

Identification of the Pollen Grains Some Cultivars of Chickpeas (*Cicer arietinum* L.)

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ABSTRACT

Key words:

chickpeas, pollen grain,
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The current research includes a study of some characters of pollen grain for four cultivars of chickpeas that grown in Iraq during the years 2012-2013. This study was conducted in the Department of Biology at the College of Education / University of Mosul in 2012-2013 for certain varieties of chickpeas. These are the: Turkish, Iraqi, Moroccan and Indian. This study concentrates on the pollen grains that was taken from the mature anthers of the flowers which were stored in 70% ethyl alcohol that flowers were taken from the field. Each mature anther was taken as a soft or dry sample after it was boiled for 30 minutes and then placed on the watch glass and drops of sofranine-glycerine dye was added. The pollen grains were swapped by a special dropper for each type, placed on a glass slide, and then a cover of the slide was gently placed on it, and examined under the microscope. The measurements were taken for (25) pollen grains and each cultivars and the dimensions of each pollen grain were taken in the polar axis and the equatorial axis.

The results of this study indicated that the chickpeas cultivars included in this study were differed significantly at the level of 5% probability in many properties of the pollen grains.

It is clear from this study that the characters of pollen grains are important in the diagnosis and isolation of the four cultivars of chickpeas studied. It was found that the pollen grains in the four studied cultivars were triangular holes and grooves and noted that there are cultivations in form and distance in the Equatorial and polar axes.

تميز حبوب اللقاح في بعض اصناف محصول الحمص (*Cicer arietinum* L.)

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كلية التربية/ جامعة الموصل

الخلاصة

تضمن البحث الحالي دراسة الصفات المظهرية لحبوب اللقاح لأربعة أصناف من محصول الحمص المزروعة في العراق للعام (2012-2013) درست الصفات المظهرية على العينات في قسم علوم الحياة بكلية التربية /جامعة الموصل عام 2012-2013 لاصناف الحمص وهي التركي، العراقي، المغربي، والهندي .

درست حبوب اللقاح المأخوذة من متوك الازهار الناضجة، والمحفوطة في كحول ايثيلي 70% التي جمعت من الحقل. حيث اخذ كل متك ناضج عينة طرية او جافة بعد ان تم غليها بالماء لمدة نصف ساعة ثم وضع في زجاجة الساعة واضيف اليه قطرات من صبغة السفرائين- جلسرين بعد ان تم فتح المتك بواسطة ابرتي تشريح دقيقتين، وتم هرس المتك لاستخراج حبوب لقاحه وتعرضها للصبغة، ثم سحبت حبوب اللقاح المستخرجة مع الصبغة بواسطة قطارة خاصة لكل صنف، ووضعت على شريحة زجاجية، ثم وضع غطاء الشريحة برفق عليها، وفحصت تحت المجهر الضوئي. اخذت القياسات ل(25) حبة لقاح ولكل صنف واخذت ابعاد كل حبة في المحور القطبي والمحور الاستوائي وتشير النتائج الى أن أصناف الحمص المشمولة في هذه الدراسة اختلفت معنويا في العديد من الصفات المظهرية عند مستوى احتمال 5% فقد وجدت فروقات معنوية في اغلب تفاصيل وخصائص حبوب اللقاح في الاصناف المدروسة.

الكلمات المفتاحية :

الحمص ، حبوب اللقاح ، الطور
الاستوائي و القطبي.
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ويتضح من خلال هذه الدراسة ان لحبوب اللقاح اهمية في تشخيص وعزل الاصناف الاربعة المدروسة لاصناف الحمص. واتضح ان حبوب اللقاح في الاصناف الاربعة المدروسة هي من الطراز الثلاثي الفتحات والاخاديد ولوحظ ان هناك تغيرات في شكلها وابعادها في المحورين الاستوائي والقطبي.

Introduction:

The pollen grains characters are important aspects that assist in the diagnosis and classification of exploited species, especially the economic ones, which are part of the country's natural wealth (Mohammed 2011). The plant wealth of Iraq is of great importance as on its lands 151family plant families grows, which includes (860) genus and more than (3500) species (Al-Mousawi 1987). The diagnosis of plants and the study of their environments and areas of spread help to develop scientific plans for the development of plant wealth to serve the national economy (Al-Mashadani 1995· Ahmed 1995). Chickpeas (*Cicer arietinum* L.) belonging to the Fabaceae family, is a plant of dicotyledonous. It contains about 730 genus and more than 19,400 species. It is highly nutritious (Al-Katib, 2000).

The study of the pollen grains is an important biological material in determining and linking evolutionary and natural relations between different species, genus and different family the plants. The study of pollen grains has shown an increasing importance in the field of classification for the adoption of fixed characters that do not affected by the changes of different environmental conditions (Al-abadi 2008). The last decades have seen many studies of fossils of plant pollen grains as they study the various living characters, especially size, shape and the state by which it spread, the number of holes in the germination and the location of the grooves, as well as the exact characteristics of the walls of the living Exine and the type of Sculpturing and the existence of fine holes that could be studied and identified after discovering the scanning electron microscope (SEM) as it was found that the importance of studying the pollen grains corresponds to the study of the appearance of vegetative and reproductive organs as well as being an important factor in determining the evolutionary and natural relations between different races and families (Radford et al. 1974· Perveen 1999).

