plants of *E. annuus* derived from natural stands in Poland (Table 1) had 2n=27 chromosomes (Fig. 2, 4). Similarly as in *E. canadensis* the chromosomes were differentiated into isobrachial (5 pairs) and heterobrachial (8 pairs) ones. An additional unpaired isobrachial chromosome occurred. Both types of chromosomes were 0.36–0.72 μm long, (Tab. 2).

DISCUSSION

No karyological investigations on *Erigeron canadensis* and *E. annuus* from Central Europe had been undertaken prior to this one.

The number of chromosomes found for *E. canadensis* from natural stands in Poland (2n=18) agrees with the data published by several authors for this species from Japan, North America, the USSR (Uzbekistan Republic) and Western Germany.

The results found for *E. annuus* (2n=27) agree with the data for this species from Japan, India, North America and Sweden. Tahara, however, found 2n=26

Tabela 2

Comparison of the length and proportion of chromosome arms of *Erigeron canadensis* L. and *E. annuus* (L.) Pers.

Species	Proportion of arms	Aproximate length in microns	Number of pairs	Number of single chromosomes
Erigeron canadensis L. (2n = 18)	1:1	3.06	1	—
		2.97	1	—
		2.52	1	—
		2.25	1	—
		2.16	1	—
	1:3	3.06	1	—
		2.88	1	—
		2.61	1	—
		2.34	1	—
Erigeron annuus (L.) Pers. (2n = 27)	1:1	0.72	1	—
		0.63	1	—
		0.54	1	1
		0.45	1	—
		0.36	1	—
	1:3	0.72	2	—
		0.63	3	—
		0.45	1	—
		0.36	2	—

in material from Japan. Holmgren found the haploid chromosome number n=13 to 14 in plants from Sweden.

Chromosomes of both species were differentiatied into isobrachial and heterobrachial ones. An unpaired chromosome was found in *E. annuus*. Other chromosomes of this species and all those of *E. canadensis* could be grouped into homological pairs.

SUMMARY

Materials for the present study were collected from natural stands in Poland (Tab. 1).

The number of chromosomes 2n = 18 found in *Erigeron canadensis* corresponds to the number prevovusly observed by other scientists.

The number 2n = 27 chromosomes determined for *E. annuus* corresponds to the number published by other authors; however is discordant with the number 2n = 26 chromosomes, found by Tahara (1915, 1921) for the plants from the area of Japan, and Holmgren (1919) who found in this species from the area of Sweden haploid numbers in meiosis n = 13–14 chromosomes.

In both species chromosomes were differentiated — they were composed of isobrachial and heterobrachial chromosomes.

In *E. annuus* besides pairs of isobrachial and heterobrachial chromosomes one unpaired isobrachial chromosome alwyas occured.

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Badania kariologiczne u Erigeron canadensis L. i E. annuus (L.) Pers. ze stanowisk naturalnych w Polsce

Streszczenie

Materiał do badań zebrany został ze stanowisk naturalnych w Polsce (tab. 1).

Liczba chromosomów 2n = 18 stwierdzona u *E. canadensis* jest zgodna z liczbą podaną przez innych badaczy.

Ustalona liczba 2n = 27 chromosomów dla *E. annuus* odpowiada liczbie cytowanej przez innych autorów; niezgodna jest natomiast z liczbą 2n = 26 chromosomów którą podaje Tahara (1915, 1921) dla roślin z terenów Japonii i Holmgren (1919), który na materiale ze stanowisk w Szwecji, stwierdził u tego gatunku liczby haploidalne w podziale mejotycznym, dla tego gatunku n = 13–14, chromosomów.

U obu gatunków chromosomy wykazywały pod względem morfologii zróżnicowanie, a mianowicie na równoramienne i nierównoramienne chromosomy.

U *E. annuus* poza parami równoramiennych i nierównoramiennych chromosomów występował jeden nieparzysty chromosom równoramienny.