

Diagnostic Characterization of Powdered Herbal Drugs for their Identification & Authentication in Classical Unani Formulations

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ABSTRACT

Diagnostic characters of seven powdered herbal drugs namely Anab-us Salab (fruit), Bekh-e-Sausan (root), Kaifal (stem bark), Kalijiri (fruit), Nankhwah (fruit), Tukhm-e-Khurfa (seed) and Turbud (Root) have been discussed in detail for their identification and authentication in classical unani formulations. The investigation includes correct botanical and vernacular names, family name, organoleptic studies, therapeutic uses, unani formulations containing these drugs, besides their microscopical studies that includes identification of various cells/tissues/cell contents along with their measurements. All these studies will serve as a reference standard to the academicians, researchers, plant chemists, TM students, health professionals and plant base pharmaceutical industries.

Keywords: Diagnostic characterization, identification, authentication, powdered herbal drugs

INTRODUCTION

A herb is a plant or part of a plant valued for its medicinal, aromatic and savoury qualities. The use of herbs as medicine is the oldest form of healthcare known to the humanity and has been used in all the cultures throughout history.[1-4] The World Health Organization estimates that about 70-80% of the world population, particularly in the developing countries rely

on the herbal medicine as a source of primary healthcare. [5-8]

Herbal drugs are chief constituents in traditional medicine especially the Unani System of Medicine. In Unani classical formulations seeds, leaves, stem, roots, barks, flowers or plant as a whole has been used as a chief ingredient over the millennia. These formulations have reached extensive adequacy as beneficial agents like antimicrobial, analgesic, anti-inflammatory, hepatoprotective, treatment of asthma, cirrhosis, hypertension etc.[9-14] In today's medical practice the general acceptability of Unani drugs have given rise to their increasing demand resulting the various forms of abuse and adulteration of the herbs leading to consumers and manufacturers disappointment. In this scenario the authentication of the herbal drugs and identification of adulteration from the genuine material herb are essential for both pharmaceutical companies as well as public health to ensure reproducible quality of herbal medicine.

As most of the classical unani formulations like Huboob (Pills); Aqras (Tablets); Kushtajat; Majoon; Itrifal; Khamira; Luboob; Marham etc. contains herbal ingredients in their powdered form, a knowledge of these herbs in their powdered form is a must because the ordinary diagnostic features of the herb in the

unground condition largely disappeared in the powder and new modified characters have become prominent. Therefore, present study is done on seven powdered herbal drugs namely Anab-us Salab (fruit), Bekh-e-Sausan (root), Kaifal (stem bark), Kalijiri (fruit), Nankhwah (fruit), Tukhm-e-Khurfa (seed), Turbud (Root) for their identification and authentication in classical unani formulations. Correct botanical and vernacular names, family name [15,16]; organoleptic studies, therapeutic uses, [17,18], unani formulations containing these drugs, besides their microscopical studies that includes identification of various cells/tissues/cell contents along with their measurements will serve as a reference standard to the academicians, researchers, plant chemists, TM students, health professionals and plant base pharmaceutical industries.

METHODOLOGY

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.[19-22] Most diagnostic features and the dimensions of the cells and other particles were recorded. Photomicrography was performed by using digital microscope with computer attachment.

RESULT & DISCUSSION

1. Anab-us Salab (Fruit)

Anab-us-Salab is the fruit (berries) of *Solanum nigrum* L. (Family:

Solanaceae). It is known as Black Nightshade, Common Nightshade Garden Nightshade in English, Mako in Bengali, Hindi, Marathi and Punjabi, Makoya in Urdu, Ruahtareek in Persian, Kakamachi, Bahuphalla, Katuphala, Rasayani, Tiktika in Sanskrit and Ambussalap, Enabeddir in Arabic.[15-18] Being Cold & Dry [23,24] the berries (fruit) are laxative, alterative, aphrodisiac, tonic, diuretic, improves appetite and useful in the diseases of the heart and the eye, piles, inflammation, leucoderma, itch, bronchitis, asthma, hiccough and fevers. It is also used in the treatment of chronic cirrhosis (enlargement) of the liver and the spleen.[17, 25-28] Berries are the important ingredient of a number of Unani formulations like Sadri, Zimad Niswan, Qairoot-e-Mamool, Roghan-e-Mukhtara, Roghan-e-naf-e-Warm-e-Niqras.[10, 12,13]

Diagnostic characterization of the powdered drug

The powdered drug is dark brown in colour with aromatic odour and bitter in taste. On examination under the microscope the powdered drug shows following diagnostic characters:- (Figure 1- 6)

- Fragment of epicarp in surface view consisting of brown, moderately thick walled, polygonal cells with striated cuticle.
- Fragment of testa in surface view consisting of brown coloured, thick walled cells which are sinuous in outline.
- Fragment of testa in sectional view consisting of sclerenchyma cells having thickness on their radial walls and at the base giving the appearance of beaker shaped cells having dimensions $72\mu-90\mu \times 54\mu-72\mu$.
- Abundant starch grains that are simple, spherical having diameter $2.25\mu-9\mu$.
- Fragment of endosperm and cotyledons consisting of moderately thick walled, parenchyma cells filled with oil globules and numerous aleurone grains that are

globular and very minute having diameter 1μ - 2μ .

