

گزارش‌های کروموزومی جدید یا نادر برای ۱۰ گونه

متعلق به جنس *Cousinia* از ایران (I)

New or rare chromosome counts in ten species of *Cousinia* from Iran (I)

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ده گونه *Cousinia* جمع‌آوری شده از استان خراسان مورد شمارش کروموزومی در تقسیم میوز قرار گرفتند. گزارش کروموزومی هشت گونه به اسامی زیر برای اولین بار از ایران ارائه می‌گردد:

Cousinia antonowii (n=۱۲), *C. chaetocephala* (n=۱۳), *C. dasylepis* (n=۱۳), *C. eriobasis* (n=۱۲), *C. freynii* (n=۱۳), *C. prasina* (n=۱۳), *C. rechingerorum* (n=۱۳), *C. termei* (n=۱۳).

عدد کروموزومی دو گونه زیر با گزارش‌های قبلی مطابقت دارد:

Cousinia adenostegia (n=۱۳), *C. trachyphyllaria* (n=۱۳)

متن کامل مقاله در قسمت انگلیسی ارائه شده است.

واژه‌های کلیدی: *Cousinia*، شمارش کروموزومی، ایران

نشانی نگارنده: سیده باهره جوادی، بخش تحقیقات رستنی‌ها، موسسه تحقیقات آفات و بیماری‌های گیاهی، اوین، صندوق پستی ۱۴۵۴، تهران ۱۹۳۹۵، ایران.

NEW OR RARE CHROMOSOME COUNTS IN TEN SPECIES OF *COUSINIA* FROM IRAN (I)

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Abstract

The meiotic chromosome counts are reported in 10 species of the genus *Cousinia* including: *C. adenostegia*, *C. antonowii*, *C. chaetocephala*, *C. dasylepis*, *C. eriobasis*, *C. freynii*, *C. prasina*, *C. rechingerorum*, *C. termei* and *C. trachyphyllaria* from Iran. Specimens have been collected from different parts of Iran out of which, eight species are considered to be new and two provide confirmation of the previous data. The chromosome number in all studied species is $n=13$ (except *Cousinia antonowii* and *C. eriobasis* i.e. $n=12$).

Key words: *Cousinia*, Chromosome counts, Iran

Introduction

Cousinia Cass. with ca 600 species is one of the largest genus of Asteraceae and the largest in the Arctium group tribe Cardueae, subtribe Carduinae (MABBERLEY 1990, HAFFNER 2002, SUSANNA *et al.* 2003a). This genus with over 400 species in S.W. Asia has its maximum concentration in the Flora Iranica area. Overall, it has a remarkably limited distributional range compared with other genera of similar size (RECHINGER 1986). Its area coincides largely with the mountain parts of the Irano-Turanian region. The decline in species number towards

the borders of the area is abrupt. (RECHINGER 1986). On the basis of duration and morphological characters, this genus with such a high number of species is divided in 12 groups and 57 sections. But, because of taxonomic problems, there are too many individual species which are not placed in these sections (RECHINGER 1986). Therefore, more research regarding various aspects are yet to be done.

Chromosome studies on the genus *Cousinia* from Iran have been limited to ARYAVAND (1975), AFZAL-RAFII (1980), GHAFFARI (1984, 1986, 1987), GHAFFARI & CHARIAT-PANAHI (1985), GHAFFARI & DJAVADI (1998), DJAVADI & GHAFFARI (1999), GHAFFARI *et al.* (2000), SUSANNA *et al.* (2003b) and SHEIDAI *et al.* (2005).

The present study, therefore, considers chromosome reports of 10 species out of which eight are new from Iran.

Materials and Methods

Floral buds of the materials were collected and immediately fixed in the Piennar's solution (ethanol; chloroform; propionic acid; 6:3:2 v/v) for 24 hrs., transferred to 70% alcohol and stored under refrigeration. Slides were prepared by the squash technique and cells were stained with 2% acetocarmine. All slides were made permanent by the venetian turpentine (WILSON 1945). Photographs of the chromosomes were taken by Olympus Photomicroscope at initial magnification of 1360X. The chromosome preparations and herbarium vouchers are preserved in the "IRAN" Herbarium.

