Journal Tikrit Univ. For Agri. Sci. Vol. (18) No.(3) – 2018
ISSN-1813-1646

Identification of certain morphologic characters of some chickpeas cultivars (*Cicer arietinum* L.)

Amina Ahmed Yahya
College of Education, University of Mosul, Mosul, Iraq

Key words:
chickpeas, morphological characters, leaf characters, flower character.
Corresponding author:
Amina Ahmed Yahya
E-mail:
amina.dalalbashi@gmail.com
Received: 10/10/2017
Accepted: 27/11/2017

ABSTRACT

This work includes a survey of some morphologic properties of the leaves and flowers for 4 cultivars of chickpeas that implanted in Iraq at years 2012-2013. This work was carried on at the Biology department in the College of Education / University of Mosul. Certain cultivars of chickpeas were used including the: Iraqi, Moroccan, Indian and Turkish. This study included the length of the last internode of the stem, the dimensions of the leaf, the dimensions of the leaflet, the number of leaflets per a leaf, the number of stipule and the length of the flower peduncle.

The flowers study included: the dimensions of the flag leaf of the petal leaf, the Androecium System, the Gynoecium System (using the anatomic microscope and the compound microscope (the ophthalmic lens)) for 25 readings for each of the studied traits.

The results of this work showed that the chickpea cultivars involved in this work were significantly differed in many morphologic characters, including length of the last internode of the stem, the length of the leaf, the length and width of the last leaf, as well as in the number of leaflets found in the last leaf, the length and width of leaflet in the last leaf, and the length of the stipule. In addition; significant differences were found between the four cultivars of chickpeas in the characters of the length of the flower peduncle and the details of both of Androecium and the Gynoecium Systems in the studied cultivars.

This study indicated that the characters of the leaves and flowers are substantial in the diagnosis and separation of the four cultivars of chickpeas studied.

تمييز بعض الصفات المظهرية لأصناف من محصول الحمص (*Cicer arietinum* L.)

امنة احمد يحيى
كلية التربية/ جامعة الموصل

الكلمات المفتاحية :
الحمص ، الصفات المظهرية ، صفات الاوراق ، صفات الازهار.
للمراسلة:
امنة احمد يحيى
البريد الالكتروني:
amina.dalalbashi@gmail.com
الاستلام : 10 / 10 / 2017
القبول : 27 / 11 / 2017

الخلاصــة

تم في هذه الدراسة تحديد الصفات المظهرية لبعض صفات الاوراق والازهار لأربعة أصناف من الحمص المزروعة في العراق خلال العام (2012–2013) وهي الصنف : العراقي، المغربي، الهندي والتركي.

تمت دراسة الصفات المظهرية على النماذج في قسم علوم الحياة بكلية التربية /جامعة الموصل. وشملت: طول السلامية الاخيرة للساق، وابعاد الورقة، وابعاد الوريقة، وعدد الوريقات في الورقة الواحدة، وعدد الاذينات، وطول الحامل الزهري.

اما الازهار فقد درس فيها: ابعاد ورقة العلم للورقة التويجية، وجهاز الذكورة وجهاز الانوثة (باستعمال مجهر التشريح، والمجهر المركب، واستعملت العدسة العينية المدرجة في اخذ القياسات لـ(25) قراءة لكل صفة من الصفات المدروسة) .

أوضحت النتائج هذه الدراسة وجود اختلافات متعددة بين أصناف الحمص الاربعة المشمولة بهذه الدراسة، حيث وجد اختلاف معنوي في طول السلامية الاخيرة للساق وطول الورقة وطول وعرض الورقة الاخيرة. وكذلك في عدد الوريقات الموجودة في الورقة الاخيرة، وطول وعرض الوريقة في الورقة الاخيرة . وكذلك في صفة طول الاذينات.

كما وجدت فروقات معنوية بين الاصناف المشمولة بهذه الدراسة في طول الحامل الزهري وفي

تفاصيل جهازي الذكورة والانوثة وغيرها من الصفات.

توضح نتائج هذه الدراسة ان بعض صفات الاوراق والازهار اهمية كبيرة في تشخيص وعزل الاصناف الاربعة للحمص في هذه الدراسة .

