



PRELIMINARY PHARMACOGNOSTICAL EVALUATION OF EMBELIA RIBES BURM.F. & EMBELIA ROBUSTA AUCT. NON ROXB. FRUITS – A COMPARATIVE STUDY

Ayurveda

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ABSTRACT

Background: Vidang (*Embelia ribes* Burm.f.) is a very genuine plant for its anthelmintic activity. In Ayurveda, it is a first choice of drug for its krimighna action or to kill foreign pathogens. *Embelia robusta* auct. Non roxb., the other species of vidang is adulterated in *Embelia ribes* Burm.f.

Objective: Preliminary pharmacognostical study includes macroscopic & microscopic characteristics which are also a tool for identification & authentication of a plant. Therefore shastrokta or original vidang & its adulterant species were selected for the comparative study.

Materials & Methods: For macroscopic study, dried fruits were observed with all sense organs. For microscopic study, dried fruits were made softened with water & dilute Hydrochloride acid. Then transverse sections were cut & then observed in binocular microscope.

Results: *Embelia ribes* Burm.f. is black in colour. A few yellow spots are present on its seed. *Embelia robusta* auct. Non roxb. is reddish brown in colour. Its seed possess numerous yellow spots. Mesocarp of *Embelia ribes* Burm.f. has comparatively less layers. *Embelia ribes* Burm.f. has more number of perisperms with less intercellular space. Seed testa is thick in *Embelia robusta* auct. Non roxb. *Embelia robusta* auct. Non roxb. has scleroid cells which are dense & small in size.

Conclusion: Primary cell organs of both species i.e. *Embelia ribes* Burm.f. & *Embelia robusta* auct. Non roxb. are same. Major macroscopic differences between two species are in size, shape, colour of fruits. Major microscopic differences are in arrangement & density of cells, intercellular space, number of layers of cells etc. Basic features of genus in both species are same. But differences may be due to different species. Their differences justify their same genus but different species. These differences can be used for identification of both species available in the market.

KEYWORDS:

Embelia ribes Burm.f. ; *Embelia robusta* auct. Non roxb.; Pharmacognosy; Perisperm; Bradyscleroid cells

Introduction:

Embelia ribes is popularly known as 'Vidanga' or 'Vavding' (in Sanskrit) and Baberung (in Hindi), is highly esteemed drug in Ayurveda as a "Krimighna" or powerful anthelmintic drug. However, the dried fruits of *E. ribes* Burm. f. was officially declared as the botanical source of the drug 'vidanga' by the Government of Indian in 1966 and was included in Indian Pharmacopoeia^[1].

Embelia ribes Burm. f. is a large, scandent, struggling, medicinal climbing shrub with elongated branchlets hanging over the support belonging to the family Myrsinaceae. Leaves are coriaceous, elliptic, shortly acuminate, glabrous on both sides, petioles 6-16 mm long. Flowers are pentamerous, numerous & small. Pedicel is 1.5-2mm long, glandular pubescent, bracts minute, deciduous. Petals are 5, greenish, yellow, free, elliptic. Stamens are 5 shorter than the petals, erect. Fruit is globose, 3-4mm in diameter, smooth succulent, black when ripe, like a pepper-corn when dried, tipped one with persistent style. The plant is distributed in India, Sri Lanka, Singapore and Malaysia. In India it is mainly found in Eastern Himalayas, hilly regions of Arunachal Pradesh, Assam, Bengal^[2].

Most of the biological actions of *Embelia ribes* Burm.f. like anthelmintic, antifertility, antidiabetic, antidyslipidemic, antioxidant and anticancer activities have been attributed to the active principle Embelin, a dihydroxy benzoquinone (2, 5-dihydroxy-3-undecyl-p-benzoquinone)^[3]. The fruits also contain embelin, quercitol, tannin, christembin, embolic acid, fatty ingredients, resinoid, volatile oil, vilangin. Fruits are astringent, bitter useful in helminthiasis, skin diseases, leprosy, pruritis, nervous debility, amentia, dyspepsia, jaundice, flatulence, colic, constipation, strangury, tumour, asthma, bronchitis, dental caries, odontalgia, hemicrania, dyspnoea, cardiac diseases, psychological disorder, ringworm, fever, emaciation, general debility^[4].

