

Anatomical Study to the Vegetative Part of Two Variety of Species *Mirabilis Jalapa* (Nyctaginaceae) in Iraq

Neepal Imtair Al-garaawi⁽¹⁾, Aliaa M. Ali⁽¹⁾ Nidaa A. Abu-Serag⁽²⁾

1 College of Education for Pure Science . University of Kerbala (neepal.i@uokerbala.edu.iq)

2 Department of Biology, Babylon University, Hilla, Iraq (seragdcnidaa@yahoo.com)

Abstract

The Anatomical characters of leaves and stem was studied to two variety with pink flower and yellow flower belong to the species *Mirabilis jalapa* from the family Nyctaginaceae and many characters of the leaves and stem epidermis and transvers section of the stem was useful to separate between the varieties, especially the qualitative characters, like the indumentum type and distribution ,the shape of crystal bundles ,type of stomata It was record the actinocytic type in variety with yellow flower while the anomocytic type found in variety with pink flower stem epidermis ,in transvers section of the stem the vascular bundles was variable between the varieties ,so the quantitative characters was useful to separate between the varieties like diameter and numbers of epidermal cell in leaves and stem ,diameter of stomata and the numbers ,diameter of stem tissues like phloem ,xylem ,chlorenchyma ,collenchyma ,and the diameter of vascular bundles.

Keyword: *Mirabilis jalapa*, Anatomical characters ,epidermis ,leaves,stem,tissues.

Introduction

The Nyctaginaceae is considered from Angiosperm of the Dicotyledon under the Caryophyllales. It contains about 30 genera with nearly 400 species of herbs, shrubs, and trees, which originate in temperate and warm tropical regions in the world. This family was described by the scientist Hemerl in 1901. *Mirabilis jalapa* is characterized by estipulate leaves with smooth edges of Entire and Reticular veins. The vegetative parts usually contain Raphides crystals in bundle or single form. The flowers are in the form of a small, tubular structure representing the petaloid calyx consisting of five united sepals that look like a corolla, and the flower is perigynous, meaning that the superior ovary consists of one carpel, one ovum, and basal placentation and contains one style and one stigma in the form of 5 or 6 stamens capitate and anther has two lobes, and the fruits are dry, hard, can-like, and small (Chakaravarty, 1976).

Mirabilis consists of approximately 28 species distributed all over the world. There are about 50 to 60 species in America, and it is almost limited in the New World. It has different types and forms, as it is found as annual herbs or shrubs, and its legs are procumbent and erect or are climbing. The plant was registered in 1953 as an ornamental plant in all orbits of the world, and there were some disputes that its origin was from Mexico and others from India. Today, it has settled in the tropics of North America, Latina, France, and India. In Brazil, it is known as Clavillia or Maravilla, and Bonina is known in Pera as Jalapa or Maravilla.

Mirabilis is considered one of the important medicinal and economic plants, and through the studies and research conducted on the extracts of the studied plant for all parts of the plant indicated that it contains many chemical compounds and drugs that are used in medicine in the treatment of many diseases and confirmed (aequez, 1999'M) in its importance as a treatment for dysentery Amoeboid in Mexico. It is also used in most peoples in the treatment of colic and diarrhea (Holdsworth, 1992)), and it was used in China to treat diabetes and constipation (2008, Lee et al). (Bogle, 1974) used the studied type in the manufacture of dyes prepared for the manufacture of cakes and gelatin, and they use it in the manufacture of cosmetics. (Walker, 2008) confirmed that the roots of the studied type contain chemical compounds, including carbohydrates, Alkaloid, Glcocosides. (Mishkinsky *et, al*, 1967) showed the importance of type to reduce blood sugar concentrations, i.e. to treat diabetes. Besides, (Subin, 2011) found that it contains Flavonoids, Tannic acid, Phenolics, and its leaves are used against fungi because it contains ethanol, and its roots contain compounds as antihistamines, and all its parts are used as antioxidants, Subin (2011). (Maxia et al, 2010) showed the importance of its leaves, tubers, and seeds being used as an antibacterial treatment. (Mohamed *etal*, 2010) used his tubers as an anti-fungal. Maxia et al. (2010) confirmed the effectiveness of its roots as antihistamines.

In terms of anatomy, the beginnings were in 1873 by dissecting the vegetative and flower parts of the species *Mirabilis longiflora*. De Bary (1884) described the anatomy of the young stems of the two species *Mirabilis Jalapa* and *Mirabilis longifolia* and anatomical studies of seeds of species belonging to the *Mirabilis* and *Abronia* (Pant & Mehra, 1963).anatomical studies of flowers and other species related to the family were studied by (Joshi & Rao 1934) and (Metchalf & Chalk, 1950) presented an anatomical comparison of some species of the family. He also studied the anatomy of nodes and inflorescence of several species including *Mirabilis jalapa*

(Sharma, 1962). In Iraq, no anatomical study was available for the species under study, so it is useful to study the species *Mirabilis jalapa*, a comparative anatomical study of two Variety species, one in violet *Mirabilis jalapa* (pink flower) Variety and the other in yellow *Mirabilis jalapa*. (Yellow fl.) the variety and the utility of these traits are in anatomical diagnosis, isolation, and classification of its variety.

Materials and Methods

The autopsy study included anatomy of two types or two varieties of *Mirabilis jalapa*, and it was based on samples collected during field trips in Karbala Governorate. The vegetative parts of the stems and leaves were dissected and their microscopic characteristics were studied, in terms of quantity and quality:

1.1 Preparation of vegetative organs epidermis

Stem Epidermis

1. Sections of the stems were taken from the middle approximately, and the length of the piece taken varies according to the length and diameter of the stems, and the length of the pieces taken ranged between (-1) 4 cm.
2. Sections of the stems were placed and transferred to a slide containing clean water and an incision was made in the middle and the epidermis of the stem was separated under an autopsy microscope with an insulin needle gently and rotate the section with fine forceps until the epidermis was obtained, or sometimes used the Scraping method so that one end of the piece was held with the thumb or fine forceps The inner tissues of the stem were scraped using a dissection blade. The epidermis is dyed with safranin dye and washed with ethyl alcohol 70% and placed in a slide container on a drop of glycerin. The cover of the slide was gently placed and its ends were blocked by transparent nail polish or any other color, and the slides were marked with a sticker labeled in which the information was recorded and kept until examination, diagnosis, and imaging.

Leaf Epidermis

(Al-Garaawi, 2017) the method with some modification in preparing the Epidermis of the lower and upper leaf was followed with the following steps:

1. The second leaf is taken from the plant at the flowering stage.
2. The middle third of the fully grown leaf is taken so that it includes all areas of the blade from one edge to the other.
3. The leaf was held in the same way for the upper and lower Epidermis, a slit is made that runs from edge to edge across the width of the leaf and in the middle to include all of the blades.
4. The required Epidermis was isolated by the scraping process of the contrasting Epidermis and the tissues between them until clean Epidermis is obtained.
5. The Epidermis was dyed with saffranin, then washed with alcohol.
6. The clean Epidermis was transferred to a new slide containing a drop of calicirin and covered with a Coverslip gently. The slices were marked and preserved until they were used for examination and diagnosis.

