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 DECRANE and SMETS 1996), a family including also the South African genera Grielim 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 margine profunde quinque lobatus lobis bi- vel tri- aculeato-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.
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 Guzlan (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


This unit is often associated with the typical N. procumbens. The diploid chromosome number is \(2n=14\) and the karyotype formula is \(2n=2x=6m + 2m^{sat} + 4m + 2sm = 14\) (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.


This plant is an endemic unit of the Hisma Basin (Southern Jordan). It can be found in only two sites near Jebel Guzlan. The following data are the first records for this recently described species. The chromosome number is \(2n=14\) and the karyotype formula is \(2n=2x=2m + 2m + 2m^{sat} + 4m\) (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.
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).
REFERENCES


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


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