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CHROMOSOME COUNT REPORTS OF TWO RARE ENDEMIC SPECIES OF TANACETUM IN IRAN

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The present study is reported somatic chromosome number of two *Tanacetum* species including *T. stapfianum* (Rech.f.) podlech (2 population) and *T. lingulatum* (Boiss.) Bornm. (1 population) for the first time. They belong to *Asteraceae* family and are endemic species from Iran. Two species of *Tanacetum* were collected from their habitats to investigate their karyotypes. Both species were diploid and chromosome numbers were 2n=2x=18. Ideograms are depicted for each population.

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Key words: *Asteraceae*; Chromosome number; new counting; *Tanacetum;* Iran

گزارش شمارش کروموزومی دو گونه انحصاری نادر از جنس Tanacetum در ایران

سارا صادقیان: کارشناس پژوهشی بخش تحقیقات منابع طبیعی، مرکز تحقیقات و آموزش کشاورزی و منابع طبیعی استان فارس، سازمان تحقیقات، آموزش و ترویج کشاورزی، شیراز، ایران

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تحقیق حاضر عدد کروموزومی دو گونه Tanacetum به نام‌های T. stapfianum (Rech. f.) podlech (۲ جمعیت) و T. lingulatum (Boiss.) Bornm. (یک جمعیت) را برای اولین بار گزارش می‌کند. این گونه‌ها متعلق به خانواده Asteraceae و جزء گیاهان انحصاری ایران می‌باشند. پارامترهای کروموزومی آنها بررسی شد. هر دو گونه دیپلوئید و دارای فرمول کاریوتایپی ۲n =۲x=۱۸ بودند. ایدیوگرام آنها نیز رسم گردید.

INTRODUCTION

The genus *Tanacetum* L. belongs to Asteraceae family. It includes about 160 species in the world and is the third largest genus of tribe Anthemideae, distributed in Asia, North Africa, North America and Europe (Oberprieler & al. 2007). This genus has 54 species in the area of Flora Iranica (podlech 1986) and has 31 species in Iran of which 16 species are endemics (Mozaffarian 2005, 2008). Many karyological data concerning chromosome numbers have already been

published in *Tanacetum* and the most common basic chromosome number in the genus was found to be x=9. There are some reports of ploidy levels in some species. Javadi (2017) studied 14 populations of *Tanacetum polycephalum* and *Tanacetum parthenium* from different parts of Iran and reported that in all of them the basic chromosome number was x=9 and showed two ploidy levels (diploid and tetraploid). Sonboli & al. (2011) studied *T. fisherae* from Kerman province and showed chromosome number 2n=44+1B that indicates a pentaploid level (5x) based on x=9, which is a new ploidy level for this genus. Chehregani & al. (2011) recorded various levels of polyploidy within 14 populations of *T. polycephalum*. The number of chromosome was 18 (diploid), 36 (tetraploid) and 54 (hexaploid). Chehregani & al. (2012) also reported evolutionary karyotypic variation in *Tanacetum parthenium* populations in Iran and confirmed the existence of two levels of ploidy, diploid (2n=2x=18) and tetraploid (2n=4x=36) in the species. The chromosome numbers for the endemic species, *Tanacetum stapfianum* and *Tanacetum lingulatum* have not been reported yet. In this study we investigated the karyotypes of these two species for the first time.

MATERIALS AND METHODS

Two species *Tanacetum stapfianum* (two populations) and *Tanacetum lingulatum* (one population) have been studied (table 1). Vouchers are deposited in the Herbarium of Fars Agricultural and Natural Resources Research and Education Centre of Iran.

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 treated with 0.5% saturated of α-Bromo naphthalene at 4°C for 4-5 h. Then 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 60ºC for 20-25 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.

RESULTS

There was no difference between basic chromosome number of the two species (x=9). The somatic chromosome numbers (2n), karyotype formula and parameters for the studied species and populations are summarized in table 2. Two species were diploid with 2n=2x=18. The chromosomes were mostly metacentric (m) (levan & al. 1964), (fig. 1) and two populations of *T. stapfianum* are categorized in type 1A and *T. lingulatum* species is categorized in type 2A (table 1). Ideograms are depicted for each species and population (fig. 2).