Stem transverse section

The middle of the stem was chosen for the two studied species, and the length depends on the length of the stem in the plant samples and the ease of obtaining sections of it, samples were cut by hand (Hand section). (Al-Garaawi, 2012) the method was followed according to the following steps:

1. The stem piece was placed horizontally under a dissecting microscope and held by the thumb and cut with a sharp blade until complete sections were obtained.
2. The stem was held vertically with the thumb and forefinger and cut off until complete sections were obtained.
3. The prepared sections were placed directly with the safranin dye. The sections were then transferred to a clean glass slide containing one or several drops of glycerine.
4. The slide cover is gently placed and the edges sealed with nail polish and the slides are marked and preserved.

Results and discussion

Stem Epidermis

When studying stem Epidermis, two types of cells were found: Ordinary cell and Stomata, which varied in numbers and lengths. Indumentum was distinguished by the presence of

glandular hair, agglutinins, and papillae, and the hairs also differed in number and length. It is reported by (Stebbins, & Khush, 1961) that stomatal complex cells in seed coats were first studied by Strasburger (1866) and four types were distinguished depending on the presence and arrangement of Dicotyledons. The characteristics of stomata are of taxonomic importance in distinguishing and diagnosing between the different taxonomic orders. It was indicated in the stomata understudy that its type in the family as a whole was of the anomocytic type (Chew, 2010). This is characteristic of the stem Epidermis of the *M. j.* (pink fl.) Var., while the actinocytic type was recorded in the stem Epidermis of the *Mirabilis j.* (Yellow fl.) variety. This is a trait recorded for the first time for the species under study, and that trait was distinguished between the two types (panel 6). The surface covering, its capillaries were of two types: Multicellular glandular and none- glandular ranged between (3-15) cells, and by comparing the stem Epidermis of the two types of *Mirabilis jalapa* with *M. j.* (pink fl.) variety and *Mirabilis j.* (Yellow fl.) Variety, it was found that there is a variation in the diameters of the stomata. It was in the *M.j.* (pink fl.) variety between (32.5-25) μm and a rate of (30) μm , while the dimensions were larger in the *Mirabilis j.* (Yellow fl.) Variety ranged between (42.5-30) μm and a rate of μm . Stomata, larger measurements were also recorded in the *M.j.* (yellow fl.) Variety. It ranged between (37.5-20) μm with a rate of (25) μm , as for the type *M.j.* (pink fl.) Variety It was between (27.5-15) μm and a rate of (20) μm , Table (1), Panel (4). The characteristics of stomata were considered important taxonomically to separate the taxonomic ranks, as in the study (Al-Garaawi, 2017). The normal epidermal cells, the normal cell walls in the *M.j.* (pink fl.) Variety is distinguished by being thicker than the walls of the *Mirabilis J.* (yellow fl.) Variety. The cells in them are also irregular in shape and most are nearly equal in dimensions while in the *M.j.* (pink fl.) Variety The walls of its cells were often elongated and the walls in both subspecies were straight. Also, a variation in the dimensions of the Epidermis cells was recorded between the two types, as they were larger in the Epidermis of the *M.j.* (pink fl.) Variety The cell lengths ranged between (105-30) μm and on average (80) μm while the cell lengths of *M.j.* (yellow fl.) Variety ranged between (62.5-25) μm and a rate of (37.5) μm , the cell width was also greater in the *M.j.* (pink fl.) Variety. It was between (50-25) μm and a rate of (42.5) μm , as for the *M.j.* (yellow fl.) Variety. The width of its cells was (37.5-15) μm and at a lower rate of (20) μm , Table (1). The number of cells in the microscopic field was important in isolating and diagnosing the two varities, as the cell numbers were more in the *M.j.* (yellow fl.) Variety It ranged between

(220-165) cells, with a rate of (180) cells, while in the *M.j.* (pink fl.) Variety It ranged between (110-70) cells, with a lesser rate of (88) cells, Table (1).

The indumentum is represented by papillae, which are characterized by their delicacy, so they can hardly be distinguished in the surface view, they are found in the form of semicircles or crescent shapes on the surfaces of normal epidermal cells (some of course). In the cross-section of the stem, the indumentum appears convex in the shape of a dome or a mound, while the other type of indumentum is two types of glandular hair and non-glandular hair, which are characterized by their frequent presence in the areas of the epidermis located above or near the veins, and the characteristics of the indumentum are taxonomically important to separate the taxonomic ranks as in the study (Al-Garaawi, 2017). The two types were distinguished by the presence of many types of hairs according to the number of cells of these hairs, as the hairs were with multiple cells, of which (4-3) cells, (5-6) cells, (9-8) cells, (12) cells and (15) cells were recorded. With its two types, glandular and non-glandular, the gland is characterized by the presence of a clear glandular cell, while the glandular cells are normal, and these structures have benefited in the isolation and separation of the two variety taxonomically, as they varied in the intensity of their presence or spread on the surface of the epidermis. The hairs with (4-3) cells and (6-5) cells were the most common and widespread in the stem of the *M.j.* (pink fl.) Variety. It also recorded the presence of hairs with a cell number (15-12-9-8), but in very few or rare numbers, while *M.j.* (yellow fl.) The variety was distinguished by the density of the proliferation of hairs with cell numbers (15-12-11) cells, while the presence of the rest of the types of hairs was recorded at the lower or medium-density table (2). It is noticed that this characteristic has been useful in isolating and diagnosing the two variety as well. A study of the indumentum of the stem epidermis was not available for the species under study except for what was mentioned (Rugina et al., 2006), the presence of multicellular filaments when studying stem sections in the germination stage of *Mirabilis jalapa*.

