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Dixit Renu

Professor, Dept. of Dravyaguna,
S.V. Ayurvedic College, Tirupati,
Andhra Pradesh, India

Bindurani K

P.G. Scholar III year, Dept. of
Dravyaguna, S.V. Ayurvedic
College, Tirupati, Andhra
Pradesh, India

Reddy KV Vijaya Bhaskara

Associate Professor, Dept. of
Shalya Tantra, S.V. Ayurvedic
College, Tirupati, Andhra
Pradesh, India

Pharmacognostic study of different stages i.e., bud [Bala], middle and mature stages of [*Terminalia chebula* Retz.] harītakī phala

Dixit Renu, Bindurani K and Reddy KV Vijaya Bhaskara

Abstract

Objective: To investigate Macroscopic and Microscopic study of Different stages of Harītakī [*Terminalia chebula* Retz.] phala i.e., Bud [Bala] stage, Middle stage, Mature stage, Plant species which is well mentioned in Ayurvedic classics. This plant is also used in various medicinal preparations and is effective in treatment.

Methods: Macroscopic and Microscopic study of Harītakī [*Terminalia chebula* Retz.] phala i.e., Bud [Bala] stage, Middle stage, Mature stage.

Results: Macroscopic and Microscopic study of Different stages of Harītakī [*Terminalia chebula* Retz.] phala i.e., Bud [Bala] stage, Middle stage, Mature stage showed distinct variations in Sclerides, Parenchymatous cells, Fibres, Xylem vessels and Major Microscopic difference was noted between Bala Harītakī Phala and Mature Harītakī phala.

Conclusion: Pharmacognostic study of Harītakī Phala of different stages is helpful to ensure its Identity, Authenticity, Purity, Quality and Efficacy of the drug.

Keywords: Harītakī, pharmacognosy, bala harītakī, vibhitakī

Introduction

Harītakī [*Terminalia chebula* Retz.] belongs to family Combretaceae. A moderate sized and large deciduous tree It is Mainly found in Punjab, Assam, Bihar, Karnataka, Western ghats, Tamil Nadu, Bombay, Kerala, Andhra Pradesh, Madhya Pradesh and Orissa. At present the fruits are procured commercially from many reserved forests of India. It has been used traditionally for curing various ailments. It acts as Doṣa Anulomana, Dīpana, Pācana, Āyusyam, Vayasthāpana, Medhā, Smṛtibuddhī Balaprada, Rasayana, Malasāraka, Yogavahinī, Lekhana and Vātanulomana. The potential Wound healing property¹, Anti-microbial property², Anti-aging³ property of Harītakī Fruit were evaluated in different studies mentioned here, Few to mention “The Ethanolic extract of *Terminalia chebula* fruit in Wound healing on Albino-rats at different concentration.”

Materials and Methods

Aim: To study the Pharmacognostic study of different stages of Harītakī phala i.e Bud stage, Middle stage, Mature stage of Harītakī.

Plant material: Procurement and preparation of drug namely

Different stages of Harītakī phala i.e., Bud stage [Bala Harītakī], Middle stage, Mature stage of Harītakī.

Collection of drugs

Bud stage, Middle stage, Mature stage of Harītakī phala are collected from the drug collector and the fruits were dried in shade for 15 days. After proper drying the fruits, they were collected.



Image 1: Different stages of harītakī phala and powders of different stages of harītakī phala

Corresponding Author:**Dixit Renu**

Professor, Dept. of Dravyaguna,
S.V. Ayurvedic College, Tirupati,
Andhra Pradesh, India

Pharmacognostic study

Pharmacognosy of a plant gives a comprehensive knowledge regarding its method of identification and determination of quality and purity of the raw drugs. Every species has its own characteristic features which determine the authenticity of that particular drug. So, it becomes helpful to determine the authenticity of that particular drug and also to differentiate even closely related species of the same Genus or the same family. It is also found that often Bud [Bala] stage Harītakī is sold in place of Mature Harītakī in the name of Bala Harītakī, in the same way Vibhitaki is used in place of Bala Harītakī. It is observed that in place of Mature Harītakī phala, Bud [Bala] stage of Harītakī is substituted in markets from where the physicians of today and drug manufacturers procure their raw drug for daily requirements. Thus, there is urgent need to undertake Pharmacognostical study of the drug.

