

## CHROMOSOME NUMBERS FOR SOME EREMOPYRUM JAUB. & SPACH (POACEAE) SPECIES OF IRAN

M. Keshavarzi

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Chromosome numbers are given for six taxa of *Eremopyrum* (Ledeb.) Jaub. & Spach (*Poaceae*) of Iran: *E. bonaepartis* var. *bonaepartis* (Spreng.) Nevski ( $2n=14$  &  $28$ ), *E. bonaepartis* var. *sublanuginosum* (Drobow) Melderis ( $2n=28$ ), *E. confusum* Melderis var. *confusum* Melderis ( $2n=28$ ), *E. confusum* Melderis var. *glabrum* Melderis ( $2n=14$ ), *E. distans* (C. Koch) Nevski ( $2n=14$ ) and *E. orientale* (L.) Jaub. & Spach ( $2n=28$ ). Chromosome numbers of six studied taxa were recorded for the first time from Iran.

Maryam Keshavarzi <[Neshat112000@yahoo.com](mailto:Neshat112000@yahoo.com)>, Biology Dept., Faculty of Science, Alzahra University.

**Key words.** Karyology, *Eremopyrum*, *Poaceae*, Chromosome number, Iran.

### شمارش کروموزومی برخی گونه‌های *Eremopyrum* (Ledeb.) Jaub. & Spach (Poaceae) در ایران

مریم کشاورزی، استادیار گروه زیست شناسی دانشگاه الزهراء، ونک، تهران.

اعداد کروموزومی برای شش تاکسون از *Eremopyrum* (Ledeb.) Jaub. & Spach (*Poaceae*) ایران به شرح زیر گزارش می‌شوند: *E. bonaepartis* var. *bonaepartis* Spreng. Nevski ( $2n=14$  &  $28$ ), *E. bonaepartis* var. *sublanuginosum* (Drobow) Á. Löve ( $2n=28$ ), *E. confusum* var. *confusum* Melderis ( $2n=28$ ), *E. confusum* var. *glabrum* Melderis ( $2n=14$ ), *E. distans* K. Koch (Nevski) ( $2n=14$ ) and *E. orientale* Jaub. & Spach ( $2n=28$ ) می‌باشد.

## INTRODUCTION

The genus *Eremopyrum* Jaub. & Spach (*Triticeae*, *Poaceae*) comprises 6 taxa distributed throughout Iran (Bor 1970). According to Frederiksen (1991) in this genus four species are recognized but Keshavarzi et al. (2007) proposed five distinct and separate species despite of Frederiksen view to merge *E. confusum* Melderis and *E. bonaepartis* (Spreng.) Nevski.

During taxonomic studies on *Eremopyrum* species of Iran, some karyological investigations were done. Chromosome number and karyotype in species and hybrids can provide useful information for the assessment of taxonomic relationships (Stace 2000). *Eremopyrum* is a genus with diploid and tetraploid species (Sakamoto 1967, 1973, 1979, Frederiksen & al 1995). Previous cytological knowledge of *Eremopyrum* has revealed that this genus has basic chromosome numbers of  $x=7$  (Sakamoto 1967, 1973, 1979). There was no chromosome record for *E. confusum* in the world. Cytological records revealed that *E. distans* C. Koch (Nevski) was diploid and *E. orientale* (L.) Jaub. & Spach was a tetraploid species (Sakamoto 1979, Frederiksen 1995). *E. bonaepartis*

showed two ploidy levels ( $2n=14$  &  $2n=28$ ) (Frederiksen 1991, Sakamoto 1979). As cytological data are of great importance for the understanding of relationship and evolution in angiosperms, an attempt is made in this work to give a survey of chromosome numbers of some species of *Eremopyrum* occurring in Iran.

