

PHARMACOGNOSTIC CHARACTERIZATION OF *HARITAKI*, *AMALAKI*, *VIDANGA*, *TRIVRUTA* AND *HARIDRA* BY ORGANOLEPTIC, MACROSCOPIC AND POWDER MICROSCOPIC STUDIES

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ABSTRACT

Background: Dried *Haritaki* (*Terminalia chebula* Retz.) fruit, Dried *Amalaki* (*Phyllanthus emblica* L.) fruit, Dried *Vidanga* (*Embelia ribes* Burm.f.) fruit, Dried *Trivruta* (*Operculina turpethum* (L.) Silva Manso) root and Dried *Haridra* (*Curcuma longa* L.) rhizome; These drugs require reliable diagnostic characteristics for authentication and quality control for use in treatment of *Dadru* (dermatophytosis). This study comparatively evaluated their organoleptic, macroscopic, and powder-microscopic characteristics to identify key diagnostic features. **Materials and Methods:** Authenticated samples of *Haritaki*, *Amalaki*, *Vidanga*, *Trivruta* and *Haridra* were evaluated for their organoleptic, macroscopic and powder microscopic characteristics using standard pharmacognostical methods. Diagnostic features were documented by light microscopy and compared with pharmacopoeial references. **Results:** Pharmacognostical evaluation of *Haritaki*, *Amalaki*, *Vidanga*, *Trivruta* and *Haridra* confirmed their authenticity through organoleptic, macroscopic and powder microscopic examinations. Each drug exhibited distinct diagnostic features such as characteristic taste, odour, fracture, and microscopic markers including fibres, stone cells, starch grains, sclereids, vessels and oleoresin cells, consistent with pharmacopoeial standards. **Conclusion:** The study established reproducible diagnostic parameters for the selected drugs, ensuring accurate identification and quality control. These findings provide baseline pharmacognostical data for quality assessment of the selected drugs intended for formulations used in *Dadru* (dermatophytosis).

KEYWORDS: Authentication, Microscopy, Pharmacognosy, Powder, Quality control.

1. INTRODUCTION

Medicinal plants continue to play a pivotal role in global healthcare and remain an indispensable source of bioactive molecules for the development of traditional and contemporary therapeutics. According to the World

Health Organization (WHO), Traditional medicine is widely used globally, with WHO estimating that around 80% of the world's population uses traditional medicine, underscoring the growing need for safe, effective, and standardized plant-derived drugs.^[1] Consequently,

establishing reliable standards for the identification and quality assessment of medicinal plants has become a fundamental requirement for ensuring their therapeutic efficacy and regulatory acceptance. However, the quality, safety, and therapeutic efficacy of herbal medicines are directly influenced by the authenticity, purity, and consistency of the raw materials employed. Variations arising from geographical origin, environmental conditions, harvesting season, post-harvest processing, storage practices, and intentional or unintentional adulteration frequently compromise the quality of crude drugs.^[2]

A Pharmacognostical study is the primary step for confirms the botanical identity of a plant and establishes standardization parameters, which are essential for ensuring quality and preventing adulteration. The proper authentication of herbal raw materials is essential for ensuring the safety, quality and therapeutic efficacy of herbal medicines. The primary techniques utilized for the authentication of these materials encompass organoleptic examination, macroscopic examination and powder microscopy examination. These approaches are used to verify the identity and assess the purity of herbal substances.

Haritaki (*Terminalia chebula* Retz.), *Amalaki* (*Phyllanthus emblica* L.), *Vidanga* (*Embelia ribes* Burm.f.), *Trivruta* (*Operculina turpethum* (L.) Silva Manso) are the ingredients in formulation named *Manibhadra Yoga*; mentioned in *Ashthang Hridaya*.^[3] indicated in *Krimi* (helminthic infestations), *Kushtha* (skin disorders), *Kasa* (cough), *Arsha* (piles), *Granthi* (tumor) and *Gulma*. These traditional claims are supported by modern pharmacological studies demonstrating anti-helminthic, *Kushthghna* and *Virechaka* (purgating) properties.^[4] *Haridra* will as external application which was already proven antimicrobial and antifungal.^[5] **Aim:** To pharmacognostically characterize *Haritaki*, *Amalaki*, *Vidanga*, *Trivruta* and *Haridra* using organoleptic, macroscopic and powder microscopic parameters. **Objectives:** The study aimed to document the organoleptic traits, establish macroscopic descriptions, and identify key powder microscopic diagnostics of the drugs. These observations were systematically compared with authoritative pharmacopeial standards, thereby ensuring authenticity. The consolidated findings provide essential baseline data for reliable quality assessment and standardization.

