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A Comparative Pharmacognostical Study of Wild and Cultivate *Amalaki* (*Emblca officinalis* Gaertn.)

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ABSTRACT

Background: *Amalaki* is traditionally used drug in Ayurveda. Fruits of *Amalaki* is useful for cure of many disorders. On the basis of *Desha Bheda* (Habitat) two types of *Amalaki* are available viz., *Gramya Phala* (Cultivated) and *Vanya Phala* (Wild). cultivated variety is more often used as it offers gain to the manufacturers in terms of the amount of pulp available. To differentiate wild and cultivated variety through macroscopic, microscopic and powder microscopy this study was carried out. **Objective:** Present study was aimed to record comparative macroscopic, microscopic and powder microscopy of wild and cultivated varieties of Indian gooseberry. **Methods:** Authenticated matured fruits of both varieties were collected and macroscopic and microscopic characters were documented. **Result:** Fruit of wild variety is smaller and strong astringent than cultivated. In transverse section wild variety shows thick cuticle, lesser engaged area of mesocarp, compactly arranged cells and more concentration of fibres, sclereids and silica crystals than cultivated. **Conclusion:** Fruit of both varieties differ in size, colour and taste. In transverse section both varieties have same cells with some differentiating characters.

Key words: *Amalaki*, *Pharmacognostic study*, *Emblca officinalis*.

INTRODUCTION

Medicinal plants are large source of traditional medicinal system of drug among them *Amalaki* is a well known plant since Vedic *Kala*. It is botanically known as *Emblca officinalis* Gaertn. belongs to the family Euphorbiaceae. It is small or medium sized deciduous tree with smooth, greenish grey, exfoliating bark. Leaves feathery with small narrowly oblong, pinnately arranged leaflets. Fruits depressed globose, ½ - 1 inch in diameter, fleshy and obscurely 6 lobed,

containing 6 trigonous seeds. The tree is common in the mixed deciduous forest of India ascending to 4500 ft on the hills. It is often cultivated in Gardens and homeyards. A type bearing comparatively larger fruit than the wild plant is known in cultivation.^[1] It consists of fresh or dried fruits of *Emblca officinalis*; it is one of the important herbal drugs used traditionally both as a medicine and as a tonic to build up lost vitality and vigor.^[2] The *E. officinalis* known to have broad pharmacological properties, to list some it have the antibacterial,^{[3],[4]} antioxidant,^{[5],[6]} cardioprotective,^[7] Gastroprotective,^[8] anti-Helicobacter pylori^[9] and antistress activity.^[10]

According to the reference of *Dravyaguna Vigyana*^[11] and *Dravyaguna Hastamalaka*^[12] (Ayurvedic text) on the basis of *Desha bheda* (Habitat) two types of *Amalaki* are available viz., *Gramya Phala* (Cultivated) and *Vanya Phala* (Wild.) *Gramya Phala* is soft, fleshy and big, while *Vanya Phala* is small, hard and *Kashaya Rasa Pradhana* (Astringent taste). The properties mentioned in Ayurvedic classic are accredited to the wild variety of *Amalaki* but in the modern period

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where commercialization and bulk manufacturing has become an very important part of the economy and to meet the increasing population demands the cultivated variety is more often used since it offers gain to the manufacturers in terms of the amount of pulp available. Keeping these particulars in mind a systematic work was undertaken to differentiate wild and cultivated variety through macroscopic, microscopic study and powder microscopy.

MATERIAL AND METHODS

The Fruits of wild and cultivated *Amalaki*, were used as drug material. A detailed macroscopic and microscopic study on the both of the fruit and fruit powder was carried out to establish the correct identity of the wild and cultivated *Amalaki* fruit and find out an actual difference between the 2 varieties. The Fruits of wild species were procured from Chitrakuta (U.P.) and cultivated species from Pratapgarh (U.P.) in the month of February in fully matured condition and their authenticity was confirmed by referring various texts and with the help of taxonomists of Vindhya herbal quality testing & Research laboratory (A Unit of Minor Forest Produce Processing And Research Center) Van Parisar, Barkhdea Pathani, Bhopal, Madhya Pradesh, India.