Leaves epidermis :

1- Abaxial epidermis

When studying the abaxial epidermis there are two types of epidermal cells: ordinary cells and Stomata. It was also observed that the glandular and none glandular multicellular were found densely over the veins areas and less or rarely in the areas between the veins, especially the

three-cell or quadruple-celled, while in the veins, the long hairs with more cells were found. They were also found in single or bundles, and the shape of the bundles was spherical or nearly spherical in the epidermis of the Variety with yellow flowers, which distinguishes it from *M.j.* (pink fl.) Variety in which the shape of the Raphides Crystals was oval or elliptical, elongated, and this is one of the important characteristics that distinguished between the two Variety (panel 3). The epidermis was characterized by walls or edges of medium to the very zigzag shape of the letter (V, U). There was also no study of the abaxial epidermis traits of the species under study. In the *Bougainvillea* study which belongs to the same family (Chew, 2010), it was observed that the characteristics of the lower epidermal cells and stomata are similar to the epidermis of the type *Mirabilis jalapa*, and the lengths of the epidermal cells were variable that reported in the isolation of the two Variety. The lower epidermal cell lengths were greater in the *M.j.* (pink fl.) Var. It ranged between (125-62.5) μm and a rate of (84.5) μm , while lower lengths were recorded in the epidermis of *M.j.* (yellow fl.) Var. It ranged between (75-50) μm and a rate of (52.75) μm . This trait was useful for distinguishing between the two Variety as well as for the normal epidermal cell presentation trait which was also greater in the *M.j.* (pink fl.) Var. It ranged between (75-42) μm and a rate of (59.75) μm , while the rate of displaying cells was much lower in the *M.j.* (yellow fl.) Var. As it reached (35.5) μm and ranged between (45-17.5) μm , and this characteristic was also used to distinguish between the two Variety, especially the rates, Table (3). The number of epidermal cells was also measured in the microscopic field under the magnification force (40x), and the cell numbers were lower in the *M.j.* (pink fl.) Var. As it ranged between (121-79) cells and a rate of (92) cells, while the numbers were more in the *M.j.* (yellow fl.) Variety. This is what distinguished it from the other Variety, as it ranged between (147-124) cells and at a rate of (134) cells Table (3) Panel (1).

The stomata, its shape was anomocytic type that is, the stomata are not surrounded by auxiliary cells, and the lower epidermis was distinguished by the number of stomata in it more than on the upper epidermis of the leaf. This characteristic was useful in distinguishing the leaf epidermis upper and lower types. As for the dimensions of the stomata and their numbers on the lower epidermis, it was useful in distinguishing between the two Variety studied. The diameter of the stomata in the *M.j.* (yellow fl.) Var ranged between (27.5-12.5) μm with a rate of (20) μm , while the diameters of the stomata in the *M.j.* (pink fl.) Var ranged between (30-15) μm , with a rate of (25) μm , and this trait was useful in distinguishing between the two Variety as well as the

characteristic of the number of stomata in the microscopic field. Their numbers were more in the epidermis of the *M.j.* (pink fl.) Var, as it ranged between (10-26) stomata, with a rate of (17) stomata, while in *M.j.* (yellow fl.) Var, it ranged between (20-4) stomata, with a rate of (11). As for the Raphides crystals, the rates of numbers of needle Raphides crystals bundles were also reported in distinguishing between the two Variety. The largest numbers were recorded in the *M.j.* (pink fl.) Var. , ranging between (35-13) Raphides crystal at a rate of (20) bundles, while smaller numbers were recorded in *M.j.* (yellow fl.) Var. ranged from (27-10) packs, and at a rate of (12) packs, their rates were 18 in *M.j.* (pink fl.) variety which is more than the yellow color which is (12) package, table (3). The indumentum is represented by glandular and non-glandular hairs, which varied in the number of their cells at the Variety level, as the presence of hairs with cell numbers (15-12-11-9-8-5-6-4-3) was recorded for both Variety, and their presence was concentrated near and above the veins. This trait was useful in distinguishing between the two Variety, as the number of hairs was greater in *M.j.* (pink fl.) Var. Also, the hairs of numbers (3-4) were more abundant than the rest of the hairs in *M.j.* (yellow fl.) Var., while filaments with cell numbers (8) were more intense in *M.j.* (pink fl.) Var. Table (5).

2- Adaxial epidermis

The normal epidermal cells of the upper epidermis were characterized by less sinuous edges, which varied in lengths and numbers in the microscopic field. Also, no previous studies of the upper leaf epidermis were available for *Mirabilis jalapa*. Generally, the cell walls were thicker in *M.j.* (pink fl.) Var., which distinguished it from the *M. J.* (yellow fl.) Variety, whose cell walls were less thick, and the cell dimensions helped distinguish between the two Variety, so the lengths were greater in the *M.j.* (pink fl.) Variety. They ranged between (87.5-37.5) μm and a rate of (75) μm , while they were in *M.j.* (yellow fl.) The variety between (75-25) μm and a lesser rate of (62.5) μm . Likewise, the cell width ranged in *M.j.* (pink fl.) Var. between (50-25) μm , at a rate of (30) μm , and the rate is greater than that of the *M.j.* (yellow fl.) Variety in the width dimensions ranged between (37.5-12.5) μm and a rate of (25) μm , Table (4). Also, the cell number characteristic in the microscopic field was useful in distinguishing between the two Variety, as the number of cells was greater in the epidermis of the *M.j.* (yellow fl.) Variety, ranged between (135-103) cells and a rate of (122) cells, while it was less in the subspecies with purple flowers, and it ranged between (105-72) cells and the rate of (87) cells, Table (4) Panel (2). It is noticeable that the quantitative and qualitative characteristics of epidermal cells are useful in

isolating and distinguishing the taxonomic ranks, as in the study (Al-Garaawi, 2017). As for the stomata, they were less in number than on the lower epidermis, as well as their numbers varied between the two variety, and they were in very small numbers on the epidermis of *M.j.* (yellow fl.) Var. Their numbers ranged between (2-0) stomata and a rate of (0.2) stomata, while their numbers were slightly higher in *M.j.* (pink fl.) Variety, ranged between (0-5) stomata, with a rate of (2). This characteristic was useful in distinguishing between the two types, and the diameter of the stomata was measured, and this characteristic witnessed a convergence between the two types, as the diameters were between (35-20) μm , and the rate was (30) μm in *M.j.* (pink fl.) Variety, while the diameter was slightly smaller in *M.j.* (yellow fl.) Variety, ranged between (32.5-17.5) μm , with a rate of (27) μm . the bundles of needle crystals were heterogeneous between the two variety, and they were generally higher in the epidermis of *M.j.* (pink fl.) Var. It amounted to (11) bundles and ranged between (5-21) bundles, while in the other two bundles were at lower rates of (4) bundles and ranged between (1-14) bundles, which benefited the isolation of the two types, depending on this characteristic, as well as the shapes of those packages were important in Separation of the two variety as the shapes of the bundles were spherical in *M.j.* (yellow fl.) Variety, while it was elliptically elongated to oval elongated in *M.j.* (pink flowers).

The indumentum is represented by the glandular and none glandular multifilament capillaries, which were distinguished by being denser on the surface of the upper epidermis than on the surface of the lower epidermis. The two types were distinguished by the density of a specific type of multicellular hairs, as previously described in the lower epidermis, and the papillae were found, which were less visible on the upper and lower epidermis than on the stem epidermis, as it was clearer.