- Group of lignified vessels, present in various lengths with annular thickening of width 9μ - 11.25μ .

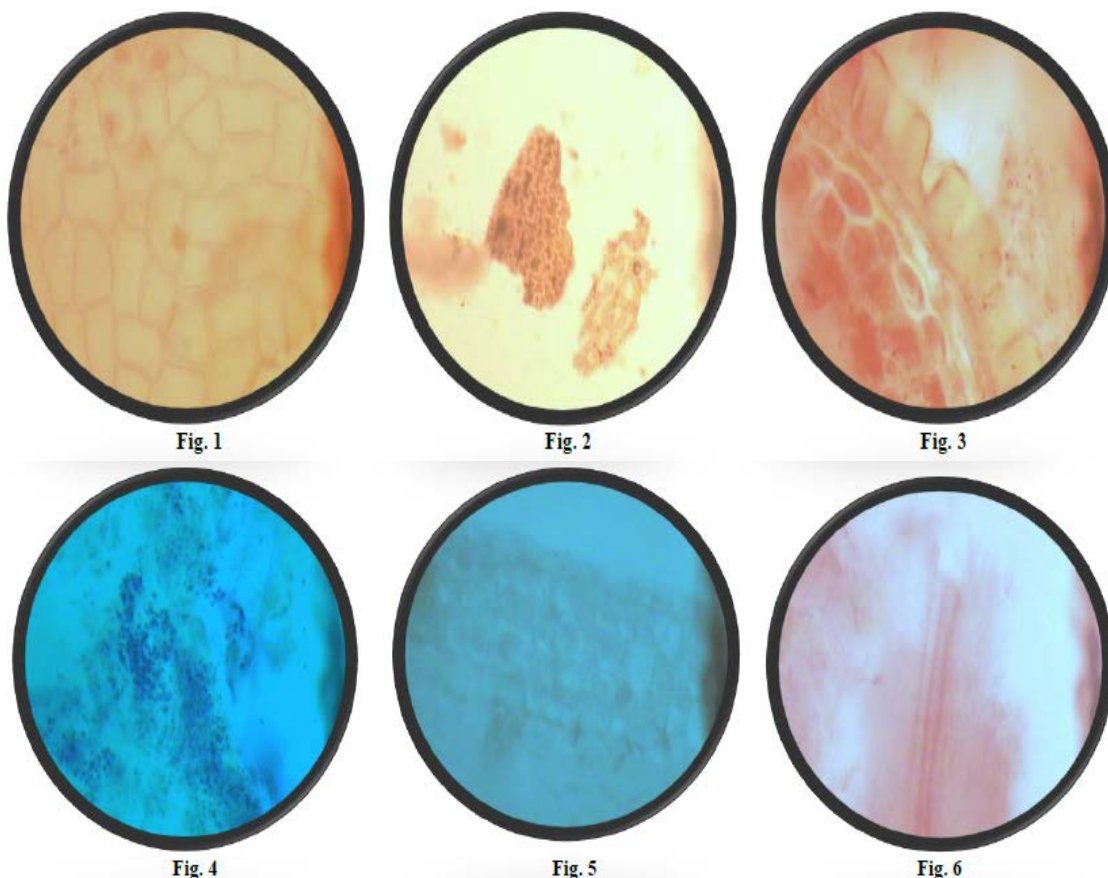


Figure 1-6 : Anab-us-Salab : Figure 1. Fragment of epicarp in surface view (x40) Figure 2. Fragment of testa in surface view (x40) Figure 3. Fragment of testa in surface view (x40) Figure 4. Starch grains in powder (x40) Figure 5. Fragment of the cotyledon filled with aleurone grains & oil globules. (x40) Figure 6. Piece of vessel showing annular thickening

2. Bekh-e-Sausan (Root)

Bekh-e-Sausan is the root of *Iris ensata* Thunb. of family Iridaceae. It is known as Irisa or Sosun in Hindi; Bikh-e-Banafshah in Persian and Irsa in Arabic.[15-18] Being Hot 2° & Dry 2° [27,28] it is chiefly used for its alterative properties and enters into many compositions for purifying the blood and for venereal affections. It is also valuable in liver complaints and dropsy.[23, 24] It is used in the preparation of a number of classical unani formulations like Safoof-e-Shumar, Safoof-e-Malah, Habb-e-Bohat-us-Saut Muzmin, Sharbat-e-Zoofa-Murakkab, Roughan-e-Naf-e-Warm-e-Niqras and Zimad-e-Khanazeer. [9, 12]

