

Comparative Pharmacognostical Evaluation of Three Market Samples of *Kharjura* (*Phoenix Dactylifera* Linn.)

Research Article

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Abstract

Kharjura (*Phoenix dactylifera* Linn.) fruits (*Kharjura*) are widely used by the traditional medical practitioners for the treatment of various diseases in their daily practices. According to Ayurvedic principles, the *kharjura* fruit *Phoenix dactylifera* Linn. is sweet (*Madhura Rasa*) in taste and increase moistness of tissues and balance *Pitta* and *Vata Dosha* (humours of body). Its fruits are used in various diseases like *Kshaya* (Malnutrition), *Daha* (Burning Sensation), *Raktapitta* (blood disorders), *Murchha* (Syncope), *Trishna* (Thirst), *Shrama* (exhaustion), *Jwara* (fever), *Swasa* (respiratory disorders), *Kasa* (cough), *Madatyaya* (Alcoholism) etc. Present study highlights pharmacognostical difference between varieties of two fresh fruits of *Kharjura* and one variety of Dry *Kharjura*. The results revealed that the fresh *Kharjura* variety contains presence of groups of stone cell, lignified stone cells layer, mesocarp cells, cells of parenchyma with starch grains, and dry *Kharjura* variety contain saccharine contents while silica deposition, starch grains, vascular bundle after stain with xylem.

Keywords: Dry *Kharjura*, Red *Kharjura*, Starch grains, Yellow *Kharjura*.

Introduction

Kharjura fruit of *Aracea* family is one of the most important drugs used for the treatment of various diseases like *Raktapitta* (bleeding from various orifices), *Shwasa* (asthma), *Kasa* (dry and wet cough), *Murchha* (syncope), *Kshaya* (lean thin due to chronic illness), *Abhighata* (injury) (1), *Shramahara* (stress relieving), *Pipasa* (thirst), *Jwara* (fever) (2), *Madyavikaranashaka* (3) etc. Dates are very nutritious, expectorant, aphrodisiac, demulcent, laxative, diuretic. (4) As per the available data the 100gm fruit contain 277 Kcal energy, 74.97g carbohydrates, 1.81 g protein, 0.15g Total fat, 6.7 g dietary fibers. The fruit is rich in dietary fiber, which prevents dietary LDL cholesterol absorption in the gut. It is also a good bulk laxative. The fibers content helps to protect the colon mucous membrane by decreasing exposure time and as well as binding to cancer causing chemicals in the colon. (5)

A large number of dates are grown in different places all over Globe especially in Punjab (India), Sindh, North Africa, Egypt and Syria with different names such as *Pindkharjura*, edible date, Dattel palm, *Pindkhejur*, *Khurma*, *Chhuhara*, *Kharika*, *Khejur*,

Khurmalyab, *Perichchangayi* etc. Dates are grown in Rohri of Sind Province having four varieties such as *Lohar*, *Assuli*, *Thottiar*, *Idulshahi* dates (6). *Kharjura* are of many varieties such as *Khajoor*, *Pindakharjoor*, *Rajakharjoori*, *Madhukharjoori*, *Bhookharjoori* and *sulemanikharjoor* (7). Number of varieties are available in market ranging from Rs. 45/- per 1kg to Rs. 850/- per kg. Generally, customers are confused about the quality of *Kharjura*. Thus, after Survey in regional area, variety of *Kharjura* which was commonly used by the consumers was selected for the study and studied pharmacognostically to establish certain botanical standards for identification and standardization of three variety of *Kharjura*.

Materials and Method

For this study three varieties of fresh *Kharjura* samples were collected from the local market of Jamnagar, Gujarat, India and authenticated from Pharmacognosy laboratory, IPGT and RA, Jamnagar. The Organoleptic character as depicted in Table 1.

Pharmacognostical studies of three samples:

Free hand thin transverse sections of all sample fruits were taken for detailed microscopic observation. Morphological characters were studied by observing the fruit as such and also with the help of the dissecting microscope. Sections were observed as such for the presence of any crystals and then were stained with phloroglucinol and Conc. Hydrochloric acid (HCl) to notice the lignified elements and other parts.

