

Palynological Study of the Genus *Arabis* L. (Brassicaceae) in Iraq

Khazal Dh. Wadi Al-Jibouri^{1*}, Areej A. Farman Al-Rawi²

¹. Department of Biology/ College of Science / Univ. of Diyala/Iraq.

². Department of Biology/College of Education for Pure Science-Univ. of Baghdad/Iraq.

*Corresponding Author: Khazal Dh. Wadi Al-Jibouri

Abstract

Pollen morphology of 4 species (*A. aucheri*, *A. auriculata*, *A. caucasica*, *A. nova*) belonging to the genus *Arabis* L. in Iraq was examined by light microscope and scanning electron microscope to determine the significance of pollen features as taxonomic characters. The results showed pollen grains of the species were monades, homopolar, tricolpate, and with medium size, but the species varied in shapes (polar and equatorial view), colpus length and width, exine thickness and exine ornamentation. Pollen colors were brown convert to brownish yellow.

Keywords: *Arabis*, *Cruciferae*, *Palynology*, *Pollen grain*.

Introduction

Brassicaceae (Cruciferae) or mustard family was one of ten most economically important plant families [1] and one of the largest angiosperm families, consists about 340 genera and 3350 species distributed mostly in temperate northern Hemisphere[2,3].

Brassicaceae included some 3980 species in 351 genera of 52 tribes [4,5]. [6] mentioned 80 genera included 177 species dispersal in Iraq, 80 genera or more are represented in the flora of Iraq[7]. Pollen morphology of Brassicaceae has been investigated by several authors [8, 9, 10, 11, 12, 13] examined pollen morphology of Brassicaceae from Jordan, while [14] studied pollen morphology of the genus *Clypeola* (Brassicaceae) in Iran [15].

Studied pollen grains of 27 species belong to 6 tribes in the province of the lower island (Al-Jazera Al-sufla) in Iraq, but [16] investigated pollens of 12 species of the genus *Erysimum* L. in Iraq [17]. Were studied the morphology of Pollen Grains and Seeds in Eight Species from Cruciferae in Iraq [18]. Examined pollen grains of the three wild species *Diplotoxis eruroides* L. *Rapistrum rugosum* L. and *Sinapis arvensis* L. in Iraq [19]. Studied Pollen morphology and its taxonomic significance of the genus *Arabis* (Brassicaceae) in Turkey, further, [20]

studied Pollen morphology of *Arabis alpina* L. (Brassicaceae) populations from the Alps and the Rila Mountains. The objectives of this study were to provide a detailed understanding of the pollen morphology of *Arabis* by light microscopy (LM) and scanning electron microscopy (SEM), and to determine the importance of these palynological data as a taxonomic character in the genus. The present study was conducted based on the pollen morphology of four species of the genus *Arabis* in Iraq for the first time.

Materials and Methods

The plant specimens were collected from the mountain region of Iraq and from National Herbarium of Iraq and Herbarium of the College of Education for pure science / University of Salahaddin. In this study, the pollen morphology of 4 species belonging to the genus *Arabis* was investigated by using light microscope (L M) and scanning electron microscope (SEM).

Light Microscope (L M)

A mature anther has been taken from dry specimens who were collected from different districts of Iraq, has put in a clean hourglass, and a drop of safranin-glycerine stain was added to them [21].

The anther was opened by two dissected needles, then the pollens have pulled with the stain by using a special dropper for each species, and put them in center of clean slide before covering with cover slip slightly, and the slide was ready for examine.

In this study slides of each species have prepared from different locations of districts, the data have been taken for (30-40) pollens from each species were studied and the following parameters were measured: polar axes (P), equatorial diameter (E), ratio of polar and equatorial diameter (P/E) in order to determine the pollen shape table (1), colpus length (C l),colpus width (C w), thickness of exine layer (E x), the slides were examined under Olympus-compound microscope, and photographed by using Canon microscopically camera in College of Education/University of Baghdad.

Scanning Electron Microscope (SEM)

Pollen exposed from the dissected anthers and was mounted onto SEM stubs on double – sided sellotape. Materials were coated with gold/palladium using Ion sputter examined by VEGNA TESCAN SEM. The terminology of [22] and [23] was used in descriptions of the pollen grains.

Results & Discussion

The results showed that pollen grains of all the studied species were monades, homopolar, tricolpate, and with medium size (36.8-46.4) μm, but the species varied in shapes in polar and equatorial view, colpus length and width, exine thickness and exine ornamentation. The pollen grains colors were brown convert to brownish yellow.

A.aucheri: pollen grains of this species were prolate, polar length 41.5 μm, equatorial length 56.6 μm, colpus length 47.3 μm, colpus width 10.2 μm, exine thickness 6.54 μm with rugo reticulate ornamentation.

