

Palynological Study to Some Taxa of the genus *Colchicum* L. (Colchicaceae)

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ABSTRACT: In this study, pollen grains of six taxa of the genus *Colchicum* L. it is medical and poisonous herb contain colchicine (alkaloid have cytotoxic effects) especially in corm and seeds. All parts are highly toxic if eaten. Handling of corms may cause skin allergy. *Colchicum* L. that collected from the wild population during the flowering time in spring and autumn season in northern and northeastern regions of Iraq were investigated under light microscope (LM) and scanning electron microscope (SEM), three of the taxa (*C. wendelboi*, *C. varians*, *C. haussknechtii*) were studied for the first time. We recorded the morphological features (shape, size, colour, number of aperture, symmetrical and ornamentation). The polar and equatorial axis dimensions of each pollen grain were calculated to obtain the ratio between the two dimensions that determine the shape of the pollen grains, then We found different points where each type of the species can be distinguished by pollen grains. they are diporate, Isopolar, bilateral symmetry, have circular shape in polar view, most of them are oblate shape in equatorial view, others are convex of one or two sides, exine ornamentation mostly reticulate but one is microreticulate.

Keywords: *Colchicum*, Pollen grain, Ornamentation, Aperture, Reticulate, Isopolar.

1. INTRODUCTION

Colchicum L. it is a genus of Colchicaceae family that are within the Liliaceae family, the name *Colchicum* comes from (Colchis) which is a place in Asia Minor, where the genus is plentiful, in Arabic languages call (Unsalan), it is represented by about 65 species distributed in Europe, West Asia and North Africa [1]. There are 6 species most of them was distributed in the north mountain of Iraq and others in the borderline between Iraq, Iran and Turkey, others are in the east region of Iraq, the English old name is "Meadow Saffron" or "Au-tumn Crocus", Arabs of Spain called "Suringan" what is called "Ukna" in Egypt [2]. There are limited detailed Palynological studies on all *Colchicum* taxa, so in this research we study the pollen morphology of 6 species in Iraq for the first time by light microscope (LM) and scanning electron microscope (SEM).

2. MATERIALS AND METHODS

The plant for this study was collected from the wild population in Iraq during the flowering time in spring and autumn season then the *Colchicum* specimens were taken to the laboratories to preparing the pollen grains for study by two ways:

2.1 LIGHT ELECTRON MICROSCOPE (LEM): Fig. 1. (A&B):

The flowers putting in (3: Ethyl alcohol with 1: Glacial acetic acid) for 24 hours then washed by 70% ethyl alcohol and keep it in the same concentrate after that the pollen grains were taken from the flower by removing the flower parts and opening the anthers by needle autopsy and putting on slide adding a drop of (Safranin-glycerin) and it was left for

20 minutes and covered by cover slide to be ready for observed by L.M. [3]. The photomicrographs were made with a digital camera eye piece (40x) and write the morphological features of the pollen grains in polar and equatorial view.

2.2 SCANNING ELECTRON MICROSCOPE (SEM): Fig. 2 &3 (A&B)

After removing the anthers from the tube and putting in the glass slide then take the pollen from anthers with needle and let them dry. Then transferring the pollen grain with SEM stub prior to sputter coating for exam the pollen with SEM (polar view and equatorial view).

3. RESULTS

All information recorded in Table (1) and the photos in Fig. (1&2&3):

3.1 COLCHICUM WENDELBOI Fig. 2(1A&1B):

Pollen grains are oblate shape flat on one side and convex on the other in equatorial view and circular in polar view, Isopolar, Bilateral symmetry have two Aperture (Diporte) in both ending, polar axis (P) (25.12-23.3) μm , equatorial axis (E) (45.05-42.76) μm , P/E ratio (0.55-0.53) μm , exine surface are reticulate ornamentation.

3.2 COLCHICUM VARIANS Fig. 2(2A&2B):

Pollen grains are oblate shape in equatorial view and circular in polar view, Isopolar, Bilateral symmetry have two Aperture (Diporte) in both ending, polar axis (p) (31.04-29.47) μm , equatorial axis (E) (49.11-47.41) μm , P/E ratio (0.63-0.62) μm , exine surface are reticulate ornamentation.

3.3 COLCHICUM SZOVITSII Fig. 2(3A&3B):

Pollen grains are oblate shape convex on both sides in equatorial view and circular in polar view, Isopolar, Bilateral symmetry have two Aperture (Diporte) in both ending, polar axis (P) (27.12-25.99) μm , equatorial axis (E) (54.03-51.07) μm , P/E ratio (0.50-0.50) μm , exine surface are reticulate ornamentation.