## METHODS & MATERIALS

The plants were collected during the years 2007-2010 in their natural habitats (Table 1). For somatic chromosome study, the seeds were germinated on moist filter paper in the laboratory (ca.  $21^{\circ}$ - $24^{\circ}$ ). The growing root tips of ca. 1.0-1.5 cm long were cut and pretreated in a saturated water solution of  $\alpha$ -bromonaphtalene (2 hrs.) at  $4^{\circ}$  C. refrigerator, fixed in a cold mixture of ethanol and acetic acid (3:1) for 24 hours. Root tips were macerated in 1N HCl for 3 hours (Cold Hydrolysis) at room temperature. Temporary slides were made by squashing the segments and staining in 2% Fe-acetocarmine for 1 – 2 hours. Voucher specimens are deposited in the herbarium of the Department of Biology of Alzahra University (AU), Iran.

Table 1. Chromosome numbers of six studied *Eremopyrum* taxa from Iran.

Taxon	Locality	Present ch. no.	Replications	Previous ch. no.
<i>E. bonaepartis</i> var. <i>bonaepartis</i> (Spreng.) Nevski	Azerbaijan: Tabriz, Khajeh, Zare 57 AU; Alborz: Karaj, Eshtehard, Babaii 66 AU; Quazvin: Quazvin to Kouhin, Keshavarzi 6 AU.	14, 28 14, 28 28	17 15 10	14, 28
<i>E. bonaepartis</i> var. <i>sublanuginosum</i> (Drobow) Á. Löve	Khorassan: Sarakhs, 12 km after Mozdoran, Babii 23 AU	28	15	14, 28
<i>E. orientale</i> Jaub. & Spach	Azerbaijan: 25 km after Tabriz to Ahar, Zare 63 AU; Khorassan, 120 km to Bojnourd, Babii 15AU.	28	16	28
<i>E. distans</i> (K. Koch) Nevski	Semnan: Bastam, Pourhabibian 60 AU; Azerbaijan: 35 km to Tabriz from Ahar, Zare 62 AU.	14	12 15	14
<i>E. confusum</i> var. <i>glabrum</i> Melderis	Khorassan: Sarakhs, 15 km to Mozdoran, Babii 8 AU.	14	10	-
<i>E. confusum</i> var. <i>confusum</i> Melderis	Khorassan: Sarakhs, Mozdoran, Babii 67 AU Khorassan: sarakhs, 15 km to Mozdoran, Babii 10 AU.	28	9 18	-

## RESULTS

Result of chromosome counting in 11 accessions of different species of *Eremopyrum* species in Iran showed that there are two ploidy levels (Table 1). Somatic metaphases are shown in figures 1 and 2. Best time for chromosome study for somatic metaphases at root tips was 11:30 for *E. bonaepartis*, *E. confusum* and *E. orientale* and 11:10 for *E. distans*.

## DISCUSSION

In this study the somatic chromosome number was counted in *E. confusum* taxa for the first time in the world. Two ploidy levels have been demonstrated in this species. Further studies on this confusing species are needed; while some authors merged this species in *E. bonaepartis* (Frederiksen 1991).

Result of present study revealed that there are two ploidy levels in *E. bonaepartis* var. *bonaepartis* native to Iran ( $2n=14$  &  $28$ ). One species (*E. distans*) were diploid ( $2n=14$ ) and three were tetraploid (*E. bonaepartis* var. *sublanuginosum*, *E. confusum* var. *confusum* and *E. orientale*). Results are in concordance with previous data (Goukasian 2004, Goukasian, Nazarova 1998, Sakomoto 1979). All reported species in this study show a basic number of  $x=7$  congruent with previous records. The tetraploid species in Iran are characterized by remarkably high distribution and

phenotypic variability (Keshavarzi et al. 2007). The reports so far suggest that *E. distans* is characterized by two ploidy level, either diploid or tetraploid, here we have observed only diploid *E. distans* accessions. Two different cytotypes were known for *E. bonaepartis* varieties in Iran, with  $2n=28$  the more common. This species has also a wide range of morphological variation in Iran (Keshavarzi 2007). The chromosome number of these species in Iran is being reported for the first time.