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Tables 1: Organoleptic Character of Three Samples

| Character | Yellow <i>Kharjura</i> Variety | Red <i>Kharjura</i> Variety | Dry <i>Kharjura</i> Variety |
|-----------|--------------------------------|-----------------------------|-----------------------------|
| Colour | Yellow | Red | Brown |
| Odour | Not distinct | Not distinct | Sweetish |
| Taste | Mild Sweet | Sweet | More sweet |
| Touch | Smooth | Smooth | Rough |
| Pulp | Fleshy | Fleshy | Absent |

Tables 2: Histochemical evaluation of Three *Kharjura* Sample

| Sr. No | Reagent | To detect | Observation | Sample- 1 | Sample- 2 | Sample- 3 |
|--------|----------------------------|----------------------------|-------------|-----------|-----------|-----------|
| 1. | Phloroglucinol+Conc. HCl | Lignified cells | Red | ++ | ++ | ++ |
| 2. | Iodine | Starch grains | Blue | ++ | ++ | ++ |
| 3. | Phloroglucinol+Conc. HCl | Calcium Oxalate – crystals | Dissolved | ++ | ++ | ++ |
| 4. | FeCl ₃ solution | Tannin cells | Dark blue | ++ | ++ | ++ |

++ = Present

Powder characters were studied according to the guidelines given as per Ayurvedic Pharmacopoeia of India.(8,9) Sample thick sections subjected to histochemical tests to find out starch grains, tannin, calcium etc. by treating various reagents. (10)

Results and Discussion

Macroscopic examination of Sample-1(Yellow colored fresh fruit) shows fruit a drupe, oblong; 2 to 3 cm long, smooth, yellow colour, pulp fleshy, odour not distinct, taste mild sweet. The Organoleptic character as depicted in Table 1.

Transverse section of Sample 1

Transverse section of fresh *Kharjura* (yellow colored fresh fruit)

Transverse section of fresh *Kharjura* showed outer epicarp followed by mesocarp and fibrous endocarp. Epicarp thick and hard made up of single layered epidermal cells with thick cuticle filled with suberine content. Mesocarp occupies wide range in the fruit differentiated in to upper tangentially, compactly arranged parenchymatous cells without any saccharin and tannin content. Inner mesocarp consist number of vascular bundles, they are open and collateral. Xylem made up of one or prominent structure with xylem fibers, phloem surrounds the xylem made of phloem fibers and sieve elements. Some of the mesocarp cells rarely contain silica deposition and oil globules.

Inner large rounded to oval shaped parenchyma cells with large amount of saccharine and tannin content. Beneath the epidermis at the zone of mesocarp compactly arranged two layered continuous ring of pitted stone cells with wide lumen. (Plate 1-from a to f).

Powder Microscopy of Sample-1 showed stone cells, vascular bundles, silica deposition, saccharine content, parenchyma cells with starch grains, group of stone cells.(Plate 2 from a to f).

Macroscopic examination of Sample 2 (Red colored fresh fruit) shows fruit a drupe, oblong; 2 to 3 cm long, smooth, red colour, pulp fleshy, odour not distinct, taste more sweet compare to Yellow Variety of *Kharjura*.

Transverse section of Sample 2

Diagrammatic transverse section of Phoenix Dactylifera Linn showed outer epicarp followed by mesocarp and fibrous endocarp. Epicarp thick and hard made up of single layered epidermal cells with thick cuticle filled with suberine content. Mesocarp occupies wide range in the fruit differentiated into upper tangentially compactly arranged parenchyma cells without any saccharin and tannin content. Inner large rounded to oval shaped parenchyma cells with large amount of saccharine and tannin content. Beneath the epidermis at the zone of mesocarp compactly arranged one-two layered smaller similar stone cells forming ring than leads to two-three layered continuous ring of large uneven shaped pitted stone cells with wide lumen. Inner mesocarp consist number of vascular bundles, they are open and collateral. Xylem made up of one or prominent structure with xylem fibers, phloem surrounds the xylem made of phloem fibers and sieve elements. Some of the mesocarp cells rarely contain silica deposition and oil globules. (Plate 2 from a to f)

Macroscopic examination of Sample 3 (Dry *kharjura* fruit) was observed that a drupe, oblong, 2 to 3 cm long, smooth, brownish colour, dry in touch, sweetish odour with sweet taste.

