CYTOGENETIC RESEARCHES ON THE SPECIES *FILIPENDULA VULGARIS* MOENCH. (*FILIPENDULA HEXAPETALA* GILIB.)

CERCETĂRI CITOGENETICE LA SPECIA *FILIPENDULA VULGARIS* MOENCH. (*FILIPENDULA HEXAPETALA* GILIB.)

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Abstract

In this paper the authors present the karyotype of the species Filipendula vulgaris MOENCH., harvested from Seaca de Câmp village (Dolj County). The plant has a number of chromosomes 2n = 14: five pairs metacentrics, and one pair submetacentric, respectively subtelocentric. The species is considered as highly developed, because of the karyotype asymmetry.

Rezumat

În această lucrare, autorii prezintă cariotipul speciei Filipendula vulgaris MOENCH. recoltată din zona comunei Seaca de Câmp (Dolj). Planta are un număr de cromozomi 2n = 14. Cele şapte perechi de cromozomi sunt: cinci metacentrice şi câte una submetacentrică, respectiv subtelocentrică. Cariotipul fiind asimetric, planta este considerată ca evoluată.

Cuvinte cheie: *Filipendula vulgaris. (Filipendula hexapetala), cercetări citogenetice*
Key words: *Filipendula vulgaris. (Filipendula hexapetala), cytogenetic researches*

INTRODUCTION

From the systematic point of view the species *Filipendula vulgaris* takes part of the *Rosaceae* family. It is a perennial plant, frequent in the Romania's flora, through the grasslands and shrubs of the forest steppe zone (CIOCÂRLAN V., 2000; PÂRVU C., 1997; TIŢĂ I., 2005).

F. vulgaris is a medicinal plant used especially in the human traditional medicine. The flowers, having a pleasant smell and the roots contain active principles like: salicylic acid derivatives (methyl- and ethyl-salicylate, monotropin, salicin, spiraeoside), flavonoids (rutin, hyperoside), coumarins, organic acids, glucides, mineral salts etc. The medicinal product *Filipendulae vulgaris flos et radix* had the following properties: astringent, emollient, diuretic, antiasthmatic, antidysenteric, antihaemorrhoidal, antilithiasic (CIULEI I. et al., 1993; ISTUDOR VIORICA, 1998; PÂRVU C., 1997; TIŢĂ I., 2005).

The reason of our research is the elucidation of the chromosome number of this medicinal plant, because in the speciality papers the cytotype varies.

MATERIAL AND METHODS

The biological material has been represented by the small roots obtained directly from the plants harvested from Seaca de Câmp village, County of Dolj.

The chromosomal complement from the radicular meristems cells has been studied by Feulgen's method, using the squash type preparation. The microphotographs of metaphases have been made using an MBL 2100 microscope with photoadapter. The chromosomes were cut out and measured with an engineer compass. The karyotype for this species has been made by arranging the homologue chromosomes in a decreasing order according to their total length. During the measuring process of the total chromosomes length, the satellites length was not taken into account (FEDOROV A., 1969; RAICU P. et al., 1983).

Biometrical analysis of the karyotype comprised the following parameters:

- chromosomes branches length [μm];
- total chromosomes length [μm];
- relative chromosomes length [%];
- branches ratio (long/short);
- centromeric index, secondary constrictions;
- satellites length [μm], and
- chromosome type.

For the centromer position and the chromosome types defining, the standardized nomenclature of Levan (1966) (cit. by RAICU P. et al., 1983) has been used, as follows:

- chromosomes with a terminal centromer were designated as telocentrics (T);
- chromosomes with a centromer situated near the terminal region were designated as acrocentrics (A);
- chromosomes with a branches ratio between 1.0 and 1.7 were designated as metacentrics (M);
- chromosomes with a submedian centromer and a branches ratio between 1.7 and 3.0 were designated as submetacentrics (SM), and
- chromosomes with a centromer in the subterminal region and a branches ratio between 3.0 and 7.0 were designated as subtelocentrics (ST) (Figure 1).

