



THE PALYNOLOGICAL STUDY OF TEN SPECIES FOR *ALYSSUM* (BRASSICACEAE) IN MID AND NORTH OF IRAQ

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Abstract

The current research showed variation in ten species of the genus *Alyssum* (*A. desertorum*, *A. homalocarpum*, *A. marginatum*, *A. menicoides*, *A. minus*, *A. penjwinense*, *A. singarensis*, *A. stapfii*, *A. strigosum*, *A. szovitsianum*) spired in central and northern Iraq and studied several characteristics including shape and size of pollen grain and dimensions colpus and the distance between two colpus and the rate of thickness of the pollen wall and the rate of diameter of the pollen aperture and there was Clear variations between the species studied.

The current study showed that all species of the *Alyssum* genus contained tricolpate and were in three forms in the Equatorial axis : Spherical, Extended Oval and Semi-spherical and In the polar axis, it was in two shape : spherical and triangular forms. It was also noted that the largest rate of pollen diameter in the equatorial axis was in the two species *A. desertorum* *A. stapfii*, which reached 20 μm , while the lowest rate of pollen diameter was in both species *A. szovitsianum* *A. menicoides*, which was 14 μm and in the polar axis, the highest rate of pollen diameter in two species *A. homalocarpum* *A. parviflorum* was appointed at 16 μm while the lowest rate of pollen diameter was in the species *A. marginatum* *A. minus* *A. stapfii* *A. szovitsianum* at 13 μm . the length of the colpus was different between the species in study, the largest rate of length of the colpus in the species *A. marginatum*, which was 12.2 μm , while the lowest rate of length of the colpus was in species *A. homalocarpum*, which was 8.2 μm .

Key words: Palynology, *Alyssum*, Brassicaceae, pollen grain.

Introduction

Brassicaceae is a large family, as it is widespread worldwide except the frozen continent (Karabacak, *et al.*, 2016) consisting of 39 tribes and about 321 genus 3660 species (Al-Shehbaz, 2012) and mentioned (Townsend and Evan Guest, 1980) in the flora of Iraq presence of (380-500) genus and more (2000-3000) species exists throughout the world but especially in areas with moderate heat and approximately 80 or more genus found in Iraq and it was noted that the plants of this family are annual or perennial perennial and rarely be small shrubs and there are a number of cultured species Most of them are vegetables and crops of economic importance (Al-Mussawi, 1987) and (Al-Katib, 2000) indicated that the family has 350 genus and 2500 species spread mostly in the temperate and cold areas of the northern hemisphere but in Iraq 75 species wild and 18 species planted for food.

The mustard family is different from the rest families

in form of the flowers and fruits, as they contain cruciform corolla and stamens type tetradynamous and the presence of siliqule and silicle with pseudo-septum barrier (Townsend and Guest, 1980; Davis, 1985).

The genus *Alyssum* L. is one of the most widespread species in the world and the largest species in the Brassicaceae family. It has 100-170 species in the world and is spread in Europe, Asia and North Africa. In Iraq, the species is more than 20 species, mostly in central and northern Iraq (Townsend and Guest, 1980). Due to the importance of species belonging to the genus *Alyssum* in the field of medical, pharmaceutical, industrial and aesthetic, the current study was chosen for this species because of the importance of the family in Iraq and the species *Alyssum* did not receive any detailed study In our country so the current research aims to study the pollen grain of ten species belonging to the genus *Alyssum* in central and northern Iraq and try to find differences between species.

Materials and Methods

Collect of plant specimens

The current study was based on the fresh and dry samples of species belonging to *Alyssum* L. which includes: (*A. desertorum*, *A. homalocarpum*, *A. marginatum*, *A. menicoides*, *A. minus*, *A. penjwinense*, *A. singarense*, *A. stapfii*, *A. strigosum*, *A. szovitsianum*) Which was collected through field trips to the central and northern regions of the country, where the number of field trips 10 trips to several governorate (Salah al-Din, Nineveh, Kirkuk, Irbil, Dohuk and Sulaymaniyah) for the period from March 2017 to July 2018. The samples were collected at the flowering stage and were compressed, dried and stored for diagnosis.

Identification of plant specimens

After samples were collected, dried and compressed, the samples were identified based on several books and flora including Iraqi, Turkish, Iranian, Chinese, Kuwaiti and Saudi flora, as well as diagnosis of specimens through the herbarium visited, especially the national herbarium in Abu Ghraib and the herbarium of the College of Science / Baghdad University and the University of Mosul. The samples were deposited in the College of Science / University of Tikrit after recording the scientific name, place and date of the collection.

Preparation of pollen grain slides

Depend on the method used by (Al-shammary and Al-Blesh, 2007) and the pollens supplied from herbarium specimens were prepared by Wodehouse's method, (1965) and acetolysis (Erdtman, 1971). Measurements were obtained and microphotos were taken after allowing one month for the specimens to reach normal dimensions and pollen forms.

1. The flowers have been taken open or non-open flowers and placed in a petri dish containing distilled water.
2. The floral parts such as calyx, corolla and pistil

were isolated and tooked the stamens.