Results and Discussion

Cousinia sect. *Lachnosphaerae* Rech. f.

C. eriobasis Bunge

Esfahan: Kashan to Esfahan, Abyaneh road, between Komijan and Yarand, 1870 m, 17 May 2005, Djavadi (IRAN 42580). n=12 (Fig. 1)

The sect. *Lachnosphaerae* Rech. f. is represented in Flora Iranica by 12 species out of which three are entirely endemic to Iran and three are common between Iran and Afghanistan. Others exist in Afghanistan (RECHINGER 1972, 1979). There is only one previous count for this section (*C. lachnosphaera* Bunge

2n=24 by PODLECH & BADER 1974). Meiosis in *C. eriobasisi* with 12 bivalents at first metaphase is the first chromosome count for this species.

***Cousinia* sect. *Leiocaules* Bunge**

***C. antonowii* C. Winkl.**

Khorasan: Qouchan, Khademanlou, 1600 m, 20 June 2005, Djavadi, Eskandari & Torabi (IRAN 50612). n=12 (Fig. 2)

The sect. *Leiocaules* Bunge consists of 13 species in Flora Iranica area out of which 6 species are exclusively endemic to Iran (RECHINGER 1972, 1979). *Cousinia antonowii* is distributed in eastern parts of Iran in Khorasan Province. Previous chromosome counts on this section are: n=12 and 2n=24 in *C. arctotidifolia* (GHAFARI 1984), 2n=24 in *C. hamadae*, *C. pseudoaffinis* (TSCHERNEVA 1985) and *C. astracanica* (SUSANNA *et al.* 2003b). The results indicate that the basic chromosome number in this section is x=12. Meiosis in *C. antonowii* with 12 bivalents at first metaphase, agrees with all of the other earlier counts in the sect. *Leiocaules*. Chromosome count of n=12 for this species is the first report.

***Cousinia* sect. *Platyacanthae* Rech. f.**

According to RECHINGER (1972, 1979), the sect. *Platyacanthae* which comprises six species, distributed in Khorasan Province. Except *Cousinia freynii* which is endemic to Iran and Turkmenistan, other species are entirely endemic to Iran.

