

CHROMOSOME COUNTS OF SIX TAXA OF LAMIACEAE FROM IRAN

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Somatic chromosome numbers of 6 species from Lamiaceae family were studied. The chromosome numbers for 5 taxa including *Lavandula sublepidota* $2n=18$, *Phlomis anisodonta* $2n=20$, *Phlomis pachyphylla* $2n=20$, *Eremostachys laevigata* $2n=22$ and *Otostegia michauxii* $2n=82$ are new reports. The chromosome number of *Nepeta depauperata* is $2n=18$. Ideograms are depicted for all studied species.

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Key words: Chromosome counts; ideogram; karyotype; Lamiaceae; Iran

شمارش کروموزومی برای شش گونه از خانواده نعنائیان از ایران
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عدد کروموزومی شش گونه متعلق به خانواده نعنائیان در این تحقیق بررسی گردید. شمارش کروموزومی برای پنج گونه *Phlomis pachyphylla* ($2n=20$), *Otostegia michauxii* ($2n=82$), *Phlomis anisodonta* ($2n=20$), *Lavandula sublepidota* ($2n=18$) و *Eremostachys laevigata* ($2n=22$) برای اولین بار گزارش می‌گردد. عدد کروموزومی برای گونه *Nepeta depauperata* نیز $2n=18$ بدست آمد. پارامترهای کروموزومی گونه‌ها بررسی شد و ایدیوگرام آنها رسم گردید.

INTRODUCTION

Chromosome information is an important key data for taxonomy, phylogeny and genetic in plants. chromosomal data such as number, morphology and behavior of chromosomes profoundly affected the evaluation of taxonomic investigations (Stace, 2000). Chromosome number and karyotype of 6 species from Lamiaceae, mostly endemics, are investigated.

Karyological data concerning chromosome number has already been published for *Nepeta depauperata* Hasaninejad & al. (2020), based on a specimen collected from Hormozgan Province, reported it as diploid with $2n=2x=34$. In our work, the count for this species is from the specimen collected in Fars Province. The chromosome numbers for 5 species are reported here for the first time.

MATERIALS AND METHODS

For cytological study, rootlets were collected from germinated seeds on wet filter paper in petri dishes at 22°C temperature, when they reached 1–1.5 cm in length, rootlets were separated. The root tips meristems were treated with 0.5% saturated α -Bromo naphthalene at 4°C for 3–4 h. Then they were fixed in 10% formaldehyde and chromium trioxide (1:1) for 16 to 20 h at 4°C. Then the root tips were rinsed for 1 h in distilled water. Hydrolysis was carried out with NaOH (1 normal) at 60°C for 20–30 minutes and used hematoxylin-iron for chromosome staining for 1 h at room temperature. Root tips were squashed in a droplet of 45% acetic acid. The best metaphase plates were selected and measured by Micromasure 3.3 software (Reeves et al. 2000). In each mitotic metaphase the arm's length of each chromosome was measured. The chromosome morphology was studied based on Levan & al. (1964). Stebbins karyotype asymmetry levels were used to define asymmetry levels (1971). Ideograms were depicted for each species. Details regarding to the studied materials are presented in table 1. Vouchers are deposited in the Herbarium of Fars Agricultural and Natural Resources Research and Education Centre.

RESULTS

Mitotic chromosome counts for examined species are presented as follows:

Eremostachys laevigata Bunge

Specimen examined: Iran, Fars, Shiraz, Hossain Abad. 2000 m. Hatami 25126.

This taxon grows in the flora Iranica area (Iran and Iraq). This species was diploid with $2n=2x=22$. The chromosomes were mostly metacentric (m) and karyotypic formula was $9m+2sm$ (fig. 1e). They were categorized in type 2A. With this study, the chromosome number of the taxon is reported for the first time.

Lavandula sublepidota Rech. f.

Specimen examined: Iran, Fars, Darab. 1200 m. Hatami 25122.

Lavandula sublepidota is an endemic species of Iran and grows in the south of Iran. Its chromosome count is reported here for the first time. This species was diploid with $2n=2x=18$ and the basic chromosome number of $x=9$. Four pairs of chromosomes of our sample were metacentric (m) and 5 pairs were submetacentric (sm) with karyotype formulas

$4m+5sm$ (fig. 1a). They were categorized in type 1A (Stebbins 1971).

Nepeta depauperata Benth.

Specimen examined: Iran, Fars, Firoozabad, Meimand. 2750 m. Hatami 25125.