Transverse section of Sample 3

It showed outer epicarp followed by mesocarp and fibrous endocarp. Epicarp thick and hard made up of single layered epidermal cells with thick cuticle filled with suberine content. Mesocarp occupies wide range in the fruit differentiated in to upper tangentially compactly arranged parenchyma cells without any saccharin and tannin content. Inner large rounded to

oval shaped parenchyma cells with large amount of saccharine and tannin content.

Xylem made up of one or prominent structure with xylem fibers, phloem surrounds the xylem made of phloem fibers and sieve elements. Beneath the epidermis at the zone of mesocarp compactly arranged two-three layered continuous ring of large uneven shaped, pitted stone cells with wide lumen. Inner mesocarp consist number of vascular bundles, they are open and collateral. Some of the mesocarp cells rarely contain silica deposition and oil globules. (Plate 4 from a to f)

Powder Microscopy of Sample 3 Showed the powder stone cells, fibers, silica deposition, blunted fibers, starch grains and lignified pitted fibers. (Plate 5 from a to h).

Discussion

Available in two colour i.e. The fresh *Kharjura* showed yellow and red colour while the dry *Kharjura* showed dark brown colour. Both the varieties were sweet in taste but Red variety seen more sweet compare to Yellow variety *Kharjura*. The fresh *Kharjura* does not have characteristic smell, but dry *Kharjura* with sweet odour.

In Yellow and Red variety *Kharjura*, mesocarp occupies wide space in the fruit differentiated in to upper tangentially compactly arranged parenchyma cells without any saccharin and tannin content, while in dry *Kharjura* saccharin and tannin contents were found. In Yellow and Red variety *Kharjura* pitted stone cells with wide lumen were found arranged in two layers. While in dry *Kharjura*, pitted stone cells with narrow lumen were found which arranged in two-three layers. Vascular bundles were found open and collateral in all the three varieties.

The squashed Yellow and Red variety *Kharjura* showed stone cells, fragment of endocarp, lignified fibers and fragments of trachieds, which were not seen in the dry *Kharjura*. The squashed dry *Kharjura* showed epicarp cells, saccharine content, acicular crystals and spiral vessel, which were absent in the fresh samples. Both the samples showed similar squashed characters like tannin content, mesocarp cells, annular vessels, epicarp cells, saccharine content, lignified stone cells, etc.

Histochemical evaluation showed that similar observation but in dried *Kharjura* lignified material is more as compared to Yellow and Red variety sample.

Conclusion

Pharmacodynamics and pharmacokinetics of the drugs depends on its *Panchabhautika* (five elements of universe) conjugation and configuration. Here conjugation means joining or union or mixing. Configuration means the relative arrangement or placement of basic constituents of the substances. Developing oneself with this concept will make the fundamentals very clear and strong.

To understand the concept of origin of drugs as a whole, one has to go to its base which is understood with this *Panchmahabhuta*. Pharmacognostical evaluation revealed differentiation between dry *Kharjura* and fresh

Kharjura. Fresh *Kharjura* contains more water-soluble content and loosely arranged parenchyma cells. It has more *JalaMahabhuta* dominancy according to Ayurveda concept. So, in conditions of instant nourishment fresh *Kharjura* variety will gives more result compare to Dry *Kharjura*. Similarly, Dry Variety of *Kharjura* shows packed mesenchymal cells and silica deposition and stone cells which showed *Prithvi Mahabhuta* dominancy, So where long lasting stability is required then Dry Variety of *Kharjura* will be used.

