

# Microscopical Characterization of Selected Floral Powders Used in Unani System of Medicine

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## ABSTRACT

In unani system of medicine the use of flowers is widely accepted to treat a variety of health problems as they possess strong medicinal potential. Various flowers are administered unanimously either as a single crude drug or get powdered and mixed with other ingredients to form a compound unani formulation. The therapeutic efficacy of the unani formulations is absolutely dependent on the quality of the plant drug used. And if the plant drugs are adulterated, the quality of the preparation cannot go up to the standard level. Microscopical characterization is the only solution for establishing the correct identification of the plant drug material. As the research on the dry flower is meager, the present paper focus on the microscopical characters of five floral powders namely Shagufa-e-Anar, Gul-e-Khatmi, Gul-e-Madar, Zufah-e-Yabis and Zafran that are frequently used in the preparation of various unani compound formulations. The study includes mainly the identification of various cells / tissues / cell contents along with their measurements. Besides this the correct botanical and vernacular names, family name, organoleptic studies, therapeutic uses and important unani formulations containing these flowers as an ingredient have also been reported. All these studies will serve as a reference material in checking the adulteration and identification of authentic floral drug sample in various compound formulations of Unani System of Medicine.

**Key words:** Unani formulation, floral powder, microscopical characters

## INTRODUCTION

Flowers are an integral part of our lives and are associated with the most poignant moments of human experiences like celebrations or grieving. [1] They are used not just for their aesthetic sense but also for nutritive and medicinal properties.

Out of the total 4, 22,000 flowering plants reported from the world, more than 50,000 plants are used for medicinal purposes. In India, more than 43% of the total flowering plants are reported to be of medicinal importance. [2] This rich and diverse resource of plant wealth which includes a large number of medicinal plants is exclusively used in the traditional system of medicine like Ayurveda, Unani, Homeopathy and Siddha. [3] Nearly 2500 species are used as medicinal herbs by the various ethnic tribes and rural folk to manage their daily ailments. [4]

In Unani System of Medicine, flowers have an important space and significance. They are used to maintain health, treat diseases, to enhance beauty from long times, manufacture a wide range of cosmetic products which are considered indispensable in day to day life and also creates a fresh, elegant and warm atmosphere that helps in relaxing one's mind at any time of the day. [5] Flowers are

directly eaten as petals or made as juice decoction, tincture or mixing them with some other ingredients and then administered. Different formulations of flowers are used as Juice, Powder, Syrup, Arka (Distilled extract), Scents, Soups etc. [6] Unani materiamedica enumerates a number of compound formulations where different flowers are admixed with other raw materials in their powdered form [7] In order to maximize the efficacy and minimize the side effects it is highly important to ensure the quality and purity of the ingredients present in those formulations. Microscopy permits the identification of the herbs and the detection of individual components of the mixture by examining their unique features histological structures, cells and cell contents. The observation of cellular-level morphology is a major aid for the authentication of drugs. These characters are especially important for identification of out broken or powdered drugs, because in these cases most of the morphological diagnostic features are lost. The powdered crude drugs can be identified based on the form, the presence or absence of different cell types based on their cytomorphological characters, e.g. parenchyma, collenchyma, fibers, stone cells, vessels, trichomes, secretory cells, epidermal cells. As the research on the dry flower is meager, present paper focus on the microscopical characters of five floral powders namely Shagufa-e-Anar, Gul-e-Khatmi, Gul-e-Madar, Zufah-e-Yabis and Zafran. The study includes mainly the identification of various cells / tissues / cell contents along with their measurements. Besides this the correct botanical and vernacular names, family name, organoleptic studies, therapeutic uses and important unani formulations containing these flowers as an ingredient have also been reported. All these studies will serve as a reference material in checking the adulteration and identification of authentic floral drug sample in various compound formulations of Unani System of Medicine.

## MATERIALS AND METHODS

Authentic crude drug samples procured from the market; powdered and sieved through 60 mesh. The powdered drug first cleared in the solution of chloral hydrate and then mounted in solution of chloral hydrate and glycerol to prevent the formation of chloral hydrate crystals during the examination of the slide. Lignification was established by the reaction with solution of phloroglucinol and hydrochloric acid. Several preparations with different mountants like iodine water, sudan III, ruthenium red, ferric chloride etc. were also made to emphasise the presence of particularly important cells or cell contents. Care should be taken to avoid the presence of any air bubble. [8, 9] Most diagnostic features and the dimensions of the cells and other particles were recorded. Photomicrography was performed by using digital microscope with computer attachment.