Transverse sections of stems

The anatomical study of the sections of the stem of *Mirabilis jalapa* in both the pink and yellow variety appeared in Panel (5) with the presence of a single layer of epidermal cells which were distinguished by their spherical to an elongated spherical shape, and some of them were distinguished by the vaulted protrusions on the surfaces of the outer cells representing the papillae. Besides, the cells were also distinguished by the thickness of their outer walls, and this thickness was greater in the epidermis of the *M.j.* (pink fl.) Var. than in *M.j.* (yellow fl.) Variety.

The epidermis layer was also characterized by the presence of multi-glandular and none glandular hairs. The epidermis layer is followed by a layer of Collenchyma Tissue, and the last tissue was found in several layers, ranging between 5-8 layers in the sub-epidermal region, and it was of the angular type and a lesser percentage of Lacunar whose cells were characterized by the thickness of their walls, Panel (8). This layer is followed by a layer of chlorenchyma tissue also consisting of approximately 5-8 layers, which is a parenchyma tissue whose cells contain large numbers of plastids to carry out the process of photosynthesis. Its cells were characterized by the delicacy of their walls, the large size of the cells, their polygonal shape to the semi-spherical shape, with small triangular intersections between them and were distinguished by their dark green color. Its cells took the shape of a square to a rectangle, and their layers ranged between 7-4. The delicacy of its walls was characterized by its pigmentation in a light pink color, followed by the wood texture, which was strongly distinguished by its staining of saffranin in a dark red color, which thickens the cell walls of its tissue consisting of fibers, vessels, and tracheids. The woody texture has the distinction of being continuous in the form of a ring in the section. This continuous ring of sclerenchyma fibers and sclereides is interspersed at nearly regular distances. The wood vessels are immersed in the tissue of sclerenchyma fibers and sclereides, and the shape of the sclerenchyma ring is wavy from the side of the pith. The sclerenchyma fibers and the sclerides were distinguished by their thin walls being highly pigmented, their shape is pentagonal to hexagonal, often four-walled, with a wide cavity. As the age of the plant increases, the number of layers of the sclerenchyma tissue increases in the Sclerenchyma ring, the thickening of the walls of the Sclerenchyma cells increases, and the expansion of the cells decreases. The vessels had thickened walls and were surrounded by very thick and small fibers. The vessels were arranged radially through the sclerenchyma tissue at alternating distances with the sclerenchyma tissue. The pith layer, which consists of thin-walled, large-sized, polygonal to spherical cells, often increase the expansion of cells as we go to the center and the cells are confined between them in between and spread in the core scattered vascular bundles of thin oval shapes elongated in the areas close to the ring of Sclerenchyma into pyramidal or oval shapes in areas close to the center of the pith. The vascular bundles are caseless with phloem for the top and wood for the bottom represented by wood vessels and fibers. The tissues of the stem sections were described in an anatomical study of several species of the *Mirabilis*, one of which is the study (Hernandez et al, 2011), but not for the species.

By comparing the stem segments in *Mirabilis jalapa* of *M.j.* (yellow fl.) Var. and *M.j.* (pink fl.) Variety, it was found that many quantitative and qualitative characteristics have been useful in isolating and diagnosing the two types from each other. The specific characteristics are like the shape of the vascular bundles, panel (7) as the vascular bundles were in *M.j.* (pink fl.) Variety. It is accompanied by a cap of sclerenchyma fibers while there is no cap in the vessels of the *M.j.* (yellow fl.) Variety. Besides, the vascular bundle shapes that were ovate to elongated ovate in *M.j.* (pink fl.) Variety, whereas the shapes were pyramidal near the pith to a lanceolate near the vascular ring, which distinguished between the two varieties and reported their isolation and diagnosis. Also, the vascular bundles close to the vascular annulus were composed of a single longitudinal row of wood vessels in *M.j.* (yellow fl.) Variety, while in the vascular bundles of *M.j.* (pink fl.) Variety, the bundles consisted of two or more rows of wood vessels, also, the xylem is within the vascular ring of *M.j.* (yellow fl.) variety was wavy, while the other type was not.

As for the quantitative characteristics, it was also useful in isolating the two Varieties, including the number of vascular bundles in the cross-section of the stem, which ranged between (10-32) bundles and with a rate of (24) bundles in *M.j.* (yellow fl.) Variety, while it ranged between (38-22) bundles, with higher rates reaching (28) bundles in *M.j.* (pink fl.) Variety. The length of the vascular bundles was greater in *M.j.* (yellow fl.) Variety, ranged between (450-300) μm and a rate of (350) μm , while it ranged between (400-250) μm in the subspecies with *M.j.* (pink fl.) Variety with a smaller rate, it was 300 μm . The vascular bundle width, the process was reversed as the bundle width was greater in the *M.j.* (pink fl.) Variety, ranged between (300-200) μm and a rate of (220) μm , while it was in *M.j.* (yellow fl.) variety between (250-150) μm and a rate of (200) μm , Table (6). Also, the thickness of the angular collenchyma tissue bordering the epidermis was thicker in *M.j.* (yellow fl.) Variety, ranged between (150-100) μm and a rate of (130) μm , as for the type with *M.j.* (pink fl.) variety was thinner, and it ranged between (110-85) μm and a rate of (100) μm , table (6). The thickness of the chlorenchyma tissue that follows the angular collenchyma tissue was also measured. The thickness of the tissue was useful in separating and distinguishing between the two studied Variety as its thickness was greater in *M.j.* (pink fl.) variety, ranged between (300-200) μm and a rate of (270) μm , while the thickness ranged between (220-100) μm and a rate of (120) μm in *M.j.* (yellow fl.) Variety table (6). The thickness of phloem tissue within the vascular ring was also measured, which was also useful in

distinguishing between the two Variety, as it was greater in the *M.j.* (yellow fl.) variety which ranged between (350-120) μm and a rate of (200) μm , while it was between (200-100) μm and a lesser rate of (160) μm in *M.j.* (pink fl.) Variety. Also, the thickness of the xylem within the vascular ring was important in isolating the two Variety, as it was very thick in *M.j.* (pink fl.) Variety Its thickness exceeded three times the other variety, ranging between (2300-1500) μm and at a rate of (1900) μm , while in yellow flowers variety, it ranged between (700-400) μm , with a rate of (590) micrometers, table (7). The diameter of the pith was also measured, the average diameter was greater in *M.j.* (pink fl.) Variety, reached (500) μm and ranged between (650-400) μm , while in yellow flowers variety, it ranged between (500-380) μm and a rate of (420) μm . The diameter of the pith parenchyma cells was also measured, which was larger in the *M.j.* (pink fl.) Variety, ranged between (70-30) μm and a rate of (50) μm , while it was between (50-20) μm and a rate of (30) μm in yellow flowers Variety, table (7) which was reported in the isolation and diagnosis of the two types of each other.