Diagnostic characterization of the powdered drug

The powdered drug is brown in colour with pungent odour and slightly bitter and aromatic taste. On examination under the microscope the powdered drug shows following diagnostic characters:- (Figure 7- 10)

- Fragment of cork cells in surface view consisting of polygonal, moderately thick walled cells.
- pieces of elongated, simple, unseptate, thick walled fibres .
- Pieces of vessels with spiral thickening.
- fragment of cortical parenchyma cells.

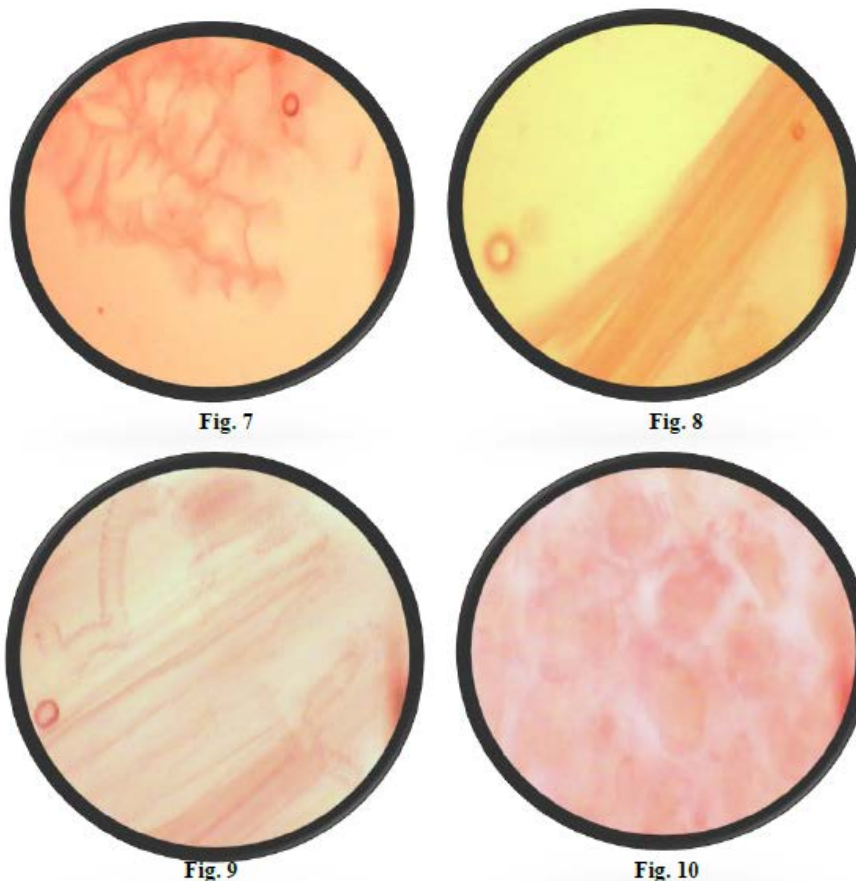


Figure 7-10: Bekh-e-Sausan : Figure 7. Fragment of cork cell (x40) Figure 8. Pieces of fibres (x40) Figure 9. Pieces of vessels showing spiral thickening Figure 10. Fragment of cortical parenchyma cells (x40)

3. KAIFAL (Stem Bark)

Kaifal is the stem bark of *Myrica esculenta* Buch. Ham. syn. *Myrica nagi* Thunb. of family Myricaceae. It is known as Box Myrtle in English; Kaiphah in Hindi, Bengali, Punjabi and Urdu; Darshishaan in Persian.[15-18] Being Hot 2° & Dry 2° Kaiphah bark is astringent, carminative[29] and antiseptic.[30] It is useful in inflammations, headache, nasal catarrh, piles, liver complaints, sores, chronic bronchitis and asthma. In unani system of medicine it is used in the preparations of a number of compound formulations like Habb-e-Munaish, habb-e-Lukhat, Habb-e-Man-e-Hamal and Habb-e-Mubarak. [9,10]

Diagnostic characterization of the powdered drug

The powdered drug is chocolate brown in colour with pleasant odour and bitter acrid taste. On examination under the microscope the powdered drug shows following diagnostic characters :- (Figure 11- 16)

- Pieces of phloem fibres which are lignified and thick walled.
- Prismatic crystals of calcium oxalate measuring 32.5µ- 40µ found scattered.
- Abundant fibres which are thick walled, lignified and accompanied by calcium oxalate prism sheath.
- A number of sclereids found either single or in groups. Individual sclereid is rectangular with faintly striated walls.
- A number of starch grains that are simple and spherical measuring 3µ-14µ in diameter.