3.4 COLCHICUM KOTSCHYI Fig. 3(1A&1B):

Pollen grains are oblate shape in equatorial view and circular in polar view, Isopolar, Bilateral symmetry have two Aperture (Diporte) in both ending, polar axis (p) (40.06-39.74) μm , equatorial axis (E) (53.34-50.23) μm , P/E ratio (0.75-0.77) μm , exine surface are reticulate ornamentation.

3.5 Colchicum Haussknechtii Fig. 3(2A&2B):

Pollen grains are oblate shape flat on one side and convex on the other in equatorial view and circular in polar view, Isopolar, Bilateral symmetry have two Aperture (Diporte) in both ending, polar axis (P) (46.22-40.01) μm , equatorial axis (E) (69.7-68.44) μm , P/E ratio (0.66-0.58) μm , exine surface are reticulate ornamentation

3.6 COLCHICUM DESERTI-SYRIACI Fig. 3(3A&3B):

Pollen grains are oblate shape flat on one side and convex on the other in equatorial view and circular in polar view, Isopolar, Bilateral symmetry have two Aperture (Diporte) in both ending, polar axis (P) (38.52-36.61) μm , equatorial axis (E) 59.05-57.62) μm , P/E ratio (0.65-0.63) μm , exine surface are microreticulate ornamentation.

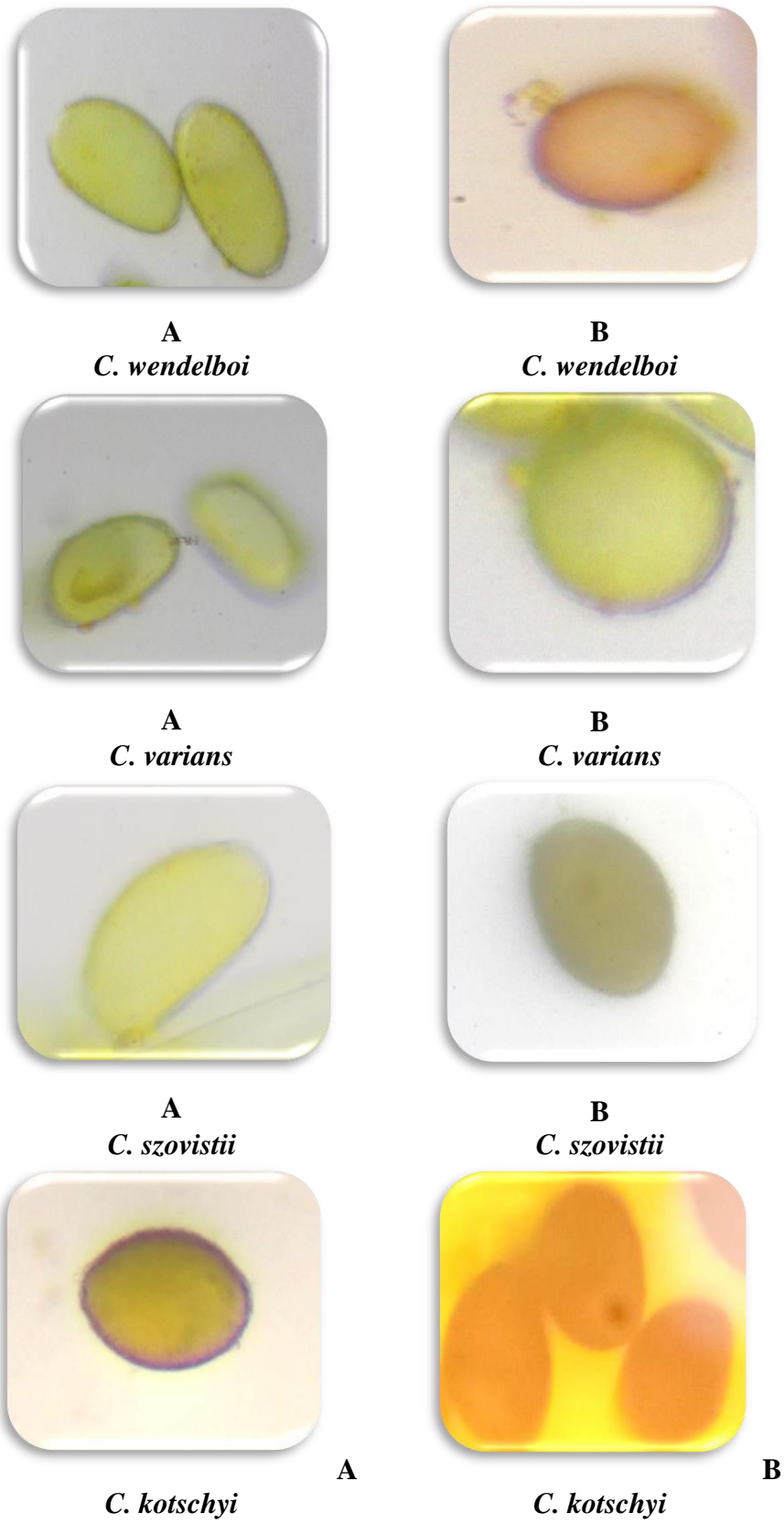
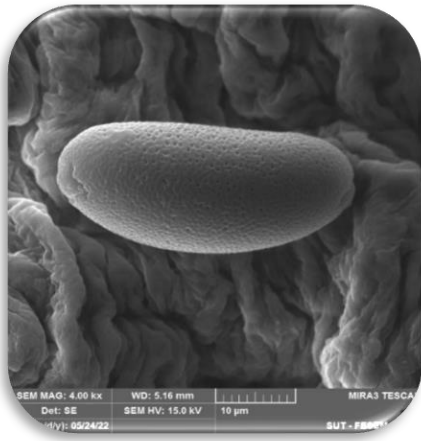