References

1. Al-Garaawy,N.I. , Al-bermani ,A.K., Abo Serag,N.A.(2017)Anatomical and taxanomial study to the leaves of *Juncus* L. Speceis from Family (Juncaceae) in Iraq.Kerbala Uni.Jor. (2017).vol.15,No.2,P142-158.
2. - Bogle, AL.(1974). The genera of Nyctaginaceae in the southeastem United States. J Arnold Arboretum; 55: 1-37.
3. Chakravarty,H.L..(1976).Plant Wealth of Iraq . Baghdad Botany directorate,Ministry of Agriculture and Agrarian Roform,Iraq .Vol.i.Pp182.
4. Chew ,S.(2010). Anatomical features of Bougainvillea (Nyctaginaceae) Studies by Undergraduate Researchers at Guelph, Vol. 4, No. 1, P. 72-78
5. Hernandez ,P. Terrazas ,T. ,Flore,H.(2011).Comparative stem anatomy of Mirabilis (Nyctaginaceae) Plant Systematics and Evolution 292(1):117-132
6. - Holdsworth, DK.(1992). A preliminary study of medicinal plants of Easter Island, South Pacific. Int J Pharmacog ; 30: 27-32.
7. Joshi, A. C. and Roe, V.S(1934) "Vascular anatomy of the flowers of four Nyctaginaceae. Jour. Ind. Bot. Soc., 1934, 13, 169-186.

8. - Lee, S., Xiao, C., Pei, S.(2008). Ethno botanical survey of medicinal plants at periodic markets of Honghe Prefecture in Yunnan Province, SW China. J Ethno pharmacol ; 117(2): 362-377.
9. M`arquez, A., Lara, O. , Esquivel, R., Mata, E., Luna, A.(1999). Plantas medicinales deM`exico II. Composici`on, usosy actividad boil`ogica UNAM, M`exico; p. 968—969.
10. Maxia, A., Sanna, C., Salve, B., Kasture, S.(2010). Inhibition of histamine mediated responses by *Mirabilis jalapa*: confirming traditional claims made about anti allergic and anti asthmatic activity. Nat Prod Res ; 24(18):P1681-1686.
11. Anatomy of the Dicotyledons, 2, London. -Metcalf, C. R. and Chalk, L.(1950).
12. Mishkinsky, J., Joseph, B., Sulman , F.(1967). Hypoglycaemic effect of trigonelline. The Lancet ; 2(7529): 1311-1312
13. Mohammed, H., Raoudh, J. , Imen, L., Ons ,M., Mohamed, D., Moncef, N.(2010). GC/MS analysis and antioxidant and antimicrobial activities of various solvent extracts from *Mirabilis jalapa* tubers. Process Biochem ; 45: 1486-1493.
14. Pant ,D.D.and Mehra,B.(1963).Nodal Anatomy of *Bougainvillea Glabra choisy* ,*B. spectabilis* willd and *Abronia elliptica* nelson .Vol.29,B,NO4.p434-466.
15. Rugina,R., C.Toma. Ivaniscu,L.(2006). HISTO-ANATOMICAL ASPECTS AT SOME DICOTILEDONATE SEEDLINGS RELATED TO THE VASCULAR TRANSITION, Botanical Garden of Iassy, University “Al.I.Cuza” Iassy, Faculty of Biology;P123-131.
16. SHARMA ,H. P. (1962).CONTRIBUTIONS TO THE MORPHOLOGY OF THE NYCTAGINACEAE.I. Anatomy of the Node and Inflorescence of Some Species. (National Botanic Gardena, Lucknow)p35-50.
17. Stebbins , L. and Khush , G. S. (1961). Variation in the organization of the Stomatal complex in the leaf Epidermis of Monocotyledons and bearing on their phylogeny . American Jornal of Botany . Vol. 48, No. 1. p. 51- 59.
18. Suban, M., Aleykutty, N., Vidya, V., Sonu, J., Visakh, P. (2011).In-vitro Antioxidant potential of Methanolic Extarcts of *Mirabilis jalapa* Linn, Free rad antioxidant , 1(4):82_86.

19. - Walker ,CI., Trevisan, G., Mateus, F., Carina, F., Maria, E., Juliano, F., Melania, P.(2008). Antinociceptive activity of *Mirabilis jalapa* in mice. J Ethno pharmacol ;120: 169-175.

Table(1) Quantitative characters of stem epidermis to varitys of *Mirabilis jalapa*

Number of the cells in microscope field (40x)	Width of epidermis cells (µm)	Length of epidermis cells (µm)	width of Stomata (µm)	Length of Stomata (µm)	Characters Varity
110(88)70	50(42.5)25	105(80)30	27.5(20)15	32.5(30)25	Mirabilis J var yellow flower
220(180)165	37.5(20)15	62.5(37.5)25	37.5(25)20	42.5(37.5)30	Mirabilis J var purple flower

Notice: The number on the right means that (Less) the value ,in the middle means(The average),in the Left means (higher)value

Table(2) Show Difference in Density between the varity *Mirabilis jalapa* on stem epidermis Hairs

Number of hair glandular and nonglandular					varity
15	11-12	8-9	6-5	3-4	
+++	+++	++	++	++	Mirabilis J var yellow flower
+	+	+	+++	+++	Mirabilis J var purple flower

Notice (+) means Little Density (++) average Density (+++)Dense

Table (3) Quantitative characters of Abaxial epidermis of leaves in varieties of *Mirabilis jalapa*

Number of Ordinary cells in microscope field	Number of crystal Bundles	Length of ordinary cells (μm)	Width of ordinary cells (μm)	Number of Stomata	Length of Stomata (μm)	characters / variety
147(134)124	27(12)10	75(52.75)50	45(35.5)17.5	20(11.6)4	27.5(20)12.5	Mirabilis J. (yellow flower) variety
121(92)79	35(20)13	125(84.5)62.5	75(59.75)42	26(17.2)10	30(25)15	Mirabilis J.(pink flower) variety

Notice: The number on the right means that (Less) the value ,in the middle means(The average),in the Left means (higher)value

Table (4) Quantitative characters of Adaxial epidermis of leaves in variety of *Mirabilis jalapa*

Number of crystals Bundles	Number of epidermal cell in microscope field (40x)	Width of epidermal cells (μm)	Length of epidermal cells (μm)	Number of Stomata (μm)	Length of Stomata (μm)	characters / Variety
14(4)1	135(122)103	37.5(25)12.5	75(62.5)25	2(0.2)0	32.5(27)17.5	Mirabilis J var yellow flower
21(11)5	105(87)72	50(30)25	87.5(75)37.5	5(2)0	35(30)20	Mirabilis J var purple flower

Notice: The number on the right means that (Less) the value ,in the middle means(The average),in the Left means (higher)value