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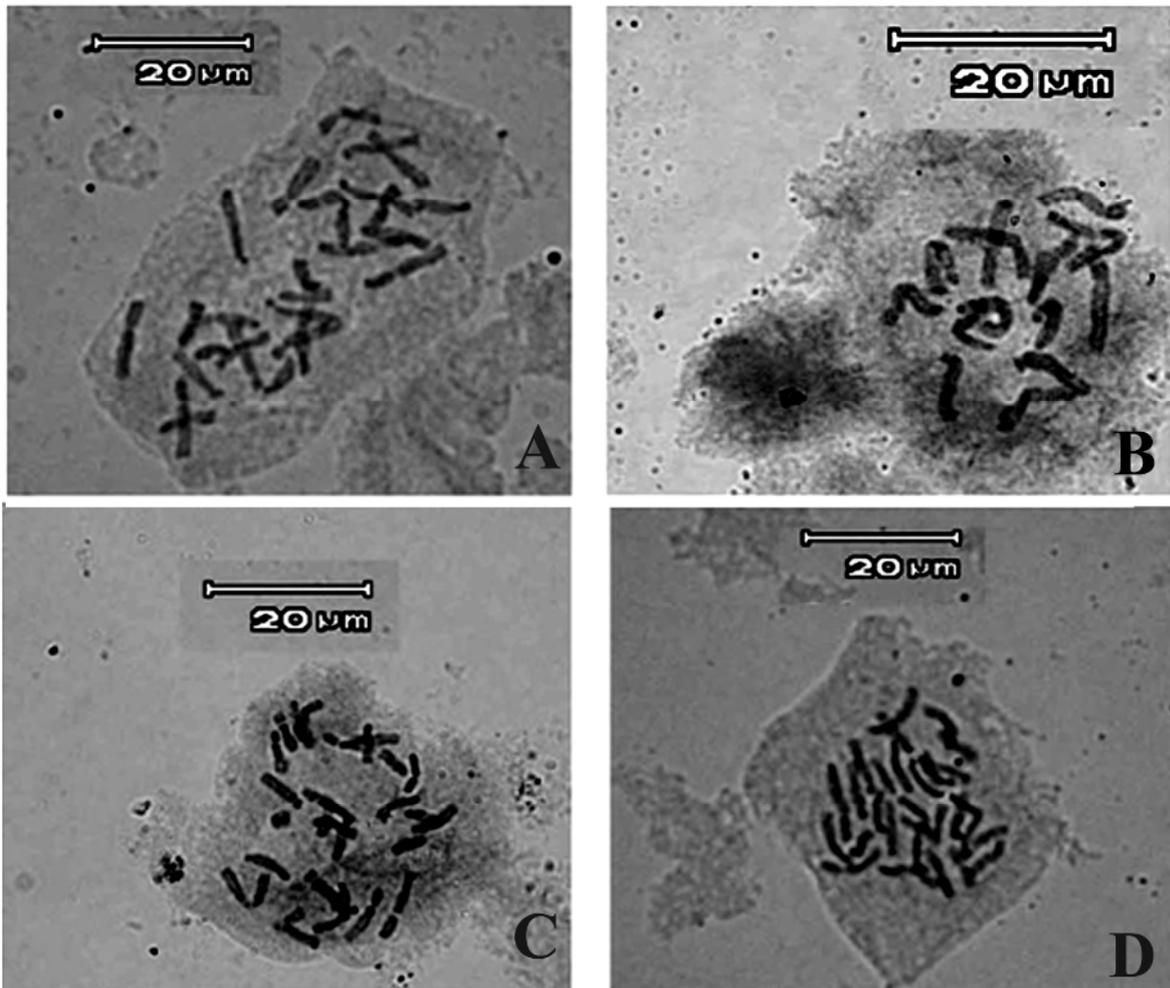


Fig. 1. Somatic metaphases. A) *E. bonaepartis* var. *bonaepartis* ( $2n=28$ ), B) *E. bonaepartis* var. *bonaepartis* ( $2n=14$ ), C) *E. confusum* var. *glabrum* ( $2n=28$ ), D) *E. confusum* var. *confusum* ( $2n=28$ ).

