

Pollen Morphology of an Endangered, Endemic Anatolian Species, *Noccaea aghrica* (P.H.Davis & Kit Tan) M.Firat & Özüdođru (Brassicaceae)

Tehlike Altındaki Endemik *Noccaea Aghrica* (P.H.Davis & Kit Tan) Fırat & Özüdođru (Brassicaceae) Türünün Polen Yapısı

Research Article

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ABSTRACT

The material of this study is *Noccaea aghrica* Fırat & Özüdođru, an endangered, endemic species, only known from three localities in eastern Turkey. The pollen grains of *N. aghrica* are usually prolate, isopolar, trizonocolpate, reticulate, and with the colpi almost running the full length and terminating at the poles. The average length and width of the pollens are 16.89 μm , 6.21 μm and for polar and equatorial axes are 20.94 μm and 18.89 μm , respectively. The pollen measurements and scanning electron microscope, light microscope photographs were given in the manuscript.

Key Words

Noccaea aghrica, Brassicaceae, pollen.

ÖZET

Araştırmamıza konu olan *Noccaea aghrica* Fırat & Özüdođru türü ülkemizde endemik tehlike altında bir tür olup yalnızca üç lokalitede bilinmektedir. *N. aghrica* polenleri genellikle prolat, izopolar, trizonokolpat, retikülat yapıda olup, kolpus neredeyse kutba kadar uzanır. Polenlerin ortalama boy ve eni sırasıyla 16.89 μm ve 6.21 μm ; ortalama polar ve ekvatorial eksen boyu ise 20,94 μm ve 18,89 μm olarak ölçülmüştür. Polen ölçüm sonuçları, elektron mikroskobu ve ışık mikroskobu fotoğrafları da çalışmamızda yer almaktadır.

Anahtar Kelimeler

Noccaea aghrica, Brassicaceae, polen.

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INTRODUCTION

The genus *Noccaea* Moench has approximately 50 species in Turkey. The material of our study, *Noccaea aghrica* (P.H.Davis & Kit Tan) M.Firat & Özüdoğru, was transferred from the genus *Thlaspi* L. to *Noccaea* by Firat et al. [1]. This generic replacement was mainly based on molecular, morphological investigations and seed coat anatomy. *N. aghrica* (Figures 1, 2) is an endangered (EN), endemic species, only known from three localities in Turkey. The distribution area of the species is Van and Hakkari regions [1].

Earlier palynological studies in the Brassicaceae concluded that the family is stenopalynous in pollen size and morphology [2]. However, the tribe Physarieae has 4-10-colpate instead of the tricolpate pollen characteristic of the rest of the family [3,4].

The aim of our research is to provide palynological information of this rare endemic Anatolian species, that may be an important tool for plant taxonomists in future works.

MATERIALS and METHODS

Pollen slides were prepared with the technique of Wodehouse [5] and photographed by the Leica DM 750 digital imaging system. Colpus length and width, pollen shape, exine and intine thickness, and polar and equatorial axes of pollens were measured from at least 30 pollen grains. The terminology for pollen morphology followed Punt et al. [6].

For electron microscopy, pollen grains were mounted on stubs, coated with gold, and examined with a FEI Quanta FEG 450 model scanning electron microscope in Bülent Ecevit University Science and Technology Research Center.

RESULTS and DISCUSSION

Noccaea aghrica pollens (Figures 3,4,5) are usually prolate-spheroidal, isopolar, trizonocolpate, reticulate, and with the colpi almost running the full length and terminating at the poles. The colpi are usually widest at the equator and gradually narrowing towards the poles. The average length and width are 16.89 μm and 6.21 μm , respectively. The lumina



Figure 1. *Noccaea aghrica* habit.



Figure 2. *Noccaea aghrica* inflorescens.

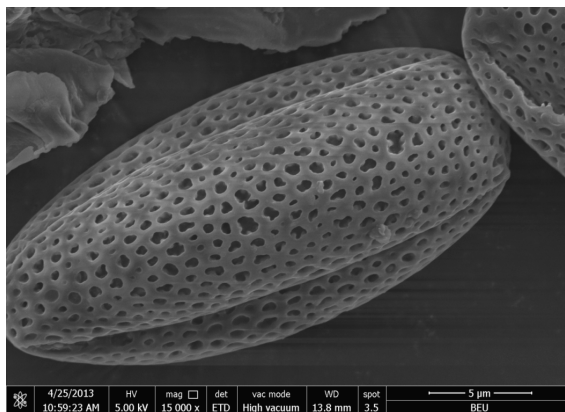


Figure 3. SEM microphotography of *Noccaea aghrica* pollen.

varied from 4- to 6-polygonal or were irregular in shape. The muri are simplicolumellate and are narrower than the lumina. The average lengths for polar and equatorial axes are 20.94 μm and 18.89 μm , respectively. The average thickness is 1.67 μm for the exine, 0.994 μm for the lumina, and 0.35 μm for the muri (Table 1).

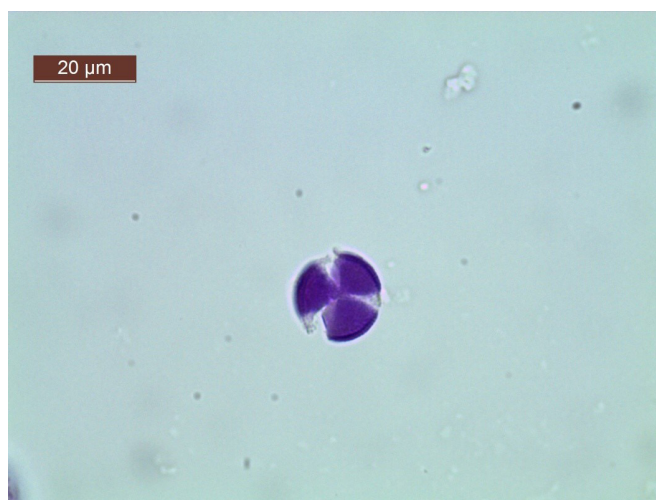


Figure 4. Light microscope image of *Noccaea aghrica* pollen polar view.



Figure 5. Light microscope image of *Noccaea aghrica* pollen equatorial view.

Table 1. Pollen measurements of *Noccaea aghrica*.

	Range	Mean/Standard deviation
Average diameter of lumina (μm)	0.87-1.10	0.994 \pm 0.54
Average diameter of muri (μm)	0.30-0.40	0.35 \pm 0.46
Polar axis (μm)	24.01-17.05	20.94 \pm 1.29
Equatorial axis (μm)	21.01-17.00	18.89 \pm 0.927
Exine thickness (μm)	2.01-1.35	1.67 \pm 0.184
Intine thickness (μm)	0.915-0.412	0.74 \pm 0.134
Apocolpium (μm)	4.776-2.216	3.85 \pm 0.58
Mesocolpium (μm)	10.98-9.01	9.77 \pm 0.51
Colpus length (μm)	19.174-14.111	16.89 \pm 1.54
Colpus latitude (μm)	6.212-3.0002	4.84 \pm 0.93

We observed only slight differences in pollen size between *N. aghrica* and related species particularly in the polar and equatorial values [7]. In *N. aghrica* pollen (Figure 4), the average polar and equatorial axes were 20.94 μm and 18.89 μm , respectively (Table 1), whereas in *T. jaubertii* Hedge, the values were 19.7 μm and 17.7 μm , respectively. Also the polar and equatorial axes in *Microthlaspi perfoliatum* were 19.5 μm and 17.6 μm , respectively. The palynological properties of *N. aghrica* match the general characteristics of Brassicaceae pollens with trizonocolpate pollen grains.

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