3. Put on a clean glass slide contain on a drop of glycerin and a drop of safaranin dye.

4. Crushed the stamens for the purpose of cracking and taking the pollen grain out of it and then covered the slides and put on it label edited information on it for each species under study.

5. The samples were examined under a light microscope and photographed by Canon digital camera and recorded data for all species.

Results

The current study showed that all species of the *Alyssum* genus contained tricolpate and were in three forms in the Equatorial axis :

1. Spherical
2. Extended Oval
3. Semi-spherical and

In the polar axis, it was in two shape :

1. Spherical
2. Triangular forms

The size of the pollen was small according to the Classification of (Erdtman, 1971), with its size in equatorial and polar axis ranging from (22-10) μm and as shown in the table 1.

It was also noted that the largest rate of pollen diameter in the equatorial axis was in the two species *A. desertorum* *A. stapfii*, which reached 20 μm , while the lowest rate of pollen diameter was in both species *A. szovitsianum* *A. menicoides*, which was 14 μm and in the polar axis, the highest rate of pollen diameter in two species *A. homalocarpum*, *A. parviflorum* was appointed at 16 μm while the lowest rate of pollen diameter was in the species *A. margintum* *A. minus* *A. stapfii* *A. szovitsianum* at 13 μm .

Table 1: The quantitative characteristics of pollen grain in ten species for genus *Alyssum* measured by micrometers.

Rate thickness of wall pollen	Rate E/P	Inter-colpus distance	Rate width of colpus	Length of colpus	Polar axis	Equatorial axis	Character / Species
1.2	0.7	7.2	2.3	8.5-10.5(9)	12-15(14)	18-21 (20)	<i>A. desertorum</i>
2.3	0.9	8.1	3.7	7.2-9.1(8.2)	15-17(16)	16-18(17)	<i>A. homalocarpum</i>
1.2	0.8	6.4	4.2	10.5-13.1(12.2)	11-14(13)	12-16(15)	<i>A. marginatum</i>
2.6	1.0	8.2	3.5	7.0-9.5(8.5)	12-15(14)	13-16(14)	<i>A. menicoides</i>
3.2	0.8	6.7	2.7	9.1-11.2(10.6)	10-15(13)	12-17(15)	<i>A. minus</i>
2.5	0.8	7.5	2.9	7.3-9.5(8.4)	15-18(16)	18-20(19)	<i>A. parviflorum</i>
1.2	0.8	7.4	3.4	8.3-10.4(9)	(14)16-12	16-18(17)	<i>A. penjwinense</i>
2.5	0.6	8.5	3.9	9.6-10.6(9.1)	11-15(13)	18-22(20)	<i>A. stapfii</i>
1.4	0.9	6.3	2.5	7.5-10.5(8.9)	12-15(14)	13-17(15)	<i>A. strigosum</i>
1.9	0.9	7.2	4.1	6.4-9.5(8.3)	10-15(13)	12-15(14)	<i>A. szovitsianum</i>

The length of the colpus was different between the species in study, the largest rate of length of the colpus in the species *A.marginatum*, which was 12.2 μm , while the lowest rate of length of the colpus was in species *A.homalocarpum*, which was 8.2 μm as shown in the table 1.

The width of the colpus also changed in the species in study, the largest rate of width of the colpus in the species *A.marginatum* was 4.2 μm , while the lowest rate of width of the colpus was in species *A.desertorum* at 2.3 μm as it was noted that the distance between the two colpus was heterogeneous in all species as shown in the table 1.

The average thickness of the pollen wall was all species with a thin wall and the highest rate of the thickness of the pollen grain wall in species *A.minus* at 3.2 μm , while the lowest rate of the thickness of the pollen grain wall in species *A. desertorum* *A. marginatum*. *A.*

penjwinense as it reached 1.2 μm , as show in the table 1.

Discussion

The current study showed that all species of the *Alyssum* genus contained tricolpate and were in three forms in the Equatorial axis :(1) Spherical; (2) Extended Oval; (3) Semi-spherical and that's according for (Inceoglu and Karamustafa, 1977; Vural and Ince, 1994; Orcan and Binzet, 2003) and In the polar axis, it was in two shape : (1) spherical; (2) triangular forms and that's according for (Orcan and Binzet, 2003).

The size of the pollen was small according to the Classification of Erdetman, with its size in equatorial and polar axis ranging from (22-10) μm that's according for (Baser, *et al.*, 2018).