Pharmacognostical study

Macroscopic and microscopic studies and powder microscopy were done with available guideline at Vindhya herbal quality testing & Research laboratory (A Unit of Minor Forest Produce Processing And Research Center) Van Parisar, Barkhdea Pathani, Bhopal, Madhya Pradesh, India.^{[13],[14]}

OBSERVATIONS AND RESULTS

Macroscopic characters

The fresh fruit is globular, fleshy, obscurely six lobed. The surface is smooth and pale or yellowish green in colour. The fruits contain a juicy pulp enclosing an obtusely, obvate, triangular, 3 celled nut, containing two seed in each cell.

Table 1: Comparative macroscopic characters of wild and cultivated varieties of *Amalaki*.(Plate 1)

	Wild	Cultivated
Size	2X2 cm	4.5X4.5 cm
Shape	Globose, Depressed	Globose, Depressed
Surface	Smooth with 6 prominent line	Smooth with 6 prominent line
Pulp	Lesser than cultivated variety	Juicy and More than wild variety
Nut	Obovate - triangular, 3 - celled	Obovate - triangular, 3 - celled
Seed	6 - Seeded, 2 in each cell	6 - Seeded, 2 in each cell
Depression at one end	Present	Present

Table 2: Comparative organoleptic characters of wild and cultivated varieties of *Amalaki*

	Wild	Cultivated
Colour	Pale yellow	Greenish yellow
Odour	Characteristic	Sour smell
Taste	Sour and Astringent	Sour and Less Astringent
Texture	Fleshy	More fleshy

The organoleptic characters shows that fruit of wild variety is strong in Astringent taste with pale yellow colour and characteristic odour, whereas cultivated has less astringent taste, greenish colour and sour smell.

Microscopic characters of *Amalaki* fruit

Epicarp:

1. Epidermis: The outermost part of the epicarp consist single layer of epidermis covered externally with a cuticle, epidermal cells are

tabular in shape and appear in surface view as polygonal.

- Hypodermis: The inner part of the epicarp just below the epidermis, is made up of 2-4 layers of Hypodermis of tangentially elongated cells, thick-walled, smaller in dimension than epidermal cells.

Mesocarp:

Inner to the epicarp, mesocarp forms bulk of fruit, consisting of thin-walled parenchymatous cells with intercellular spaces, peripheral 6-9 layers smaller, ovoid or tangentially elongated while rest of cells larger in size, isodiametric and radially elongated; several collateral fibrovascular bundles scattered throughout mesocarp consisting of xylem and phloem; xylem composed of tracheal elements, fiber tracheids and xylem fibers; tracheal elements show reticular scalariform and spiral thickenings; xylem fibers elongated with narrow lumen and pointed end; mesocarp contains large aggregates of numerous irregular silica crystals.^[15]

Table 3: Comparative microscopic characters of wild and cultivated varieties of Amalaki (Plate 2 & 3)

	Wild	Cultivated
Epidermis	Single layered of tubular cells with thick cuticle	Single layered of tubular cells with thin cuticle
Hypodermis	2-4 layered of tangentially elongated, thick-walled cells	2-4 layered of tangentially elongated, thick-walled cells
Mesocarp	1. Engage lesser area as compared to the Mesocarp of Cultivated variety. 2. Cells are thin walled, parenchymatous, tangentially elongated to isodimetric with irregular	1. Engage larger area as compared to the Mesocarp of Wild variety. 2. Cells are thin walled, parenchymatous, tangentially elongated to isodimetric with irregular thickenings.

	thickenings.	
Vascular bundle	Vascular bundles are scattered throughout mesocarp consisting of xylem and phloem	Vascular bundles are scattered throughout mesocarp consisting of xylem and phloem
Fibres and sclereids	Scattered in large number in mesocarp.	Scattered in mesocarp but less dense than wild variety.
Stone cells	Comparatively more found than cultivated variety.	Rarely found
Silica crystals	Present	Present

Two varieties of *Amalaki* have few differentiating characters. The T.S. of wild variety shows thick cuticle along with Mesocarp engage lesser area as compared to the Mesocarp of cultivated variety with compactly arranged cells and more concentration of fibres, sclereids and silica crystals, while the T.S. of cultivated variety shows thin cuticle, a bit loosely arranged mesocarp cells, less concentration of fibres, sclereids and silica crystals.