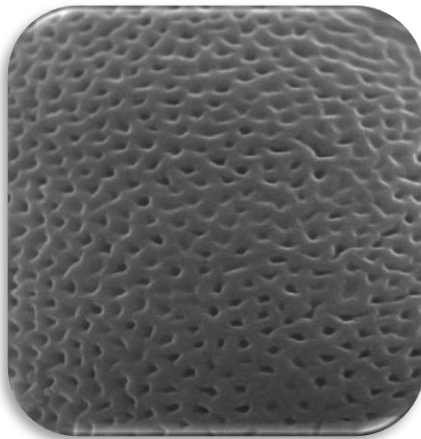
FIGURE1. - Pollen grain in light microscope (40x)
(A) in equatorial view (B) in polar view.



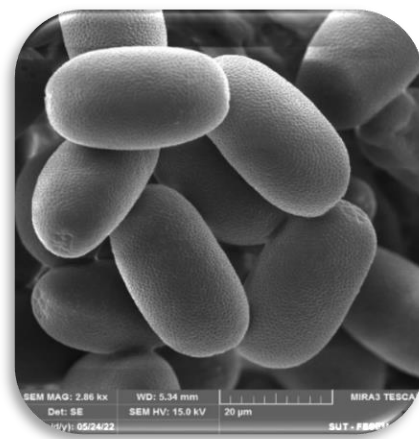
1A
C. wendelboi



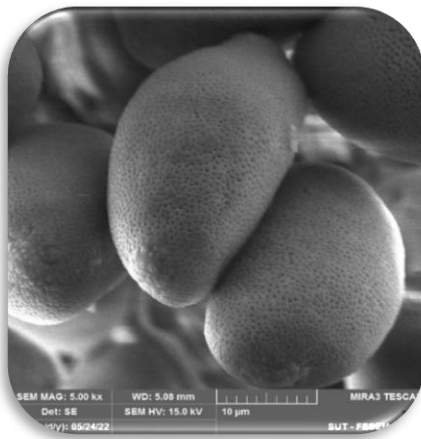
1B
C. wendelboi



2A
C. varians



2B
C. varians

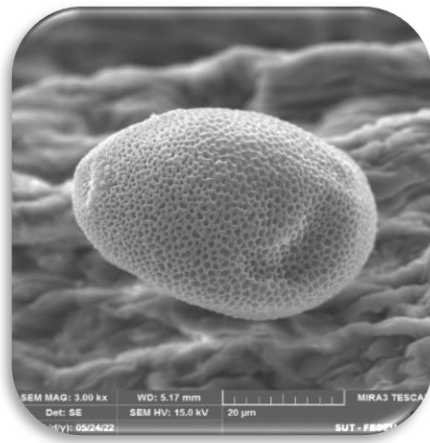


3A
C. szovistii



3B
C. szovistii

FIGURE 2. -Pollen grain in scanning electron microscope.
(A) pollen grain shape (B) exine ornamentation.