## RESULTS AND DISCUSSION

### Shagufa-e-Anar

Shagufa-e-Anar is botanically identified as the flowers of *Punicagranatum* Linn. of family Punicaceae. It is known as Anar, Dhalim or Dharimb in Hindi; Pomegranate in English; Rumman or Shajraturmman in Arabic; Anar, Darekhtenar in Persian and Anarmitha in Urdu. Being Cold  $2^{\circ}$  and Dry  $2^{\circ}$  the flowers possess different pharmacological activities and hence being used in Unani System of Medicine as astringent, haemostatic, antihelminthic, stomachic, desiccant, cicatizant etc [10-13] The flowers are analgesic and anti-inflammatory; [14, 15] antioxidant and antibacterial, [16] hepatoprotective; [17] antidiabetic [18-23] and possesses wound healing properties. [24] It is used by unani physicians in the treatment of peptic ulcer, uterine and rectal ulcer and haemorrhages. [25] Flower buds powder is useful in bronchitis. It is used as gargle in disease of oral cavity and bleeding gum. Dried unripe flowers are very effective for infantile diarrhea and dysentery. The

flowers are styptic to the gums, check vomiting and useful in biliousness. [26] There are many compound formulations having Shagufa e Anar as an important ingredient being used unanimously by the unani physicians; few of them are SharbatHabbis, QursKharoba, MajoonBusd, QursGulnar, QursTabasheer, Sharbat e Anar, Jawarish e Anarain etc. [11-13, 27] The floral powder is brick red in colour, odourless with astringent taste. On examination under the microscope the drug powder reveals following characteristics :- (Fig. 1-8)

- Fragment of epidermal cells in surface view showing anomocytic type of stomata.
- Numerous glandular and non glandular trichomes measuring 90 $\mu$  - 216 $\mu$ .
- Fragment of parenchyma cells with rosette crystals of calcium oxalate measuring 9 $\mu$  - 22.5 $\mu$ .
- Numerous pitted sclereids with large lumen, oval to isodiametric in shape measuring 76.5 $\mu$  - 99  $\mu$  x 54  $\mu$  - 72  $\mu$  present either single or in groups.
- Pieces of vessels with spiral thickenings.
- Numerous spherical pollen grains with smooth exine measuring 18  $\mu$  in size.