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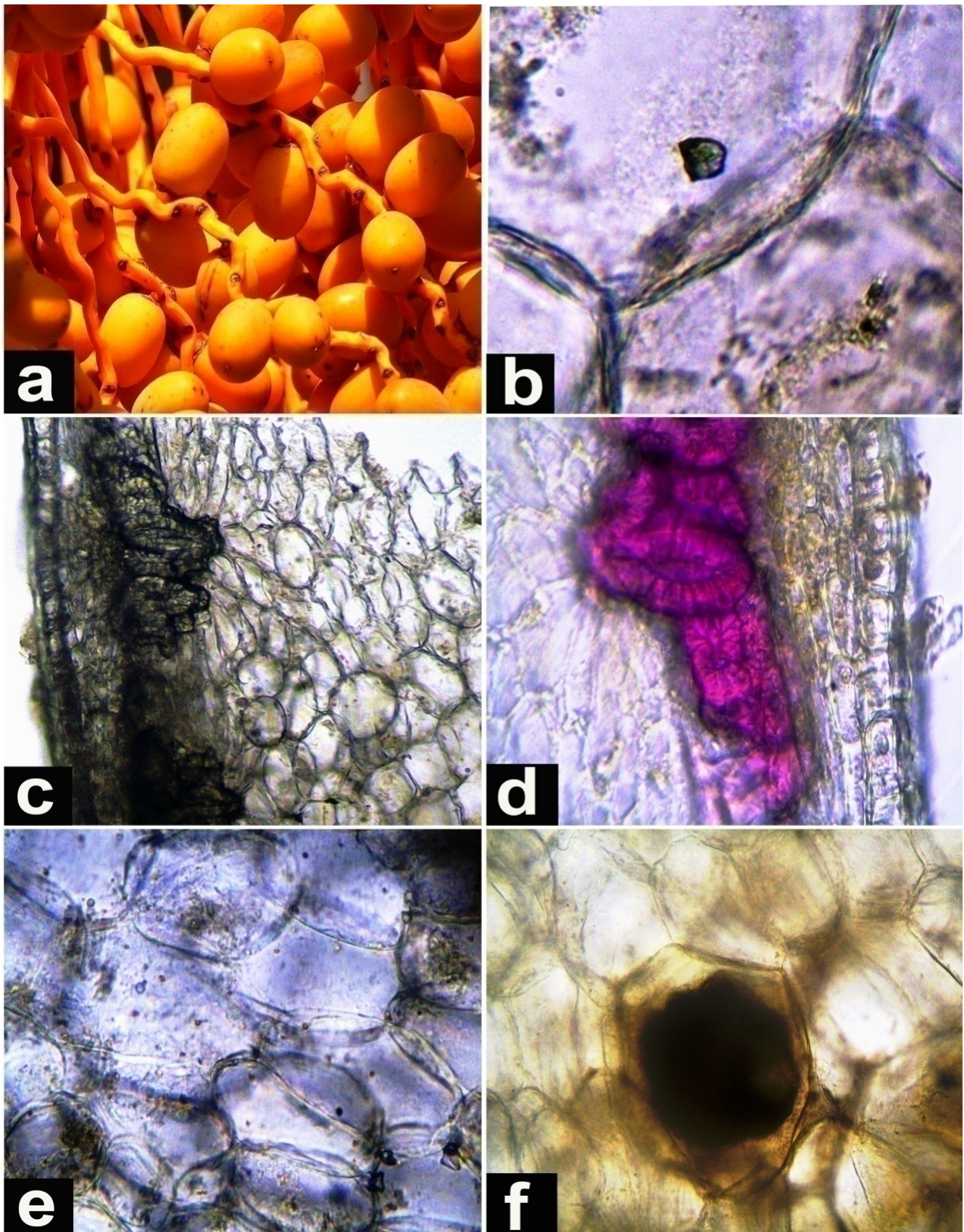
Plates 1:T.S. of Sample 1

Plate 1-[a-Yellow Kharjura Fruit, b-Crystalline Material, c-Epidermis Hypodermis Layer, d-Lignified stone cell layer, e- Mesocarp Cells, f-Saccharine content]