Pharmacognostic study

- Macroscopic Study
- Microscopic Study
- Powder Study

Observations and Results

The Pharmacognostic study of present work has been divided into 3 stages.

1. Bala Harītakī - Immature / Bud stage of Harītakī.
2. Madhyama Harītakī - Middle stage of Harītakī.
3. Harītakī - Mature stage of Harītakī.

This study was postulated with reference of **Bala Harītakī** and **Harītakī** mentioned in few Samhitas and Nighantus. So, the idea of the present thesis was to study the structural difference in the different stages of Harītakī by looking into its Microscopic parts.

The Present Macroscopic and Microscopic study was done at S.V. Ayurvedic college, Tirupati and reports of it are mentioned below.

1] HARĪTakī mature stage

Name of the Sample: Harītakī

Scientific Name : *Terminalia chebula* Retz.

Family : Combretaceae

Plant part : Pericarp of Fruit

Drug description: Dried, Yellowish-brown colour, ovoid fruits with longitudinal ribs and wrinkles

Macroscopic properties

Size: Length: 25 to 35 mm (Ref: 20- 35 mm); Width: 15 to 30 mm (Ref: 13-25 mm)

Shape: Ovoid

Colour: Yellowish- brown

Odour: Not characteristic

Taste: Astringent

Fruits ovoid in shape, Yellowish-brown in colour, externally exhibiting wrinkles and longitudinally ribbed, pericarp is fibrous, about 3 to 4 mm in thickness and non adherent to the seed.

Microscopic properties

I. T.S. of Pericarp: Transverse Section of Pericarp is done by Free hand Section cutting and Simple staining procedure and findings are as mentioned below.

Transverse section of Pericarp shows mainly three parts

(A). Epicarp (B.) Mesocarp (C). Endocarp

A. Epicarp

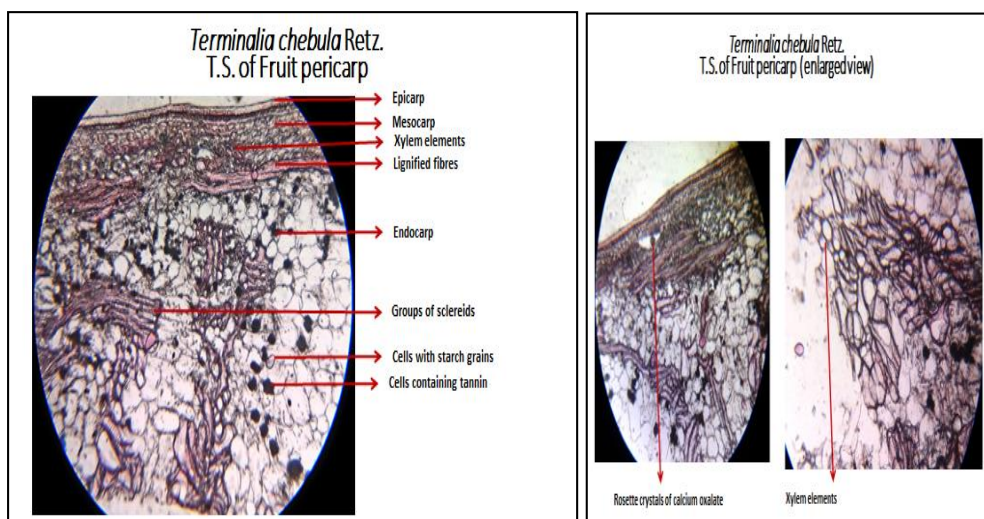
- Pericarp externally covered by a layer of Epicarp
- Epicarp represented by a single layer of Epidermis, composed of a layer of cells whose tangential and upper portions of radial walls are thickened, several of them divided in to two by a thin septa.

B. Mesocarp

- Inner to the Epicarp, Mesocarp is present
- Mesocarp composed of 2 to 3 layers of collenchymatous cells without any intercellular spaces
- It is Followed by a broad zone of parenchyma in which groups of sclereids, elongated fibres in bundles and vascular strands are scattered
- Fibres are elongated, lignified with peg like outgrowths
- Some of the cells are containing rosette crystals of calcium oxalate, tannins and some other are having starch grains

C. Endocarp

- Mesocarp followed by Endocarp
- Endocarp composed of several layers of thin-walled polygonal parenchymatous cells
- In the region of Endocarp several isolated and groups of sclereids of various shapes and sizes are present, mostly sclereids are elongated and thick walled
- Several simple round to oval starch grains are observed in the parenchymatous cells of Endocarp.



