CHROMOSOME STUDIES IN SOME SPECIES OF THE GENUS SCORZONERA L. (ASTERACEAE) IN IRAN

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Chromosome Counts for 12 Iranian species of *Scorzonera* L. are reported. Six of them are reported for the first time. Mitotic behavior are noted in some species.

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Key words. Asteraceae, Scorzonera, Chromosome, Iran, Mitosis.

مطالعات کروموزومی بر روی برخی از گونه‌های جنس **Scorzonera L.** از ایران

سید رضا صفوی

مشاهدات کروموزومی ۱۶ نمونه متعلق به ۱۲ گونه گزارش می‌شود. شش گونه‌از گونه‌های مذکور برای این اولین بار شمارش کروموزمی شده‌اند. همچنین رفتار کروموزمی در تقسیم میتوز گونه‌ها مورد توجه قرار گرفته است.

INTRODUCTION

From 61 species of *Scorzonera* L. cited in the Flora Iranica (Rechinger 1977), 52 species have been recorded from Iran. Chromosome numbers of the genus *Scorzonera* ranges from 2n=12 to 2n=14 and 28 [Fedorov (1969), Casas (1977), Moore (1982), Goldblatt & Dale (1975-1991)].

In this paper, choromosome studies for 16 specimens including 12 species are reported, six of which are for the first time. Voucher specimens are preserved in the herbarium of Research Institute of Forests & Rangelands (TARI).

MATERIALS AND METHODS

Achenes were taken from the herbarium materials (tab. 1). Then, the root tips from germinated achenes fixed in the fixing fluid (3: 1; absolute ethanol / glacial acetic acid). Root tops were squashed and stained in Fe-acetocarmine (Darlington & Wylie 1955). Chromosome counts were carried out from the mitotic microsporocytes which were prepared as mentioned above. Paintig of chormosomes were done by using a painting tube of microscope at the magnification of 680X and 1660X, (Figs. 1-12).

OBSERVATION AND DISCUSSION

The results of this study are summerised in table 2, but each species will be dealt with in detalis.

S. laciniata L.; 2n=14; Fig. 1.

This species has a wide distribution from Center and Sout of Europe to East of Asia. 2n=14 agree with previous count of Sosnovets (See Fedorov 1969). The chromosomes are metacentric, heterogeneous and having no satelites. The segregation of homologous chromosomes are irregular in mitotic anaphase.

S. songorica (Kar. & Kir.) Lipsch.; 2n=12; Fig. 2.

This species has a distribution in central Asia, Afghanistan and Iran. Tweleve chromosomes were observed in mitosis which is recorded for the first time. The chromosomes are metacentric heterogeneous and having, no satelites. The segregation of homologous chromosomes are irregular in mitotic anaphase.

S. luristanica Rech. f.; 2n=12, Fig. 3.

S. luristanica has a distribution in Iran and Iraq and 2n=12 is the first chromosome number report for it. Mitosis was not normal and segregation of homologous

Tabel 1. The origin of materials used in chromosome studies of *Scorzonera* spp.

Taxon	Origin and collector
S. laciniata L.	Khorasan: Shirvan, Assadi & Maassoumi 50387.
S. laciniata L.	Azarbayejan: Bonab, Assadi & Akhani 61351.
S. songorica (Kar. & Kir.) Lipsch.	Baluchestan: Taftan Mnt., Mozaffarian 53002.
S. luristanica Rech. f.	Kordestan: Kamiaran, Assadi 60650.
S. armeniaca (Boiss. & Huet.) Boiss.	Tehran: Haraz road, Assadi & Mozaffarian 32991.
S. phaeopappa (Boiss.) Boiss.	Kohgilouyeh: Iasuj, Bakhtiar & Iravanzadeh 24.
S. phaeopappa (Boiss.) Boiss.	Chaharmahal: Lordegan, Mozaffarain 54431.
S. calyculata Boiss.	Tehran: Tafresh, Amin & Bazargan 18719.
S. calyculata Boiss.	Azarbayejan: Marand, Assadi & Olfat 68556.
S. ramosissima DC.	Hamadan: Ganj Nameh, Maassoumi, Mozaffarain & Safavi.
S. pusilla Pall.	Kerman: Ravar Mnt. Assadi & Bazhosha 56249.
S. pusilla Pall.	Korassan: Tayebad, Mozaffarian 67587.
S. papposa DC.	Fars: Evas to Lar, Assadi & Sardabi 41696.
S. paradoxa Fisch & C. A. Mey.	Esfahan: Kashan to Natanz, Assadi & Bazgosha 55957.
S. latifolia (Fisch. & C. A. Mey.) DC.	Kordestan: Baneh to Saghez, Fattahi & al. 2536.
S. lanata (L.) O. Hoffm	Fars: Shiraz, Foroughi 4216.