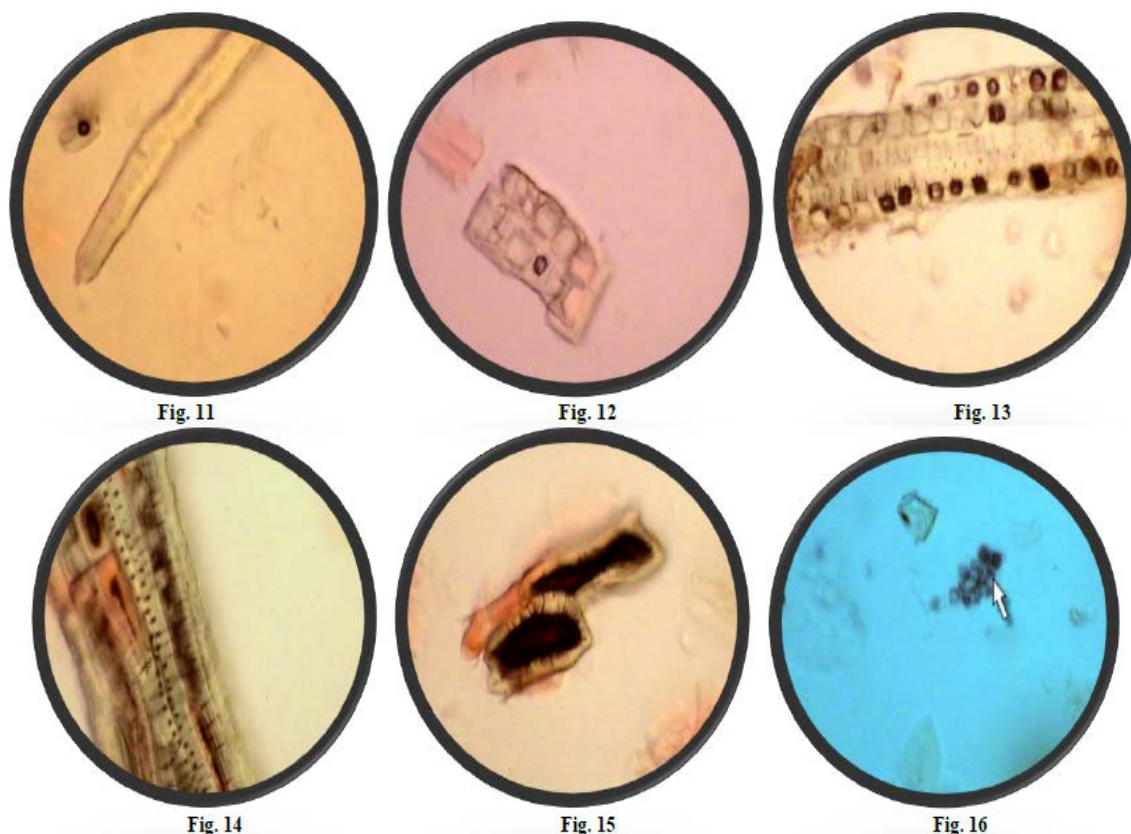


Figure 11-16 : Kaifal : Figure 11. A piece of phloem fiber (x40) Figure 12. Prismatic crystals of calcium oxalate (x40) Figure 13. Piece of crystalline fiber (x40) Figure 14. Group of pitted fibres with crystals fibres and sclereids (x40) Figure 15. Group of sclereids (x40) Figure 16. Starch grains (x40)

4. Kalijiri (Fruit)

Kalijiri is the fruit of *Centratherum anthelminticum*(Willd) Kuntz syn. *Vernonia anthelmintica* Willd. of family Asteraceae. It is called Purple Fleabane in English, Kaliziri in Hindi & Punjabi, Atarilal & Itrilal in Arabic & Persian and Agnibija, Somraji or Kananajiraka in Sanskrit. [15-18] Being Hot 2° and dry 3° the seeds are credited with tonic, stomachic, anthelmintic, diuretic, antiperiodic and alterative. They also enter into the prescription for leucoderma, psoriasis and other skin affections. [18, 31,32] It is an important ingredient of a number of classical unani formulations such as Habb-e-Man-e-Hamal, Habb-e-Mohallil and Habb-e-Bawaseer Khooni.[9,10,12]

Diagnostic characterization of the powdered drug

The powdered drug is dark brown in colour with indistinct odour and bitter, acrid taste. On examination under the microscope the powdered drug shows following diagnostic characters:- (Figure 17- 20)

- Non- glandular trichomes which are elongated, unicellular, thick walled measuring 90µ- 243µ in length and 4.5µ- 9µ in width.
- Fragments of cotyledon having polygonal parenchyma cells, slightly thick walled filled with aleurone grains and oil globules.
- Fragment of fruit wall in surface view showing polygonal shaped, slightly thick walled epidermal cells with striated cuticle.
- Pieces of thick walled, lignified fibres; having width 9µ- 13.2µ; present either single or in groups.