Plate 2: Powder microscopy of Sample 1

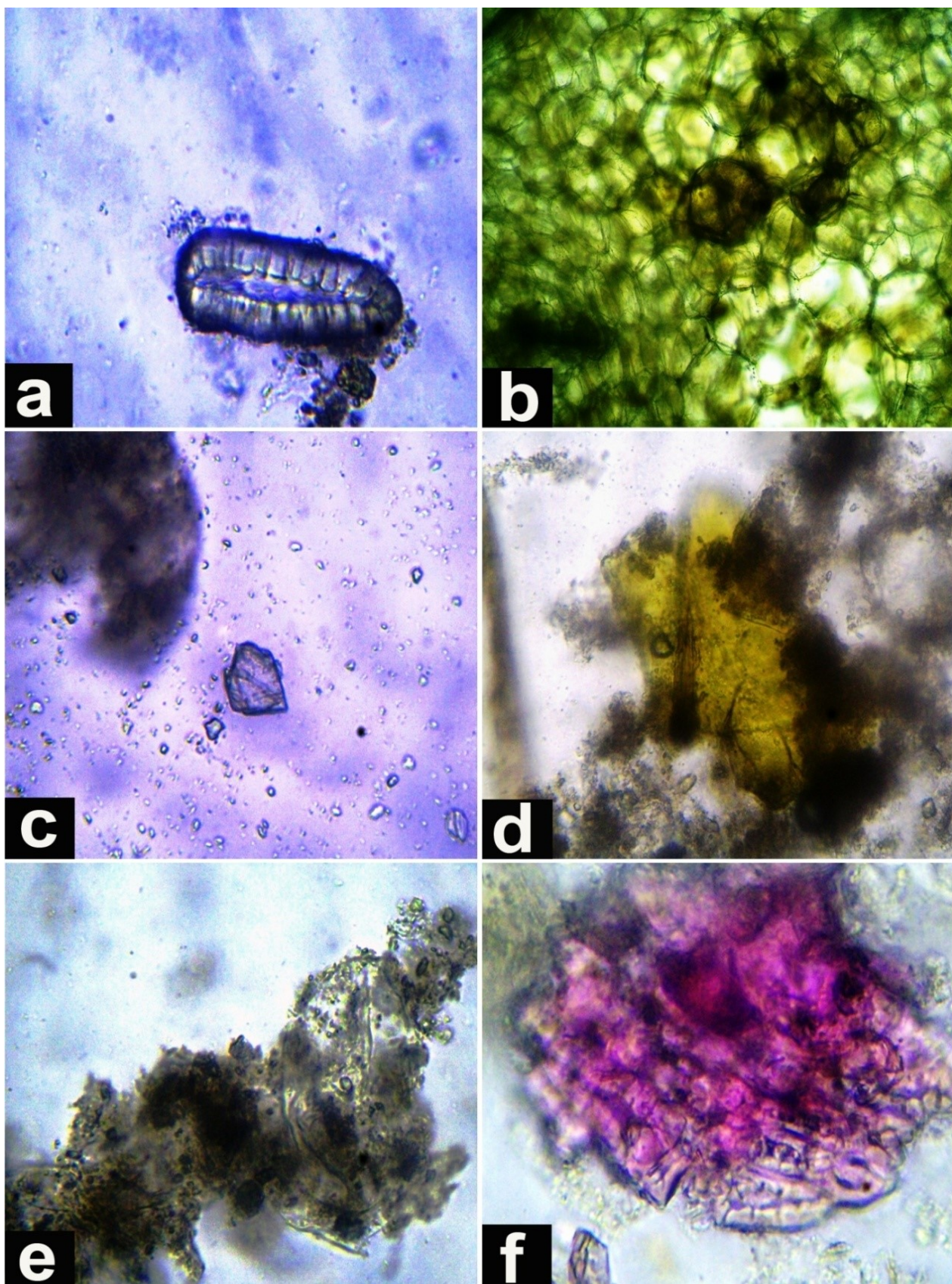


Plate 2-[a-Stone cells, b-Vascular Bundles, c-Silica deposition, d-Saccharine content, e-Parenchymal cell with starch grains, f-Group of stone cells]