chormosomes are irregular in anaphase. The chromosomes are metacentric, heterogeneous and having no satelites.

S. armeniacea (Boiss. & Huet.) Boiss.; 2n=14; Fig. 4.

The distribution of the species is in West of Asia. Previous report is 2n=14 (Nazarova, see Goldblatt 1975-1978). I observed 14 choromosomes at mitotic metaphase. Chromosomes are metacentric, heterogeneous and having no satelites. The segregation of homologous chromosomes is irregular in anaphase.

Table. 2. Chromosome counts in *Scorzonera* species.

Taxon	Present counts	Previous counts		Level of ploidy
	2n	2n	References	
S. laciniata	14	14	Sosnovets (see Fedorov 1969)	Diploid
S. songorica	12	--		Diploid
S. luristanica	12	--		Diploid
S. armenica	14	14	Nazarova (see Goldblatt 1975-78)	Diploid
S. phareopappa	14	--		Diploid
S. calyculata	28	--		Tetraploid
S. ramosissima	12	--		Diploid
S. pusilla	28	28	Sosnovets (see Fedorov 1969)	Tetraploid
S. papposa	14	14	Sosnovets (see Fedorov 1969)	Diploid
S. paradoxa	14	-		Diploid
S.latifolia	12	12	Poddubnaia-Arnoldi & al. (see Fedorov 1969)	Diploid
S. lanata	12	12	Magulaev (see Goldblatt 1969)	Diploid

S. phaeopappa (Boiss.) Boiss.; 2n=14; Fig 5.

This toxon has a limited distribution in West of Asia. According to my knowledge, there are no previous counts for this taxon, and its chromosome number (2n=14) is being reported for the first time. The chromosomes are metacentric, heterogeneous and without satelite. The segregation of homologous chromosomes are irregular in anaphase.

S. calyculata Boiss.; 2n=28, Fig 8.

S. calyculata has been distributed in Iran and Iraq. This species has 28 chromosomes in mitosis and this is the first chromosome

number report for it. The segregation of homologus chromosomes are irregular in mitotic anaphase. The chromosomes are heterogeneous.

S. ramosissima DC.; 2n=12; Fig 7.
This taxon has a limited distrbution in West Asia. Tweleve chromosomes were observed which is the first chromosome number report. The chromosomes are metacentric, heterogeneous and have no satelites. The segregation of homologous chromosomes are irregular in mitotic anaphase.