2. MATERIALS AND METHODS

Dried samples of *Haritaki*, *Amalaki*, *Vidanga*, *Trivruta* and *Haridra* were subjected to pharmacognostical evaluation using standard procedures to establish their identity, authenticity, and diagnostic features through macroscopic, organoleptic and powder microscopic examinations.

2.1 Collection of raw materials

Dried *Haritaki* fruit, dried *Amalaki* fruit, dried *Vidanga* fruit, dried *Trivruta* root and dried *Haridra* rhizome were procured from the Government Ayurved Pharmacy, Rajpipla, Gujarat.

2.2 Identification of raw material

Identification and authentication of *Haritaki*, *Amalaki*, *Vidanga*, *Trivruta* and *Haridra* were identified in the Pharmacognosy Laboratory of Upgraded Department of Dravyaguna, Government Ayurved College, Vadodara, Gujarat; through macroscopic, organoleptic, and powder microscopic examinations. The diagnostic characteristics were compared with reference standard given in Ayurvedic Pharmacopeia of India and Quality standards of Indian Medicinal Plants.

2.3 Preparation of the test drugs

Glycerine and distilled water were used as mounting media for preparation of powder microscopic slides used in pharmacognostical research were procured from the Pharmacognosy Laboratory, Upgraded Department of Dravyaguna, Government Ayurved College, Vadodara, Gujarat.

3. Organoleptic study

The samples of *Haritaki*, *Amalaki*, *Vidanga*, *Trivruta* and *Haridra* were assessed for organoleptic characters by different sense organs. Taste is perceived by the gustatory sense organ and odour by the olfactory sense organ. The colour was evaluated through the visual sense organ.^[6]

4. Macroscopic study

Samples of *Haritaki*, *Amalaki*, *Vidanga*, *Trivruta* and *Haridra* were examined for their macroscopic characteristics, including shape, size, surface texture, and colour. Observations were made with the naked eye, and dimensions were measured using a centimetre scale. The recorded features were compared with the descriptions available in the quality standard of Indian medicinal plants.^[7]

5. Powder microscopy study

For powder microscopy, the obtained powder of sample was passed through a sieve No. 60 for further analysis. The powder samples for the powder microscopic study *Haritaki*, *Amalaki*, *Vidanga*, *Trivruta* and *Haridra* were powdered and slides of powder material were prepared and observed under a microscope at different magnifications.

6. OBSERVATIONS

6.1 Organoleptic characters

Organoleptic characters of powder drugs were examined for organoleptic characteristics and observations were mentioned in table no.1. [Fig.no.1 & 2]

Table No. 1: Organoleptic characters of drugs.