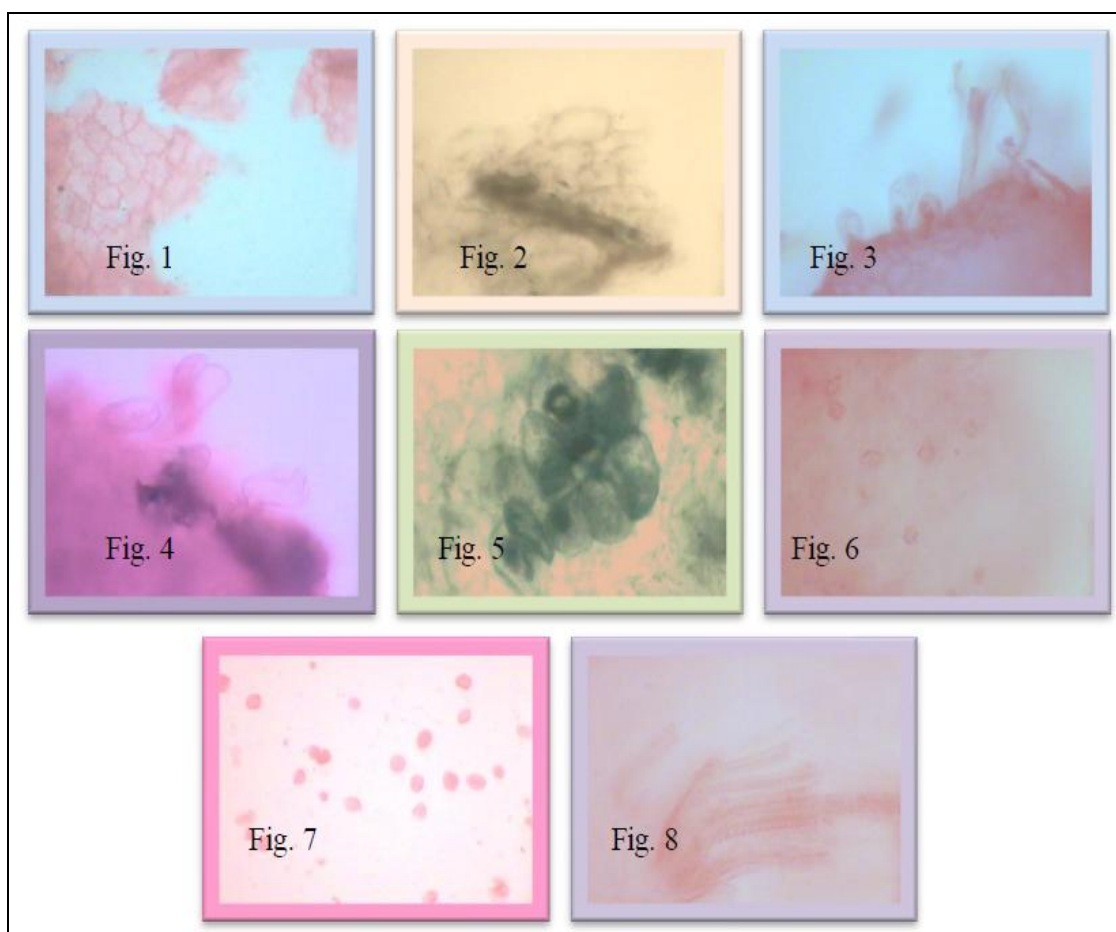


Figure 1- 8 : Shagufa -e -Anar

Fig. 1 : Fragment of epidermal cells of petal (x40) ; Fig. 2 : Epidermal cells showing stomata (x40) ; Fig. 3 & 4 : Glandular and Non Glandular trichomes (x40) ; Fig. 5 : Pitted sclereids in groups (x40) ; Fig. 6 : Parenchyma cells with rosette of calcium oxalate crystals (x40) ; Fig. 7 : Pollen grains (x40) ; Fig. 8 : Pieces of vessels with spiral thickenings (x40)

### Gul-e-Khatmi

Gul e Khatmi is botanically identified as the flowers of *Althaea officinalis* L. of Malvaceae family. It is known as Gulkhairo in Hindi & Persian;

Marsh-mallow in English; Bazarulkhatme in Arabic and Khatme or Khitmi in Urdu. It is valued in Unani System of Medicine for its emollient and resolvent properties. Being Cold  $2^{\circ}$  & Wet  $2^{\circ}$  it is used as a concoctive,

anti-inflammatory, relaxant and anodyne. Khatmi flower is exhilarant and tonic to heart, [28] antimicrobial antibacterial, anti-inflammatory and antioxidant. [29-31] It is useful in the treatment of headache, cervical adenitis, gastric ulcers and respiratory disorders [32] It is an important ingredient of a number of classical unani formulations such as Qairooti Arad Baqla, Raughan Mukhtara, Dawaul Musk Motadil Jawaharwali, ItrifalMuqawwi-e-Dimag, khamira Abresham Sada, Khamira Gaozaban Ambri. Floral powder of Gul-e-Khatmi is brown in colour with faint odour and muciligenous taste. On examination under the microscope it reveals following characteristics :- (Fig. 9-14)

- Abundant pollen grains that are spherical with spinousexine having diameter 103.5 $\mu$  - 126  $\mu$ .
- Fragment of sepal in surface view with dense tuft of very elongated, simple trichomes.
- Abundant simple trichomes that are unicellular, unseptate, thick walled with acute apex and having width 13.5 $\mu$  - 32 $\mu$ .
- Stellate trichomes having 8-10 elongated arms joined at their base to form a radiating structure. The radiating arms are moderately thick walled with acute apex.
- Fragment of petal in surface and sectional view.
- Pieces of vessels with spiral thickenings.