Table 4: Organoleptic characters of powder of wild and cultivated varieties Amalaki fruits (Plate 3 & 4)

	Wild	Cultivated
Condition	Dried powder of fruits.	Dried powder of fruits.
Colour	Brown	Light Brown
Texture	Smooth	Smooth
Odour	Mild herbaceous	Mild herbaceous
Taste	Sour and astringent	Sour and astringent

Microscopy of fruit powder: Powder of both varieties of *Amalaki* shows fragments of uniformly thickened epidermal cells, mesocarp cells, sclereids, fibres, stone cells, prismatic crystals of silica and oil globules but the wild variety shows more fibres, silica crystals, stone cells and sclereids than cultivated variety.

Plate 1



Fig. 1a: Photograph showing Fruits of *Amalaki* (Wild Variety)



Fig. 1b: Photograph showing Fruits of *Amalaki* (Cultivated Variety)

Plate 2: T.S. of wild variety

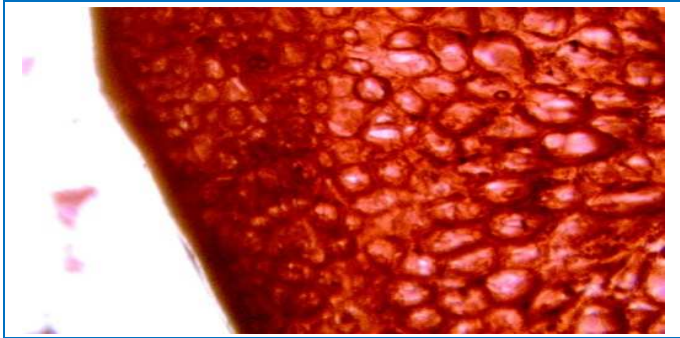


Fig. 2a: T.S. of Fruit of wild variety of Amalaki showing epicarp & mesocarp Ep. – Epicarp, Mes.- Mesocarp

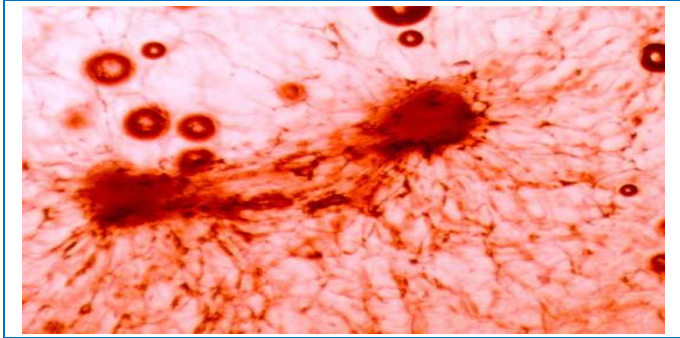


Fig. 2b: T.S. of fruit of wild variety of Amalaki showing vascular bundles. VB : Vascular bundles, Pa : Parenchyma

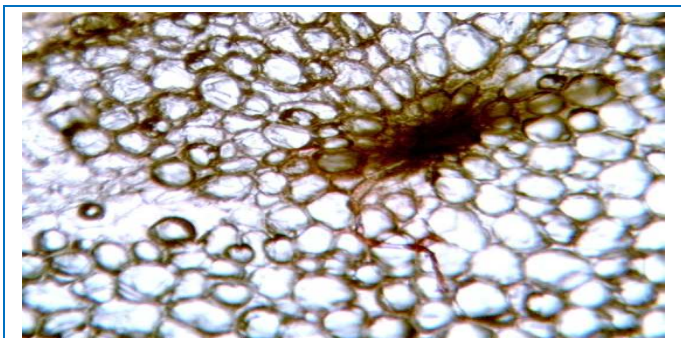


Fig. 2c: T.S of fruit of wild variety of Amalaki showing sclereids. Sc - Sclerids