The fruits of *Embelia ribes* Burm.f. possess the restricted geographic distribution of taxon and IUCN threatened status, inherent sterility of the seed, less yielding capacity & also it is the highly demanded drug in domestic as well as international markets. Because of these drawbacks, crude drug traders are subjected to adulterate this fruit with the fruits of *Embelia robusta* auct. Non roxb., *Myrsine africana* Linn., and *Piper cubeba* Linn. F. At some places, these are currently being traded under the name of vidanga^[5].

Out of these *Embelia robusta* auct. Non roxb. was selected for the study as it belongs to same genus but a different species. Its seeds are found in abundance. It is a rambling shrub or small tree, branches glabrous, leaves broadly elliptic, suddenly & shortly acuminate, gland-dotted, the margins entire or sometimes irregularly toothed, base rounded or subacute, petioles long. Flowers pale greenish yellow in axillary racemes. Fruits globose, apiculate with the style, red when ripe. It is distributed from Ceylon to Malabar coast through Sylhet & Assam to Singapore^[2].

Both possess same actions according to modern literature. So both species of *Embelia* were selected for the comparative pharmacognostical study to see the basic differences in their physical & anatomical characteristics & to set basic criteria for identification of both species available in the market.

Material & methods:

Crude drugs:

Fruits of *Embelia ribes* Burm.f. were collected from herbal garden of Ayurveda Regional Research Institute, Itanagar & was authenticated from the same with Authentication no. – 2655

Fruits of *Embelia robusta* auct. Non roxb. were collected from botanical garden of Joginder nagar, himachal Pradesh & was authenticated from herbarium section, Department of Botany, Rajasthan University, Jaipur with Authentication no. – RUBL211596

The whole procedure was carried out at laboratory of *Dravyaguna Vigyan* Department, National institute of Ayurveda, Jaipur, Rajasthan

Material used:

Safaramine, glycerine, HCl, water, blade, brush, watch glass, slides, coverslip, filter paper, graduated ruler, binocular compound microscope with camera

Methods:

Preliminary pharmacognostical study includes macroscopic & microscopic characteristics of a drug.

Macroscopic study:

Crude samples were spread on table & then examined for size, shape, colour, odour, touch & taste.

Microscopic study:

For microscopical examination of fruit and seed, the specimens or outer coat of seed or fruit were taken & examined:

(i) **Outer Coat** –For examining the outer coat boiled 3 or 4 seeds or fruits in caustic alkali solution in a test tube for 1-2 minutes. After boiling, placed the pieces on slide and examined them after mounting in glycerol solution.

(ii) **Section** – Seeds were embedded in paraffin wax blocks for section cutting. For this, a block of paraffin (0.6 × 0.5 × 1.5 cms. in size) was made and the seed was embedded in the block by making a cavity or a pit in the block with a hot teasing needle. Cut the section with a sharp razor (through the object) together with the paraffin, placed them on to the slide, removed paraffin with a needle and examined the section in safranin solution^[6].

Observations:

Results & Discussion:

***Embelia ribes* Burm.f.**



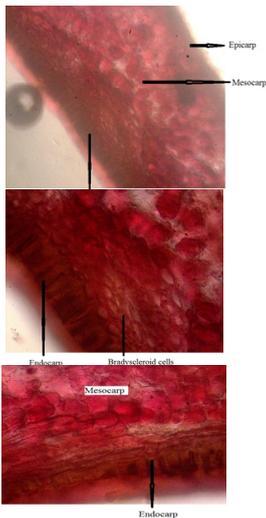
Picture no. 1 showing fruits of *Embelia ribes* Burm.f.



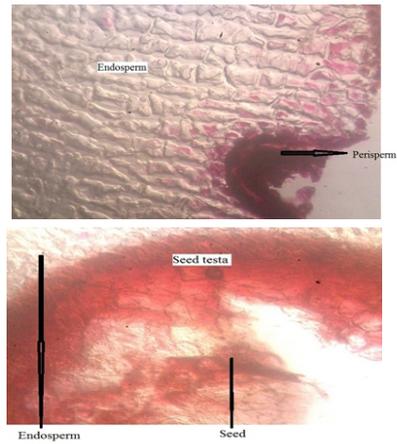
Picture no. 2 showing seeds of *Embelia ribes* Burm.f.