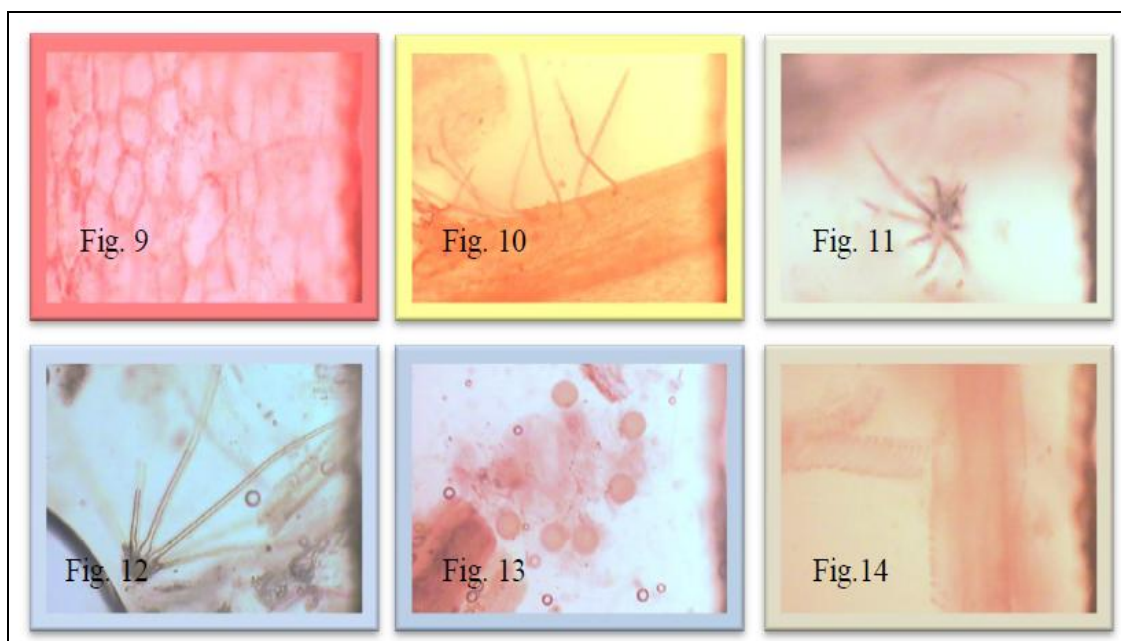


Figure 9-14: Gul-e-Khatmi  
 Fig. 9: Fragment of epidermal cells of petal(x40); Fig. 10: Fragment showing non glandular trichomes(x4); Fig. 11&12: Stellate trichomes (x10); Fig. 13: Pollen grains (x10); Fig. 14: Piece of spiral vessel (x40)

### Gul-e-madar

Gul-e-madar is botanically identified as the flowers of *Calotropis gigantea* R.Br. of Asclepiadaceae family. It is known as Madar or Ak in Hindi; Gigantic Swallowwort in English; Ashur or Oshmor in Arabic; Khok or Khark in Persian and Ak in Urdu. In Unani System of Medicine being Hot  $4^{\circ}$  & Dry  $4^{\circ}$  the flowers are considered digestive, stomachic, tonic and good for liver. It is useful in asthma, catarrh

and loss of appetite. Madar flowers are analgesic, antimicrobial, antibacterial, anti oxidant, cytotoxic, [33-36] hepatoprotective, antitumour, anti histamatic and anti diabetic. [37,38] It is an important ingredient of Habb-e-PapitaWilayati and Habb-e-Sundrimundri. The floral powder is yellowish brown coarse, heterogenous powder with characteristic aromatic odour and slightly bitter taste. On examination under the

microscope it reveals following characteristics :- (Fig. 15-20)

Fragment of the epidermal cells of petals in surface view. The cells are polygonal, parenchymatous with moderately thick walls.

- Fragment of corolla with paracytic type of stomata.

- Fragment of corolla with rosette crystals of calcium oxalate.
- Fragment from gynostagium region showing trichomes.
- Pieces of vessels with spiral and annular thickenings.
- Abundant pollen grains that are spherical with smooth exine and having diameter  $30\mu - 32\mu$ .