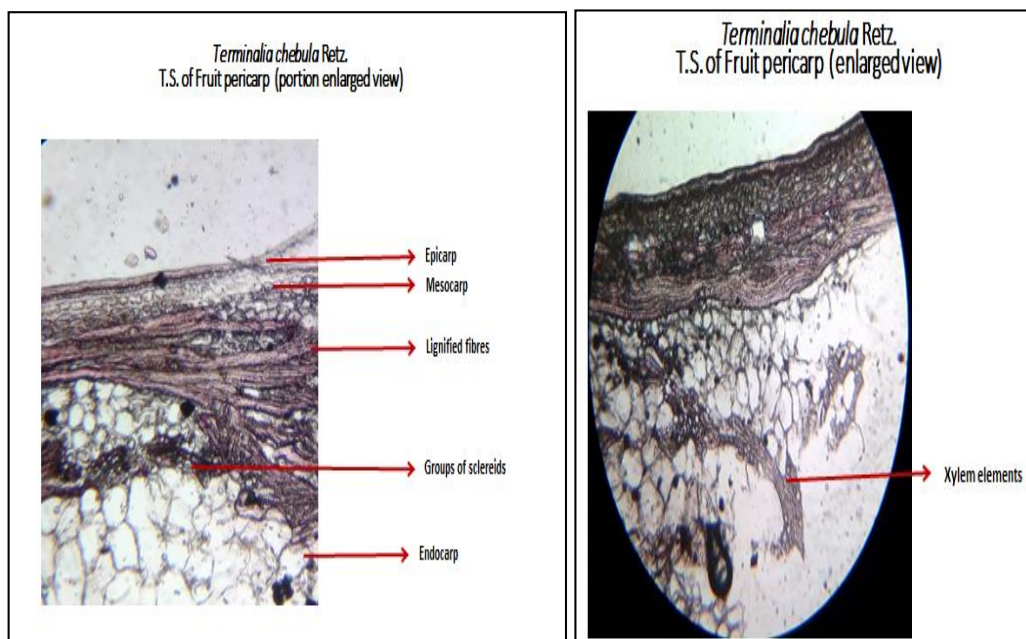


Image 2: Microscopic study of haritaki phala of bud stage, middle stage, mature stage

2] Haritaki bud stage

Name of the Sample: Bud stage of Haritaki

Scientific Name: *Terminalia chebula* Retz.

Family: Combretaceae

Plant part: Pericarp of Fruit

Drug description: Dried, black colour, ovoid fruits with prominent ridges and More Wrinkles.

Macroscopic Properties

Size : Length: 15 to 20 mm (Ref: 15- 20 mm); Width: 10 to 20 mm (Ref: 8-15 mm)

Shape : Ovoid

Colour : Blackish colour

Odour : Not characteristic

Taste : Astringent

Fruits ovoid in shape, Black in colour, externally exhibiting wrinkles and longitudinally ribbed, pericarp is fibrous, about 2-3 mm in thickness.

Microscopic properties

I. T.S. of pericarp: Transverse Section of Pericarp is done by Free hand Section cutting and Simple staining procedure and findings are as mentioned below.

Transverse section of Pericarp shows mainly three parts

(A). Epicarp (B.) Mesocarp (C). Endocarp

A. Epicarp

- Pericarp externally covered by a layer of Epicarp
- Epicarp represented by a single layer of Epidermis, composed of a layer of cells whose tangential and upper portions of radial walls are thickened

B. Mesocarp

- Inner to the Epicarp, Mesocarp is present
- It is Followed by less broad zone of parenchyma in which groups of sclereids, Xylem elements, elongated fibres in bundles.