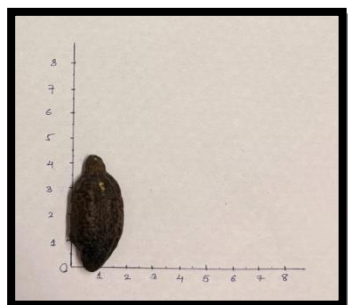
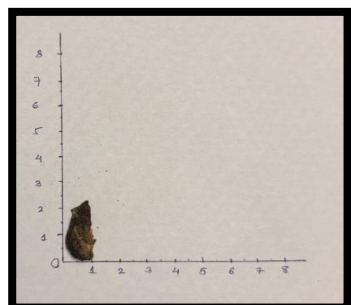
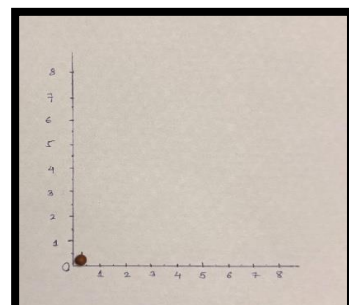
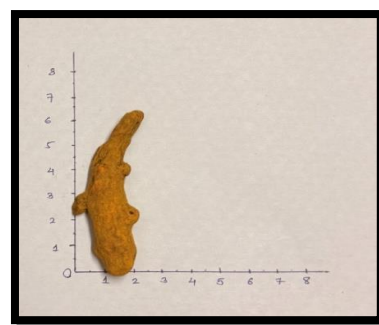
Sr. No.	Name of Sample	Colour	Touch	Taste	Odour
1.	Dried <i>Haritaki</i>	Dark brownish-black	Smooth hard	Astringent	Not characteristic
2.	Powdered <i>Haritaki</i>	Light yellowish-brown	Fine-smooth	Astringent	Characteristic
3.	Dried <i>Amalaki</i>	Blackish	Rough	Astringent, Sour	Characteristic
4.	Powdered <i>Amalaki</i>	Brownish-yellow	Fine-smooth	Astringent, Sour	Characteristic
5.	Dried <i>Vidanga</i>	Reddish-light brown	Smooth	Light bitter, Astringent	Not characteristic
6.	Powdered <i>Vidanga</i>	Brown	Fine-smooth	Astringent, Bitter	Characteristic
7.	Dried <i>Trivruta</i>	Light brown	Rough	Bitter	Not characteristic
8.	Powdered <i>Trivruta</i>	Pale-whitish	Fine-smooth	Bitter, Astringent	Characteristic
9.	Dried <i>Haridra</i>	Dark yellow	Smooth hard	Bitter, Astringent	Characteristic
10.	Powdered <i>Haridra</i>	Dark yellow-orange	Fine-smooth	Astringent	Characteristic

7. Macroscopic characters

Haritaki, *Amalaki*, *Vidanga*, *Trivruta* and *Haridra* were examined for macroscopic characteristics and observations were mentioned in below table no. 2.

Table No. 2: Macroscopic characteristics of drugs.

Sr.No	Characteristics	<i>Haritaki</i>	<i>Amalaki</i>	<i>Vidanga</i>	<i>Trivruta</i>	<i>Haridra</i>
1.	Colour	Dark yellow	Blackish	Reddish-light brown	Light brown	Dark yellow
2.	Length	4.2 cm	2.3 cm	0.5 cm	5.2 cm	6.5 cm
3.	Width	2 cm	1 cm	0.5 cm	1.5 cm	2 cm
4.	Surface	Smooth	Rough	Smooth	Rough	Smooth
5.	Shape	Oval	Irregular	Round	Cylindrical, irregular	Cylindrical, irregular
6.	Thickness	2 cm	1 cm	0.5 cm	1.5 cm	2.5 cm
7.	Fracture	Fibrous-splintery	Fibrous	Splintery	Fibrous	Splintery
8.	Texture	Hard	Hard	Hard	Hard	Hard, Compact
9.	Odour	Not characteristic	Characteristic	Not characteristic	Not characteristic	Characteristic
10.	Presence /Absence of lenticels	Absent	Absent	Absent	Present, Scattered	Absent
11.	Fig.no.	1.1	1.2	1.3	1.4	1.5

**Fig.1.1 Dried *Haritaki* fruit****Fig.1.2 Dried *Amalaki* fruit****Fig.1.3 Dried *Vidanga* fruit****Fig.1.4 Dried *Trivruta* root****Fig.1.5 Dried *Haridra* rhizome**

[Fig.no.1]

Fig.2.1 Powder of *Haritaki* fruitFig.2.2 Powder of *Amalaki* fruitFig..3 Powder of *Vidanga* fruitFig.2.4 Powder of *Trivruta* rootFig.2.5 Powder of *Haridra* rhizome

[Fig.no.2]

8. Powder microscopic characters^[8]

A few drops of glycerine (Water and glycerine ration 70:30) were used to prepare powder material slides. After that, appropriately placed powder slides were examined

under a microscope to assess their characteristics and observations were mentioned in following table no 3 to 7.

