



New chromosome counts for *Nepeta* (Lamiaceae) from flora of Iran

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Abstract

Nepeta species L. are annual and perennial plants of Lamiaceae which is a significant plant due to its medicinal characteristics. In this study the seeds of eight populations belonging to four species namely, *N. eremophila*, *N. sacharata*, *N. Bornmulleri*, *N. mahanensis* were collected for the chromosome count survey. The terminal meristem of root and squash technique was used for karyological studies. The results revealed equal chromosome number; $2n=2x=18$ for the species studied. Therefore the basic chromosome number in all investigated species was $x=9$.

Key words: chromosome number, karyotype, Labiatae, *Nepeta*

1. Introduction

Nepeta L. (catmint) is belonging to the family Lamiaceae and subfamily Nepetoideae, tribe Mentheae (Cantino et al., 1992) is one of the largest and medically important genera in this family with 300 species growing as perennial, rarely annual, herbaceous and fruticose plants (Jamzad, 2003a).

Nepeta species are significantly distributed in Eurasia, North Africa, North and Central America and Canary Islands. The diversity and species richness are found in South West Asia and Himalayas (Jamzad et al., 2000). Up to now it has been reported 75 species of the genus for flora of Iran of which 39 species are endemic (Rechinger, 1982; Jamzad et al., 2012).

Nepeta has been studied from morpho-anatomical (Acar et al., 2011; Kaya and Dirmenci, 2008), palynological (Celenk et al., 2008; Moon et al., 2008), phytochemical (Baser et al., 2000, Asgarpanah et al., 2014), molecular phylogenetical (Jamzad et al., 2003b) and especially from cytogenetical point of view.

Extensive cytological information has been provided on the different species of *Nepeta*. Based on karyotypes and analyses of meiotic pairing behavior at Metaphase I in different *Nepeta* species, the chromosome number are ranging from $2n=14, 16, 18, 32, 34, 36, 54$ and basic chromosome numbers, $x=7, 8, 9, 13, 17, 18$ (Aryavand, 1975, 1977; Gill, 1979; Baden, 1983; Ghaffari and Kelich, 2006; Saggoo et al., 2011; Kharazian et al., 2013). According to Baden (1983), the chromosome number $2n=18$ and 36 are common in this genus indicating the basic chromosome number $x=9$ and 18 .

Karyotype characterization such as number, size and morphology is important to conduct the evolutionary events of the taxa. The present work has done to determine the chromosome number and basic chromosome number of four endemic species of *Nepeta* for the flora of Iran. All the chromosome numbers are the first chromosome count for these taxa.

2. Materials and methods

2.1. Plant materials

Seeds of eight accessions belonging to four species of *Nepeta*, namely *N. mahanensis* Jamzad & Simonds, *N. Bornmulleri* Husskn. ex Born., *N. sacharata* Bunge., *N. eremophila* Hausskn. & Bornm. were collected from Kerman province of Iran (Table 1). Voucher specimens of the taxa studied were deposited in the Herbarium of Shahid Bahonar University of Kerman.

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1.2. Chromosomal studies

Mitotic studies were made on metaphase cells of root tips obtained from germinating seeds on wet filter paper in Petri dishes at 25°C temperature. Root tips were pretreated for 16 h in α -monobromonaphthalene at 4 °C and washed and fixed in Carnoy solution (3:1 absolute ethanol:glacial acetic acid) for 24 hours. The root tips were hydrolyzed in 1N HCl solution at 60° C for about 5 minutes, washed and stained in 2% aceto-orcein for 2 h in room temperature or in aceto-iron hematoxilin for 10 minutes at 40° C (Agayev, 1996 with some modification). The roots were gently squashed in 45% acetic acid on a slide glass. The clearest mitotic metaphases of at least 5 cells were photographed with an Olympus BH-2 light microscope equipped with camera photomicrograph system.

3. Results

In the present study, first chromosome count has been reported in four species of *Nepeta*, including, *N. mahanensis*, *N. Bornmulleri*, *N. saccharata* and *N. eremophila* (Table 1).

All of them are annual plants which are endemic to Iran with a small distribution area in high plateau of southeast of Iran with the exception of *N. saccharata* which has distributed in most parts of Iran (Jamzad 2012).

The results of the study revealed that all the *Nepeta* species studied were diploid. The somatic chromosome numbers were $2n=2x=18$ and the basic chromosome numbers $xX=9$ (Figure 1, A-D).

Table 1. The vouchers details of studied *Nepeta* species from the flora of Iran

Species/accession	Locality
<i>N. mahanensis</i> Jamzad & Simonds	Iran: Kerman, Mahan, 1400-1600 m, Payandeh 315
<i>N. mahanensis</i> Jamzad & Simonds	Iran: Kerman, near cross road to Shahdad, 1400-1600 m, Payandeh 1550
<i>N. Bornmulleri</i> Husskn. ex Born.	Iran: Kerman, Jiroft, Dalfard, 1800-2000 m, Payandeh 1549
<i>N. Bornmulleri</i> Husskn. ex Born.	Iran: Kerman, Jiroft, Rabor, 1800-2000 m, Payandeh 316
<i>N. saccharata</i> Bunge.	Iran: Kerman, Jiroft, Dalfard, 2000-2300 m, Payandeh 1548
<i>N. saccharata</i> Bunge.	Iran: Kerman, Jiroft, Bahrasman mt., 2000-2300 m, Payandeh 317
<i>N. eremophila</i> Hausskn. & Bornm.	Iran: Kerman, Rafsanjan, 1400-1500 m, Payandeh 318
<i>N. eremophila</i> Hausskn. & Bornm.	Iran: Kerman, bibhayat, 1400-1500 Payandeh 319