Introduction

The morphological characters are very essential properties that help in the diagnosis and isolation of different cultivars (Dallal-Bashi 2010) . This is specifically important for the economic ones, which is regarded as part of any country natural wealth (Al-Talb 2011). In Iraq the plant wealth is of great importance as on its wide area 151 plant families are always grows, that may includes (860) genus and may form more than (3500) species (Al-Mousawi 1987). The identification of plants and understanding their environments and lands of spread assist in improving scientific plans for increasing plant wealth and to develop the national economy (Al-Mashadani 1995, Ahmed 1995). Chickpeas (*Cicer arietinum L.)* which belonging to the Fabaceae family, is characterized by that it is a dicotyledonous. It include about 730 genus and may be more than 19,400 species(Al-Mousawi 1987). It is regarded one of the important highly nutritious product (Al-Katib 2000, DEV et al. 2017).

The study of the morphologic characters of any plant is the basis for describing plant groups and diagnosing them because they are easily observable and have much heterogeneity and are regarded as the mainstay on which the authors are based (Al-Talb 2011). The most important characters of leaves are the dimensions of the leaf's blade and the number of leaflets and their dimensions as well as the study of the presence or absence of stipules, which was used by most researchers as a criterion for classification of species (Al-abadi 2008).

Flowers are regarded of high taxonomic value as they are not affected by environmental conditions. In most taxonomic studies, perianth and reproductive parts have been used for the importance of their characters in isolating cultivars (Al-Katib 2000, Cubero 1987).

A qualitative and a diagnostic study is necessary to find the characters that help in the taxonomy of chickpea who have high differences between its cultivates that are usually implanted in Iraq. The present study concentrate mainly on the reproductive and flowering properties of the 4 chickpeas cultivars included in this study that are the Iraqi, Moroccan, Indian and the Turkish ones.

Methods:

The morphological study for chickpeas was carried on the soft samples planted in March 2012 in the Biology department at the College of Education / Mosul University. The chickpeas of each of the four cultivars (Turkish, Iraqi, Moroccan and Indian) was planted in longitudinal lines. The distance between one line and another was about 50 cm and at a depth of 4 cm per seed. The planting and irrigation continued till the maturity of the crop was completed which lasted about 5 months. The vegetative and reproductive properties were studied in details for each of the four cultivars using the usual ruler, which included: the length of the last internode of the stem (cm), the dimensions of the leaf (cm), the number and the dimensions of leaflets (cm), the number of stipules and the length of the flowering peduncle (cm).

Concerning the flowers, the dimensions of the petal flag leaf (cm), the Androecium Systems (dimensions of the anthers (cm), and the length of the filament(cm)), the Gynoecium Systems (dimensions of the ovary (mm), length of style (mm)), by using the graduate ophthalmic lens of the anatomic and the compound microscope. The readings of 25 measurements were taken for each character studied.

The classification of chickpeas is as follows:

Kingdom: Plantae
Division : Angiosperms
Class : dicotyledons
Subclass: Rosids
Order: Fabales

Family: Fabaceae
Genus: Cicer
Species: C. arietinum

Results:

a. The leaves

The leaves of the studied cultivars were characterized by a unipinnately compound and their arrangements were mutually supportive alternate , petiolate and containing stipules. The studied cultivars varied in the length of the last internode of the stem, in the dimensions of the leaf and the number and dimensions of leaflets and the length of stipules. The results indicated that the chickpea cultivars included in this study differed significantly in the length of the last internode of the stem . The chickpeas cultivars were divided into two different groups depending on this character. The Turkish cultivars recorded the highest significant length of the last internode of the stem (2.43 cm) , so forming a primary independent group. The local (Iraqi) has the lowest significant length of the last internode of the stem (1.90cm), forming a second independent group (Table 1). Concerning the length of the flag leaf, significant differences were observed between the cultivars included in this study (Fig. 1), so the cultivars were divided into three groups. The Turkish and Moroccan cultivars recorded the highest significant length of the flag leaf (8.18 and 8.47 cm respectively) , forming a distinct independent group, while the local (Iraqi) form the less significant length of the flag leaf (5.74 cm) so, formed a separate independent group. The Indian variety was isolated by another group (6.19 cm), forming a third independent group (Table 1).

Table (1): Shows the length of the last internode of the stem, the length and width of the leaf, and the number of its leaflets.

