

Karyological aspects of the genus *Neurada* L. (Neuradaceae J.G. Agardh)

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Abstract - The genus *Neurada* includes three taxa: *Neurada procumbens* L. var. *procumbens*, *N. procumbens* L. var. *stellata* M. and D. Zohary and *N. al-eisawii* Barsotti, Borzatti and Garbari, a recently described endemic unit of the Hisma Basin (Southern Jordan). Chromosome number and karyotype morphology of *N. procumbens* var. *stellata* and *N. al-eisawii* were investigated. All plants show $2n=14$ chromosomes. The great morphological differentiation of the mentioned units is probably due to a local schizogenic process of populational fragmentation of *Neurada procumbens*, the diploid annual prostrate plant widespread mainly in subtropical desertic habitats.

Key Words: Karyology, *Neurada*.

INTRODUCTION

Neurada has been little investigated from a karyological point of view. Only three papers on the chromosome number counting are known (MURBEK 1916; HAGERUP 1932; MURIN *et al.* 1970) and one paper on karyotype morphology has been published up to now (OGINUMA and FUJITA 1997). The genus, included by some authors in Rosaceae (MEIKLE 1977; MAIRE 1980; OZENDA 1991), is today definitively ascribed to Neuradaceae (RONSE DECRAENE and SMETS 1996), a family including also the South African genera *Grielum* and *Neuradopsis*. From a phylogenetic point of view the position of Neuradaceae in the Malvales order (APG 1998) needs further investigation (JANSEN *et al.* 2000). *Neurada* is represented by annual plants generally with prostrate habit and a characteristic diskoidal spiny fruit (Fig. 1). Up to now the taxa included are: *N. procumbens* L. var. *procumbens* distributed along the subtropical desert area from India to

Morocco, *N. procumbens* L. var. *stellata* M. and D. Zohary present in the desert of Israel and Jordan (ZOHARY 1972) and *N. al-eisawii* Barsotti, Borzatti and Garbari (BARSOTTI *et al.* 2000), an endemic unit of the Hisma Basin (Southern Jordan).

Two varieties of *Neurada* were cited by MAIRE (1980), *N. procumbens* var. *orbicularis* and *N. procumbens* var. *pentagona*; the former is mentioned by MEIKLE (1977) as a synonym of *N. procumbens*, the latter may fit with the protologue of *N. procumbens* var. *stellata* "Fructus marginе profunde quinque lobatus lobis bi- vel triaculeato-dentatis" (ZOHARY and DE ANGELIS 1952). It is worth to pinpoint that in DELILE's tables (1813), referred as iconotype by Maire, the fruit of var. *pentagona* is not deeply five-lobed (ZOHARY 1972).

Fruits of *N. stellata* from Jordan have neither a deeply five-lobed margin nor a pentagonal shape while the numerous radial spins have three-pointed tips.

In any case further taxonomical and nomenclatural investigations are needed due to the absence of valid descriptions and because of the confusing nomenclature of these taxa.

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MATERIALS AND METHODS

Karyological investigations were carried out on the root tips of plantules germinated from hydrated fruits under room light and temperature. The samples here investigated come from Jebel Guzman (Southern Jordan); they were collected by G. Barsotti in April 1998. Germination rate was just above 1% and death rate was 100% after 4-5 days.

The root tips were pre-treated in aqueous solution of 0,03% colchicine for three hours and fixed in Carnoy for one hour. Feulgen squashes were prepared and made permanent by mounting in Euparal. Idiogrammatic formulas were obtained according to LEVAN *et al.* (1964).

RESULTS

1. *Neurada procumbens* L. var. *stellata* M. and D. Zohary, Palest. J. Bot. Jerusalem ser., 5(4): 248-250 (1952).

This unit is often associated with the typical *N. procumbens*. The diploid chromosome number is $2n=14$ and the karyotype formula is $2n=2x=6sm + 2m^{sat} + 4m + 2sm = 14$ (Fig. 2); mean chromosome size is 1,52 μm and the karyotype is slightly symmetric (symmetry index = 0,38) (ROMERO ZARCO 1986). Nucleolar organizers were found at the tip of the long arm of the 4th pair of chromosomes.

2. *Neurada al-eisawii* Barsotti, Borzatti and Garbari, Bot. Chron. 13: 111-115 (2000).