Table No. 3: Powder microscopic characteristics of *Haritaki* (*Terminalia chebula* Retz.) fruit powder.^[9] [Fig.no.3]

Sr.No.	Characteristics of <i>Haritaki</i> (<i>Terminalia chebula</i> Retz.) fruit powder	Fig.No.
1.	Fibres	3.1
2.	Stone cell	3.2
3.	Starch grains	3.3
4.	Epidermis	3.4

Table No. 4: Powder microscopic characteristics of *Amalaki* (*Phyllanthus emblica* L.) fruit powder^[10] [Fig.no.4]

Sr.No.	Characteristics of <i>Amalaki</i> (<i>Phyllanthus emblica</i> L.) fruit powder	Fig.No.
1.	Epidermal cells in surface view	4.1
2.	Parenchyma from the mesocarp	4.2
3.	Isolated sclereids	4.3
4.	Prismatic crystals of silica	4.4
5.	Pitted vessel attached with parenchyma	4.5
6.	Starch grains	4.6
7.	Group of stone cells	4.7
8.	Fibres	4.8

Table No. 5: Powder microscopic characteristics of *Vidanga (Embelia ribes* Burm.f.) fruit powder^[11] [Fig.no.5]

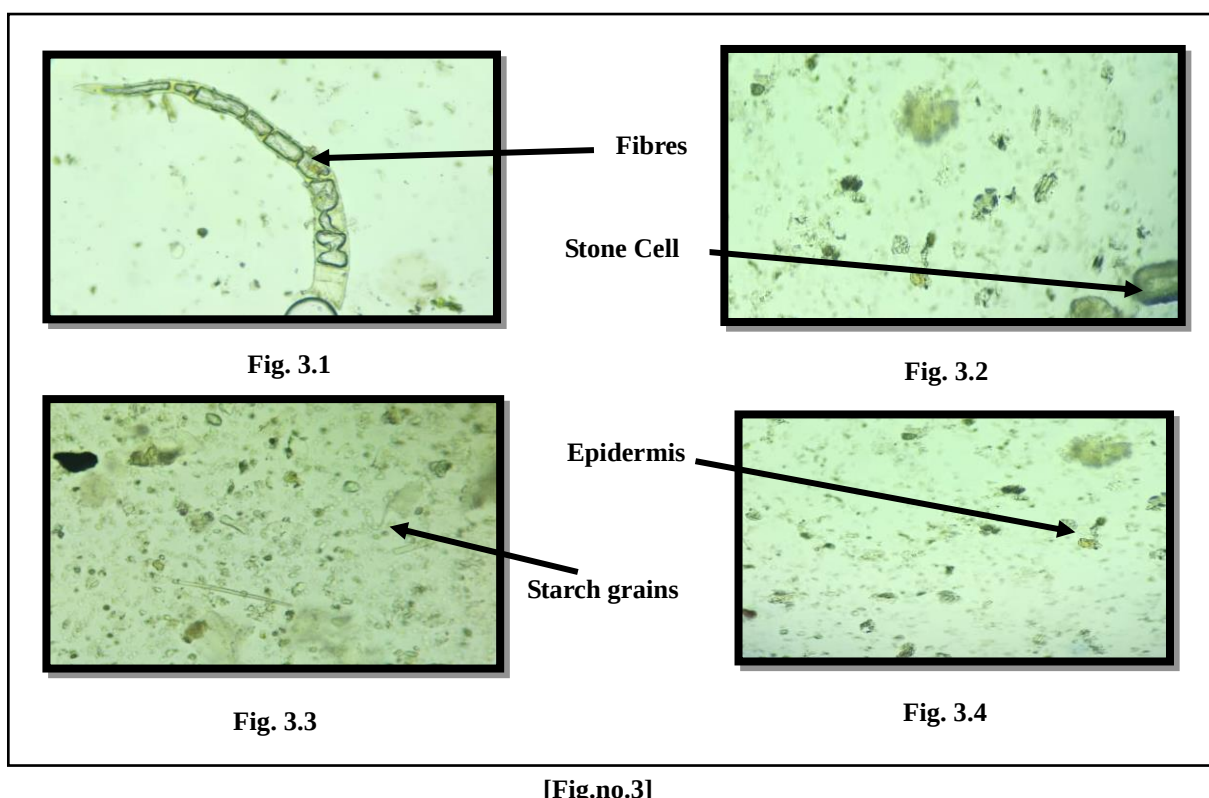
Sr.No.	Characteristics of <i>Vidanga (Embelia ribes</i> Burm.f.) fruit powder	Fig.No.
1.	Dark brown pedicle-like cells of endocarp	5.1
2.	Dark brown-coloured cells of the perisperm	5.2
3.	Epicarp in surface view with striated alticle	5.3
4.	Stone cells of mesocarp	5.4
5.	Sclereid cells	5.5