Due to the large differences between the cultivars of a particular type of chickpea plant, it requires to conduct a diagnostic and a qualitative study to identify the characteristics of taxonomic importance to isolate these cultivars. This study focused on the pollen grains characters of four cultivars of chickpeas, namely Turkish, Iraqi, Moroccan and Indian

Methods:

The pollen grains were, taken from the mature flowers anthers, which were stored in 70% ethyl alcohol that was collected from the field. Each mature anther (taken from a soft or dry sample) , boiled for half an hour, then placed in the glass watch , the anther then opened by using two anatomic needles and crushed to get the pollen grains and drops of the sofranine-glycerin dye were added (Al-mayah 1983). The pollen grains then swiped using a special dropper for each cultivar, and placed on a glass slide, the cover slide was placed gently, examined by compound microscope using the lens scale. The readings of 25 pollen grains were taken to study the characters of the pollen grains for each cultivar . The dimensions of each grain were taken in the polar axis and the equatorial axis.

The classification of chickpeas is as follows:

Kingdom: Plantae

Division : Angiosperms

Class : dicotyledons

Subclass: Rosids

Order: Fabales

Family: Fabaceae

Genus: Cicer

Species: *C. arietinum* (Al-Katib,2000)

Results:

Palynological study:

The results of this study showed that the pollen grains in the studied cultivars has two identical and symmetric poles, the three-hole Tricolporate (Fig. 1), and it looks in different shapes according to the location or the view from which it is seen as either spherical and octagonal-spherical in the equatorial, or as a semi-spherical - triangular in polar view as in (Fig. 1). The results of this study showed that there was a significant difference in the length of the equatorial axis , as the lengths of the equatorial axis in the Moroccan, Turkish and Iraqi varieties were 1.54, 1.48 and 1.47 μm respectively, which differ significantly in comparison with the Indian variety which recorded 1.35 μm . The polar axis was also significantly different in length and showed that the lowest length of the Moroccan and Turkish varieties (1.56 and 1.52 μm respectively) (Table 1).

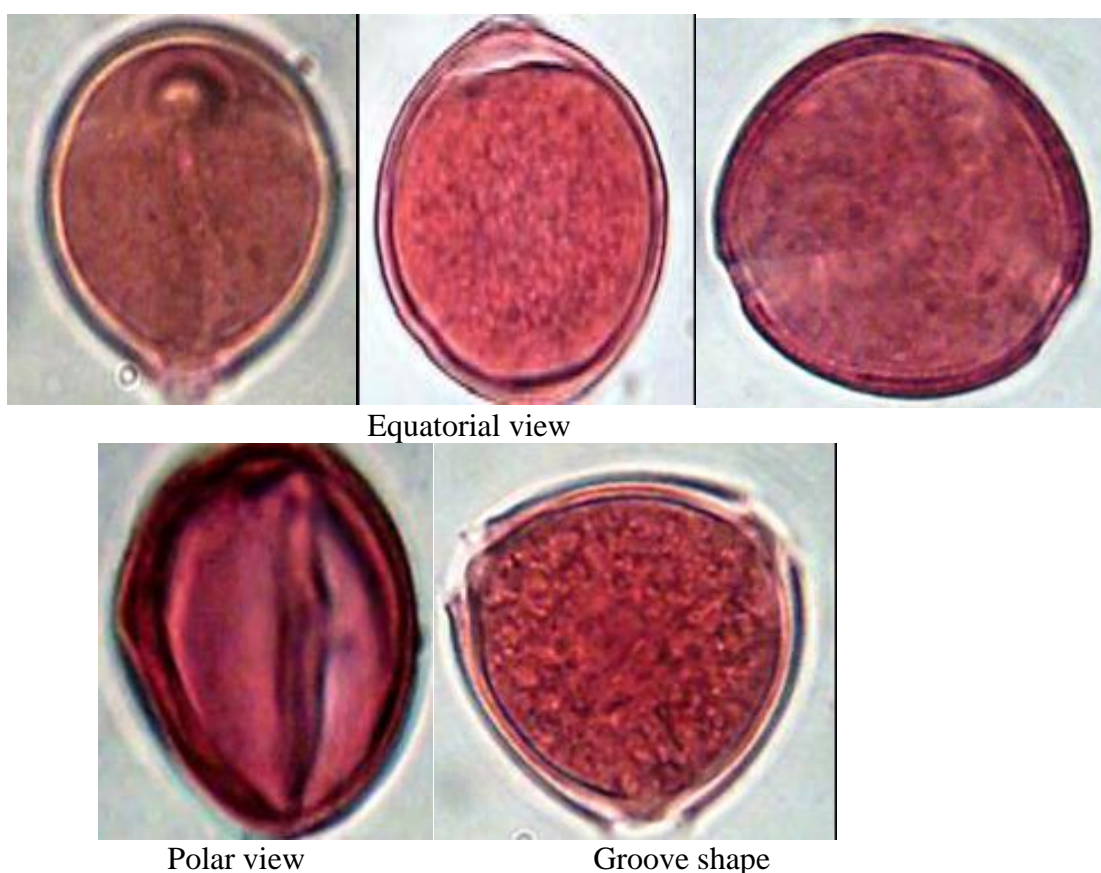


Figure :1 shows the forms of pollen grains

Table (1): Shows the forms of pollen grains in the studied varieties of chickpeas