This plant is an endemic unit of the Hisma Basin (Southern Jordan). It can be found in only two sites near Jebel Guzman. The following data are the first records for this recently described species. The chromosome number is $2n=14$ and the karyotype formula is $2n=2x=2m + 2sm + 2m + 2sm + 2m^{sat} + 4m$ (Fig. 3). Satellites were found at the tip of the long arm of the 5th pair of chromosomes. Mean chromosome size is 1,2 μm . The

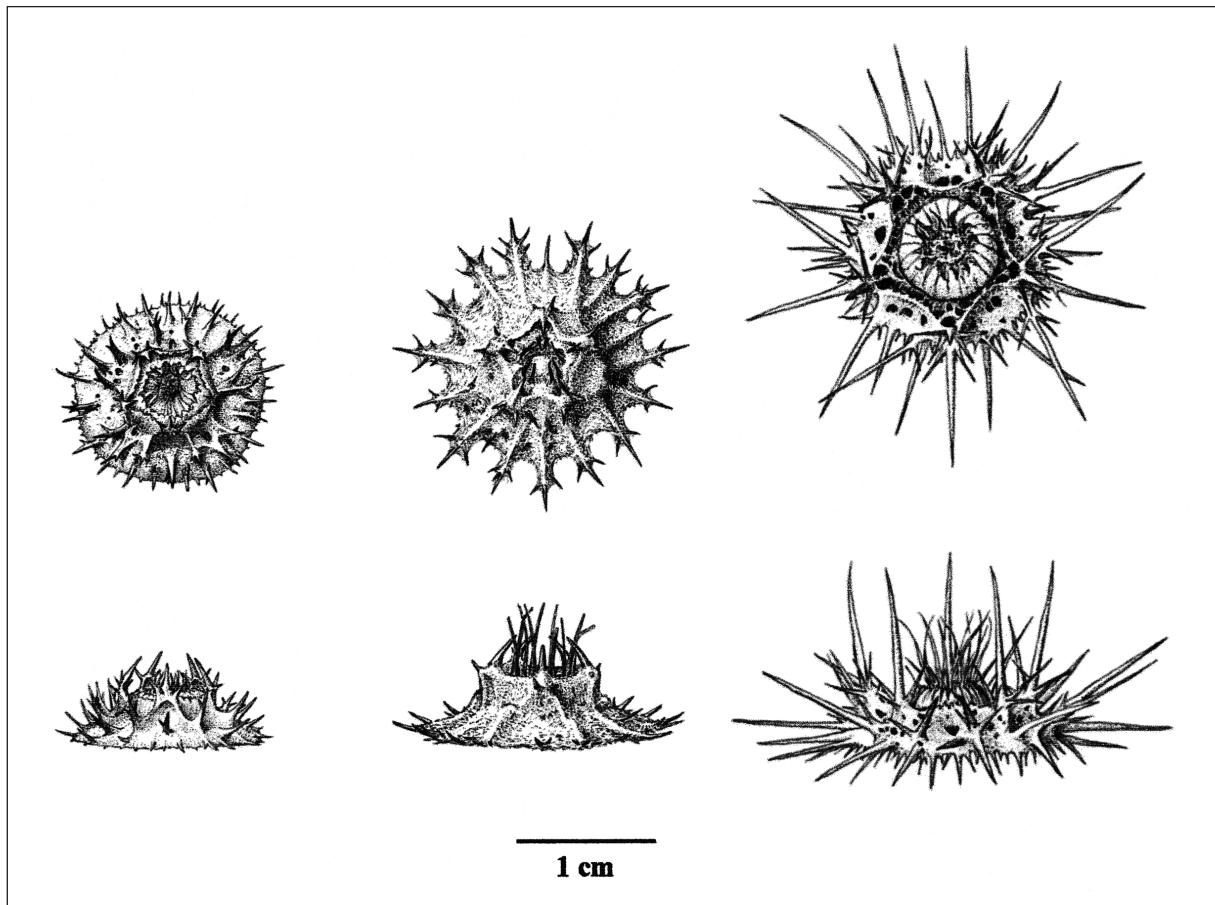


Fig. 1 – Three different fruits, from left to right *N. procumbens* L. var. *procumbens*, *N. procumbens* L. var. *stellata* M. and D. Zohary and *N. al-eisawii* Barsotti, Borzatti and Garbari.

