

# THE CHARACTERISTICS OF MITOTIC CHROMOSOMES AT *CALENDULA OFFICINALIS* L.

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**Key words:** *Calendula officinalis*, metaphases, chromosomes.

**Abstract:** the metaphases which were analysed contains 32 small chromosomes (3.56 – 1.6 µm). In these metaphases were identified the follow types of chromosomes: **M**, **m** and **sm**.

## INTRODUCTION

The *Calendula officinalis* individuals contain a bitter compound, essential oils, saponins. The plants have golden - yellow flowers, and are present in yards and gardens. The plants are used in treatment of duodenal and / or gastric ulcerations, for liver illness and for dysmenorrhoea.

## THE AIM OF INVESTIGATIONS

The investigations aim was to find out and to characterise the chromosomal formula of Pot Marigold (*Calendula officinalis* L.). In selection and melioration actions, it is very important to establish the best ways to increase the amplitude of individual variability.

## MATERIALS AND METHODS

Seeds of Pot Marigold were obtained from Hălăreşti village (Vaslui County), harvested in 2000.

Germination (in average of 96%) was assured in Petri dishes, on filter paper moisturised with distilled water, at a medium temperature of  $22 \pm 2^{\circ}$  C. When the little roots have reached 5 – 10 mm in length, the plantlets were treated with 0.2% colchicines, for 2 hours, at room temperature. After that, the plantlets were kept for another 2 hours on filter paper moisturised with distilled water.

The settled (fixation) was assured for 16 hours in absolute ethylic alcohol / glacial acetic acid mixture (3 : 1), at room temperature.

For hydrolysis was assured in 50%HCl, for 10 minutes, at room temperature. The staining was realised with Carr reactive. The microscopic slides were prepared by squash method. The metaphases were photographed with 100x immersion objective, by Nikon Eclipse 600 camera.

Homologous chromosome groups were settled in accordance with the rapport between long arm and short arm, the mitotic index, the difference between arms and with the relative length of the chromosomes.

## RESULTS AND DISCUSIONS

In analysed metaphases, the chromosomes number was 32, so that  $2n = 32$  (Fig. 1 and Fig. 2). Chromosome length was between 3.56 µm (pair I) and 1.63 µm (pair XVI). Long arm length ranges between 1.62 µm (pair II) and 0.78 µm (pair XVI), and short arm length ranges between 1.47 µm (pair III) and 0,71 µm (pair XVI). The arms rapport was between 1.76 (pair IX) and 1.07 (pair XIII). The difference was between 0.69 µm (pair X) and 0.07 µm (pairs XIII and XVI). The centromeric index has had values between 48.35 (pair III) and 36.43 (pair X). The relative length was comprised between 8.79 (pair I) and 4.02 (pair XVI).

In accordance with these values, in the karyotype is present only one pair of chromosome **sm** (pair X). the other pairs being **m**. Chromosomes from pairs XIII (arms rapport of 1.07), II, III and XVI (arms rapport of 1.09) can be notified as **M**.

The haploid set has a length of 40.5 µm.

## CONCLUZIONI

*Calendula officinalis* L., from Hălărești population (Vaslui County), displayed 32 small chromosomes, of M, m and sm types

The arms rapport ranges between 1.76 and 1.07 and the difference was between 0.69  $\mu\text{m}$  and 0.07  $\mu\text{m}$ . The centromeric index has had values between 48.35 and 36.43, while the relative length was comprised between 8.79 and 4.02.

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**Fig.1. Metaphase at *Calendula officinalis* L. (2n=32)**



**Fig. 2. Metaphase at *Calendula officinalis* L. (2n=32)**

Table 1. The traits of mitotic chromosomes of *Calendula officinalis* L. ( $2n=32$ )

Chromosomes Pair	Type	Total length ( $\mu\text{m}$ )	Variability limits ( $\mu\text{m}$ )	Long arm ( $\mu\text{m}$ )	Variability limits ( $\mu\text{m}$ )	Short arm ( $\mu\text{m}$ )	Variability limits ( $\mu\text{m}$ )	Arms difference ( $\mu\text{m}$ )	Arms rapport	Centromeric index	Relative length
I	m	3.56	3.55-3.57	1.47	1.44-1.50	1.32	1.29-1.35	0.15	1.11	37.07	8.79
II	(M)m	3.15	3.14-3.16	1.62	1.60-1.64	1.43	1.41-1.45	0.19	1.13	45.39	7.77
III	(M)m	3.04	3.04-3.04	1.61	1.61-1.61	1.47	1.44-1.50	0.14	1.09	48.35	7.50
IV	m	3.03	3.02-3.04	1.56	1.55-1.58	1.43	1.41-1.45	0.13	1.09	47.19	7.48
V	m	2.85	2.82-2.88	1.41	1.39-1.44	1.25	1.25-1.25	0.16	1.12	43.85	7.03
VI	m	2.74	2.70-2.79	1.49	1.47-1.52	1.27	1.27-1.27	0.22	1.17	46.35	6.76
VIII	m	2.69	2.69-2.69	1.59	1.58-1.61	1.03	1.02-1.05	0.56	1.54	38.28	6.64
VIII	m	2.67	2.67-2.67	1.54	1.51-1.58	1.03	1.01-1.05	0.51	1.49	38.57	6.59
IX	m	2.53	2.52-2.54	1.49	1.44-1.55	0.95	0.95-0.95	0.54	1.56	37.49	6.24
X	Sm	2.47	2.47-2.48	1.59	1.58-1.61	0.90	0.85-0.95	0.69	1.76	36.43	6.24
XI	m	2.39	2.38-2.41	1.50	1.50-1.51	0.97	0.94-1.00	0.53	1.54	40.58	6.09
XII	m	2.28	2.25-2.32	1.16	1.14-1.17	0.98	0.91-1.05	0.18	1.18	42.98	5.90
XIII	(M)m	1.94	1.94-1.95	0.98	0.94-1.02	0.91	0.88-0.95	0.07	1.07	46.90	4.79
XIV	m	1.81	1.72-1.73	0.99	0.88-0.91	0.77	0.73-0.73	0.22	1.28	42.54	4.46
XV	m	1.72	1.79-1.83	0.89	0.97-1.02	0.73	0.70-0.85	0.16	1.34	42.44	4.24
XVI	(M)m	1.63	1.58-1.69	0.78	0.77-0.79	0.71	0.69-0.73	0.07	1.09	43.55	4.02