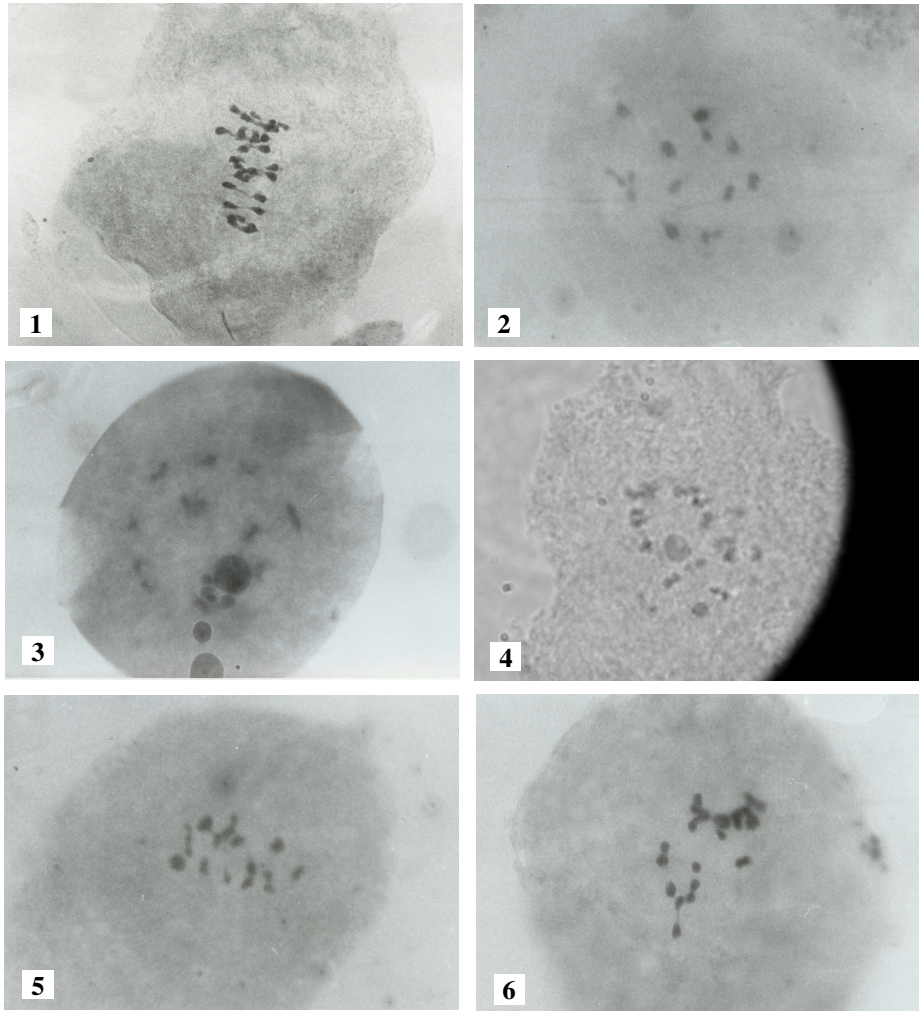
***C. freynii* Bornm.**

Khorasan: Mashhad to Chenaran, Akhlamad (Binaloud mountains), 1400 m, 15 June 2005, Djavadi, Eskandari & Torabi (IRAN 50616). n=13 (Fig. 3)

Meiosis in this species showed 13 bivalents at diakinesis. According to present data, this is the first chromosome count for this species.

***Cousinia rechingerorum* Bornm**

Khorasan: Torbat-e Jam, Bezd (in mountains), 1700-2300 m, 21 June 2005, Djavadi, Eskandari & Torabi (IRAN 39729). n=13 (Fig. 4)



Figs 1-6. Meiosis in *Cousinia* ssp. Fig. 1. *C. eriobasis* (n=12), metaphase I. Fig. 2. *C. antonowii* (n=12), metaphase I. Fig. 3. *C. freynii* (n=13), diakinesis. Fig. 4. *C. rechingerorum* (n=13), diakinesis. Fig. 5. *C. trachyphyllaria* (n=13), metaphase I. Fig. 6. *C. adenostegia* (n=13), metaphase I.

This species is found in a very restricted area of Khorasan Province and has been mentioned only from type locality (Kuh-e Bezd). Meiosis in this species showed 13 bivalents in diakinesis. The chromosome count of $n=13$ is the first report for this species.

***Cousinia trachyphyllaria* Bornm. & Rech. f.**

Khorasan: Mashhad, Robat Sefid, 1750 m, 19 June 2005, Djavadi, Eskandari & Torabi (IRAN 50617). $n=13$ (Fig. 5)

In meiosis we observed 13 bivalents at first metaphase, which agrees with previous report by GHAFFARI (1984).

***Cousinia* sect. *Serratuloideae* Bunge**

***C. adenostegia* Rech. f.**

Khorasan: Mashhad to Neyshabour, Chenaran (Binaloud mountains), 17 June 2005, Djavadi, Eskandari & Torabi (IRAN 50614). $n=13$ (Fig. 6)