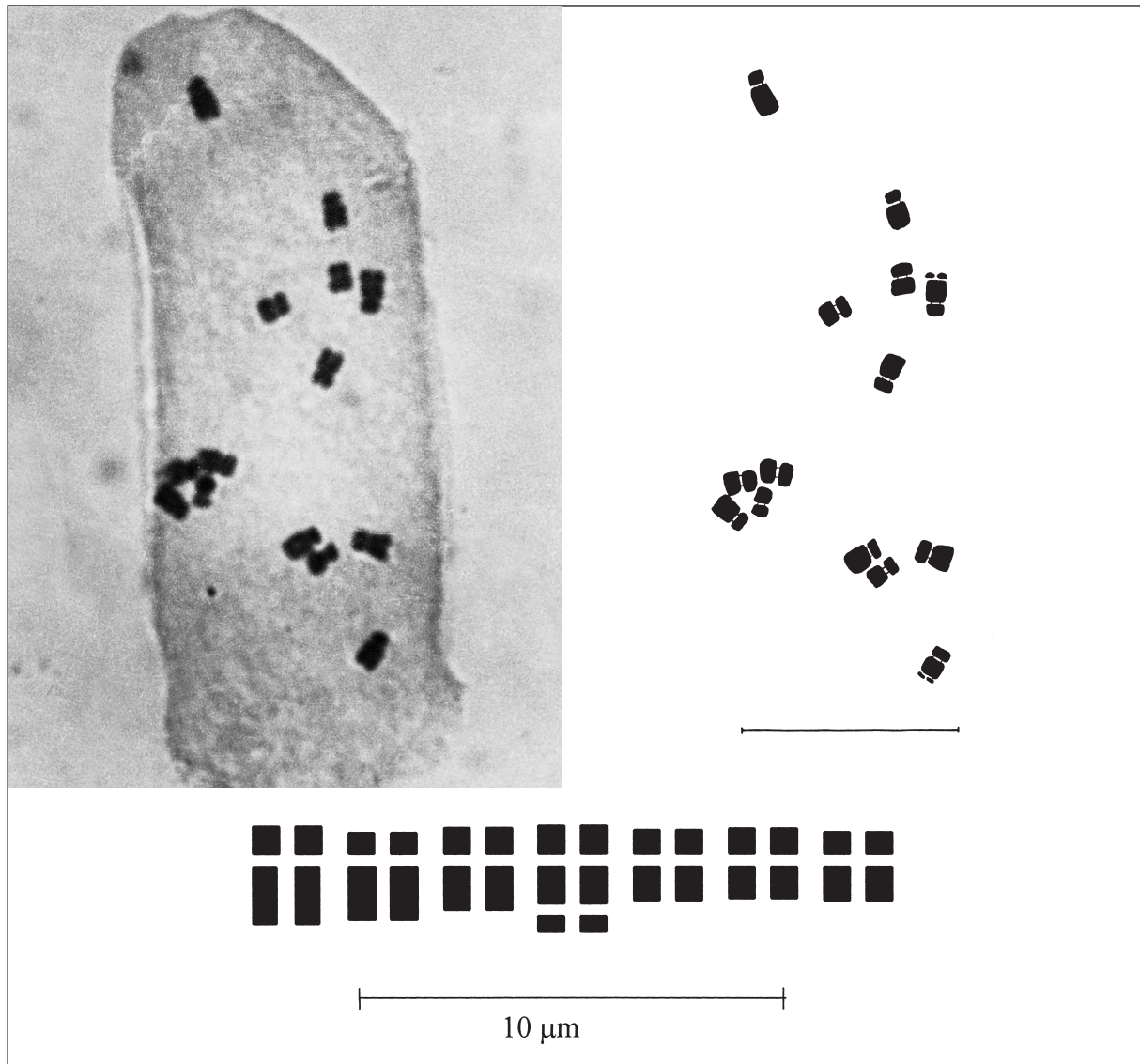


Fig. 2 – Mitotic metaphase plate, scheme and idiogram of *N. procumbens* L. var. *stellata* M. and D. Zohary, $2n=14$. Bar 10 μ m.

karyotype appears more symmetric (symmetry index = 0,27) than in *N. procumbens* var. *stellata*.

DISCUSSION AND CONCLUSIONS

The karyological analysis carried out on the taxa of *Neurada* known up to now showed $2n=14$, a chromosome complement with a generally symmetric karyotype and one pair of satellited chromosomes in the 4th or 5th position. The karyotype morphology of *N. procumbens* var. *procumbens* was not analyzed due to the scarcity of material and very low germination rate, but the chromosome number $2n=14$ was counted; the karyomorphology of this species,

investigated by OGINUMA *et al.* (1997), consistently differs in size, shape and number of nucleolar constrictions from the material here investigated. In the family Neuradaceae, $2n=14$ is known also for *Grielum sinuatum* L. (CURTIS 1976) of South Africa. As regards morphological characteristics of the *Neurada* fruits, a marked polymorphism in shape and size, constant for each infrageneric units, is well known. The chromosome number, the same throughout the genus, and the close similarity between idiograms, are probably due to schizogenic, i.e. sympatric differentiation at local populational level. The chromosome number $2n=12$, recorded by MURBEK (1916) for *N. procumbens*, is to be considered as wrong, according to HAGERUP (1913).