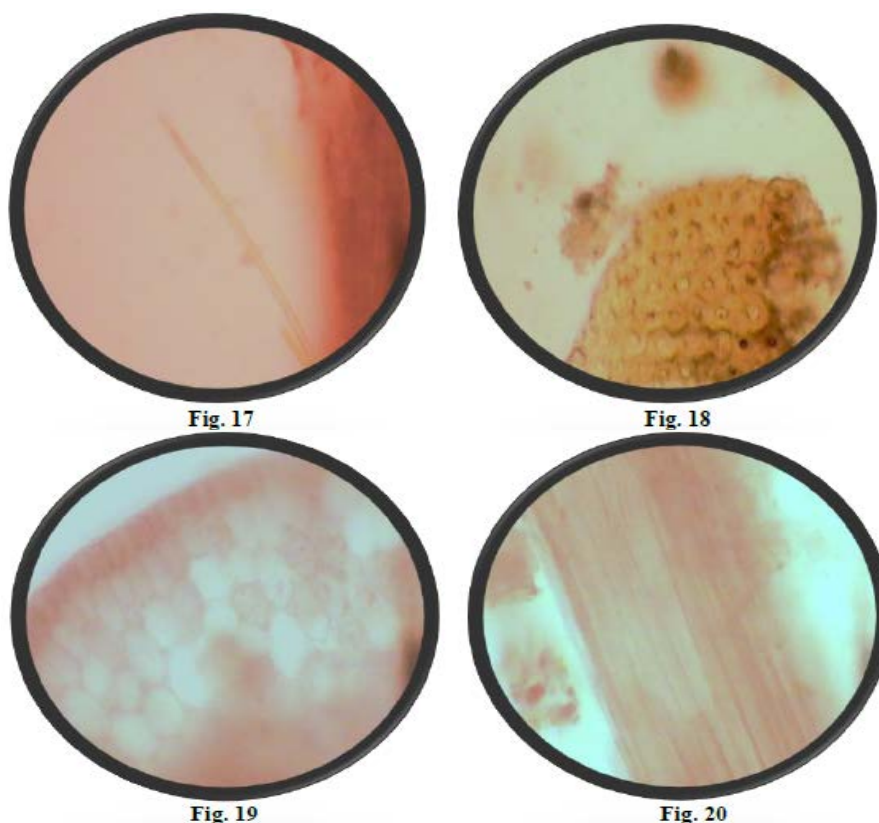


Figure 17-20 : Kalijiri : Figure 17. Non glandular trichome (x40) Figure 18. Fragment of stone cells (x40) Figure 19. Fragment of cotyledon parenchyma filled with aleurone grains oil globules (x40) Figure 20. Pieces of fibres in groups (x40)

5. Nankhwah (Fruit)

Nankhwah is the fruit of *Trachyspermum ammi* (L) **Sprague** syn *T.copticum* Linn; *Carum copticum* Hiern of family Apiaceae. It is called Carum, Ajowan or Caraway in English; Ajowan, Ajwain in Hindi; Nankhwah in Persian; Ajwan in Urdu and Ajamoda, Dipani, Dipya or Uragandha in Sanskrit. [15-18] Being Hot 3° & Dry 3° [33] Nankhwah fruits are much valued for their carminative, diuretic, galactagogue, tonic, expectorant antispasmodic, stimulant and emmenagogue properties. [30] They are administered to improve speech and eye sight, kidney troubles, inflammations, vomiting, dyspepsia; good for ear-boils, liver, spleen and hiccough. [18] In classical unani text Nankhwah fruits are used in the preparation of Habb-e-Pachlona, Habb-e-Deedan Qawi, Qurs-e-Deedan, Safoof-e-Hazim, Safoof Mahazzil, Safoof Suranjan, Jawarish-e-Narmushk, Jawarish-e-Zaoni Sada, Majoon-e-Buqrat, Majoon-e-Rashidi and Jawarish-e-Qaiser etc. [9,10,12,14]

Diagnostic characterization of the powdered drug

The powdered drug is dark brown in colour with characteristic, aromatic odour and taste. On examination under the microscope the powdered drug shows following diagnostic characters:- (Figure 21- 26)

- Fragment of epicarp in surface view consisting of polygonal cells with thin, sinuous walls and a faintly, irregularly striated cuticle.
- Fragment of the mesocarp consisting of longitudinally elongated, moderately thick walled sclereids with well marked pits.
- Fragment of vittae consisting of thin walled, polygonal cells.
- Fragment of vascular elements consisting of reticulately thickened, pitted vessels.
- Fragment of the parenchyma cells of the endosperm filled with aleurone grains and oil globules.