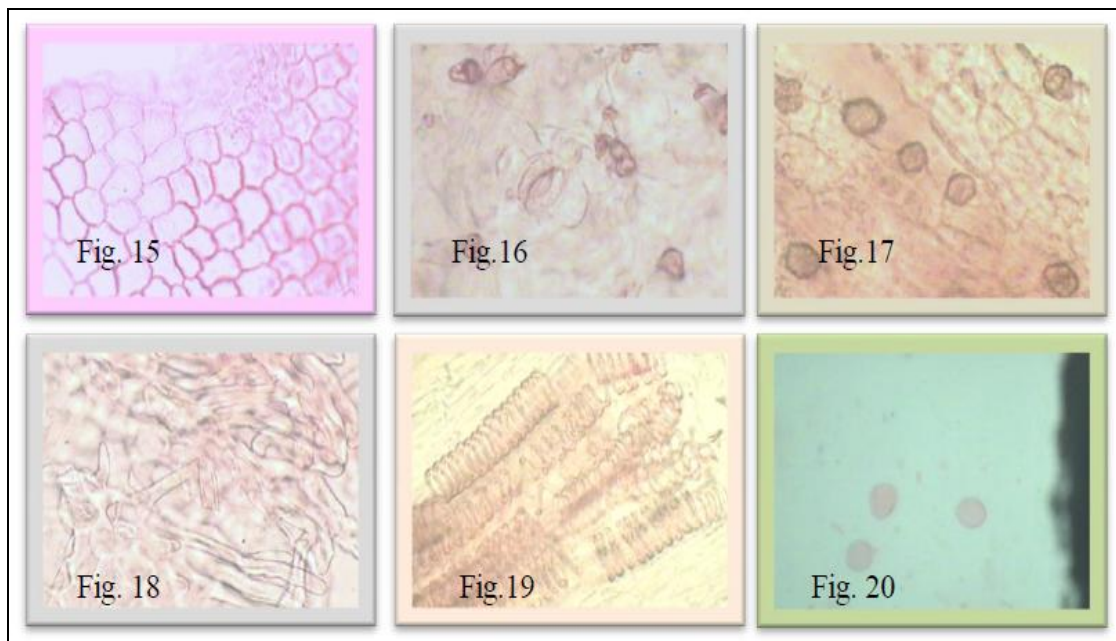


Figure 15-20: Gul-e-Madar

Fig. 15: Fragment of epidermal cells(x40); Fig. 16: Fragment showing stomata (x40); Fig. 17: Rosette of calcium oxalate crystals (x100); Fig. 18: Non glandular trichomes (x40); Fig. 19: Pieces of vascular elements (x100); Fig. 20: Pollen grains (x40)

### Zufah-e-Yabis

Zufah-e-Yabis is botanically identified as the flowers of *Hyssopus officinalis* L. of family Lamiaceae. It is known as Zufahyabis in Hindi; Hyssop in English; Zufah-e-Yabis, Zufahulreetih in Arabic; Zufahehuskka, Zufahetar, Zufaheyabis in Persian and Zufah in Urdu. Being Hot 3° & Dry 3° it has a long history of medicinal use in Unani System of Medicine as carminative, tonic, antiseptic, expectorant and cough reliever. [39] The flowers are anthelmatic, stimulant, diuretic, deobstruent, cathartic, stomachic, diaphoretic and resolvent. It is used in tea blends for cough relief, antispasmodic effects and relieving catarrh. Apart from this it exhibits various other pharmacological activities i.e. anti-bacterial, anti-fungal, anti-oxidant, anti-viral and anti-platelet activities. [40,41] It is used as

an important ingredient in the preparation of Majoon-e-Nankhwah and Habb-e-Ghariqoon. Floral powder is cream coloured with characteristic odour and bitter in taste. On examination under the microscope it reveals following characteristics :- (Fig. 21-25)

- Fragment of the epidermal cells of the petal showing elongated rectangular cells that are irregularly and sinuous in outline.
- A number of Uniseriate, unicellular, conical, thick trichomes.
- A number of spherical pollen grains measuring  $25\mu - 31\mu$  in diameter.
- Abundant fibres that are simple, unicellular, unseptate, thick walled with blunt tip, found either single or in groups.