According to the Flora Iranica (RECHINGER 1972, 1979), the sect. *Serratuloideae* possesses 11 species. Except *Cousinia pterocaulos* which is endemic to Iran and Talish, all other species are entirely endemic to Iran. RECHINGER (1979) has not considered any section for *C. adenostegia* but, SHEIDAI *et al.* (2005) believed that, this species belongs to the sect. *Serratuloideae*. Previous chromosome counts on this section were reported for *C. crispa* ($2n=26$) and *C. hypoleuca* ($2n=26$) by AFZAL-RAFII (1980). Among the species studied by SHEIDAI *et al.* (2005), *C. elbursensis*, *C. pinarocephala*, *C. pterocaulos* and *C. crispa* have chromosome number of $n=12$ while, *C. adenostegia*, *C. concolor*, *C. hypoleuca*, *C. irritans*, *C. sheidaii*, *C. discolor* and *C. serratuloides* possessed $n=13$. It seems that, this section has two basic chromosome numbers of $x=12$ and 13. Meiosis in our sample showed 13 bivalents at first metaphase, which coincide with earlier reports by SHEIDAI *et al.* (2005).

***Cousinia* sect. *Stenocephalae* Bunge**

***C. prasina* Jaub. & Spach**

Gilan: Loushan, Jirandeh, 1300-1400 m, June 2005, Djavadi (IRAN 42581). n=13 (Fig. 7)

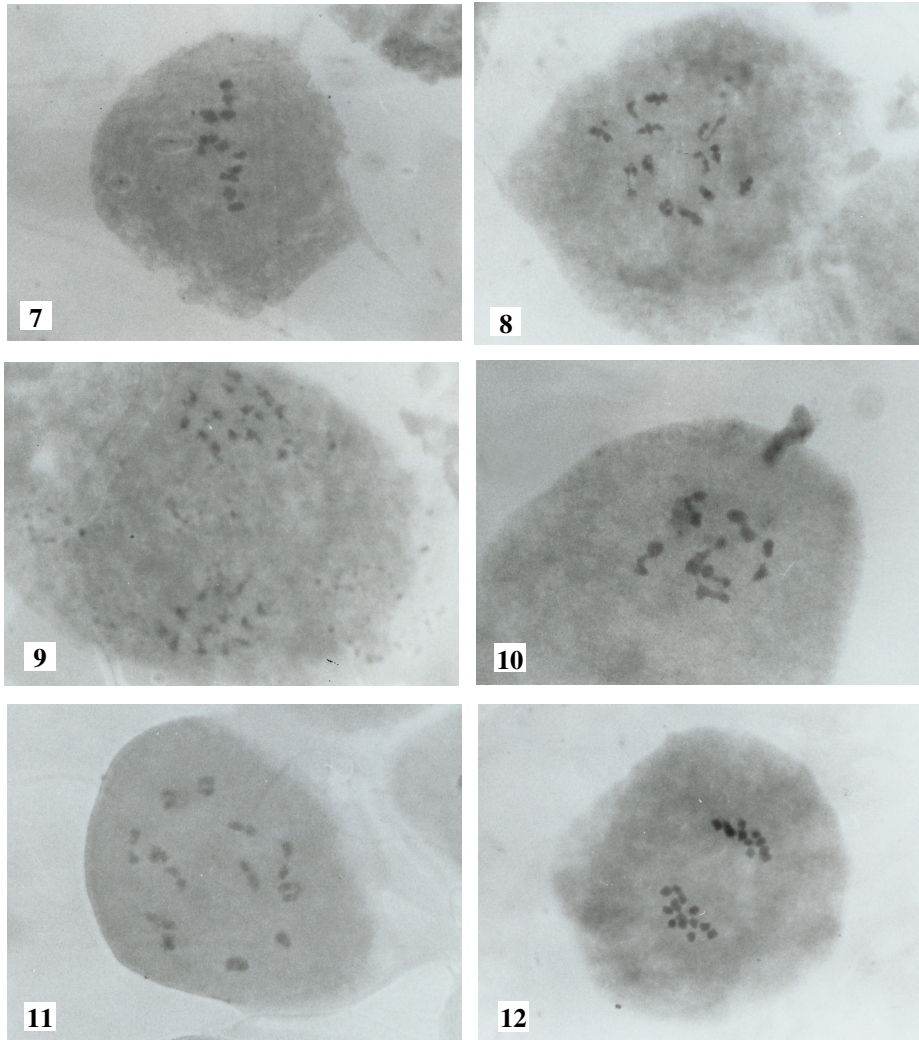
Section *Stenocephalae* with 34 species, is the third largest after sect. *Cynaroideae* and *Alpinae* respectively. Among 26 species distributed in Iran, 23 are entirely endemic (RECHINGER 1972, 1979). It seems that, Iran is the center of diversity of this section, so that the density and diversity of the species decreases from east to west (GHAFARI and DJAVADI 1998). Meiosis in *Cousinia prasina* showed 13 bivalents at first metaphase. The author also observed three bivalents associated with nucleolus at diakinesis stage, which agrees with the previous reports on the section by GHAFARI & DJAVADI (1998). On the basis of writer's result and those of other authors, the basic chromosome number in this section is $x=13$ [*C. commutate* ($2n=26$) and *C. lucida* ($2n=26$) by AFZAL-RAFII (1980), *C. gauba* ($n=13$) by GHAFARI & CHARIAT-PANAHI (1985), *C. albiflora* ($2n=26$) by TSCHERNEVA (1985), *C. aggregate* ($n=13$), *C. assyrica* ($n=13$), *C. calolepis* ($n=13$), *C. commutate* ($n=13$), *C. cylindracea* ($n=13$), *C. gauba* ($n=13$), *C. glaucopsis* ($n=13$), *C. nekarmanica* ($n=13$) and *C. staliana* by GHAFARI & DJAVADI (1998)]. The presence of $x=9$ [*C. hypopolia* ($2n=18$) by CHYKASANOVA (see FEDOROV, 1974) and $x=12$ (*C. recurvata* ($2n=24$) by AFZAL-RAFII (1980)] seems to be contradictory and needs further studies. Therefore, this is the first chromosome count for this species.

