

## CHROMOSOME COUNT REPORTS OF SEVEN ENDEMIC AND NATIVE SPECIES OF IRAN

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The somatic chromosome number of 7 species from 5 families of angiosperms is reported from Iran. The chromosome numbers for 4 taxa including *Tanacetum dumosum* (Asteraceae)  $2n=18$ , *Phlomis elliptica*  $2n=20$  & *Phlomis aucheri* (Lamiaceae)  $2n=20$  and *Alcea aucheri* (Malvaceae)  $2n=42$  are new reports. Also, the tetraploid level ( $2n=4x=32$ ) for *Fibigia umbellata* is reported for the first time.

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**Key words:** *Alcea*; *Anisosciadium*; *Fibigia*; *Phlomis*; *Pseudofortuynia*; *Tanacetum*; Iran; new counting

گزارش شمارش کروموزومی هفت گونه انحصاری و بومی از ایران

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تحقیق حاضر عدد کروموزومی هفت گونه متعلق به پنج خانواده از ایران را گزارش می‌کند. شمارش کروموزومی برای چهار گونه شامل:

*Phlomis aucheri* ( $2n=20$ ) و *Tanacetum dumosum* ( $2n=18$ ), *Phlomis elliptica* ( $2n=20$ ), *Alcea aucheri* ( $2n=42$ )

بار گزارش می‌شود. همچنین سطح تتراپلویدی ( $2n=4x=32$ ) برای گونه *Fibigia umbellata* نیز برای نخستین بار ارایه شده است. پارامترهای

کروموزومی آنها بررسی شد و ایدیوگرام هر گونه رسم گردید.

### INTRODUCTION

Chromosome number is the karyotype feature most commonly used in cytotaxonomical analyses (Guerra, 2008) and chromosomal data such as number, morphology and behavior of chromosomes profoundly affected the evaluation of taxonomic investigations (Stace, 2000). The chromosome numbers for four species (*Tanacetum dumosum*,

*Phlomis elliptica*, *Alcea aucheri* and *Phlomis aucheri*) have not been reported yet, so in this study we investigate the karyotypes 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 of  $\alpha$ -Bromo naphthalene at 4°C for 3-4 h. Then they were fixed in 10% formaldehyde and chromium trioxide (1:1) for 20 to 24 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 1-2 h at room temperature. Root tips were squashed in a droplet of 45% acetic acid. The preparations were observed with an optical microscope (BH2 Olympus supplemented Digital color video camera) at a magnification of 2000x. The best metaphasical plates were selected and measured by Micromesure 3.3 software (Reeves & al. 2000). In each mitotic metaphase the arm's length of each chromosome was measured. Details regarding 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

The chromosome counts of examined species are given below:

### Asteraceae

*Tanacetum dumosum* Boiss.

This taxon is an endemic species for Iran. This species was diploid with  $2n=2x=18$ . The chromosomes were metacentric (m) and submetacentric (sm) (fig. 1) and are categorized in type 2A (table 1, 2). Ideogram is depicted for this species (fig. 1). According to data, the chromosome number of this species is reported here for the first time.

### Brassicaceae,

*Fibigia umbellata* (Boiss.) Boiss.

This species is an endemic species for Flora Iranica area (Iran and Iraq). This species was tetraploid with  $2n=4x=32$ . The chromosomes were mostly submetacentric (sm) (fig. 1) and are categorized in type 2A (table 1, 2). Ideogram is depicted for this species (fig. 1).  $2n=4x=32$  is a new ploidy level for this species. Previous chromosome count for this species was  $n=8$  by Aryavand (1983).

*Pseudofortuynia leuoclada* (Boiss.) Khosravi

This species is endemic for Iran and is found in a

limited area of north east of Fars province. In 2003 it has been renamed from *Pseudofortuynia esfandiarii* to *Pseudofortuynia leuoclada* by Khosravi (Khosravi, 2003). This species was diploid with  $2n=2x=14$ . The chromosomes were mostly metacentric (m) (fig. 1) and are categorized in type 1A (table 1, 2). Ideogram is depicted for this species (fig. 1). Our results are agreement with the previous reports of  $n=7$  by Aryavand (1975).

### Lamiaceae

*Phlomis elliptica* Benth.

This taxon is an endemic species for Iran. This species was diploid with  $2n=2x=20$ . The chromosomes were metacentric (m) (fig. 1) and are categorized in type 1A (table 1, 2). Ideogram is depicted for this species (fig. 1). With this study, the chromosome number of the taxon is reported for the first time.

*Phlomis aucheri* Boiss.

This taxon is an endemic species for Iran. This species was diploid with  $2n=2x=20$ . The chromosomes were metacentric (m) and submetacentric (sm) (fig. 1) and are categorized in type 2A (table 1, 2). Ideogram is depicted for this species (fig. 1). This is the first chromosome count for this species.

### Malvaceae

*Alcea aucheri* (Boiss.) Alef.