This taxon is an endemic species of Iran and grows in south and south west of Iran. The studied specimens showed a diploid chromosome number of $2n=2x=18$ and basic chromosome number of $x=9$. The chromosomes were metacentric (m) and submetacentric (sm) and karyotypic formula was $4m+5sm$ (fig. 1d). They were categorized in type 2A. Chromosome number of *N. depauperata* was previously reported $2n=34$ by Hasaninejad & al. (2020). A repeat of counts from different localities in Iran, may elucidate the variation in chromosome number for this species.

Ostostegia michauxii Briq.

Specimen examined: Iran, Fars, Kazeroon. 1100 m. Hatami 25127.

Ostostegia michauxii is an endemic species of Iran and grows in Fars Province. The chromosome number $2n=82$ was counted for this species. The chromosomes were metacentric (m) and submetacentric (sm) and karyotypic formula was $52m+29sm+1st$ (fig. 1f). They were categorized in type 2A. According to the data, of our knowledge, the chromosome number of this species was not previously reported, so, here we report it for the first time.

Phlomis anisodonta Boiss. subsp. *occidentalis*

Jamzad

Specimen examined: Iran, Fars, Sepidan, Komehr. 2500 m. Hatami 25123.

Phlomis anisodonta grows in central and western part of Iran and Iraq. This specie showed a diploid chromosome number of $2n=2x=20$ and the basic chromosome number of $x=10$. The karyotype formulas were $9m+1sm$ (fig. 1b). Most of them were metacentric and were categorized in type 2A. This is the first chromosome count for this species.

Phlomis pachyphylla Rech.f.

Specimen examined: Iran, Fars, Kazeroon. 1200 m. Hatami 25124.

Phlomis pachyphylla is an endemic species of Iran and grows only in the south of Iran. This species was diploid with $2n=2x=20$. All chromosomes are metacentric (m) and are categorized in type 1A. Karyotype formula was $10m$ (fig. 1c). This is reported here for the first time.

Table 1. Karyotype characters of the 6 studied species. Abbreviations: TL: total length of chromosome, LA: long arm, SA: short arm, AR: arm ratio, DRL: difference of relative length, CI: centromeric index, A₁: intrachromosome asymmetry index, A₂: interchromosome asymmetry index, VRC: value of relative chromatin, TF%: total form percentage, SC: symmetry classes of Stebbins and K. F.: karyotype formula.

species	TL	LA	SA	AR	DRL	CI	A ₁	A ₂	VRC	%TF	SC	K.F.
<i>Eremostachys laevigata</i>	6.75	4.06	2.69	1.63	3.76	0.39	0.33	0.12	6.75	39.85	2A	9m+2sm
<i>Lavandula sublepidota</i>	2.58	1.61	0.97	1.70	5.80	0.37	0.40	0.16	2.58	37.52	1A	4m+5sm
<i>Nepeta depauperata</i>	2.11	1.40	0.71	2.03	4.28	0.34	0.48	0.11	2.11	33.77	2A	4m+5sm
<i>Otostegia michauxii</i>	1.93	1.18	0.75	1.64	0.89	0.38	0.36	0.17	2.36	38.79	2A	52m+29sm+1st
<i>Phlomis anisodonta</i>	5.59	3.20	2.39	1.38	5.44	0.43	0.24	0.16	5.59	42.77	2A	9m+1sm
<i>Phlomis pachyphylla</i>	6.74	3.80	2.95	1.31	3.72	0.43	0.22	0.12	6.75	43.69	1A	10m