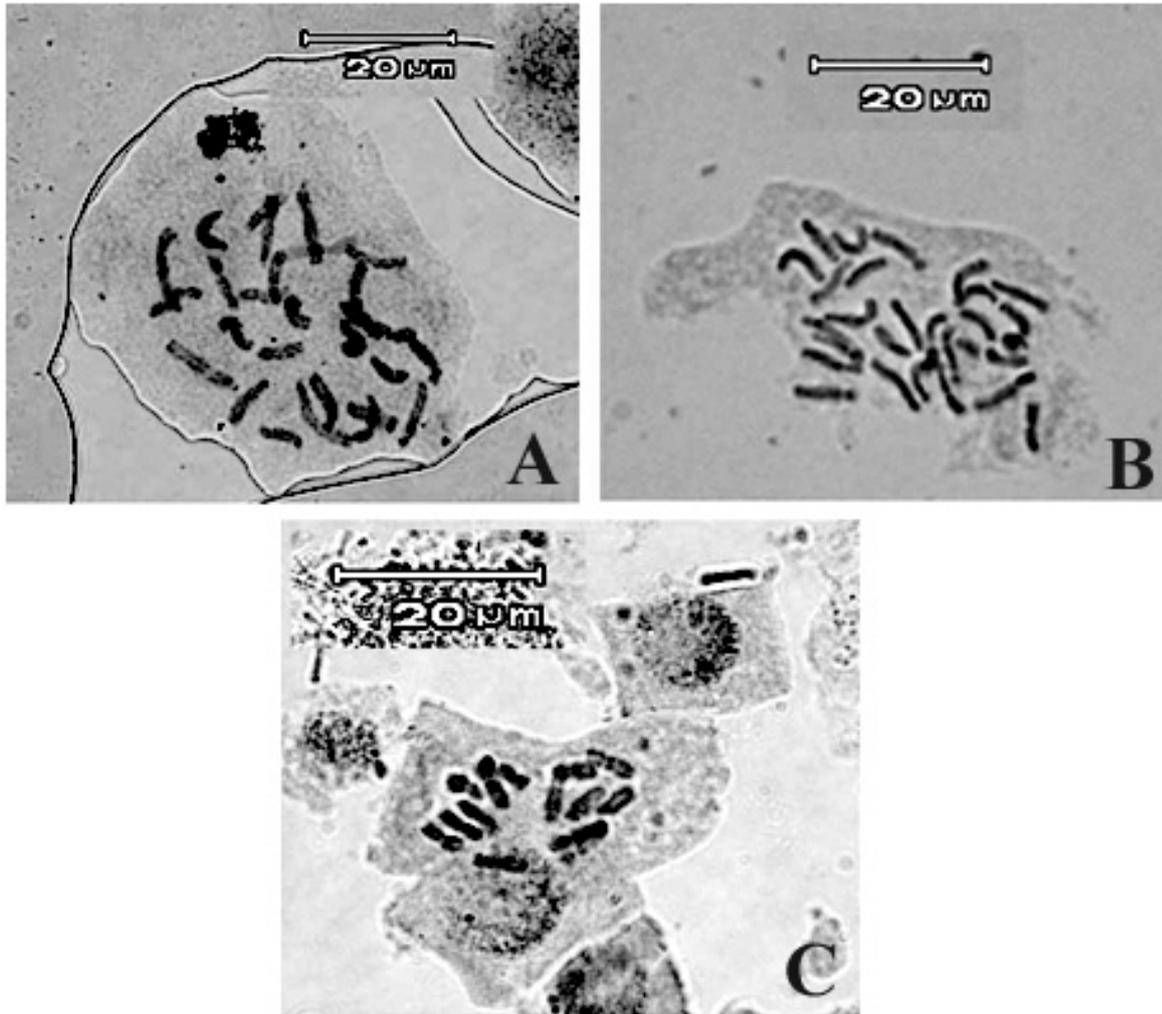


Fig. 2. Somatic metaphases. A) *E. bonaepartis* var. *sublanuginosum* ( $2n=28$ ), B) *E. orientale* ( $2n=28$ ), C) *E. distans* ( $2n=14$ ).

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