Characters Cultivates	Length of equatorial axis (μm)	Show equatorial axis	Length of polar axis (μm)	Show Polar axis
Turkish	1.48 a	Spherical- Pear	1.52 c	triangle
Iraqi	1.47 a	Spherical	1.73 a	triangle
Moroccan	1.54 a	Pear	1.56 c	Semi-spherical
Indian	1.35 b	Spherical-ovoid	163 b	triangle

In terms of thickness of the outer shell of the pollen grain, significant differences were observed . The Indian specie recorded the highest thickness of the outer shell of the pollen grains (1.22 μm), while the Iraqi one recorded the least thickness of the outer shell of the pollen grain (0.96 μm). A significant difference was found in the length of the groove in the Iraqi (1.33 μm) compared to others, while the Turkish and Moroccan cultivars recorded the lowest length of the groove in the pollen grain (1.06 μm in each). On the other hand the width of the groove of the Moroccan, Turkish and Indian varieties recorded the significantly highest width of the groove (1.28, 1.02 and 0.95 μm respectively), while the Iraqi cultivar recorded the least width of the groove (0.79 μm) (Table 2).

Table (2): Shows the thickness of the outer shell, Length and width of groove in the pollen grain.

Characters Cultivates	The thickness of the outer shell (μm)	Length of groove in the pollen grain (μm)	width of groove in the pollen grain (μm)
Turkish	1.14 b	1.06 c	1.09 a
Iraqi	0.96 c	1.33 a	0.79 b
Moroccan	1.11 b	1.06 c	1.28 a
Indian	1.22 a	1.16 b	0.95 a

Discussion:

The pollen grain characters are important in most taxonomic studies for their clarity and ease of dealing with them in comparison to other characters especially those characters that are stable in different environmental conditions, which are regarded of the good qualities in taxonomy (Ahmed 1995) (Al-Katib 2000).

The present study showed that the chickpeas pollen grain, which is of the triangular type of holes and grooves, which is one of the properties of the fabaceae family (Al-Mousawi 1987). In terms of shape, they varied according to the axis in which they appear, where the Equatorial axis appeared in a spherical shape or triangular shape in all the studied cultivars. This result corresponds to that of (Al-Maadidi 2006) when they studied some cultivars of Rhus. The results of this study also showed significant differences in the dimensions of the pollen grain as the length of the Equatorial axis significantly differ between the Indian and other cultivars. As far as the length of the polar axis, also a significant difference was found between the lowest length of the Moroccan and Turkish, while the highest length of the Iraqi cultivar, and these results corresponds to the results obtained by (Erdman 1952) when they studied the pollen grains of several types of covered seeds plants angiospermae, when they observed significant differences in the form of Pollen grains in the polar and Equatorial axis. This result is also consistent with that of (Al-Wadi et al. 2007) when they studied three cultivars of the eggplant family solanaceae . Concerning the thickness of the outer shell of the pollen grain a significant difference was found in the Indian chickpea (the highest thickness) in comparison to the Iraqi chickpea (less thickness of the outer shell), which is in consistent with the results obtained by (Al-Tamimi et al. 2007) when they studied the grains of ten species of Compositae. In this study the length of the groove in the pollen grain was also significantly differ between Iraqi type (the highest length of the groove 1.33 μm) and the Turkish and Moroccan cultivars (least length). As far as the width of the groove in the pollen grain, a significant difference was found in the Moroccan, Turkish and Indian cultivars (highest width) in comparison with the Iraqi one (lowest width). This result is in concomitant with that of (Al-Azerj 2011) who studied the characters of pollen grains in wild species of fowl plants for 31 genus of 4 families as their study included the characters of the style, shape, size, nature of the holes, and the thickness of the wall and the length of the groove. Finally the results of the present study were in accordance with the results of several researches (Erdman 1952 · Karim 1979 · Torres 2000).

Conclusion:

It is clear from this study that the character's pollen grains are important in the diagnosis and isolation of the four varieties chickpeas studied. It was found that the pollen grains in the four studied cultivars were a triangular type of holes and grooves and noted that there were variations in form and distance in the Equatorial and polar axes.

It is clear that the grain of the pollen has important taxonomic characters which can be more important if scanning electron microscopy (SEM) is used to identify more accurate characters of pollen grain such as surface decoration, grooves and openings.

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