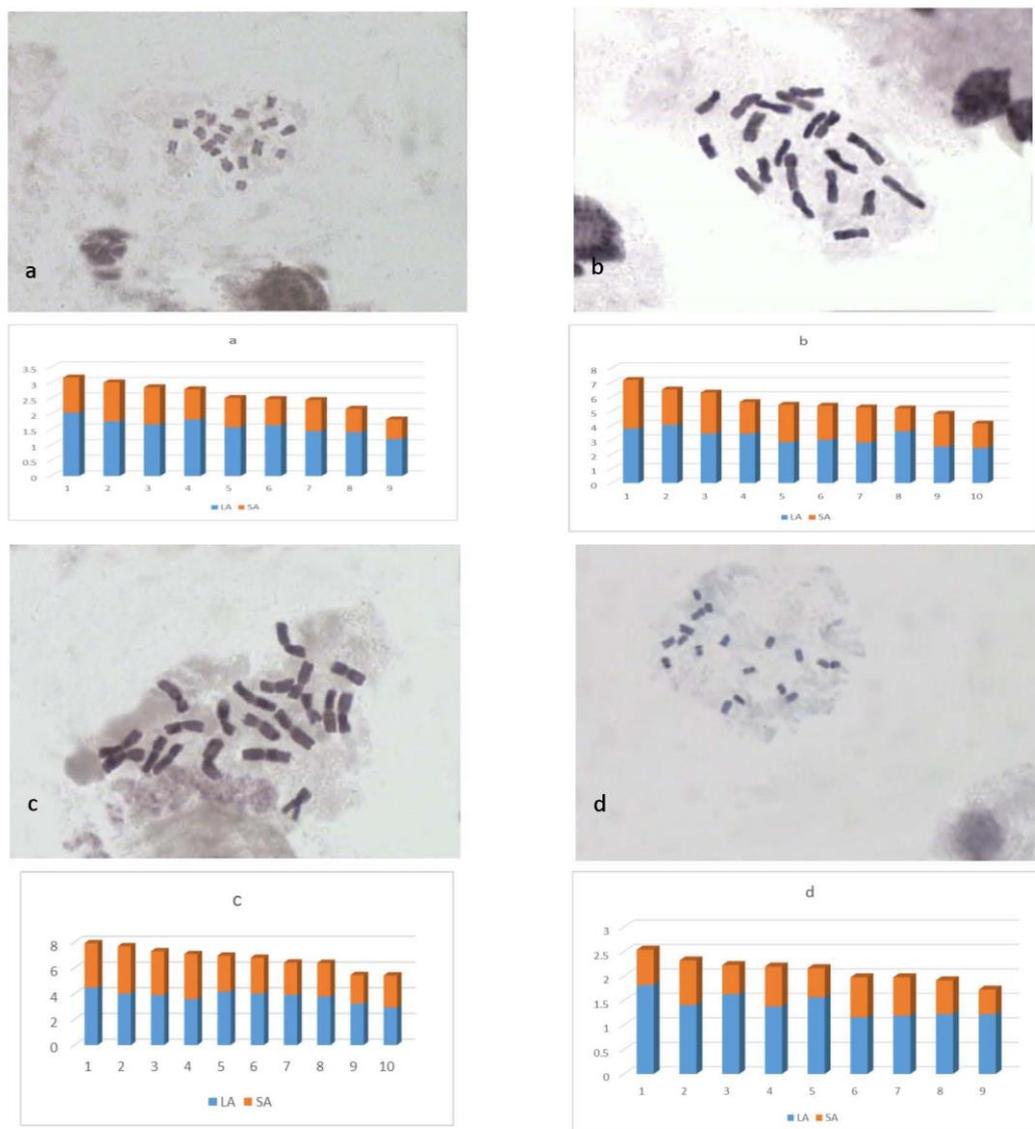


Fig. 1: Somatic metaphases and Ideograms of studied species. a, *Lavandula sublepidota* (2n=18); b, *Phlomis anisodonta* (2n=20); c, *Phlomis pachyphylla* (2n=20); d, *Nepeta depauperata* (2n=18); e, *Eremostachys laevigata* (2n=22); f, *Otostegia michauxii* (2n=82).

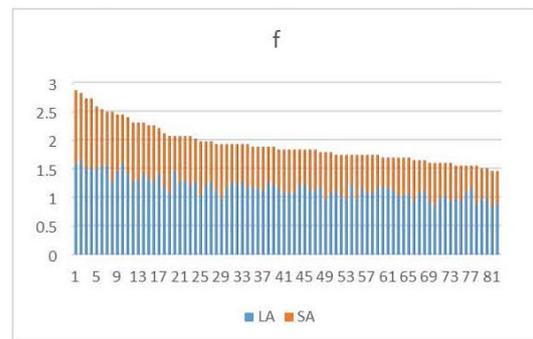
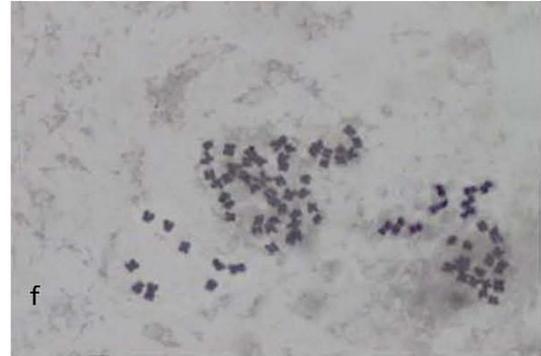
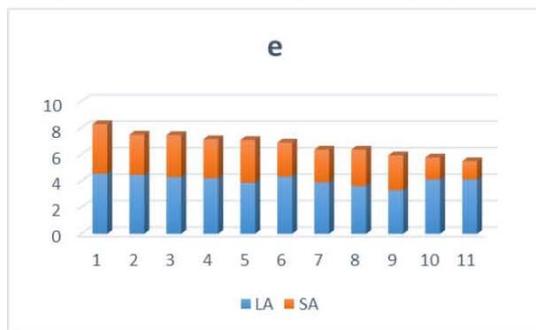


Fig. 1. Continued.

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