C. Endocarp

- Mesocarp followed by Endocarp

- Endocarp composed of few layers of thin-walled polygonal parenchymatous cells

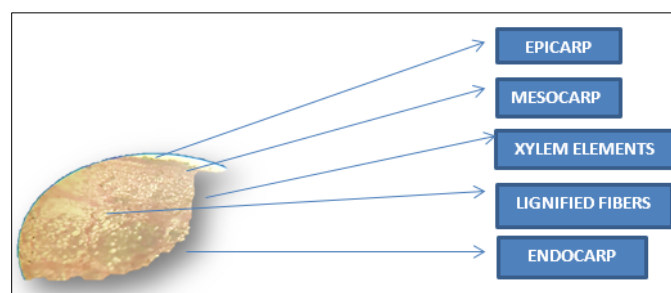


Image 3: T.S. of bud stage of haritaki [*Terminalia chebula* Retz.]

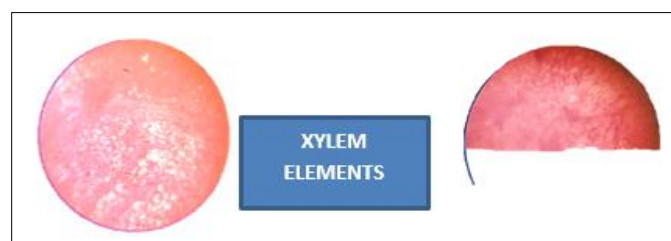


Image 4: T.S. of bud stage of haritaki [*Terminalia chebula* Retz.]

3] HARitaki middle stage

Name of the Sample: Haritaki Middle stage

Scientific Name : *Terminalia chebula* Retz.

Family : Combretaceae

Plant part : Pericarp of Fruit

Drug description: Dried, Yellowish-green colour, ovoid fruits with longitudinal ribs and wrinkles

Macroscopic Properties

Size : Length: 15 to 30 mm (Ref: 15- 30 mm); Width: 15 to 30 mm (Ref: 13-25 mm)

Shape : Ovoid

Colour : Yellowish- green

Odour : Not characteristic

Taste : Astringent

Fruits ovoid in shape, Yellowish-green in colour, externally exhibiting wrinkles and longitudinally ribbed, pericarp is fibrous, about 3 to 4 mm in thickness and non adherent to the seed.

Microscopic properties

I. T.S. of pericarp: Transverse Section of Pericarp is done by Free hand Section cutting and Simple staining procedure and findings are as mentioned below.

Transverse section of Pericarp shows mainly three parts

(A). Epicarp (B.) Mesocarp (C). Endocarp

A. Epicarp

- Pericarp externally covered by a layer of Epicarp
- Epicarp represented by a single layer of Epidermis, composed of a layer of cells whose tangential and upper portions of radial walls are thickened.

B. Mesocarp

- Inner to the Epicarp, Mesocarp is present
- Mesocarp composed of 2 to 3 layers of collenchymatous cells without any intercellular spaces
- It is Followed by a broad zone of parenchyma in which

groups of sclereids, elongated fibres in bundles and vascular strands are scattered

C. Endocarp

- Mesocarp followed by Endocarp
- Endocarp composed of several layers of thin-walled polygonal parenchymatous cells

In the region of Endocarp several isolated and groups of sclereids of various shapes and sizes are present, mostly sclereids are elongated and thick walled.

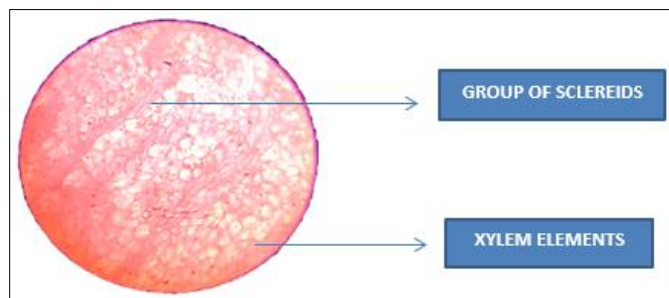


Image 5: T.S of middle stage of haritaki [*Terminalia chebula* Retz.]

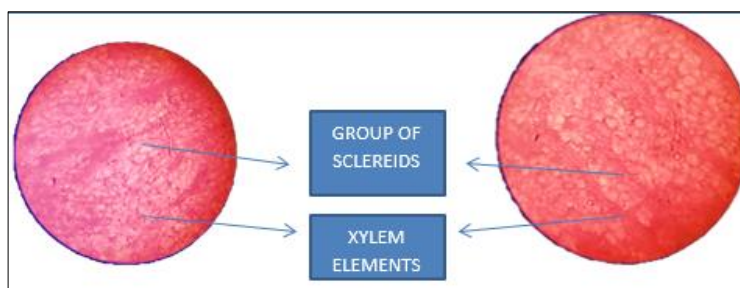


Image 6: T.S of middle stage of haritaki [*Terminalia chebula* Retz.]