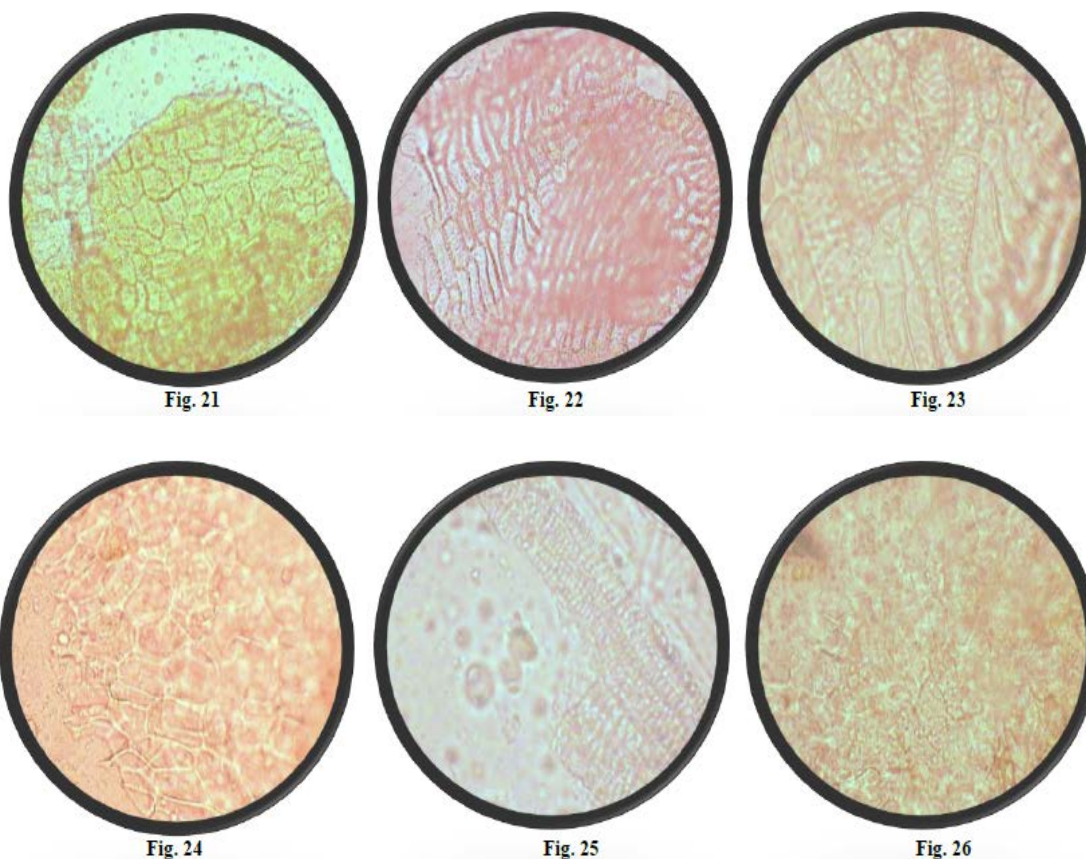


Figure 21- 26: Nankhwah : Figure 21. Fragment of epicarp in surface view (x40) Figure 22. Sclereids from the mesocarp (x40) Figure 23. Sclereids from the mesocarp (enlarged view) (x100) Figure 24. Fragment of vittae (x40) Figure 25. Vascular elements (x40) Figure 26. Fragment of endosperm showing aleurone grains & oil globules (x40)

6. Tukhm-e-Khurfa (Seed)

Tukhm-e-khurfa is the seed of *Portulaca oleracea* Linn. of family Portulacaceae. It is called Common Purslane, Garden Purslane in English, Khurfa in Hindi, Urdu and Arabic; Cholza, Kurufakara, Buklutulkukkema in Persian and Brihallani, Gholika, Lonika in Sanskrit. [16-18,23,27,28] Being Cold 2°-3° & Moist 2° [23,24] the seeds are described as demulcent, cooling diuretic and anthelmintic. It is used by the unani physicians in curing the diseases of kidney and bladder as strangury, dysuria, haematuria, gonorrhoea etc and of lungs such as haematemesis, haemoptysis, in external applications in burns, scalds and various form of skin diseases. As the seeds are beneficial to intestinal mucous membrane it is used frequently to relieve torminia, tenesmus and other distressing symptoms in dysentery and mucous diarrhoea. [17,18] It is used in the preparations of a number of compound unani formulations such as