A.auriculata: pollen grains feartuers were subprolate, polar length 42.2 μm, equatorial length 36.8 μm, colpus length 32.25 μm, colpus width 8.4 μm, exine thickness 4.3 μm with infratectum and sunken apertures ornamentation.

A.caucasica: this species distinguished with subprolate, , polar length 53.75 μm ,equatorial length 46.4 μm, colpus length 38.7 μm, colpus width 6.45 μm ,exine thickness 6.45 μm with infratectum and sunken apertures ornamentation.

A.nova: pollen grains of this species were subprolate, polar length 46.5 μm, equatorial length 37.2 μm, colpus length 43.1 μm, colpus width 8 μm, exine thickness 4.3 μm with microreticulate ornamentation.

The largest pollen grains were founded in *A.caucasica* 44.5 μm, while the smallest founded in *A. nova* 33.5, the longest equatorial length was founded in *A. caucasica* 46.4 μm but the shortest equatorial length was founded in *A.auriculata* 36.8 μm, the longest polar axis was founded in *A. aucheri* 56.6 μm while the shortest polar axis founded in *A. auricula* 42.2 μm, the longest colpus was in *A.aucheri* 47.3 μm ,but the shortest was in *A. auriculata* 32.25 μm, the largest colpus width founded in *A. aucheri* 10.2 μm, while the smallest width founded in *A. caucasica* 8 μm, the largest thickness exine was in *A. aucheri* 6.54 μm, while the smallest in *A. auricula* and *A.nova* 4.3 μm.

It seemed that pollen grains of the species had a taxonomic importance in the separation of taxa, and according to the available literature, the present study regarded as the first study for the pollen grains of the genus *Arabis* in Iraq.

Table 1: Pollen morphology of the genus *Arabis* (Cruciferae) in Iraq

Taxa	P (μm)	E(μm)	P/E	Pollen Shape	Exine Thickness (μm)	Ornamentation of exine
<i>Arabis aucheri</i>	(60.2- 51.6) 56.6	(47.3-34.3) 41.5	1.36	Prolate	6.54	Rugo-reticulate
<i>A.auriculata</i>	(51.6- 38.7) 42.2	(38.7-34.4) 36.8	1.14	Subprolate	4.3	Reticulate
<i>A.caucasica</i>	(60.2- 47.3) 54	(47.3-43) 46.4	1.16	Subprolate	6.45	Reticulate
<i>A.nova</i>	(47.3- 43.1) 46.5	(38.7-34.4) 37.2	1.25	Subprolate	4.3	Micro reticulate

P=Polar axes E=Equatorial diameter

Table 2: Pollen morphology of the genus *Arabis* (Cruciferae) in Iraq

Taxa	Pollen size (µm)	Pollen shape in polar view	Pollen shape in Equatorial view	Colpus length(µm)	Colpus width (µm)	colpus
<i>A. aucheri</i>	(34-47) 40.5	Triangular	sub spheroidal	47.3	10.2	Normal
<i>A.auriculata</i>	(33-38)35.5	Circular	prolate	32.25	8.4	Sunken
<i>A.caucasica</i>	(41-48)44.5	Circular	prolate	38.7	8	Sunken
<i>A.nova</i>	(30-37)33.5	Triangular	Sub spheroidal	43	9.3	normal