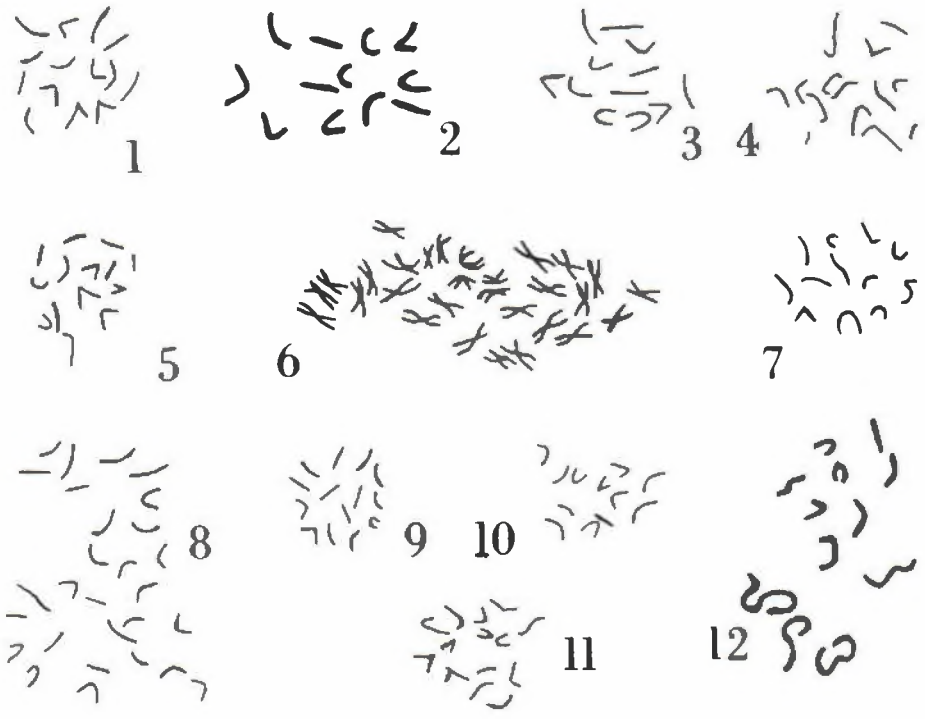
S. pusilla Pall.; 2n=28; Fig 6.
This species has been distributed in West of Asia. Previous report is 2n=28 (Sosnovets, see Fedorov, 1969). I observed 28 bivalents at mitotic metaphase. The chromosomes are metacentric, homogeneous, with no satelites. The segregation of homolgous chromosomes are regular in mitotic anaphase.

S. papposa DC., 2n=14; Fig 9.
S. papposa has been distributed in West Asia and Sosnovets (see Fedorov 1969), reported chromosome count of 2n=14 for it. I found the same number. Chromosomes are metacentric, homogeneous and have no satelites. The segregation of homologous chromosomes are regular in mitotic anaphase.

S. paradoxa Fisch. & C. A. Mey.; 2n=14; Fig 11.
This species has a limited distribution in W. Asia, and 2n=14 is the first chromosome number report for it. Mitosis was not normal (segregation of homologous chromosomes are irregular in mitotic anaphase). The chromosomes are metacentric, homogeneous and have no satelite.

S. latifolia (Fisch. & C. A. Mey.) DC.; 2n=12 Fig 10.
This taxon has been distributed in West of Asia. Previous reports are 2n=12 (Poddubnaia-Arnoldia & al., see Fedorov 1969). I observed 12 bivalents at mitotic metaphase. Chromosomes are metacentric, homogeneous and have no satelites. The segregation of homologous chromosomes are irregular in mitotic anaphase.

S. lanata (L.) O. Hoffm.; 2n=12; Fig 12.
This species has been distributed in West of Asia and it was first examined by Magulaev (see Goldblatt 1986-1987.) who reported chromosome count of 2n=12. I



Figs. 1-12: Mitosis in the root tips of *Scorzonera* species. -1. *S. laciniata*, 2n=14 (680 X). -2. *S. songorica*, 2n=12 (1660 X). -3. *S. luristanica*, 2n=12 (680 X). -4. *S. armeniaca*, 2n=14 (1660 X). -5. *S. phaeopappa*, 2n=14 (680 X). -6. *S. pusilla*, 2n=28 (680 X). -7. *S. ramosissima*, 2n=12 (680 X). -8. *S. calyculata*, 2n=28 (680 X). -9. *S. papposa*, 2n= 14 (680 X). -10. *S. latifolia*, 2n=12 (680 X). -11. *S. paradoxa*, 2n=14 (680 X). -12. *S. lanata*, 2n=12 (1660 X).

found the same number of chromosomes. The chromosomes are metacentric, heterogeneous and have no satelites. Segregation of homologous chromosomes are irregular in mitotic anaphase.

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