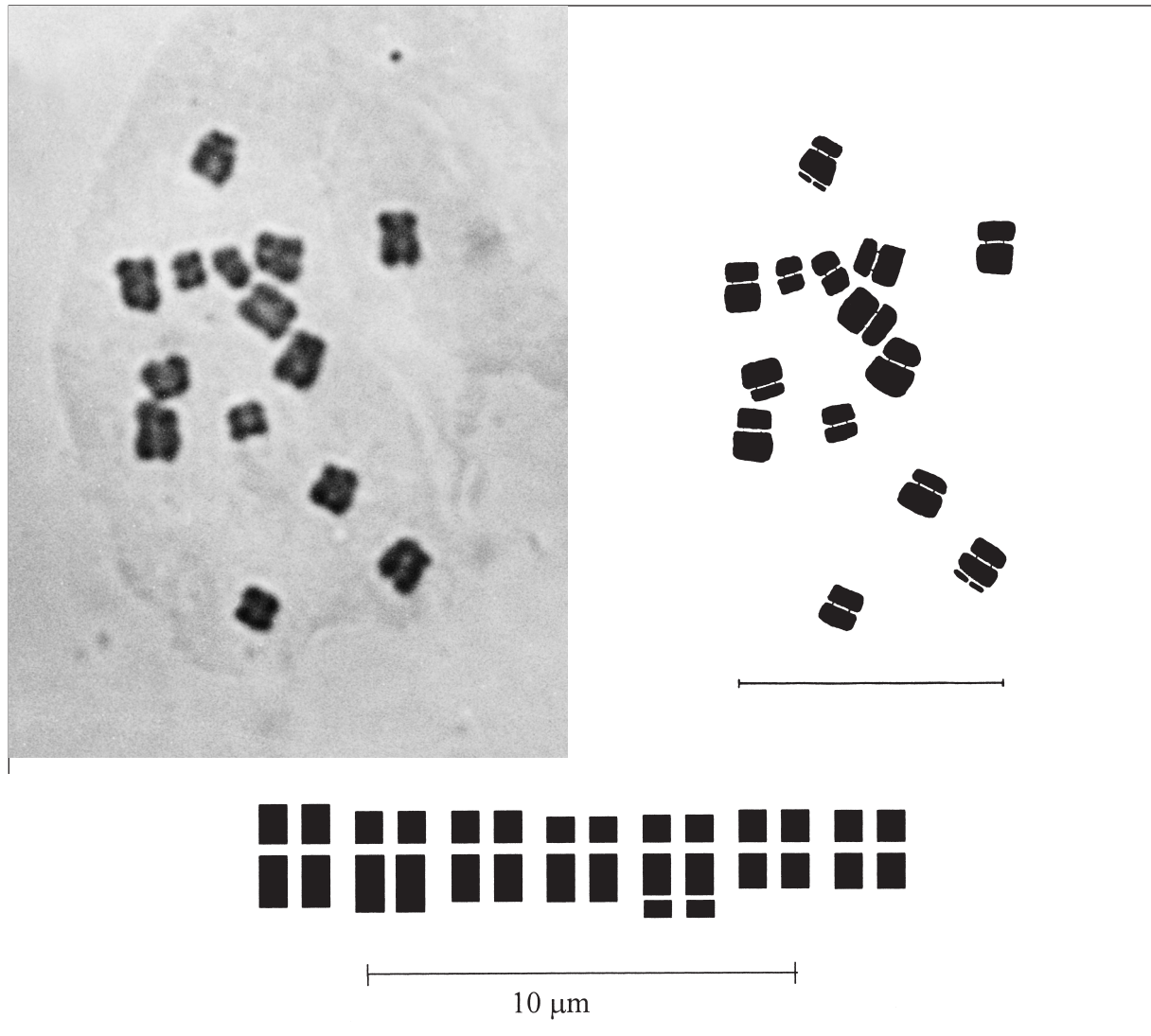


Fig. 3 – Mitotic metaphase plate, scheme and idiogram of *N. al-eisawii* Barsotti, Borzatti and Garbari, $2n=14$. Bar 10 μ m.

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