Table No. 6: Powder microscopic characteristics of *Trivruta (Operculina turpethum* (L.) Silva Manso) root powder^[12] [Fig.no.6]

Sr.No.	Characteristics of <i>Trivruta (Operculina turpethum</i> (L.) Silva Manso) root powder	Fig.No.
1.	Xylem fibres and xylem vessels	6.1
2.	Calcium oxalate crystals	6.2
3.	Starch grains	6.3

Table No. 7: Powder microscopic characteristics of *Haridra (Curcuma longa* L.) rhizome powder^[13] [Fig.no.7]

Sr.No.	Characteristics of <i>Haridra (Curcuma longa</i> L.) rhizome powder	Fig.No.
1.	Cortical parenchyma cells with starch grains and oleoresin cells	7.1
2.	Cork in surface view	7.2
3.	Group of spiral and annular vessels	7.3
4.	Fragment of reticulate vessels	7.4
5.	Starch grains	7.5



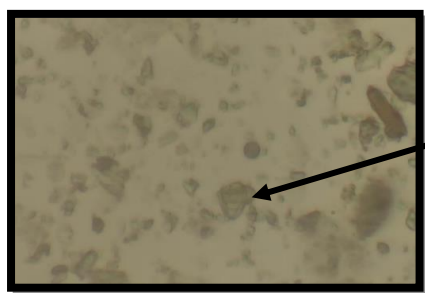


Fig. 4.1

Epidermal cells
in surface view

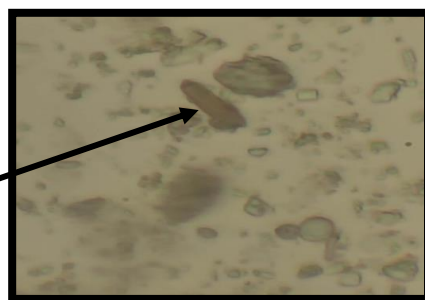


Fig. 4.2

Parenchyma
from the
mesocarp



Fig. 4.3

Isolated

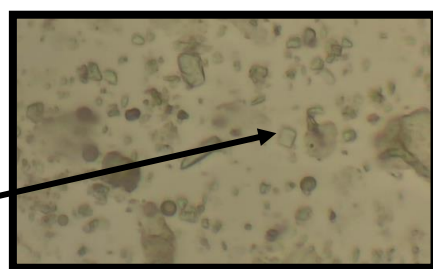


Fig. 4.4

Prismatic
crystals of
silica



Fig. 4.5

Pitted vessel
attached with

Starch

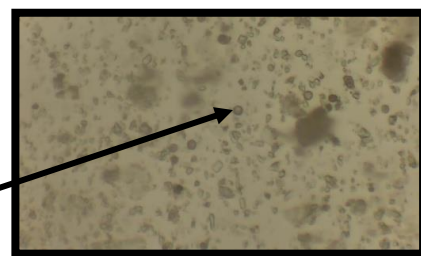


Fig. 4.6

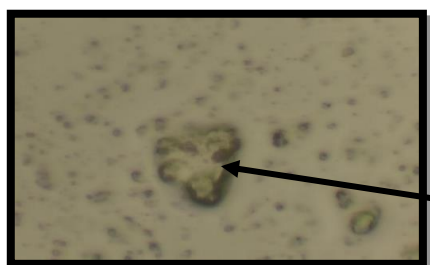


Fig. 4.7

Group of stone cells

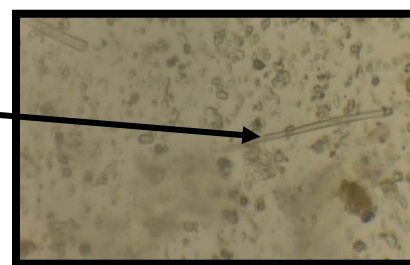


Fig. 4.8

Fibres

[Fig.no.4]



Fig. 5.1

Dark brown cells of the perisperm

Dark brown pedicel-like cells of endocarp



Fig. 5.2

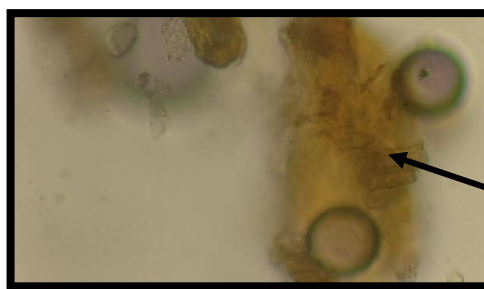


Fig. 5.3

Stone cells of mesocarp

Epicarp in surface view with striated alveles



Fig. 5.4



Sclereid Cells

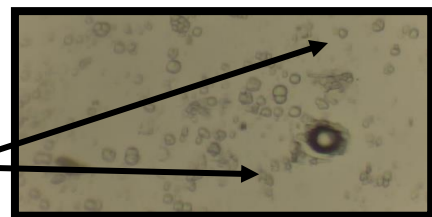
Fig. 5.5

[Fig.no.5]