Table(5) Difference in Density of hairs in leaves epidermis between the variety *Mirabilis jalapa*

Dense of hair glandular and nonglandular depending on number of cells					variety
15 cells	11-12 cells	8-9 cells	5-6 cells	3-4 cells	
++	++	++	++	+++	Mirabilis J. (yellow flower)variety
++	++	+++	++	++	Mirabilis J. (pink flower)

Table (6) Quantitative characters of stem section to variety *Mirabilis jalapa*

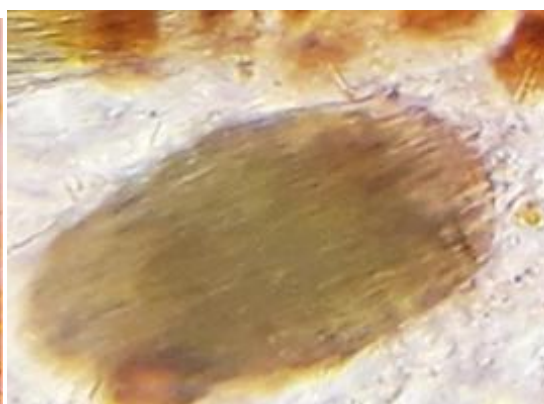
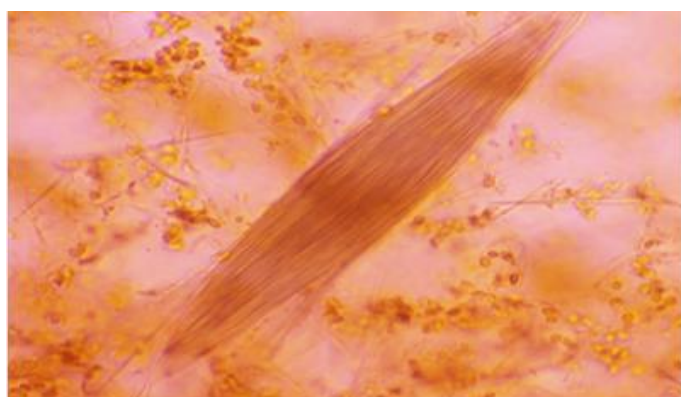
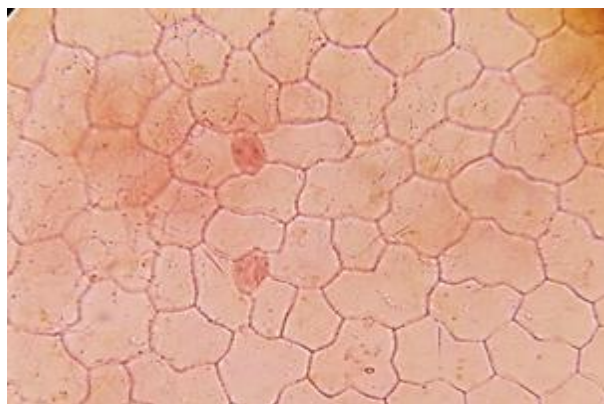
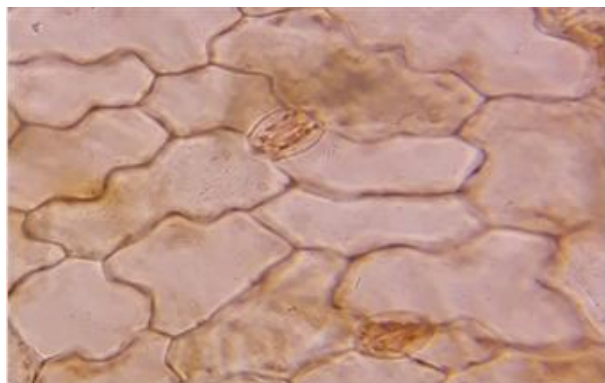
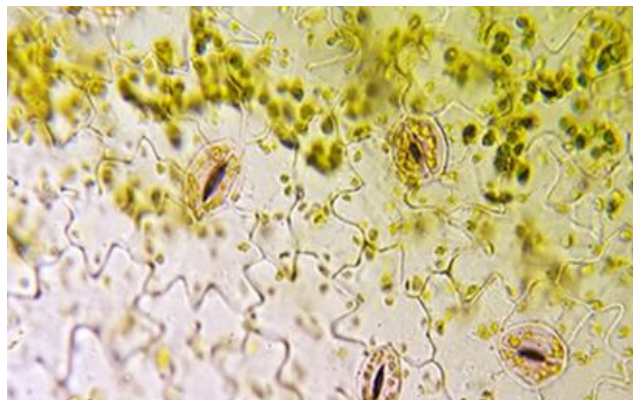
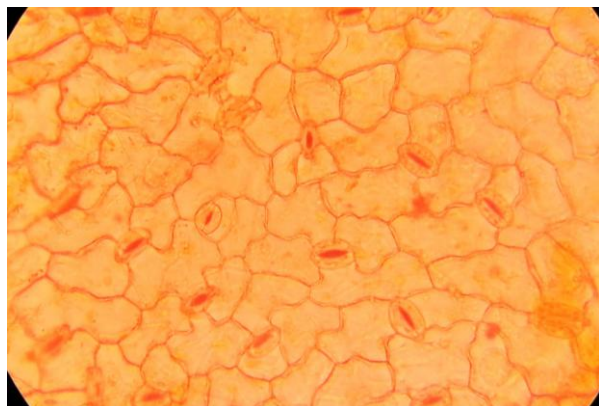
Thickness of angular chlorenchyma tissue) μm (	Thickness of angular collenchyma tissue) μm (	Width of vascular bundle) μm (	Length of vascular bundle) μm (	Number of vascular bundle	characters varity
220(120)100	150(130)100	250(200)150	450(350)300	32(24)10	Mirabilis J var yellow flower
300(270)200	110(100)85	300(220)200	400(300)250	38(28)22	Mirabilis J var purple flower