Powder analysis of three stages of haritaki

Mature stage of Haritaki: Powder analysis

Powder analysis: Powder Analysis is carried out by clarifying the powder in chloral hydrate solution and prepared Glycerin mount, Iodine solution mount and Saffranin solution mount and the following characters are identified.

Organoleptic properties

Colour : Light Brown

Odour : slightly pungent but Not characteristic

Taste : astringent

Texture : Fine Powder

Microscopic characters

- Simple starch grains of various shapes and sizes.
- Fragments of Vessels with simple pitted thickenings
- Xylem fibres with peg like outgrowths, Fragments of parenchymatous tissue
- Isolated and groups of sclereids in various shapes and sizes

Bud stage of Haritaki

1) Organoleptic properties

Texture: Rough to touch, free flowing.

Odour: Pleasant

Colour: Greenish black

Taste: Astringent

2) Microscopic characters

- Xylem fibres with peg like outgrowths.
- Isolated and less groups of sclereids in various shapes and size.

Middle stage of Haritaki

i) Organoleptic properties

Texture: Slightly Rough.

Odour: Pleasant.

Colour: Light yellowish.

Taste: Astringent.

ii) Microscopic characters

- Fragments of Vessels with simple pitted thickenings
- Xylem fibres with peg like outgrowths.
- Isolated and groups of sclereids in various shapes and sizes

Powder analysis of Haritaki phala

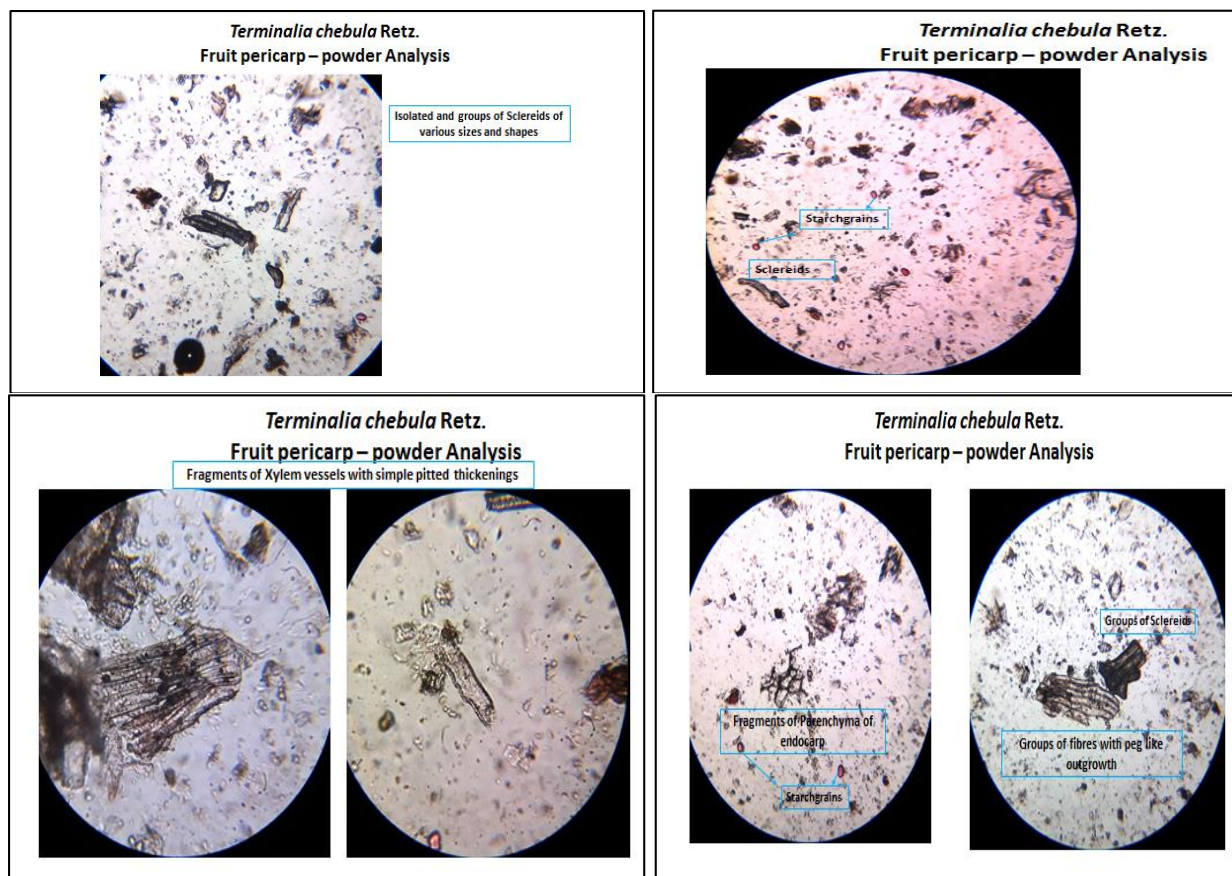
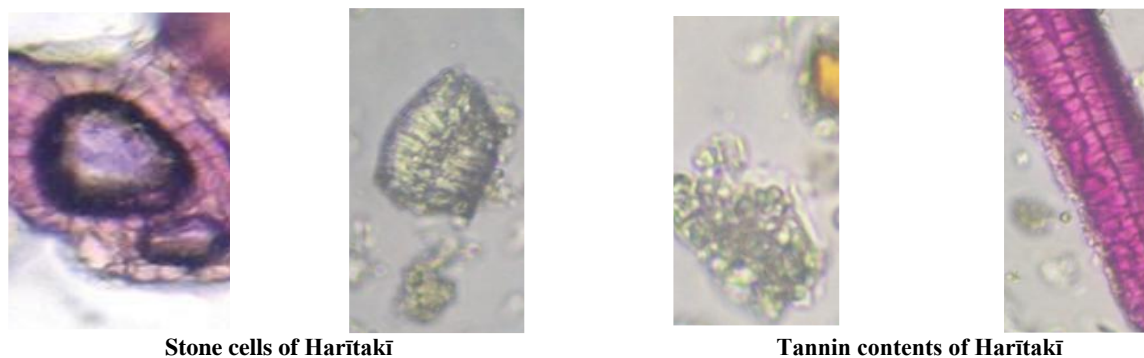