It was also noted that the largest rate of pollen diameter in the equatorial axis was in the two species *A.desertorum* *A.stapfii*, which reached 20 μm , while the

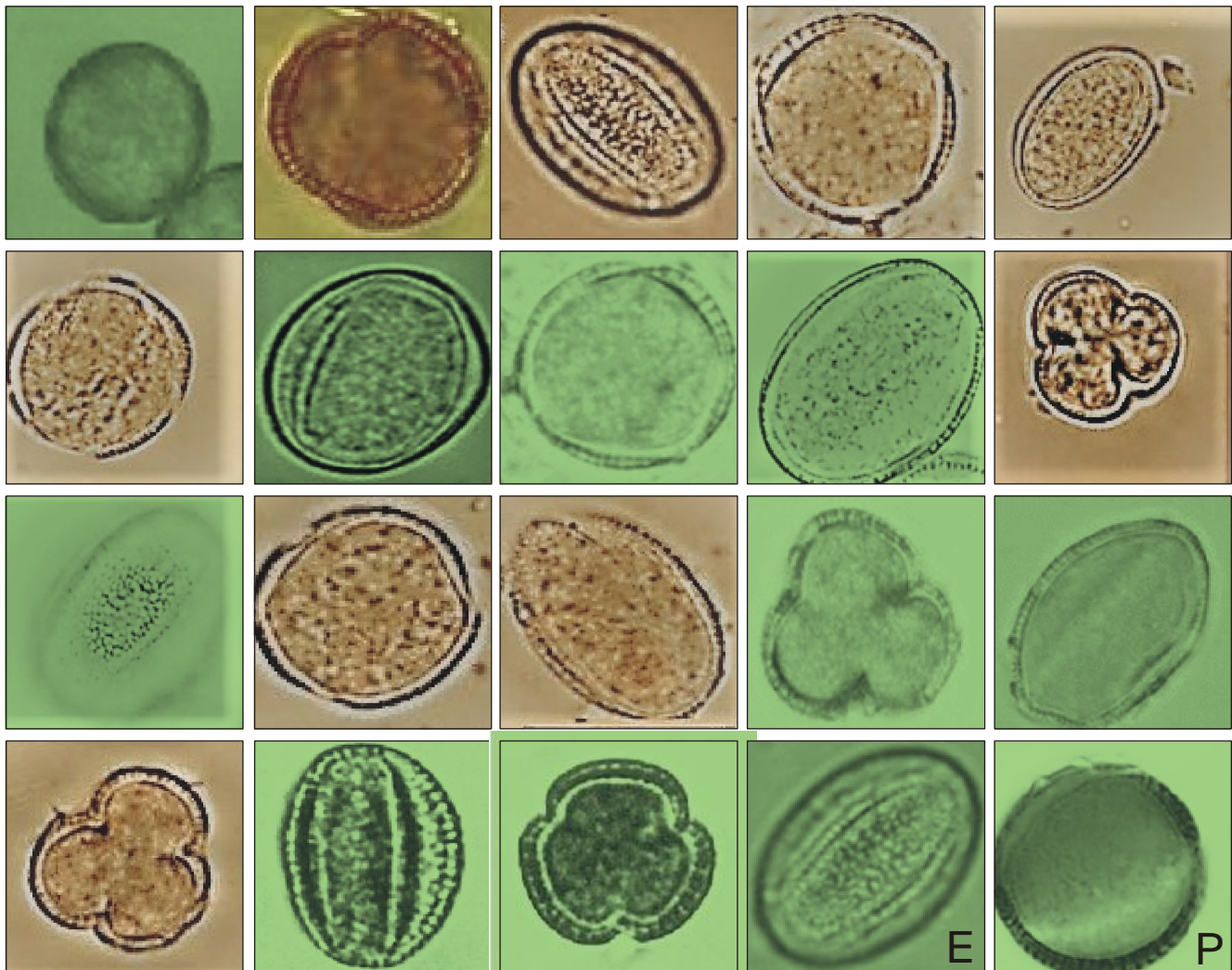


Fig. 1: Pollen grain in light microscope 100x for ten species genus *Alyssum*. E= Equatorial view; P= polar view.

1. *A.desertorum*, 2. *A.homalocarpum*, 3. *A.marginatum*, 4. *A.menicoides*, 5. *A.minus*, 6. *A.penjwinense*, 7. *A.singarensis*, 8. *A.stapfii*, 9. *A.strigosum*, 10. *A.szovitsianum*

lowest rate of pollen diameter was in both species *A.szovitisianum* *A.menicoides*, which was 14 μm and in the polar axis, the highest rate of pollen diameter in two species *A.homalocarpum* *A.parviflorum* was appointed at 16 μm while the lowest rate of pollen diameter was in the species *A.marginatum* *A.minus* *A.stapfii* *A.szovitisianum* at 13 μm . The length of the colpus was different between the species in study, the largest rate of length of the colpus in the species *A.marginatum*, which was 12.2 μm , while the lowest rate of length of the colpus was in species *A.homalocarpum*, which was 8.2 μm that's according for (Al-Shehbaz, 2012)

The width of the colpus also changed in the species in study, the largest rate of width of the colpus in the species *A.marginatum* was 4.2 μm , while the lowest rate of width of the colpus was in species *A.desertorum* at 2.3 μm as it was noted that the distance between the two colpus was heterogeneous in all species that's not according for (Anchev and Deneva, 1997) because different in location and climate. The average thickness of the pollen wall was all species with a thin wall and the highest rate of the thickness of the pollen grain wall in species *A.minus* at 3.2 μm , while the lowest rate of the thickness of the pollen grain wall in species *A. desertorum* *A. marginatum*. *A. penjwinese* as it reached 1.2 μm , that's not according for (Bolurian, 2009).

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