Fig. 6.1

Xylem fibres and xylem vessels



Calcium oxalate crystals

Fig. 6.2

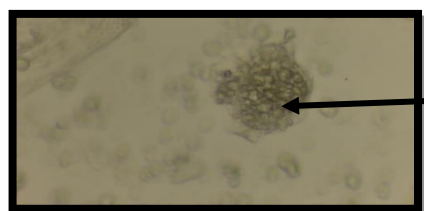
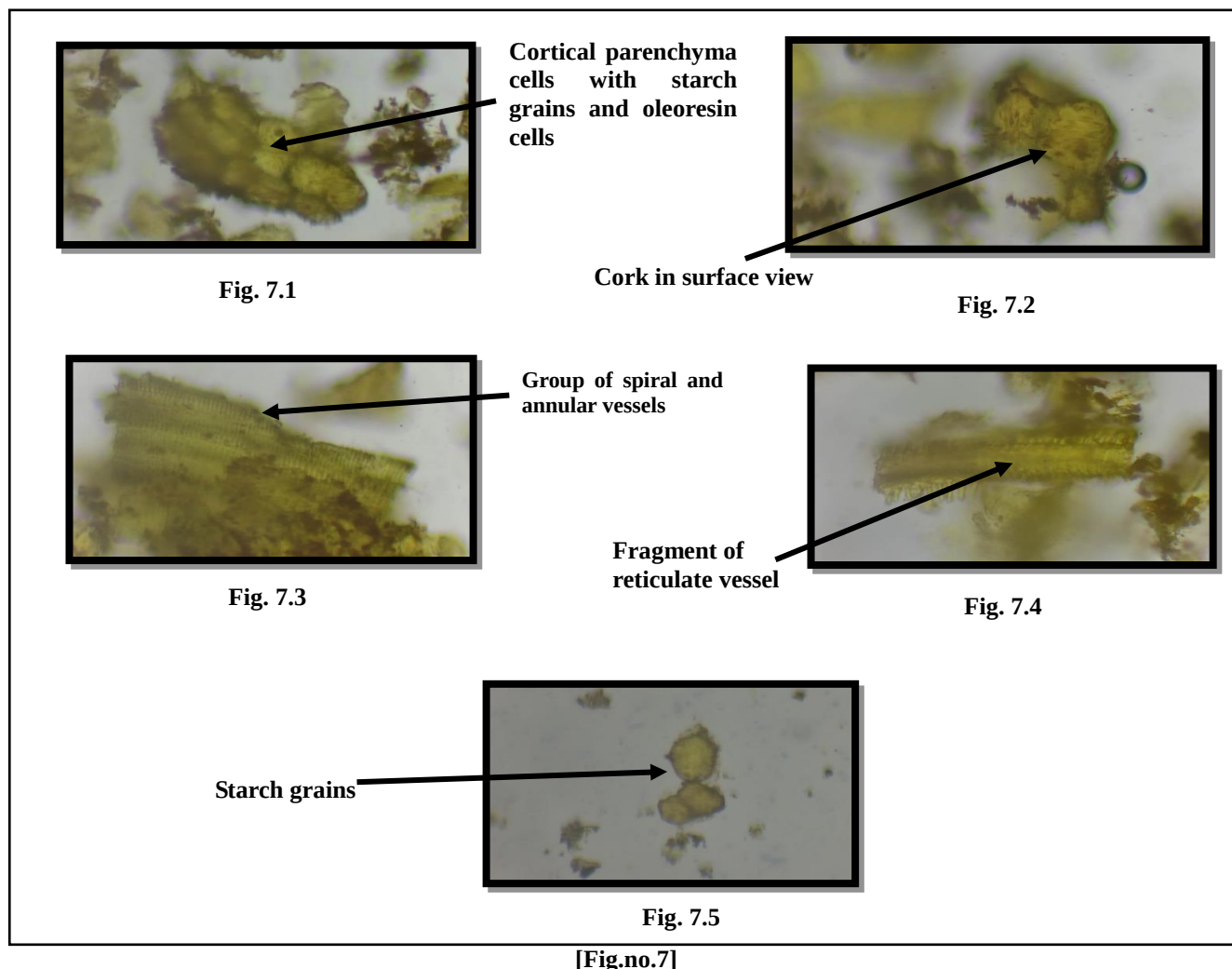


Fig. 6.3

Starch grains

[Fig.no.6]



9. DISCUSSION

The pharmacognostical evaluation of *Haritaki* (*Terminalia chebula* Retz.), *Amalaki* (*Phyllanthus emblica* L.), *Vidanga* (*Embelia ribes* Burm.f), *Trivruta* (*Operculina turpethum* (L.) Silva Manso), and *Haridra* (*Curcuma longa* L.) confirmed their authenticity through organoleptic, macroscopic, and powder microscopic examinations. Distinct diagnostic features were observed: **Organoleptic:** Each drug exhibited characteristic colour, taste, and odour, with powdered forms showing more pronounced diagnostic odours and tastes. **Macroscopic:** Shape, size, fracture, and texture provided reliable identification markers, e.g., fibrous-splintery fracture in *Haritaki* and lenticels in *Trivruta*. **Powder microscopy:** Diagnostic structures such as fibres, stone cells, starch grains, sclereids, prismatic crystals, xylem vessels, and oleoresin cells were observed, matching pharmacopeial standards. These findings validated the botanical identity of all five crude drugs and established reproducible diagnostic parameters for their authentication.

10. CONCLUSION

The present study documented diagnostic pharmacognostic characteristics features for *Haritaki*, *Amalaki*, *Vidanga*, *Trivruta*, and *Haridra* supporting their identification and preliminary quality assessment. Organoleptic, macroscopic and powder microscopic examinations provided distinct markers that support the detection of adulteration. These results contribute baseline standardization data for the selected drugs, strengthening their pharmacopeial validation and providing pharmacognostic quality-control data for drugs used in Ayurvedic formulations indicated for *Dadru* (dermatophytosis).

11. ACKNOWLEDGEMENT

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