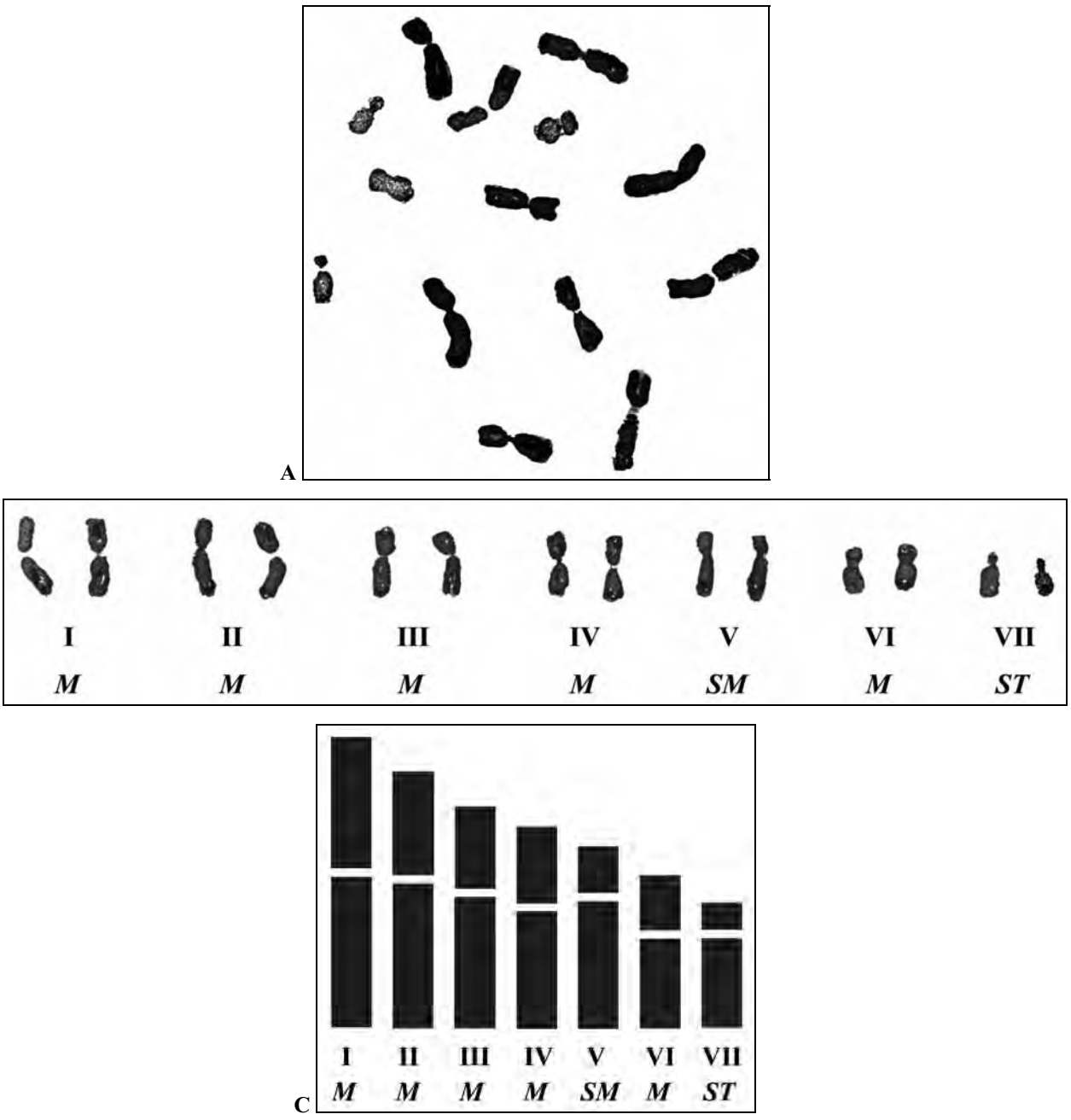

Figure 1. Metaphasis (A), karyotype (B), and idiogram (C) of the *Filipendula vulgaris* Moench.
[Metafaza (A), cariotipul (B) şi idiograma (C) la *Filipendula vulgaris* Moench.]

RESULTS AND DISCUSSIONS

In the speciality papers has been reported that the number of chromosomes for this species varies: 2n = 14 or 2n = 16 (BAKER H. & BAKER IRENE, 1967; CIOCÂRLAN V., 2000; FEDOROV A., 1969).

In our research, the number of chromosomes has been determined as 2n = 14.

The chromosome pairs I, II, III, IV, and VI, having the branch ratio between 1.16 and 1.63 are from metacentric type. The chromosome pair V having the branch ratio 2.72 is from submetacentric type. The chromosome pair VII having the branch ratio 3.24 is from subtelocentric type.

On the chromosomes, the satellites were not identified.

From the biometric analysis of the karyotype (Table 1) has been established that:

- the total length of the chromosomes are comprised between 2.84 and 6.85 μm;
- the relative length of the chromosomes varies between 8.17 and 19.66%;
- the centromeric index values cover the range between 23.60 and 46.25, and
- the branches ratio (long/short) values are comprised between 1.16 and 3.24.

Table 1.

Biometrical study of the *Filipendula vulgaris* MOENCH karyotype
[Studiul biometric al cariotipului la *Filipendula vulgaris* MOENCH]

Chromosomes	**Branches length [μm]**				**Total chromosome length [μm]**	**Relative chromosome length [%]**	**Centromeric index**	**Branches ratio (long/short)**	**Chromosome type**
	Long branch		*Short branch*						
	$\bar{x}$	$s\bar{x}$	$\bar{x}$	$s\bar{x}$					
I	3.68	0.30	3.17	0.13	6.85	19.66	46.25	1.16	*M*
II	3.50	0.10	2.50	0.10	6.00	17.28	41.65	1.40	*M*
III	3.17	0.21	2.00	0.05	5.17	17.02	38.67	1.59	*M*
IV	2.83	0.13	1.83	0.12	4.66	15.33	39.27	1.55	*M*
V	3.07	0.18	1.13	0.14	4.20	13.82	26.90	2.72	*SM*
VI	2.17	0.07	1.33	0.15	3.50	11.51	38.00	1.63	*M*
VII	2.17	0.07	0.67	0.16	2.84	8.17	23.60	3.24	*ST*

Based on the theory of Levitzky (1931) and Stebbins (1971) (cit. by RAICU P. et al., 1983), which consider that the symmetric karyotypes are primitives, and the asymmetric are much specialized, the evolution going from the symmetric to the asymmetric karyotype, we could make the affirmation that the species *Filipendula vulgaris* Moench. has an asymmetric karyotype, in consequence being highly developed.

CONCLUSIONS

1. The plant *Filipendula vulgaris* MOENCH., harvested from the flora of Seaca de Câmp village, County of Dolj, has a number of chromosomes 2n = 14.

2. The chromosome pairs I, II, III, IV, VI are from metacentric type, while the chromosome pairs V and VII are from submetacentric, respectively subtelocentric type.

3. From the evolutionary point of view, and starting from the karyotype analysis, has been found that the plant is highly developed.

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