4. Conclusions

A lot of studies have been made to discuss the cytological information in the family Lamiaceae. Members of the family are equally diverse in chromosome number (Gill, 1981; Budantsev et al., 1992). However, the majority of the recorded data by various workers, revealed the $x=8$ and $x=9$ as the most common primary basic chromosome numbers and the original basic number for the family. The other numbers have arisen secondarily (Srivastava, 2012). Previous studies (Baden, 1983; Ghaffari and Kelich, 2006; Kharazian et al., 2013; Saggioo et al., 2011) have frequently reported $2n=2x=18$ in *Nepeta* which support the classical view of $x=9$ as a primary basic number.

Aknowledgements

The authors wish to thank the Office of Graduate Studies of the Payame Noor University for their support.

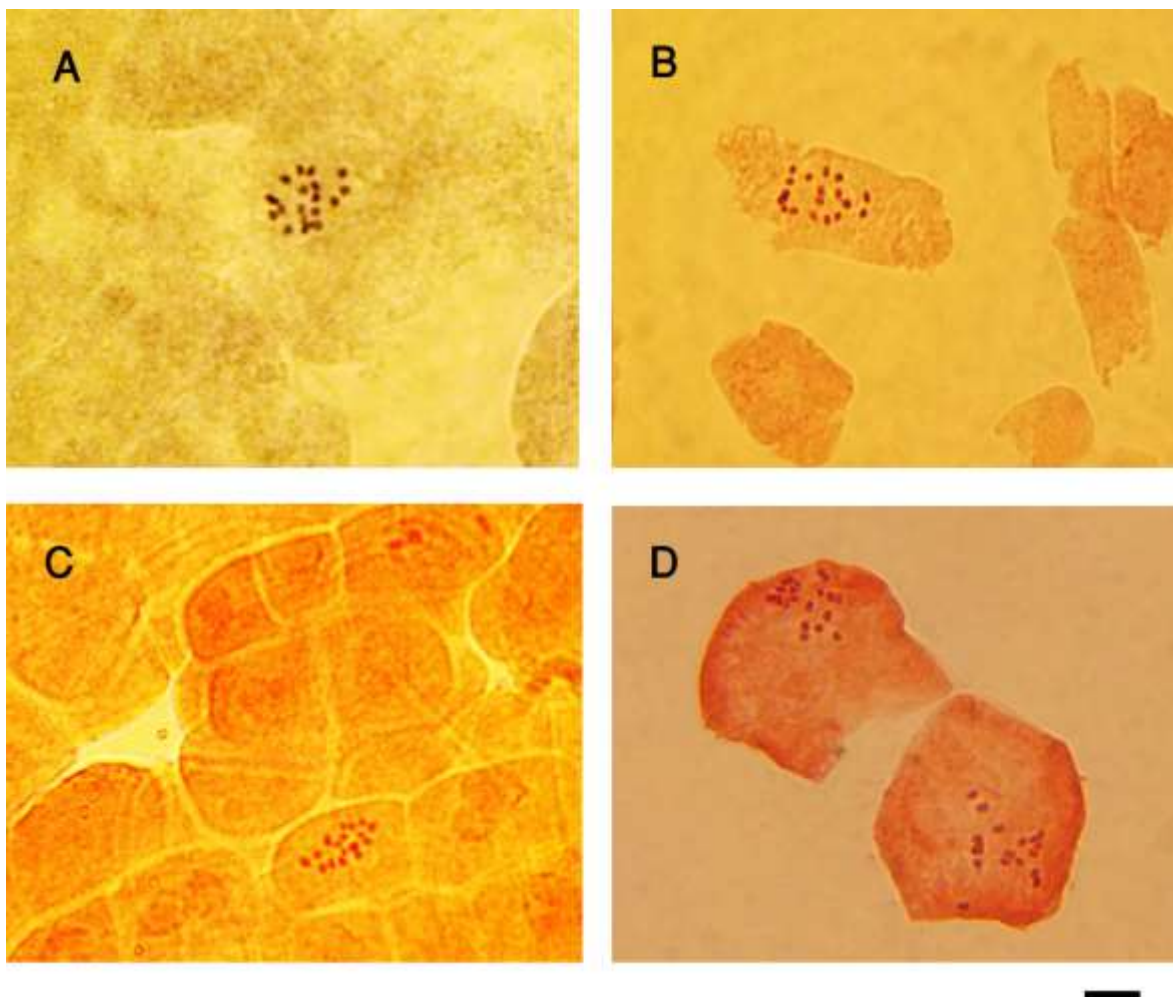


Figure 1. Somatic chromosomes of *Nepeta* species (A: *N. Bornmulleri*, B: *N. mahanensis*, C: *N. saccharata*, D: *N. eremophila*. Scale bar = 10 μ m)

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(Received for publication 18 February 2015; The date of publication 15 August 2015)