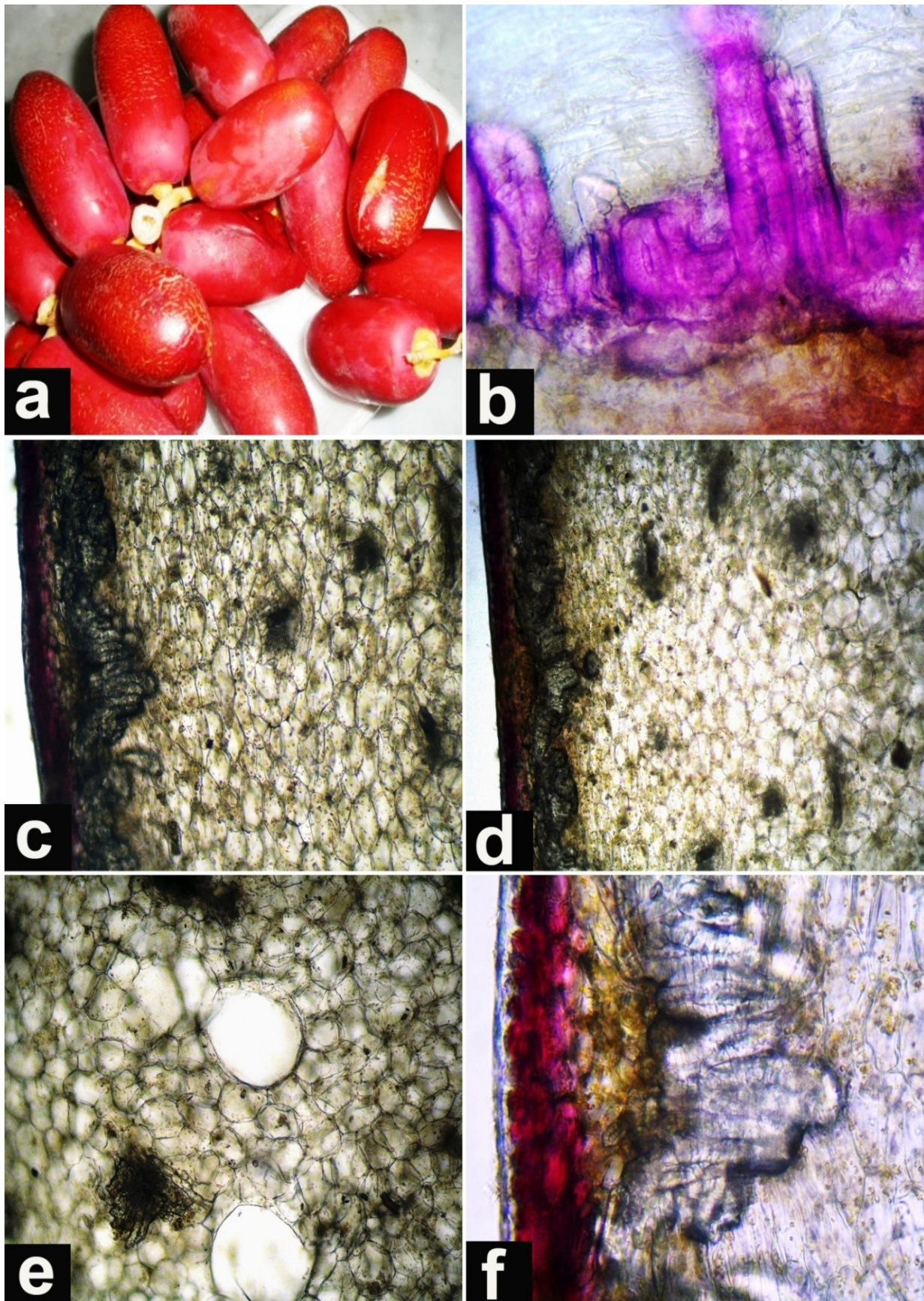
Plates 3: T.S. of Sample 2

Plate 3-[a-Red Kharjura Fruit, b-1-2 layer stone cells, c-Epicarp Mesocarp Layer, d-Multilayer loosely arranged parenchyma, e- Saccharine content, f-Single layer epidermis]