Table 1. Karyotype characters of two *Tanacetum* species. 2n: Diploid chromosome numbers; A_1: intrachromosome asymmetry index; A_2: interchromosome asymmetry index; TF%: total form percentage; DRL: difference of relative length; VRC: value of relative chromatin; SC: symmetry classes of Stebbins and K.F.: karyotype formula.

species	locality	2n	A1	A2	VRC	DRL	%TF	SC	K.F.
Tanacetum stapfianum (Dasht-e Arjan)	Iran, Fars province, west of Shiraz, Dasht-e Arjan, 12812.	2x=18	0.19	0.13	8.20	4.66	44.75	1A	7m+2sm
T. stapfianum (Bamoo protected area)	Iran, Fars province, north of Shiraz, Bamoo protected region, 12813.	2x=18	0.21	0.13	8.90	4.51	43.91	1A	9m
T. lingulatum	Iran, Fars province, east of Shiraz, Sarvestan, 12814.	2n=18	0.26	0.17	6.09	5.55	41.88	2A	8m+1sm

Table 2. Mean of chromosomes analysis of two *Tanacetum* species. 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.

species	TL	LA	SA	AR	CI	DRL	%TF	%SA	%LA
*Tanacetum stapfianum (*Dasht-e Arjan*)*	8.20	4.53	3.67	1.27	0.45	4.66	44.75	4.97	6.13
*T. stapfianum (*Bamoo protected area*)*	8.87	4.96	3.91	1.28	0.44	4.51	43.91	4.88	6.19
T. lingulatum	6.09	3.54	2.55	1.45	0.42	5.55	41.88	4.65	6.04

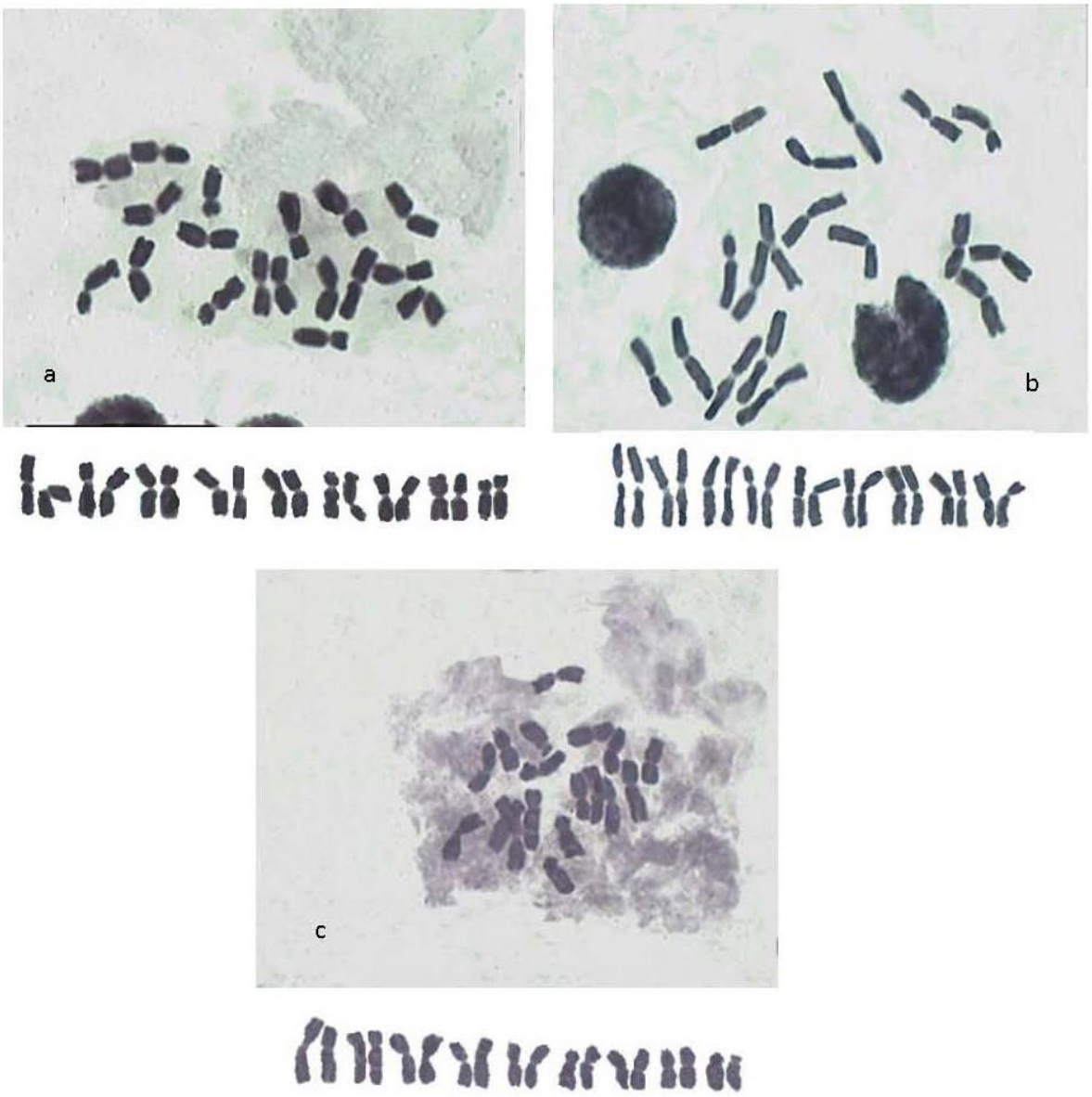

Fig. 1. Somatic metaphases in *Tanacetum* species. a, *T. stapfianum* (population of Dasht-e Arjan)*;* b, *T. stapfianum* (population of Bamoo protected area) and c, *T. lingulatum*.