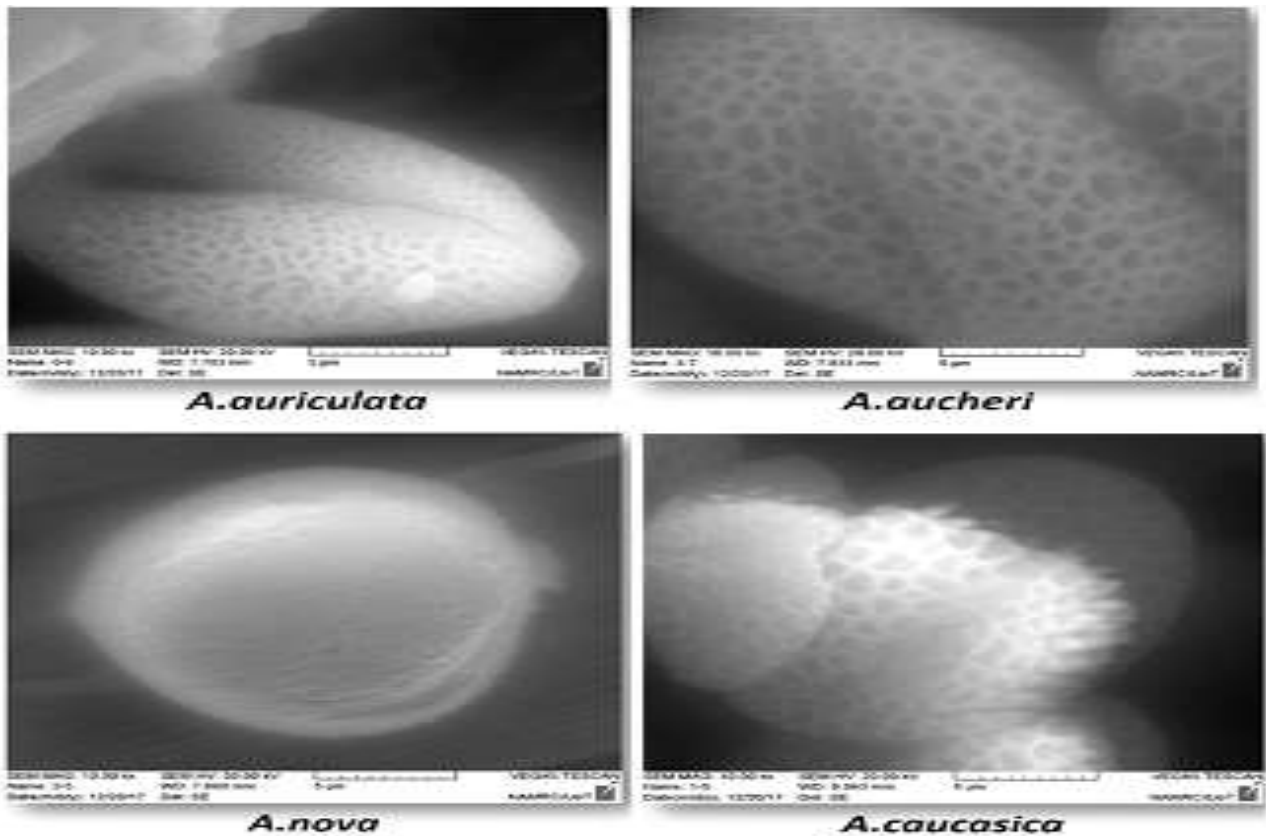


Fig. 1: Pollen grains of species by (SEM)

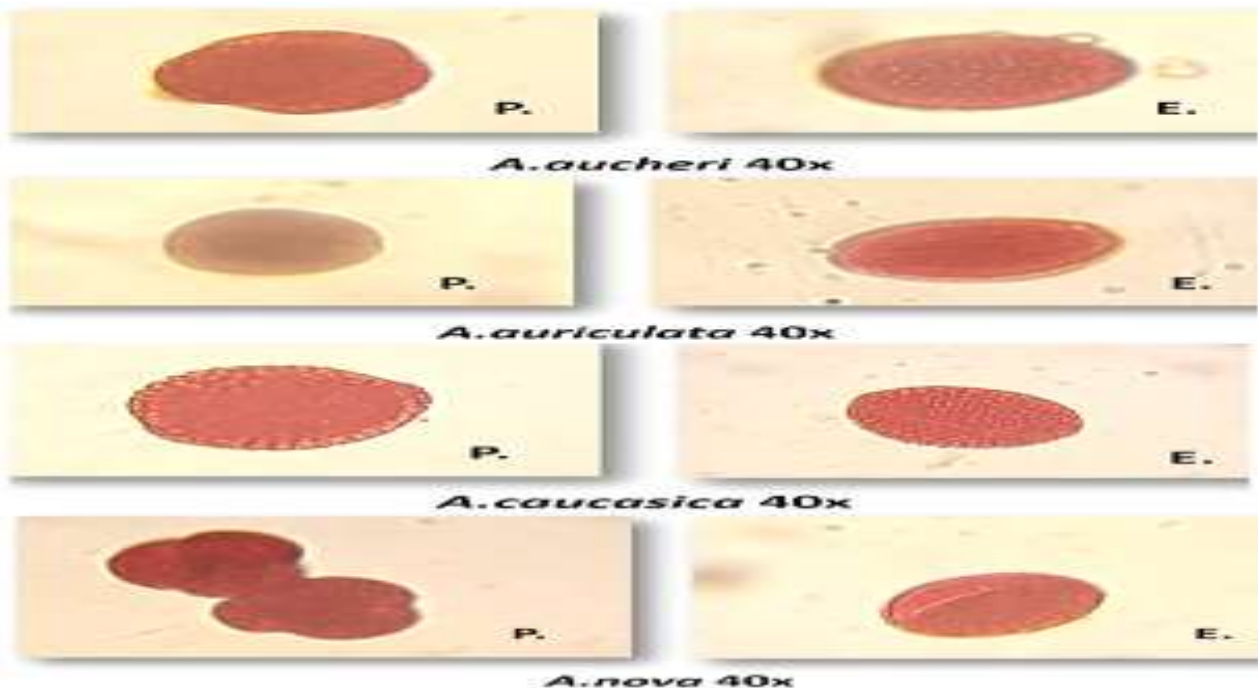


Fig. 2: Pollen grains of Species by light microscope

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