Plate 3: T.S. of cultivated variety

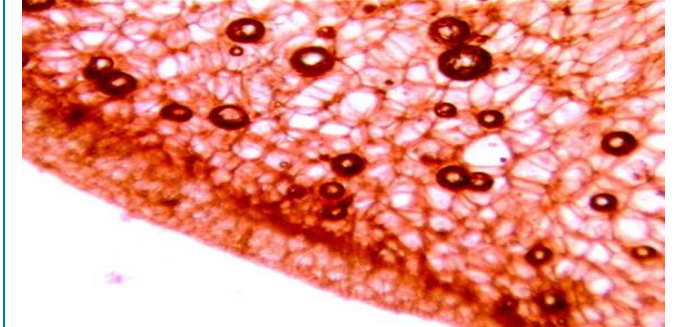


Fig. 3a: T.S. of Fruit of Cultivated variety of *Amalaki* showing Epicarp & Mesocarp. Ep. – Epicarp, Mes.- Mesocarp, Epi. – Epidermis, Hy. – Hypodermis, Pa. – Parenchymatous cell

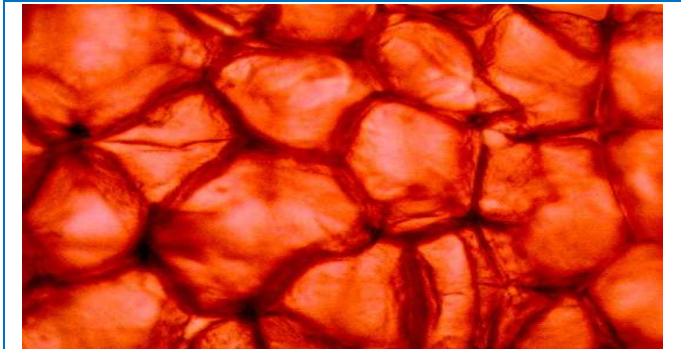


Fig. 3b: T.S. of Fruit of Cultivated Variety of *Amalaki* showing parenchymatous Cells of Merocarp. Pa. – Parenchymatous cell

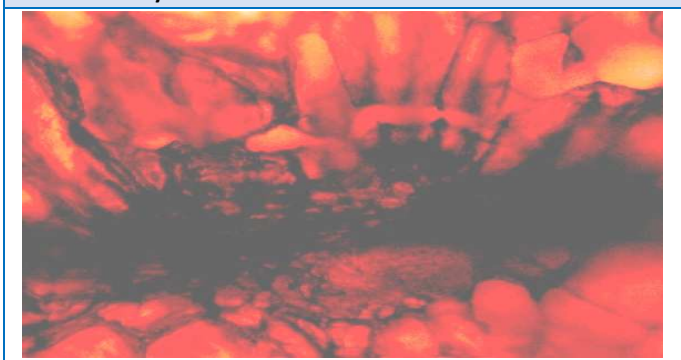


Fig. 3c: T.S. of fruit of cultivated variety of *Amalaki* showing vascular Bundle. VB. - Vascular Bundle