Safoof-e-Ziabetus Sada, Habb-e-Jadwar, Habb-e-Sil, Qurs-e-Anjbar, Qurs-e-Kafoor, Qurs-e-Kahruba, Qurs-e-Kaknaj, Qurs-e-Atash, Qurs-e-Istisqa, Barood Qula Haad, Jawarish aamla Ambari, Habb-e-Baul ud dam, Habb-e-Khunaq, Qurs-e-Firanjmushk, Qurs-e-Tabasheer Afyuni, Khamira-e-Marwareed Banuskha Kalan, Zabbi, Safoof tabasheer Murakkab. [9-14]

Diagnostic characterization of the powdered drug

The powdered drug is black in colour, odourless, tasteless. On examination under the microscope the powdered drug shows following diagnostic characters :- (Figure 27-28)

- fragment of testa having polygonal epidermal cells with dark patches of stellulate lobes,
- numerous starch grains that are spherical, simple, approx.. 2.25 μ - 6.75 μ in diameter.

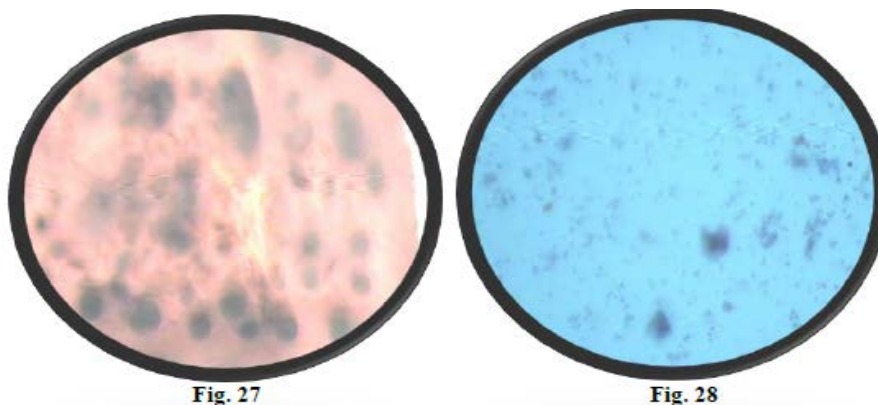


Figure 27-28 : Tukhm-e-Khurfa : Figure 27. Fragment of testa (x40) Figure28. Starch grains (x40)

7. Turbud (Root)

Turbud is the root of *Operculina turpethum* (L) Silva Manso syn. *Ipomoea turpethum* R. Br. of family Convolvulaceae. It is commonly called Indian Jalap, False Jalap, Indian Rhubarb or Turpeth in English; Nisoth in Hindi & Punjabi; Trivit, Kalaparni in Sanskrit and Turbud in Persian & Urdu. [15-18] Roots of turbud are frequently used by the unani physicians to cure brain diseases, paralysis, bronchitis, pain in the muscles, joints, & chest. [17,18] Being hot 3° and dry 3° [23] it expels Balgham and Sauda from the body.

Turbud roots is an important ingredient of a number of unani formulations such as Habb-e-Falij Mulaiyin, Habb-e-Ghariqoon, Habb-e-Iyarij, Habb-e-Suranjan, Habb-e-Aftimoon, Habb-e-Deedan Qawi, Habb-e-Mafasil, Habb-e-Istisqa, Habb-e-Asha, Habb-e-Banafsha,, Habb-e-Banafsha Qawi, Habb-e-Bars, Habb-e-Bahrami, Habb-e-Ayarij, Habb-e-Sakbeenaj, Habb-e-Kheezaran, Qurs-e-Deedan, Qurs-e-Mulaiyin, Qurs Bukhar, Safoof Deedan, Itrifal-e-Deedan, Itrifal-e-Mulaiyin, Itrifal-e-Aftimoon, Jawarish-e-Tabasheer Mushil etc. [9-14]