Plates 4: T.S. of Sample 3

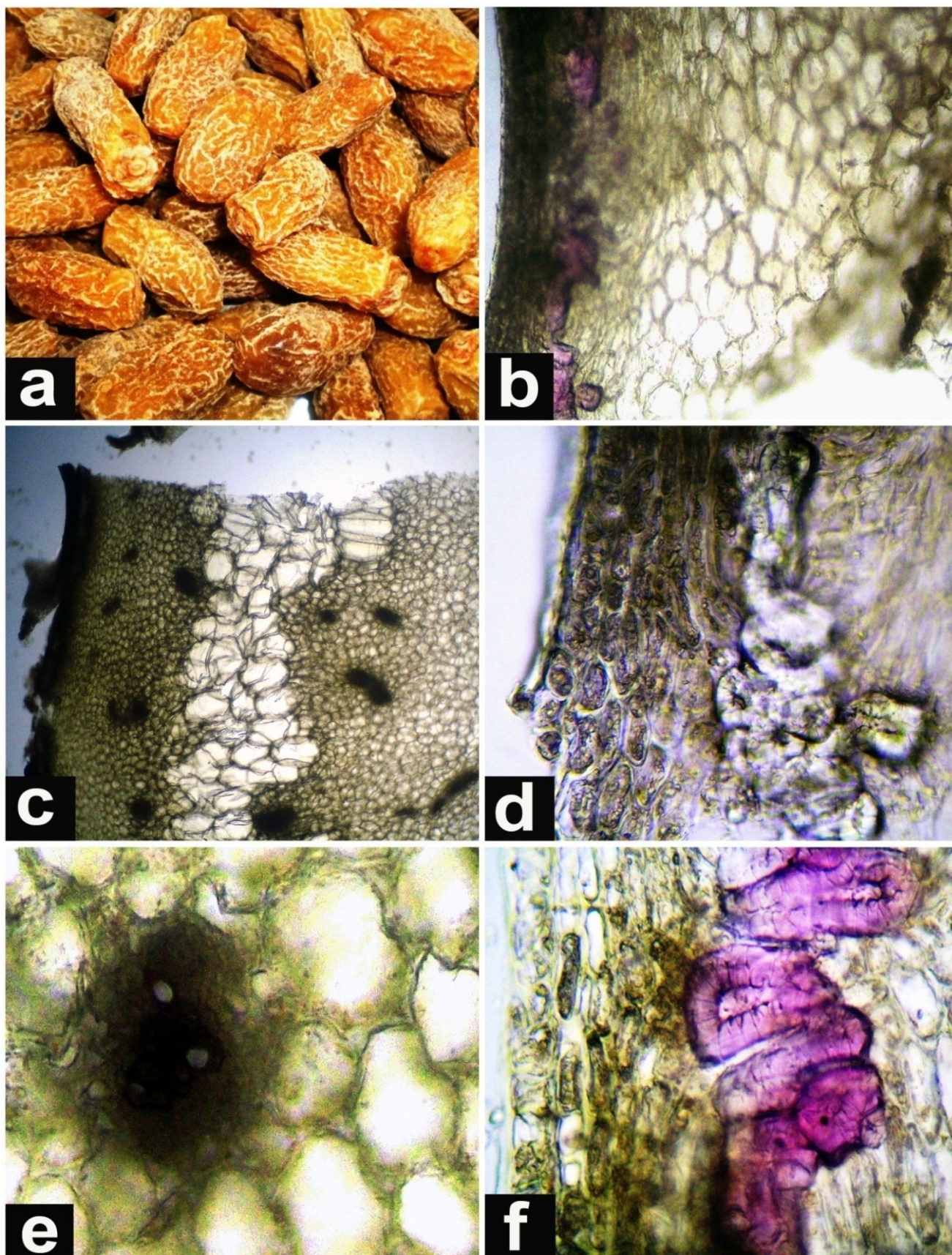


Plate 4 -[a-Dry Kharjura Fruit, b-Compact arranged Mesocarp Cells, c-Epicarp Mesocarp Endocarp,d-Multilayer epicarp with stone cells, e- Vascular bundles with stone cells, f-Lignified stone cells]