Characters / Cultivates	Length of last internode of the stem (Cm)	Length of Leaves (Cm)	Width of leaves (Cm)	No. of leaflet
Turkish	2.45 a	8.18 a	2.38 a	14.88 a
Iraqi	1.90 b	5.74 c	1.98 b	11.77 b
Moroccan	2.19 ab	8.47 a	2.30 ab	14.72 a
Indian	2.27 ab	6.19 b	2.23 ab	14.68 a

There were significant differences between the cultivars in the width of the flag leaf. The Turkish cultivar recorded the highest significant width of the flag leaf in comparison to other cultivars (2.38 cm), while the Iraqi cultivar showed the lowest width (1.98 cm). As far as the number of leaflets found in the flag leaf, the Iraqi cultvar recorded the lowest number of leaflets in the flag leaf (11.77), whereas the Turkish, Moroccan and Indian varieties recorded the highest number of leaflets (14.88, 14.72 and 14.68) respectively. This means a significant difference between the two types (Table 1).

Concerning the length of the leaflets in the flag leaf, the Moroccan and Turkish cultivars were distinguished by the highest significant length of the leaflets (1.75 and 1.56 cm respectively), while the Iraqi class recorded the lowest length of the leaflets (0.95 cm) . The Turkish one was distinguished by the significant highest width of the leaflets in the flag leaf (0.92 cm), while the Iraqi one showed the lowest width of the leaflets (0.55 cm) forming an independent group (Table 2). In terms of length of the stipules, the chickpeas cultivars included in this study were divided into two groups accordingly. The Moroccan and Turkish varieties had the highest significant length (1.57 and 1.48 cm respectively), while the Indian and Iraqi varieties recorded the lowest length (0.76 and 0.61 cm respectively) (Table 2).

The results of this study showed significant differences between the cultivars in the length of the flower peduncle of the chickpeas plant (Fig. 1). The Moroccan cultivar recorded the highest significant length of the flowering peduncle, (2.43 cm) and the Iraqi cultivae was the lowest length of the flowering peduncl, (1.44 cm.) .