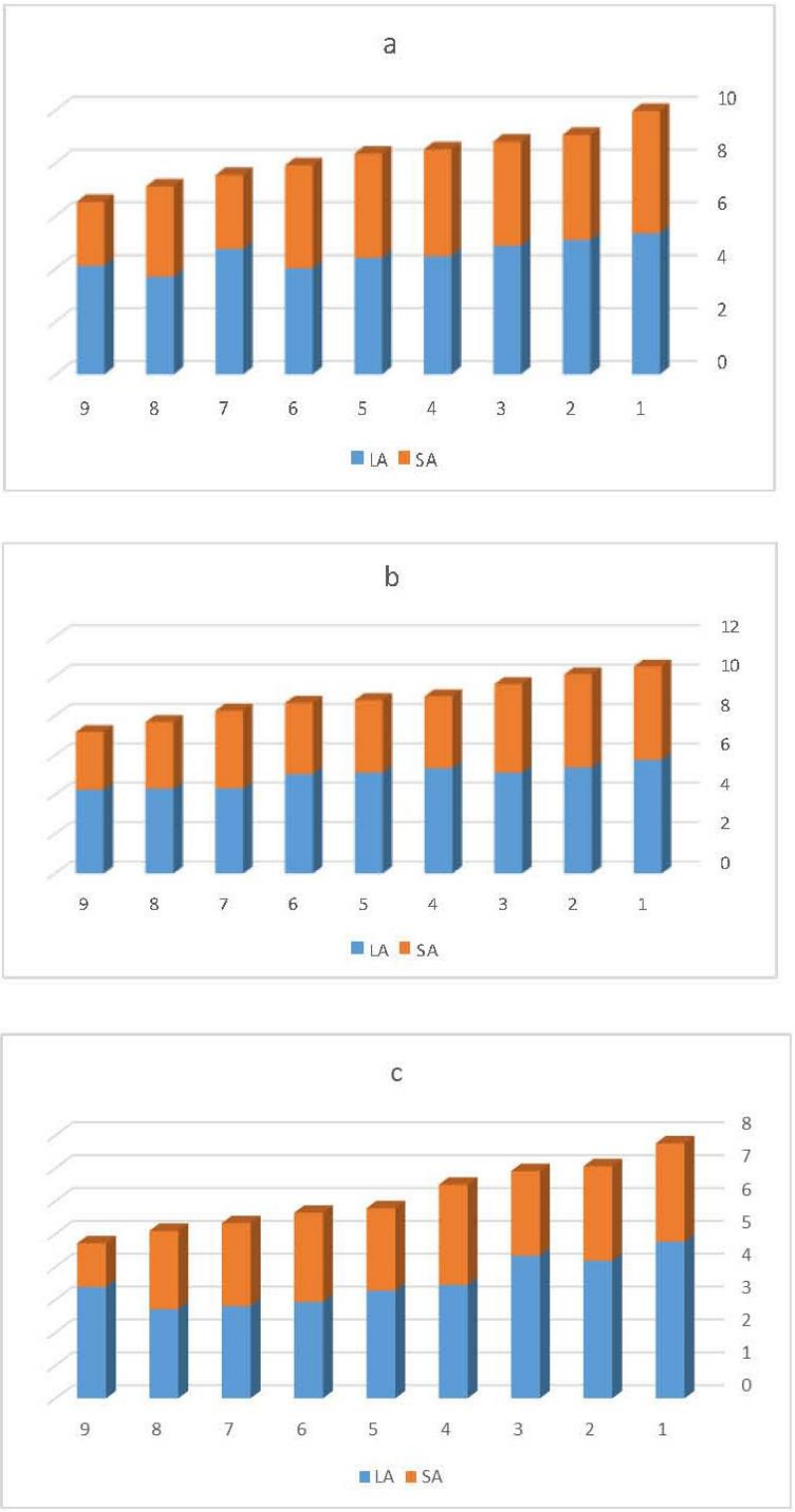

Fig. 2. Ideograms of *Tanacetum* species. a, *T. stapfianum* (population of Dasht-e Arjan); b: *T. stapfianum* (population of Bamoo protected area) and c: *T. lingulatum*.

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