Plate 4: Powder Microscopy of Wild variety

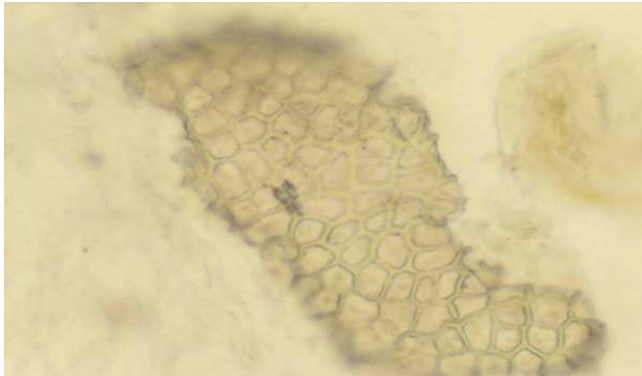


Fig 4a: Photograph showing Fragment of epicarp



Fig 4b: Photograph showing Fibre



Fig 4c: Photograph showing stone cell

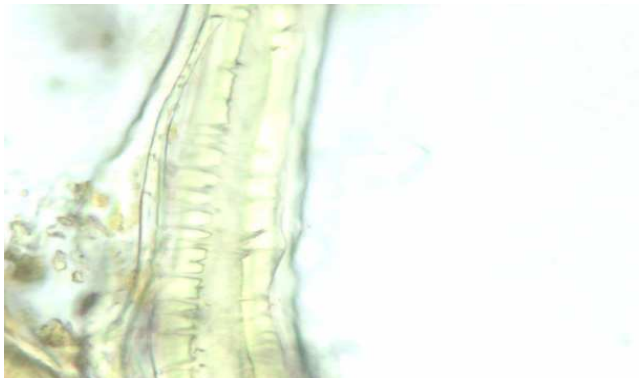


Fig 4d: Photograph showing Tracheids

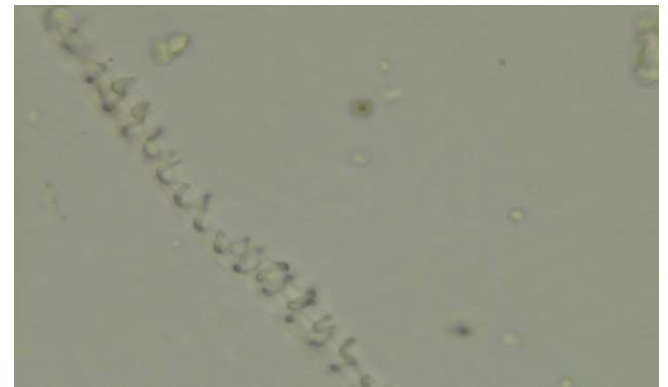


Fig 4e: Photograph showing Spiral Vessel

Plate 5: Powder microscopy of cultivated variety



Fig 5a: Photograph showing Cells of epicarp with Small crystals of Silica



Fig 5b: Photograph showing Fibre



Fig 5c: Photograph showing Fragments of cells of Mesocarp

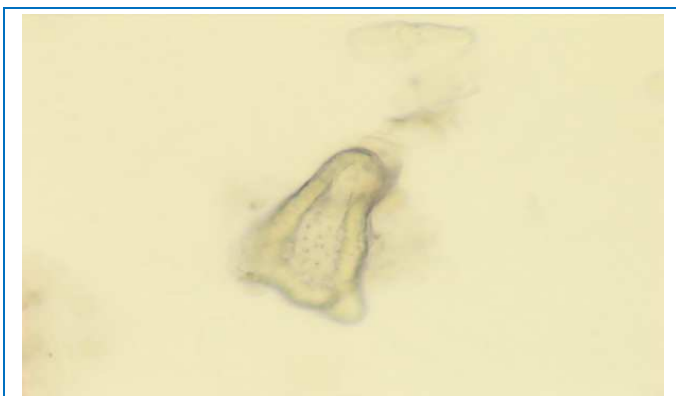


Fig 5d: Photograph showing Stone cells

CONCLUSION

Amalaki is identified botanically as *Emblia officinalis* Gaertn. belonging to family Euphorbiaceae. Fruit of both varieties differ in size, colour and taste. Fruit of wild variety is smaller and strong astringent than cultivated. In transverse section both varieties have same cells with some differentiating characters. Wild variety shows thick cuticle, lesser engaged area of mesocarp, compactly arranged cells and more concentration of fibres, sclereids and silica crystals than cultivated. The observed pharmacognostical characters of the taken two varieties of *Amalaki* i.e. *Emblia officinalis* Gaertn. are almost matched with the referral standard (API) characters of the same which confirm the authentication of the samples.

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