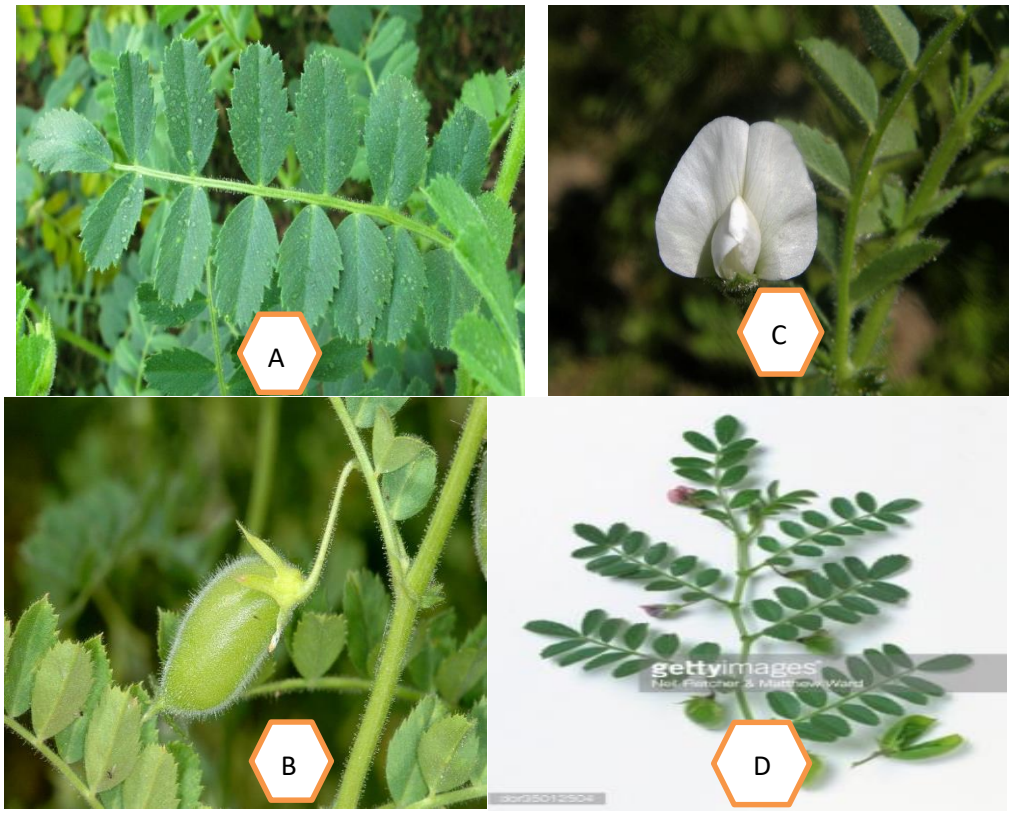

Figure 1: (A): Leaflets (B):petiole and petiolate (C) Shows chickpeas flower. (D) Chickpeas fruits (Valenzuela- Herrera1et al. 2016)

Table 2: Shows the length and width of the leaflets and length of stipules

Characters / Caltivates	Length of leaflet (Cm)	Width of leaflet (Cm)	Length of stipules (Cm)
Turkish	1.56 a	0.92 a	1.48 a
Iraqi	0.95 c	0.55 c	0.61 b
Moroccan	1.75 a	0.70 b	1.57 a
Indian	1.25 b	0.69 b	0.76 b

b. Flowers

I. The Calyx

The Calyx in allcultivars consists of five green-yellowish, synseplly surrounding all the flower parts. It has a wide-ranging arrangement, and there were no changes in its dimensions and shapes for the studied cultivars because they are very small.

II. Corolla

The results of this study showed that the Corolla is composed of five small white petals in an overlapping descending form (Fig. 2). There is a large petal called the flag covered by two wings petals which cover another 2 partially united petals called the keel. The Moroccan variety was

distinguished by the highest significant length and width of the petals flag leaf (8.69 and 4.18 mm respectively) from the rest of the other cultivars . The Iraqi variety with the lowest length and width of the petals (6.16 and 2.50 mm) (Table 3)

Table 3: Shows the length of flowering peduncle , Length and width petals.

Characters / Cultivates	Length of flowering peduncle (Cm)	Length of petals (Cm)	Width of petals (Cm)
Turkish	1.96 b	7.19 b	3.93 a
Iraqi	1.44 c	6.16 c	2.50 b
Moroccan	2.43 a	8.69 a	4.18 a
Indian	1.85 b	8.38 a	3.90 a

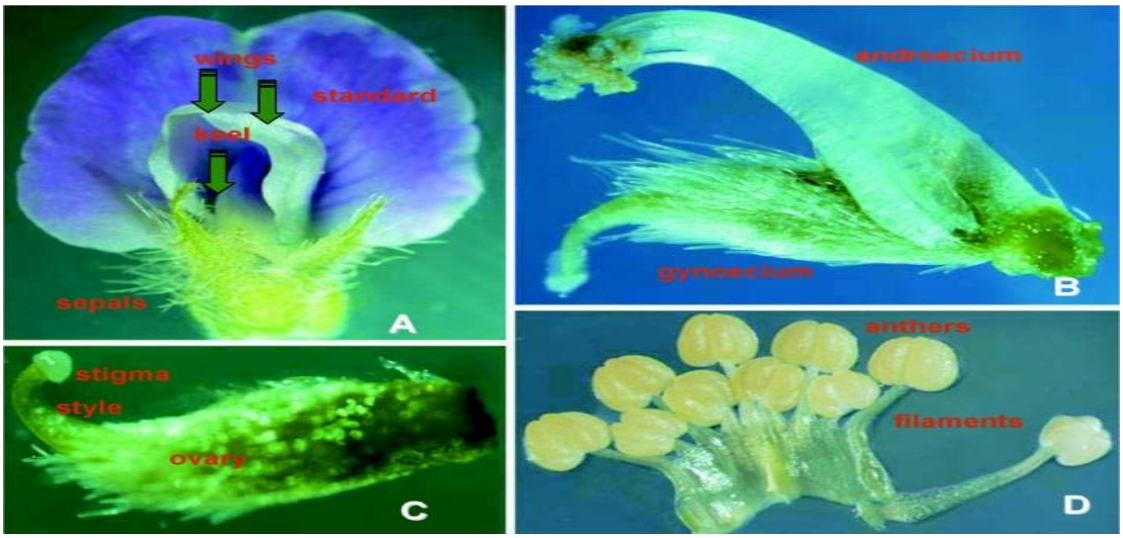

Figure 2: Shows (a): petals (banner petals, wing, petal , keel)
(b): anther and pistil (c) pistil (ovary, style , stigma)
(d) Stamens (9 fused and 1 free)

III. Androecium system

The results of this study showed that the Androecium system in all the cultivars contains 10 stamens, nine of which are conjunctive and one of them is free to meet the petals. Each stamen is composed of anther and filaments as in (Fig. 2).