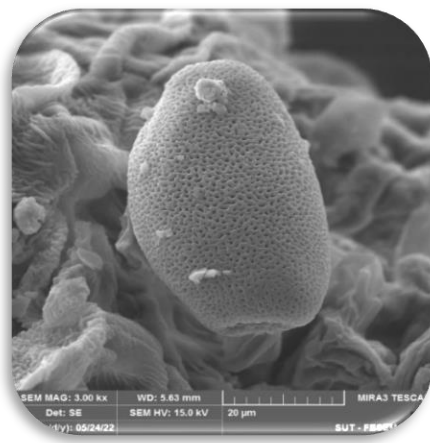
1A

C. kotschy



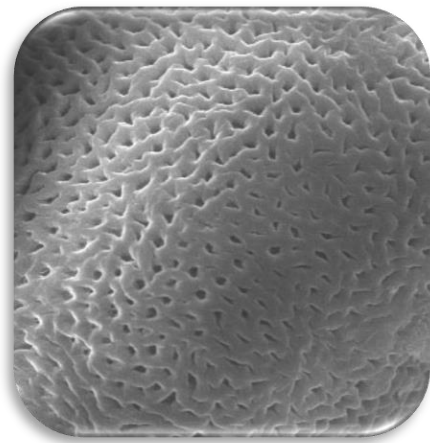
1B

C. kotschy



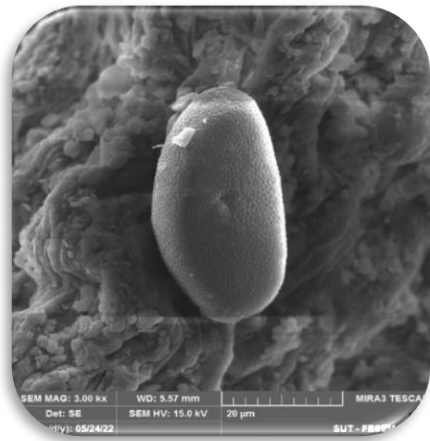
2A

C. haussknechtii



2B

C. haussknechtii



3A

C. deserti-syriaci



3B

C. deserti-syriaci

FIGURE 3. - Pollen grain in scanning electron microscope.
(A) pollen grain shape (B) exine ornamentation.

Table 1.- Pollen morphological parameters of investigated *Colchicum* species

P/E ratio (μm)	equatorial axis (E) μm	Polar axis (P) μm	Exine ornamentatio n	Shapes in equatorial view	Shapes in polar view	Species	No
(0.55-0.53) 1.25	(45.05-42.76) 19.04	(25.12-23.03) 23.86	Reticulate	oblate shape flat on one side and convex on the other	Circular	<i>C.wendelboi</i>	1
(0.63-0.62) 0.62	(49.11-47.41) 48.33	(31.04-29.47) 30.32	Reticulate	oblate	Circular	<i>C.varians</i>	2
(0.50-0.50) 0.50	(54.03-51.07) 53.44	(27.12-25.99) 26.74	Reticulate	oblate shape convex on both sides	Circular	<i>C.szovitsii</i>	3
(0.75-0.77) 0.75	(53.34-50.23) 52.16	(40.06-38.74) 39.55	Reticulate	oblate	Circular	<i>C.kotschyi</i>	4
(0.66-0.58) 0.61	(69.79-68.44) 68.89	(46.22-40.01) 42.08	Reticulate	oblate shape flat on one side and convex on the other	Circular	<i>C.haussknechtii</i>	5
(0.65-0.63) 0.64	(59.05-57.62) 58.14	(38.52-36.61) 37.31	Micro reticulate	oblate	Circular	<i>C.deserti-syriaci</i>	6

4. Discussion

Pollen morphology is very important for taxonomic suggestion; it is useful to supporting in taxonomic debate for classification. Also it has significance in modern issues of plant taxonomy [4]. The most morphological features specially pollen grain are significant in monocotyledons, both above and below the family level [5]. Pollen grains have yellow to orang-yellowish depending on maturing stage, Isopolar, have Dioperte aperture in both ending, this result is similar to that on [6]; [7]; [8]. The 6 species that study have the same shape (circular shape) in polar view, but in equatorial view they have different shapes in (*C. wendelboi*, *C. haussknechtii*) they are oblate shape flat on one side and convex on the other, in (*C. varians*, *C. kotschyi*, *C. deserti-syriaci*) it was oblate shape, in (*C. szovitsii*) it was oblate shape convex on both sides. Also found different in the exine ornamentation it was Reticulate in (*C. wendelboi*, *C. varians*, *C. szovitsii*, *C. kotschyi*, *C. haussknechtii*). But it was microreticulate in (*C. deserti-syriaci*). So as the polar, equatorial axis as well as the P/E ratio that recorded in Table (1) were the same found in investigated of some *Colchicum* taxa like (*C. szovitsii*, *C. kotschyi*, *C. deserti-syriaci*) in [9], in (*C. wendelboi*, *C. varians*, *C. haussknechtii*) it was the first recorded.

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CONFLICTS OF INTEREST

The author declares no conflict of interest.

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