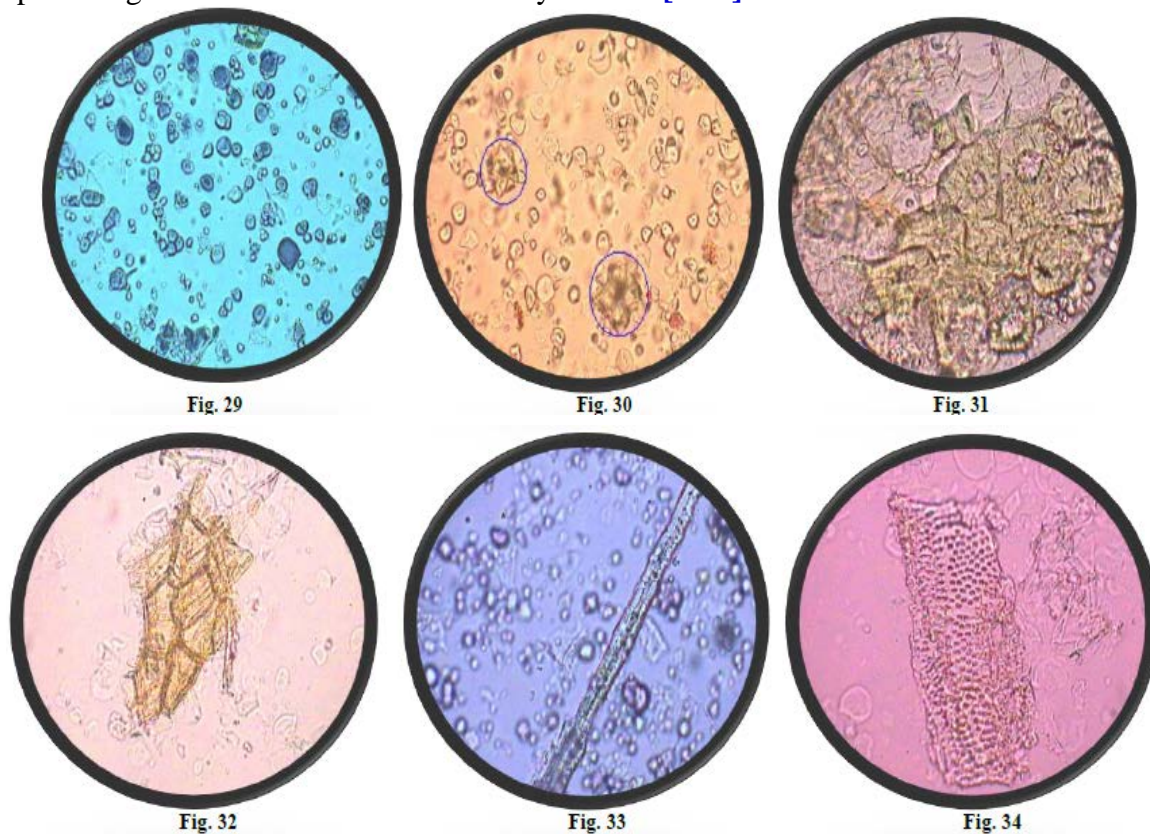


Figure 29-34: Turbud : Figure 29. Starch grains (x40) Figure 30. Rosette crystals (x40) Figure 31. Group of cork cells (x40) Figure 32. Fragment of cork cells in surface view (x40) Figure 33. Piece of fibre Figure 34. Piece of pitted vessel

Diagnostic characterization of the powdered drug

The powdered drug is cream in colour with distinct odour and somewhat nauseating taste. On examination under the microscope the powdered drug shows following diagnostic characters :- (Figure 29- 34)

- Abundant starch grains, which are simple, spherical with central hilum measuring 4.5 μ - 22.5 μ in diameter.
- Rosette **shape** crystals of calcium oxalate measuring 27 μ - 45 μ in diameter.
- Abundant sclereids of various shape (oval- elliptical- rectangular- isodiametric) thick walled, broad lumen, striated, with or without pits having dimensions of 54 μ -211.50 μ x 36 μ -58.50 μ .
- Fragments of cork cell in surface view appear as polygonal thick walled cells.
- Pieces of fibers which are thick walled with narrow lumen and simple pits.
- Pieces of pitted vessels having width of 40 μ - 80 μ .

CONCLUSION

With the worldwide increase in the popularity and acceptance of the classical Unani formulations, great attention is required towards their purity, safety, potency and efficacy. As most of the Unani formulations contain herbal ingredients in their powdered form, microscopy, in the age of modernization, still serves as a simple and most inexpensive tool in setting the reliable standard for correct identification and authentication of the herbal drug materials. Diagnostic characterization of seven discussed herbal powders provides valuable information regarding different cells/cell contents/tissues along with their measurements that will be useful not only for monitoring the purity and quality of the classical Unani formulation but also check adulteration in raw material as well hence beneficial for the academicians, researchers, plant chemists, TM students, health

professionals and plant base pharmaceutical industries.

Acknowledgement: None

Conflict of Interest: None

Source of Funding: None

Ethical Approval: Approved

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How to cite this article: Negi K, Siddiqui ZA, Khan AA. Diagnostic characterization of powdered herbal drugs for their identification & authentication in classical Unani formulations. *International Journal of Science & Healthcare Research*. 2021; 6(4): 351-360. DOI: <https://doi.org/10.52403/ijshr.20211049>