IV. Anthers:

The results of the present study showed that the anthers in all the studied cultivars consist of two kidney shaped lobes united by a wide link and each lobe contains two sachets containing large numbers of pollen grains in the form of a triangle - spherical. Variation in length and width was observed between the studied cultivars. The Turkish variety recorded significant highest length and width of the anthers (0.63 and 0.23 mm respectively). The lowest length and width of the anthers were recorded in the Moroccan variety (0.44 and 0.12 mm respectively) (Table 4).

Table 4: Shows the length of flowering pedunle, Length and width of petals

Characters / Cultivates	Length of Anthers (Cm)	Width of Anthers (Cm)	Length of Filament (Cm)
Turkish	0.63 a	0.25 a	5.98 a
Iraqi	0.47 b	0.13 c	4.66 b
Moroccan	0.44 b	0.12 c	5.80 ab
Indian	0.50 b	0.19 b	5.35 ab

V. Filaments:

The results of the present study showed that the filaments of the studied species were of a cylindrical type and relatively narrow at the point of contact with the anthers and enlarged in the middle and very low at the point of contact on the receptacle, with a yellowish color. The connection of the filament with the anther is of the final type in all species. The Turkish variety has significantly highest filament length (5.88 mm) and the local Iraqi cultivar has the shortest length of filament (4.66 mm) (Table 4).

VI. Gynoecium System

The results of the current study showed that the Gynoecium system consists of a single pistil composed of ovary, style and stigma.

i. The Ovary

The results showed that the pistil composed of one pear shaped enlarged green ovary (Fig. 2). No change was observed in color or shape in all the four cutivars. The differences were limited to dimensions only. The Indian variety recorded the highest significant length of the ovary (6.58 mm) , while the Iraqi one recorded (3.25 mm), whereas the significantly highest width of ovaries was recorded by the Iraqi, Indian and Turkish varieties (2.35, 2.26 and 1.98 mm respectively) (Table 5).

Table (5): Shows the dimensions of the gynoecium system in chickpeas.

Characters / Cultivates	Length of ovary (mm)	Width of ovary (mm))	Length of style (mm)	Length of stigma
Turkish	6.08 b	1.98 a	3.71 ab	1.36 ab
Iraqi	3.25 d	2.35 a	3.73 ab	0.96 ab
Moroccan	4.24 c	1.45 b	3.87 a	1.53 a
Indian	6.58 a	2.26 a	3.38 b	1.03 b

ii. Style

Is the part that binds the ovary with the stigma. This study showed that it is a cylindrical and that the contact of the style with the ovary is of the final type (Terminal), which extended from the top of the ovary in all the cutivars of chickpeas in this study. The results of this study showed clear significant differences in length between the four cultivars The Moroccan recorded the significant highest length of the style (3.87 mm) , while the Indian cutivar recorded the lowest length of the style (3.38 mm) (Table 5).

iii. The stigma

The style ends with stigma which is divided into 2 parts with a yellowish color and significant differences were noted in its length between the studied cultivates of chickpeas .

The Moroccan and Turkish cultivars recorded significantly highest length (1.53 and 1.36 mm) , while the Iraqi and Indian cultivars recorded the lowest length of the stigma (1.03 and 0.9 mm respectively) (Table 5 and Fig. 2).

Discussion:

The morphologic properties are very essential in taxonomic studies due to their distinctness and ease of handling with them when compared with other properties. The most important properties are those that are persist in different environmental conditions, that are regarded of the great properties in taxonomy (Ahmed 1995, Al-Katib 2000).