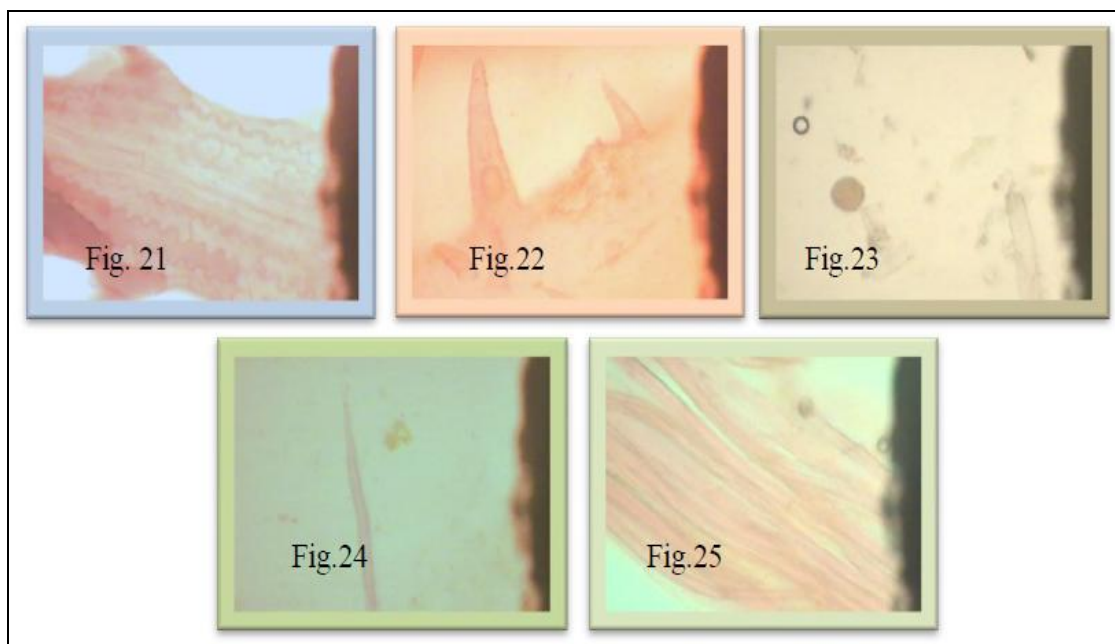


Figure 21-25: Zoofah-e-Yabis

Fig. 21: Epidermal cells in surface view (x40); Fig. 22: Non glandular trichomes (x40); Fig. 23: Pollen grains (x40); Fig. 24 : Piece of fiber (x40); Fig. 25: Fibre in groups (x40)

## Zafran

Zafran is botanically identified as the flowers of *Crocossativus* L. of Iridaceae family. It is known as Zaffran or Kesar in Hindi; Saffron in English; Zahafaran or Jafrana in Arabic; Zaafaran or Larkimasa in Persian and Jarfanekar in Urdu. In Unani System of Medicine being Hot 3° & Dry 2° it is credited as refrigerant, tonic, diuretic, laxative, galactagogue, intoxicant, stimulant for vision, tones the uterus. It is useful in diseases of the kidney, liver, spleen brain, good in scabies and enriches the blood. Oral administration of zafran may be useful as treatment for neurodegenerative disorders and related memory impairment. It has antitumoural, anticarcinogenic, antinociceptive and anti-inflammatory activities. 50mg of zafran dissolved in 100 ml. of milk was administered twice a day to human subjects and the significant decrease in lipo protein oxidation susceptibility in patients with coronary artery disease (CAD). [42-44] In

classical unani texts Style and stigma of the flower are used in the preparation of Habb-e-Hamal; Habb-e-Jawahir; Habb-e-Mudirr; Habb-e-MumsikQawi; Habb-e-Munaish; Habb-e-Nishat; Habb-e-SiyahChashm; Habb-e-Surfa; Habb-e-SurfaQawi; Qurs-e-Musallas; Jawarish-e-OodShireen; Jawarish SafarjilQabiz; majoon-e-Antaki. The powdered drug is reddish in colour with aromatic odour and bitter taste. On examination under the microscope it reveals following characteristics :- (Fig. 26-29)

- Fragments of epidermal cells in surface view showing papillae.
- Fragments of thin walled, polygonal to sub-spherical parenchyma cells.
- Broken pieces of papillae.
- A few smooth, spherical pollen grains measuring 54  $\mu$ - 126  $\mu$  in diameter.
- Fragments of vessels with annular thickenings having width 7.75  $\mu$ - 9  $\mu$  and vessels with spiral thickenings having width of 11.25  $\mu$ .