The three following species are not placed under any sections:

***C. chaetocephala* Kult.**

Khorasan: Qouchan, Khademanlou, 1600 m, 20 June 2005, Djavadi, Eskandari & Torabi (IRAN 50611). n=13 (Figs 8-9)

According to TSCHERNEVA (1997), *Cousinia chaetocephala* is placed in sect. *Stenocephalae* (syn.: sect. *Leptocephalae*), but RECHINGER (1979) did not consider any sections for this species. Meiosis showed 13 bivalents at first metaphase. Chromosome segregation at first metaphase was also 13:13. This is the first report for this species.



Figs 7-12. Meiosis in *Cousinia* ssp. Fig. 7. *C. prasina* (n=13), metaphase I. Fig. 8-9. *C. chaetocephala* (n=13); 8: metaphase I, 9: anaphase I. Fig. 10. *C. dasylepis* (n=13), metaphase I. Figs 11-12. *C. ternei* (n=13); 11. metaphase I, 12. anaphase I.

***C. dasylepis* Kult.**

Khorasan: Mashhad to Chenaran, Farizi (Binaloud mountains), 1400-1800 m, 20 June 2005, Djavadi, Eskandari & Torabi (IRAN 39730). n=13 (Fig. 10)

This species has distributed in a very limited area and collected only from one locality (RECHINGER 1972). Meiosis in this species showed 13 bivalents at first metaphase. According to available data, this is the first chromosome number for this species.

***C. termei* Rech. f.**

Khorasan: Mashhad, Shandiz, Zoshk, 16 June 2005, Djavadi, Eskandari & Torabi (IRAN 50613). n=13 (Figs 11-12)

Cousinia termei is recognized as a local endemic species from only one locality by RECHINGER (1979). The species was also collected from type locality. Meiosis showed 13 bivalents at first metaphase. Chromosome segregation at first anaphase was also 13:13. This is the first chromosome count for this species.

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