This taxon is an endemic species to flora Iranica area (Iran, Iraq and Afghanistan). This species was hexaploid with  $2n=6x=42$ . The chromosomes were metacentric (m) and submetacentric (sm) (fig. 1) and are categorized in type 2B (table 1, 2). Ideogram is depicted for this species (fig. 1). This is the first chromosome count for this species.

### Apiaceae

*Anisosciadium orientale* DC.

This taxon is distributed in the south of the Iran. It was founded chromosome number  $2n=22$  for this species and all chromosomes are metacentric (m) and are categorized in type 1A (fig. 1, table 1, 2). Ideogram is depicted for this species (fig. 1). This is the second report on the chromosome numbers for this species. Previous chromosome count for this species is  $n=11$  by Ghaffari (1987).

Table 1. Karyotype characters and collection data of the studied species (the voucher numbers belong to the Herbarium of Fars Agricultural and Natural Resources Research and Education Centre).

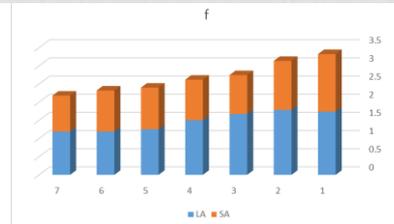
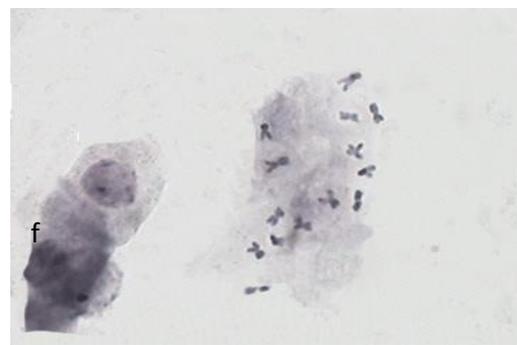
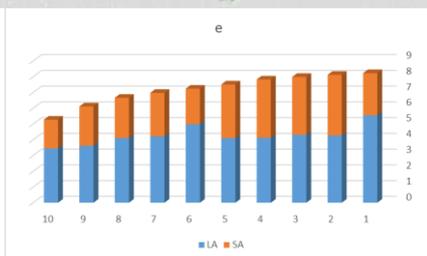
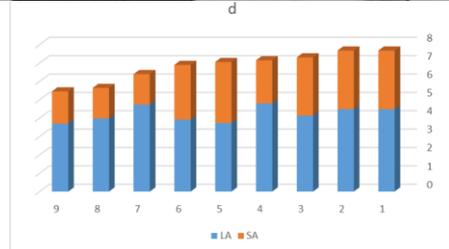
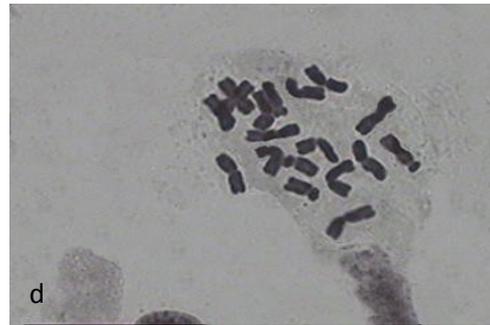
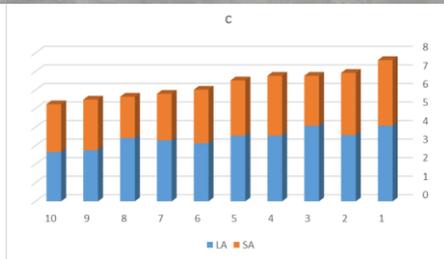
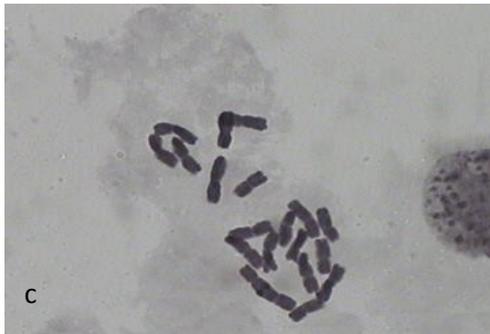
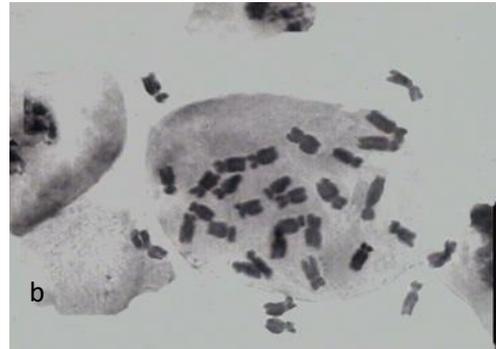
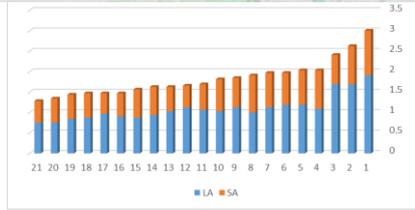
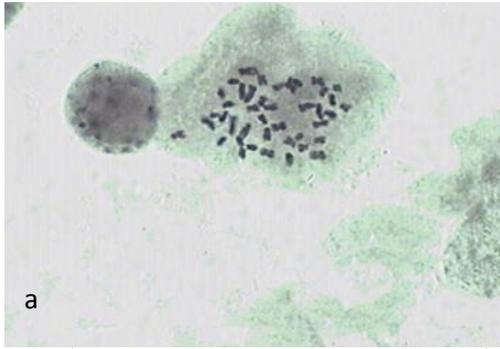
species	Family	locality	2n	A1	A2	VRC	%TF	SC	K.F.
<i>Tanacetum dumosum</i>	Asteraceae	Iran, Fars, Shiraz, Telecommunication Station of Maharlu, 9590	2x=18	0.38	0.12	6.81	38.02	2A	5m+4sm
<i>Fibigia umbellata</i>	Brassicaceae	Iran, Fars, Iran, Fars, Soorian, Ghadagaheh Abouhanifeh, 2963	2x=32	0.50	0.17	4.79	33.03	2A	4m+11sm+1st
<i>Pseudofortuynia leucoclada</i>	Brassicaceae	Iran, Fars, Abadeh, Shourgestan station, 12856	2x=14	0.18	0.16	2.67	44.72	1A	7m
<i>Phlomis elliptica</i>	Lamiaceae	Iran, Fars, Shiraz, Hossanabad Station, 997	2x=20	0.15	0.12	6.28	45.73	1A	10m
<i>Phlomis aucheri</i>	Lamiaceae	Iran, Fars, Dehbid site, 15773	2x=20	0.31	0.13	7.19	40.61	2A	7m+3sm
<i>Alcea aucheri</i>	Malvaceae	Iran, Fars, Shiraz, Mianjangal station, 15354	2x=42	0.33	0.24	1.83	39.41	2B	15m+6sm
<i>Anisosciadium orientale</i>	Apiaceae	Iran, Fars, Shiraz, Mianjangal station, 13077	2x=22	0.14	0.10	2.49	46.05	1A	11m