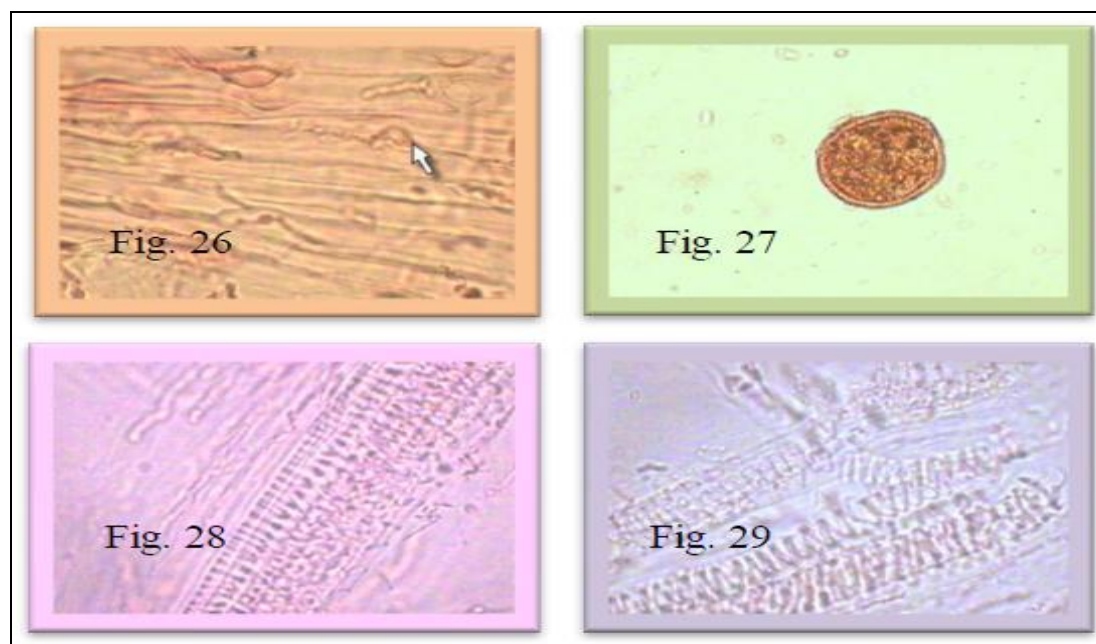


Figure 26-29: Zafran

Fig. 26: Papillae in surface view (x40); Fig. 27: Pollen grain (x40); Fig. 28: Fragments of spiral vessels(x100); Fig. 29: Fragments of annular vessels(x100)

## CONCLUSION

For several centuries, medical practitioners of the unani system of medicine have long acknowledged the therapeutic properties of the flowers in maintaining the health of people. There are many compound formulations having flowers as an important ingredient in their powdered form. Identification of authentic floral material in those formulations is highly essential in order to maximize their efficacy and minimize the adverse side effect. In this regard microscopic studies are one of the simplest and cheapest methods to establish the correct identity of the floral material. Microscopically the floral powders are identified by the adaxial and abaxial surface characteristics of the epidermal cells of the calyx, corolla and bracts, the presence or absence of stomata and trichomes with their types, epidermal papillae, number and presence of palisade cells, sclereids, types of vessels, cellular inclusions like oil globules and types of calcium oxalate crystals etc. As flowers are the reproductive part of a plant, the study of pollen morphology forms distinctive criteria for their identification in any compound formulation. The size, shape, exine thickness and its ornamentation are very

important characters of pollen grains and hence used for the identification and to differentiate between the species belong to the same genera. As the research on the dry flowers is meager, present paper will serve as a simple and most inexpensive tool in setting the reliable standard for correct identification and authentication the floral drugs present in various compound formulations of unani system of medicine.

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