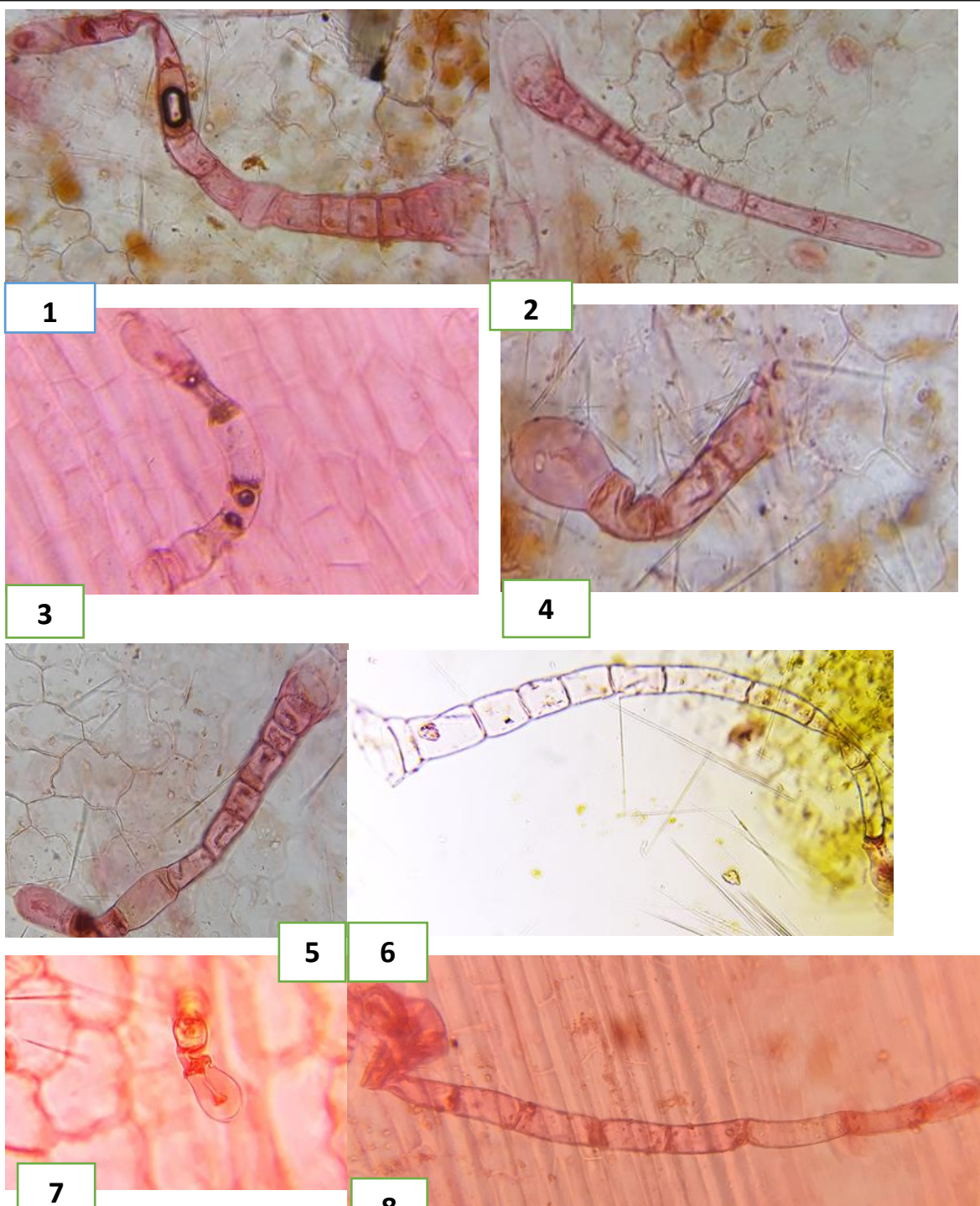
Notice: The number on the right means that (Less) the value ,in the middle means(The average),in the Left means (higher)value

Table (7) Quantitative characters of stem section to varitys of *Mirabilis jalapa*

radial of Paranchyma cell in the pith (μm)	Pith radial (μm)	Thickness of xylum tissue within vascular (μm)circle	Thickness of phoelm tissue within vascular (μm)circle	Characters varity
50(30)20	500(420)380	700(590)400	350(200)120	Mirabilis J var yellow flower
70(50)30	650(500)400	2300(1900)1500	200(160)100	Mirabilis J var purple flower

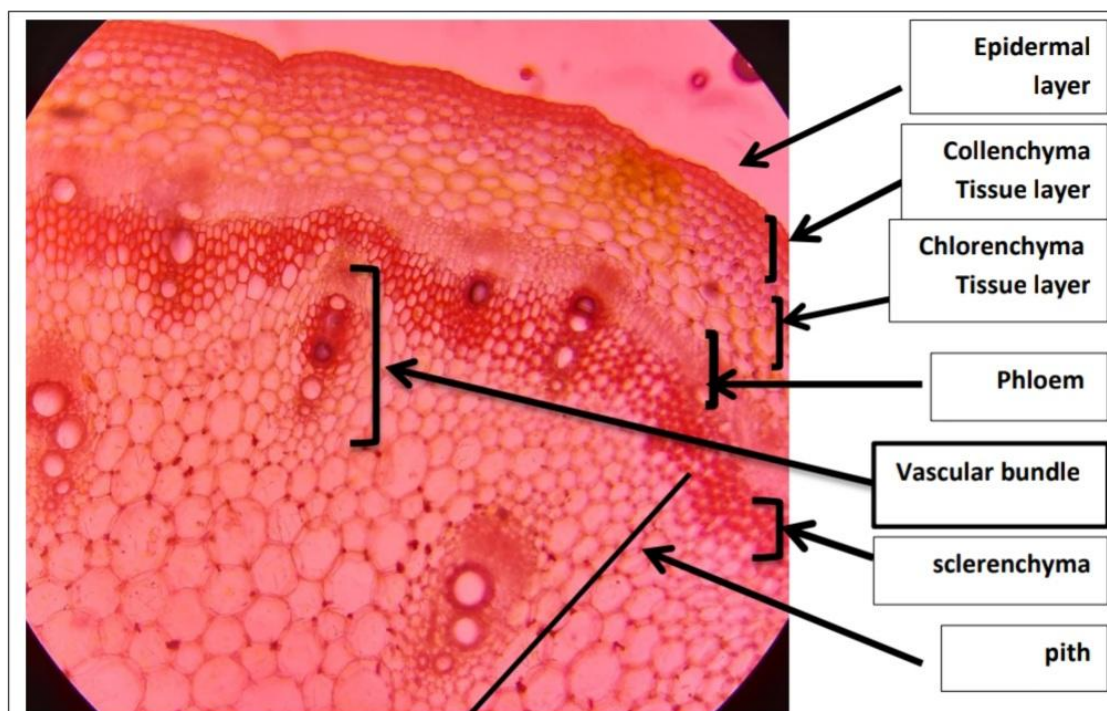
Notice: The number on the right means that (Less) the value ,in the middle means(The average),in the Left means (higher)value



