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Karyotype Analysis on Two Endemic *Salvia* L. (Lamiaceae) Species in Turkey

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Abstract: In the present Research, the chromosome number and morphology of *Salvia wiedemannii* Boiss. and *Salvia tchihatcheffii* (Fisch and Mey) Boiss. were analyzed. These species are endemic o Turkey. The chromosomes number of *Salvia wiedemannii* Boiss. is 2n = 14, *Salvia tchihatcheffii* (Fisch and Mey) Boiss. is 2n = 18.

Key words: *Salvia* L., karyotype analysis, Turkey

INTRODUCTION

The genus *Salvia* L. belongs to the Lamiaceae family and is represented by 88 taxa, of which 43 are endemic in Turkey (Davis, 1982; Dönmez, 2001). The genus *Salvia* L. is quite well known for its horticultural as well as for some commercial importance (Bhattacharya, 1978). Some of its species are commonly used in local folk medical practices and in cosmetics (Werker *et al*., 1985).

Studies on the karyotypes of this genus could not carry out enough because its chromosomes size are too small. Many researchers mentioned that the decreasing seeds germination percentage owing to B type chromosome in the *Salvia* species (Trudel and Morton, 1992).

The aims of this study was to determine the number and morphological properties of chromosomes in Turkish populations of *Salvia wiedemannii* Boiss. and *Salvia tchihatcheffii* (Fisch and Mey) Boiss. Both *Salvia wiedemannii* Boiss. and *Salvia tchihatcheffii* (Fisch and Mey) Boiss. are endemics and Irano-Turanien element.

MATERIALS AND METHODS

Samples were collected from different localities in Turkey. The Specimens kept in the herbarium of Ahi Evran University, Arts and Sciences Faculty, Department of Biology and numbered as Özkan 101 and 103. Samples were collected from the following locations: *Salvia tchihatcheffii*: B4 Ankara, Polatlı, 1000 m, 28 06 2003. *Salvia wiedemannii*: Ankara Beypazarı, 950 m, 14 07 2003. Seeds collected from various populations in Turkey were germinated in sterilized petri dishes. Then root tips were pretreated with saturated solution of ∝ monobromonaphtalene (16h) and fixed in a mixture of ethanol and acetic acid for 1 h. Root tips were hydrolyzed with 1 N HCl for 20 min at 60°C in an oven, then stained with feulgen reagent for 1 h in darkness and finally squashed in 45% acetic acid. Slides were examined under a Leica DM LB photomicroscope and photographs were taken, respectively.

The karyograms were drawn from mitotic metaphase. Chromosome measurements were based on five metaphase plates. Karyotype analysis were carried out according to the method described by Levan *et al*. (1964).

RESULTS

***Salvia wiedemannii*:** The chromosome number of this species was 2n = 14 (Fig. 1). The karyotype of this species consisted of 4 pairs of submedian (sm), 2 pairs of median point (M), 1 pairs of median region (m) (Fig. 3).

The 1st, 2nd, 4th and 7th chromosomes are submedian region (sm), the 3th and 6th chromosomes are median point (M), the 5th, chromosomes are median region (m). No satellite were observed in the karyotype of this species. Chromosomes vary from 1, 57-3.15 μm. The longest arm is 2.10 μm and the shortest arm is 0.52 μm. Karyotype details are shown Table 1.

***Salvia tchihatcheffii*:** The chromosome number of this species was 2n = 18 (Fig. 2). The karyotype of this species consisted of 3 pairs of median point (M), 2 pairs

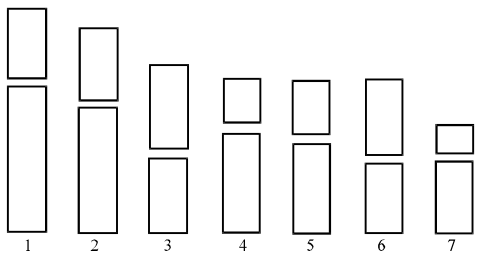

Fig. 1: Ideogram of chromosome complement of *S. wiedemannii*

Table 1: Karyotype details of somatic chromosomes of *S. wiedemannii*

Chromosome pairs	C (μm)	L (μm)	S (μm)	L/S	SAT	I	Centromeric position
1	3.15	2.10	1.05	2.0	-	33	Submedian (sm)
2	2.80	1.80	1.00	1.8	-	35	Submedian (sm)
3	2.36	1.18	1.18	1.0	-	50	Median (M)
4	2.10	1.50	0.60	2.5	-	28	Submedian (sm)
5	2.10	1.30	0.80	1.6	-	38	Median (m)
6	2.10	1.05	1.05	1.0	-	50	Median (M)
7	1.57	1.05	0.52	2.0	-	33	Submedian (sm)