The present study invested some of the morphologic characters such as leaves and others to get important taxonomic characters in the isolation and classification of the four varieties of chickpeas (Cicer arietinum) studied. Through this study of the four types of chickpeas, significant changes were evident in the length and width of the leaf blade and the number of leaflets. These results were compatible with that obtained other researchers who studied the characters of many varieties of barley (Mohammed 1999), also compatible with Al-Debaisi(Al-Debaisi 2013) who studied the

phenotypic properties of chrozophora tinctoria L. and reported that the lengths of the simple stipulate leaves differ from one species to another. Moreover, compatible with (Dallal-Bashi 2010) who found significant differences for several characters of the stems and leaves in Oat (*avena sativa* L).

In present study differences were also found in the length and width of the leaflets blade and in the length of the stipules, and this result is in consistence with another study on wheat cultivars (Mahmoud 2004). The results of this study showed significant differences in some of the Androecium characters as there were significant differences in the length and width of the anthers, which differed from one cultivars to another, as well as the length of the filaments. These results were in concomitant with that of others(Al-Debaisi 2013). In addition, significant differences were found in some of Gynoecium System as the length and width of the ovary and the length of the style were observed as well as a significant difference in the length of stigma was found between the chickpeas verities and this is corresponds to (Al-Talb 2011) who studied some grapes cultivar and to(Al – Maadidi 2006) who studied the characters of Rhus.

Conclusion:

This study indicated that the characters of leaves and flowers are very essential in the diagnosis and isolation of the 4 varieties of chickpeas studied in this work.

References:

Ahmed NS. Taxonomic Study of Cripis Sex in Iraq. Master Thesis, College Science, University of Basra, Iraq (1995).

Al – Maadidi AMM. Taxonomic study of rhus L. (Anacardiaceae)In Iraq. Journal of Science Rafidain. 2006; 17(10): 100-114

Al-abadi, MOMS. Comparison of taxonomic importance of some varieties in Nineveh governorate). Master Thesis, Faculty of Education, University of Mosul, Iraq (2008).

Al-Debaisi EAR. Study of morphological and anatomical characteristics, environmental studies, and geographical distribution of the species of chrozophora tinctoria L. in Iraq. Journal of Rafidain University 2013; 16(2): 17-29.

Al-Katib YM. Classification of Seed Plants, Publishing House for Printing and Publishing. University of Mosul, Iraq (2000).

Al-Mashadani NN. A comparative taxonomic study of species (Boraginaceae) Onosma L in Iraq. PhD thesis, Faculty of Science, University of Mosul, Iraq (1995).

Al-Mousawi AH. Plant classification science, Dar al-Kitab for printing and publishing, University of Mosul , Iraq. (1987).

Al-Talb NNYM. A study of morphological, anatomical and chemical characteristics for some grape varieties Vitis vinifera L. Cultivated in Nineveh province. Faculty of Education, University of Mosul, Iraq. 2011 Master Thesis.

Cubero JI. Morphology of chickpea . In :saxena, M.Cand singh , k . B(eds). The chickpea. CAB International , walling ford , UK 1987; pp.35-66.

Dallal-Bashi AY. Using the morphological, anatomical and chemical characteristics in the diagnosis of seeds and plants of some imported oats (Avena sativa L.). Master Thesis . Faculty of Education. University of Al Mosul . Iraq 2010.

DEV A. , preeti V. and Bheru L. Gentic character variability studies in desi chickpea(cicer arietinum) genotypes . Int.J.Curr.Microbiol.App.Sci. 2017; 6(4):20-25.

Mahmoud RH. Dependence of phenotypic traits of grains and plants in the diagnosis of some Wheat Types Triticum sp. Master Thesis, Faculty of Education, University of Mosul, Iraq (2004).

Mohammed MA. The distinction between some of the varieties of barley Hordeum sp using The phenotypic properties of seeds and plants. Master Thesis, Faculty of Education, University of Mosul, Iraq (1999).

Valenzuela-Herrera1 A, Manjarrez-Sandoval P, Morales-Gómez A, Salinas-Pérez RA, Gómez-Gómez L, Fierros-Leyva GA et. al. Jumbo 2010", cultivar of chickpea "kabuli" type of extra large size from Sinaloa, Mexico. Glo. Adv. Res. J. Agric. Sci. 2016; 5(7): 277-282.