2n: Diploid chromosome numbers A<sub>1</sub>: intrachromosome asymmetry index, A<sub>2</sub>: interchromosome asymmetry index, TF%: total form percentage, VRC: value of relative chromatin, SC: symmetry classes of Stebbins and K.F.: karyotype formula.

Table 2. Mean of chromosomes analysis of seven species.

species	TL	LA	SA	AR	CI	DRL	%TF	%SA	%LA
<i>Tanacetum dumosum</i>	6.81	4.22	2.59	1.77	0.37	3.63	38.02	4.22	6.53
<i>Fibigia umbellata</i>	4.79	3.20	1.58	2.12	0.33	4.34	33.03	2.06	4.18
<i>Pseudofortuynia leucoclada</i>	2.67	1.48	1.19	1.24	0.45	6.11	44.72	6.39	7.90
<i>Phlomis elliptica</i>	6.28	3.41	2.87	1.20	0.46	3.79	45.73	4.57	5.42
<i>Phlomis aucheri</i>	7.19	4.27	2.92	1.63	0.40	4.11	40.61	4.06	5.94
<i>Alcea aucheri</i>	1.83	1.11	0.72	1.55	0.40	4.50	39.41	1.88	2.89
<i>Anisosciadium orientale</i>	2.49	1.35	1.15	1.17	0.46	2.73	46.05	4.19	4.90

TL: total length of chromosome, LA: long arm, SA: short arm, AR: arm ratio, CI: centromeric index, DRL: difference of relative length, TF%: total form percentage, %SA: Relative length percentage of short arm, %LA: Relative length percentage of long arm.



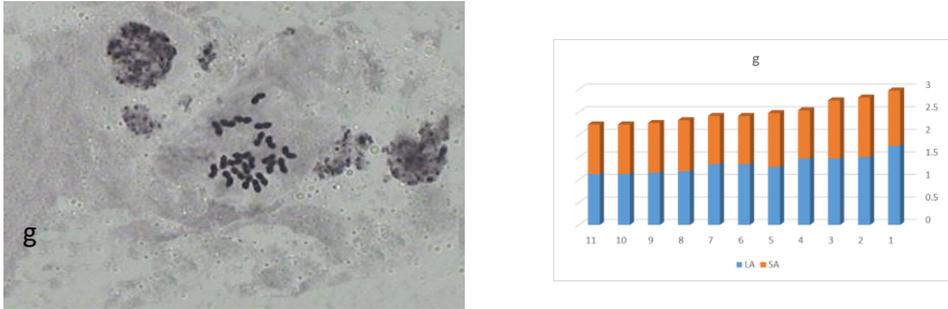


Fig. 1. Somatic metaphases and Ideograms of, a: *Alcea aucheri* ( $2n=42$ ), b: *Fibigia umbellate* ( $2n=32$ ), c: *Phlomis elliptica* ( $2n=20$ ), d: *Tanacetum dumosum* ( $2n=18$ ), e: *Phlomis aucheri* ( $2n=20$ ), f: *Pseudofortuynia leuoclada* ( $2n=14$ ), g: *Anisosciadium orientale* ( $2n=22$ ).

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