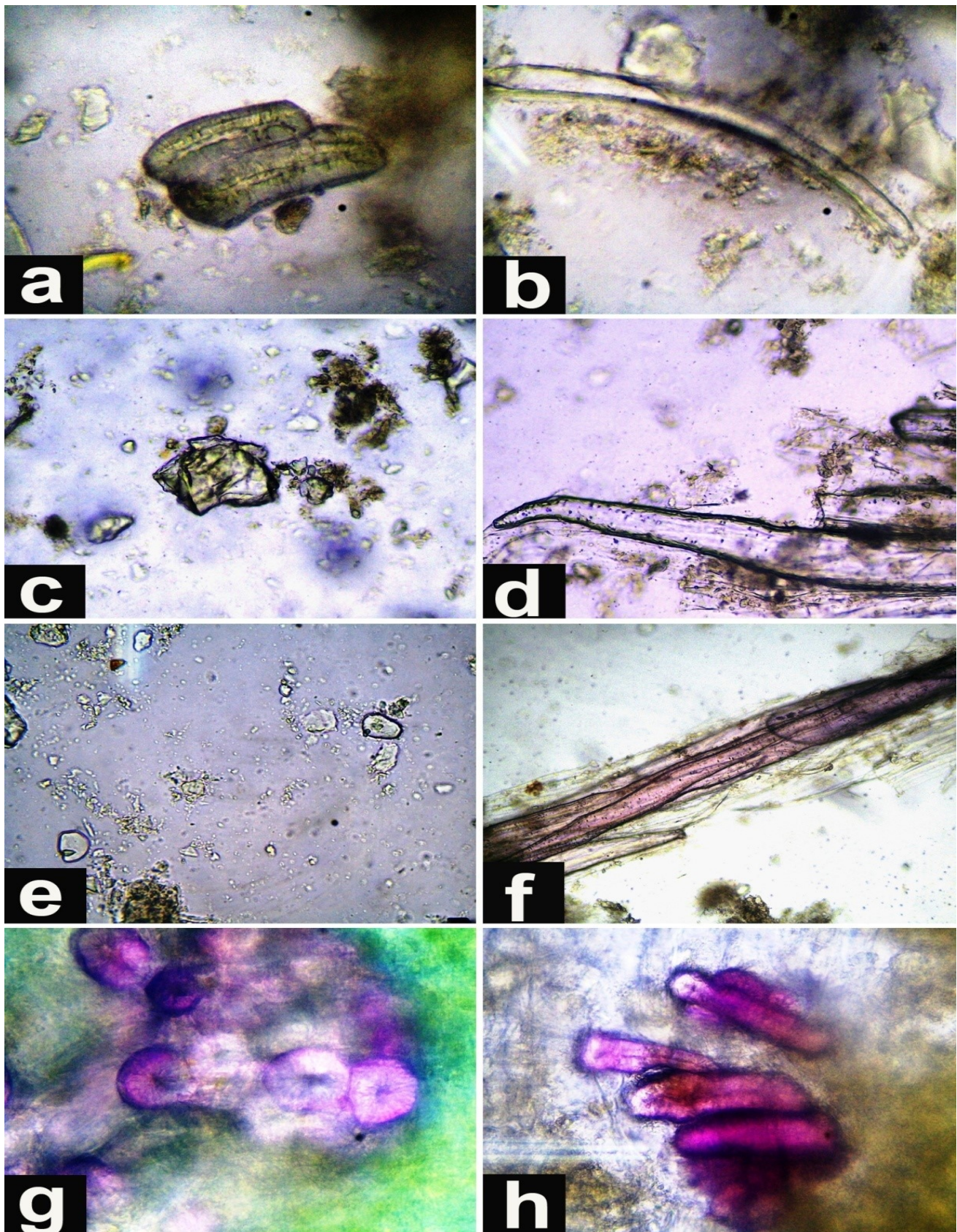
Plates 5: Powder microscopy of Sample 3

Plate 5-[a-Powder stone cells, b-Fibres, c-Silica deposition, d-Blunted fibers, e-Starch grains, f-Lignified Pitted fibres, g-Group of stone cells, h-Group of stone cells]