Image 7: Fruit pericarp – powder analysis



Stone cells of Haritaki

Tannin contents of Haritaki

Image 8: Powder analysis of Bud stage and middle stage of Haritaki

Conclusion: It is to conclude that the Pharmacognostic Study was done on 3 different stages of Haritaki as there is a lot of substitution of Mature Haritaki with Bala Haritaki and in place of Bala Haritaki with Vibhitaki phala [4, 5] which is Drupe like 2- 4.5 cms long and 1.2 – 2.5 cms broad, Blackish with five longitudinal ridges and the Market value of Bala Haritaki [6] (40 Rs/kg) is very high compared to Mature Haritaki Phala in certain areas. This made us to study the Pharmacognostic study to identify Authenticate purity of different stages of Haritaki.

- On comparative study of different stages of Haritaki it was found that Bala Haritaki Phala is small in size with prominent ridges of 2.5 cms in length, Dark blackish to brown in colour of varying sizes, has more wrinkles compared to others.
- The Madhyama Haritaki Phala is Dark brown in colour with prominent ridges, more Oval, Globose in shape compared to Bala Haritaki Phala of 2.5 cms in length, where as Mature Haritaki Phala is Yellowish brown in

colour with Longitudinal ridges and wrinkles between 2.5-3.5 cms in length, obovoid from a broad base.

- The Major Microscopic difference noted between Bala Haritaki Phala and Mature Haritaki phala are mentioned below.
- Sclerides in region of endocarp are less in density in Young ones compared to Matured Haritaki.
- Distribution of Calcium oxalate crystals in the parenchymatous cells of the endocarp is less in Young ones compared to Matured Haritaki.
- Fibres are less lignified in Young ones, when compared to Matured Haritaki.
- Wall thickening of Xylem vessels is less prominent in Young ones when compared to Matured Haritaki.

After Pharmacognostic studies, it was noted that there is difference in structure of Bud Stage Haritaki [Bala Haritaki], Middle stage of Haritaki, Mature stage of Haritaki. Structurally Mature Haritaki is well developed than other stages of Haritaki.

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