Table 2: Karyotype details of somatic chromosomes of *S. tchihatcheffii*

Chromosome pairs	C (μm)	L (μm)	S (μm)	L/S	SAT	I	Centromeric position
1	2.90	2.50	0.40	6.25	-	13.9	Subterminal (st)
2	2.90	1.45	1.45	1.00	-	50.0	Median (M)
3	2.10	1.55	0.55	2.81	-	26.0	Submedian (sm)
4	2.00	1.05	0.95	1.10	-	47.5	Median(m)
5	1.57	1.32	0.25	5.28	-	15.9	Subtermina (st)
6	1.56	0.78	0.78	1.00	-	50.0	Median(M)
7	1.44	0.92	0.52	1.76	-	36.1	Submedian (sm)
8	1.31	0.78	0.52	1.50	-	39.6	Median (m)
9	1.31	0.65	0.65	1.00	-	50.0	Median (M)

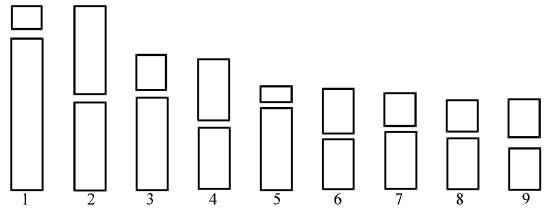

Fig. 2: Ideogram of chromosome complement of *S. tchihatcheffii*

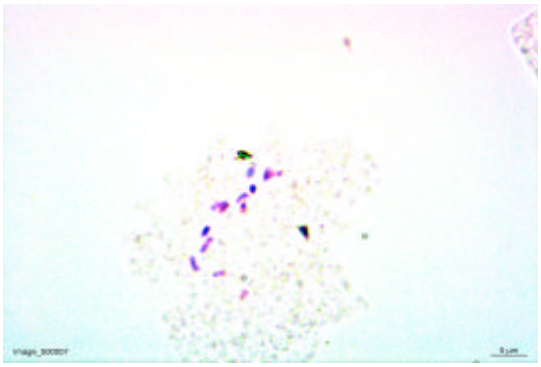

Fig. 3: Microphotograph of somatic metaphase chromosomes of *S. wiedemannii*

of median region (m), 2 pairs of subterminal (st) region and 2 pairs of submedian region (sm). 2nd, 6th and 9th chromosomes are median point (M), 4th, 8th, chromosomes are median region (m), the 3th and 7th chromosomes are submedian region (sm), the 1st and 5th chromosomes are subterminal region (st). Chromosomes vary from 1.31-2.90 μm. The longest arm is 2.50 μm and the shortest arm is 0.52 μm. No satellite were observed in the karyotype of this species (Fig. 4). Karyotype details, are shown Table 2.

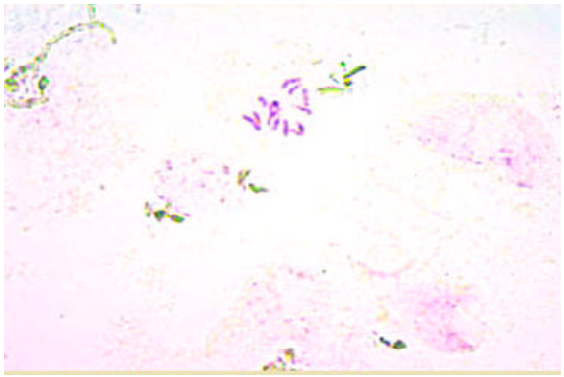

Fig. 4: Microphotograph of somatic metaphase chromosomes of *S. tchihatcheffii*

DISCUSSION

Studies on the karyotype of this genus are, so limited. Polomino *et al.* reported that the chromosomes of *Salvia lavandula* have not been determined so that its chromosomes are too small. Some researcher observed that the Mediterranean group seems to be characterized by x = 7 (Afzal-Rafii, 1976), those in Europe and Russia by x = 11 (Patudin *et al.*, 1974), those in California by x = 16 (Epling *et al.*, 1962). We observed similar results such as *Salvia wiedemannii* 2n = 14 and *Salvia tchihatcheffii* 2n = 18.

Estilai and Hashemi (1990) determined that the chromosomes numbers of *Salvia* species could vary between 2n = 14 and 2n = 64. It shows an agreement with our results.

Nakipolu *et al.* (1993a, b) observed that Salvia species had B type chromosomes but in our study we could not observe any B type chromosome. Özdemir and

Senel (1999) reported that *S. sclerea* chromosome number was 2n = 22 and the karyotypes of this species were median and submedian. In our study we observed that *Salvia wiedemannii* 2n = 14 and *Salvia tchihatcheffii* 2n = 18.

The karyotype of *Salvia wiedemannii* consisted of 4 pairs of submedian (sm), 2 pairs of median point (M), 1 pairs of median region (m) (Fig. 3). The karyotype of *Salvia tchihatcheffii* consisted of 3 pairs of median point (M), 2 pairs of median region (m), 2 pairs of subterminal (st) region and 2 pairs of submedian region (sm). 2nd, 6th and 9th chromosomes are median point (M), 4th, 8th, chromosomes are median region (m), the 3th and 7th chromosomes are submedian region (sm), the 1st and 5th chromosomes are subterminal region (st). No satellite were observed Both *Salvia wiedemannii* and *Salvia tchihatcheffii*.

In summary the study, showed that chromosome numbers and morphology were examined with details for two Endemic *Salvia* species in Turkey (*Salvia wiedemannii* Boiss., *Salvia tchihatcheffii* (Fisch and Mey) Boiss).

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