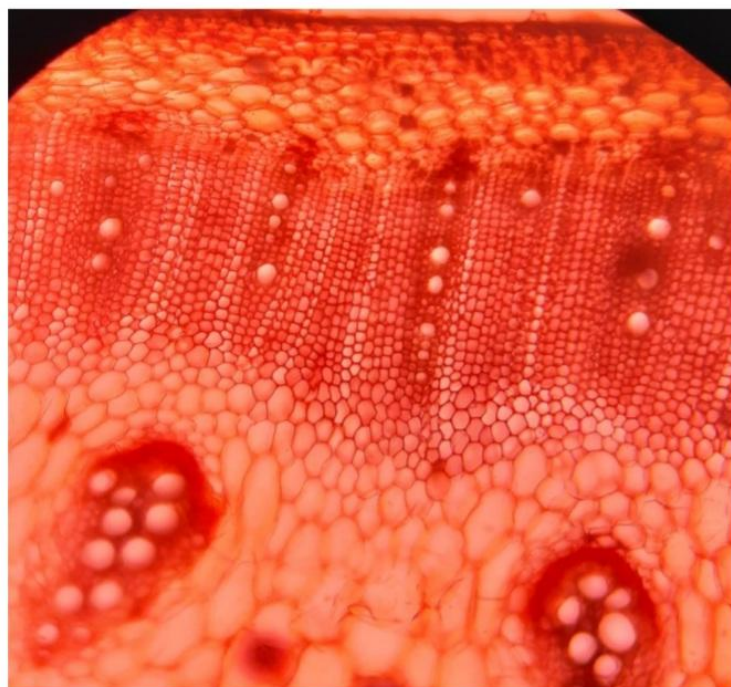


(+) types of glandular and non-glandular hair of leaves and stem epidermis in ***Mirabilis jalapa***. 1-Nonglandular hair composed of 12 cell .2- Nonglandular hair composed of 7 cell.

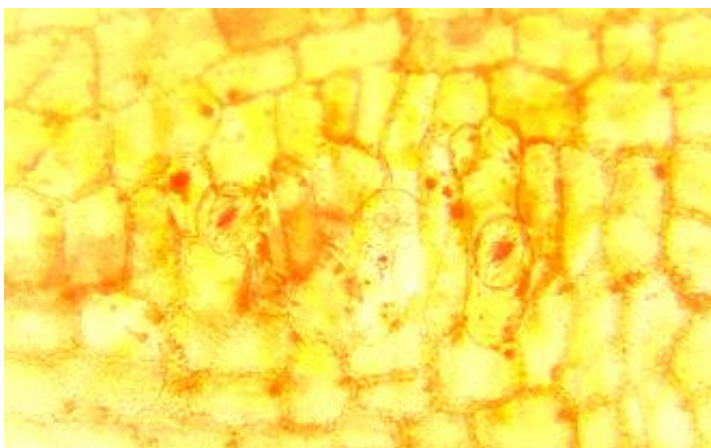
- 3- glandular hair composed of 4 cell.4- glandular hair composed of 7 cell
- 5- glandular hair composed of 10 cell.6- glandular hair composed of 12 cell
- 7- glandular hair composed of 3 cell.8- glandular hair composed of 8 cell



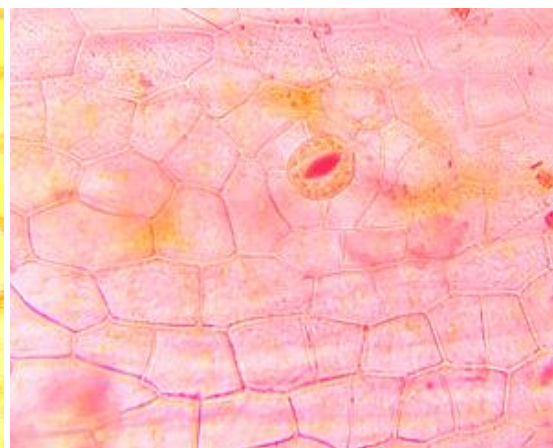
5- Stem section in *Mirabilis jalapa* (yellow fl.) Var.



6- Stem section in *Mirabilis jalapa* (pink fl.) Var.

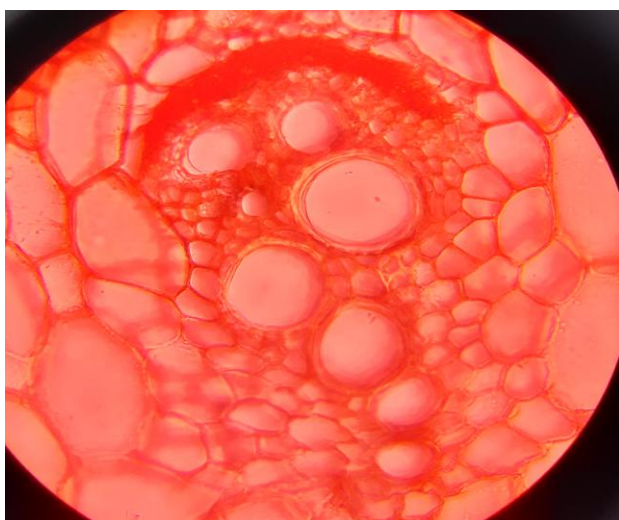


stem epiderm of *M.j.*(pink fl.)var



stem epiderm of *M.j.*(yellow fl.)var

7- the variation in stem epiderm *Mirabilis jalapa*

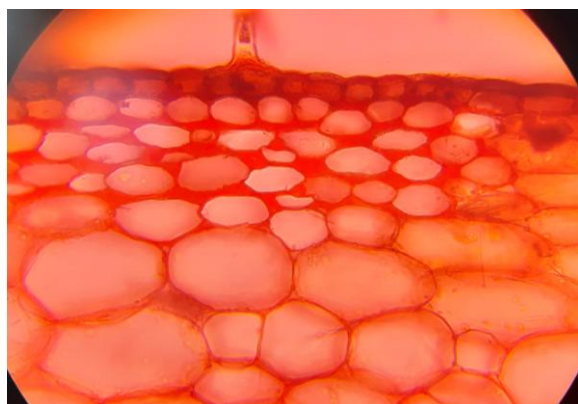


Vascular bundle of of *M.j.*(pink fl.)var

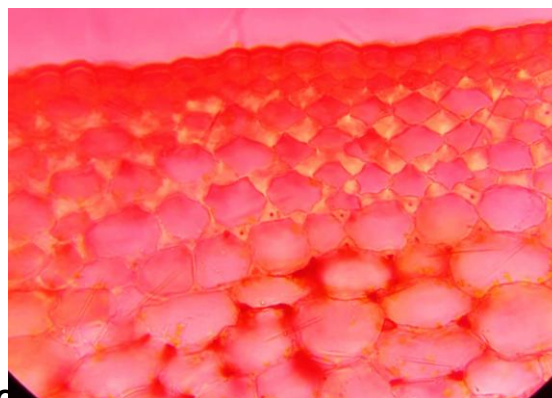


Vascular bundle of of *M.j.*(yellow fl.)var

8- the variation in vascular bundle in *Mirabilis jalapa*



Collenchyma tissue in *M.j.*(pink fl.)var



Collenchyma tissue in *M.j.*(yellow fl.)var

9- the variation of collenchyma tissue in *Mirabilis jalapa*