Macroscopic characteristics of *Embelia ribes* Burm.f.:

Fruits were light black, globular 2-3 mm in diameter. It had warty surface with a beak like projection at apex, often short. Its pericarp was brittle enclosing a single seed which was covered by a thin membrane. The entire seed was blackish brown in colour and covered with yellowish spots (chitra tandula). Its odour & taste were slightly aromatic & pungent respectively^[7].



Picture no. 3 showing microscopic structures of fruit of *Embelia ribes* Burm.f.



Picture no. 4 showing microscopic structures of seed of *Embelia ribes* Burm.f.

Microscopic characteristics of *Embelia ribes* Burm.f.:

Transverse section of fruit showed epicarp which consisted single row of tabular cells of Epidermis, usually obliterated^[8]. In surface view, cells were rounded with wrinkled cuticle.

Mesocarp consisted of a number of layers of reddish-brown coloured cells and numerous fibrovascular bundles^[9]. Inner part of mesocarp and endocarp was composed of stone cells & endodermis comprised of single layered, thick-walled, large, palisade-like stone cells^[10].

Cross section of the seed appeared more or less circular outline with depression at the base. The seed was albuminous and trizonate, composed of seed coat, endosperm and embryo^[11]. The seed coat was represented by distinctively multilayered cells. Seed testa composed of 2-3 layered reddish-brown coloured cells^[12]. Perisperm consists bradyscleroids cells, which have less intercellular space. The perisperm could be the only nutritive tissue found in some dicotyledonous species, while in others in combination with endosperm, they form the nutritive tissues of the developing embryo^[13]. The endosperm of *Embelia ribes* Burm.f. occupies the major portion of the seed and consists of several layers of cells irregular in shape with dense cytoplasm^[14]. The storage proteins had accumulated in the tissues of endosperm and also in embryo as protein bodies and they also contained minerals and crystals of calcium oxalate. These protein reserves are necessary for the synthesis of various enzymes involved in starch digestion, primarily during seed germination^[15]. Embryo was small, centrally located and embedded by the nutritive tissues of endosperm and cotyledons were obscured, however generally most seeds are sterile^[16].

***Embelia robusta* auct. Non roxb.:**



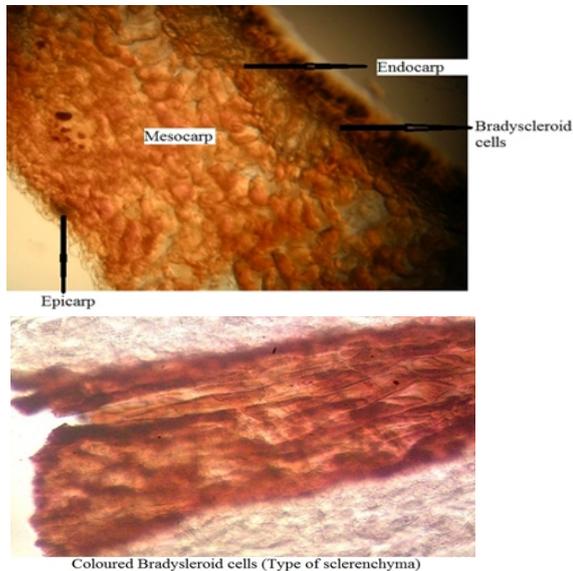
Picture no. 5 showing fruits of *Embelia robusta* auct. Non roxb.



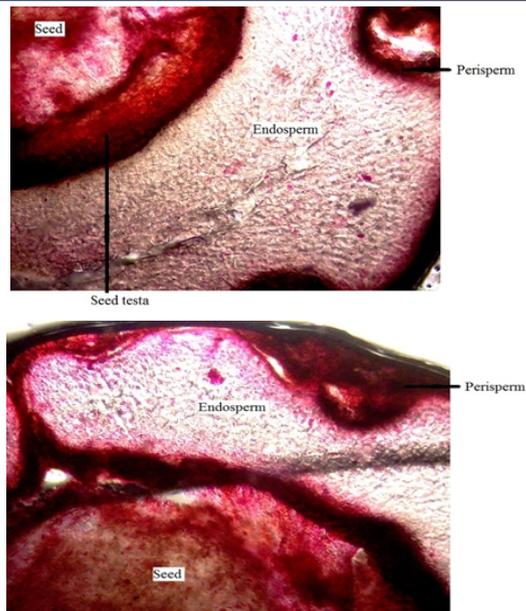
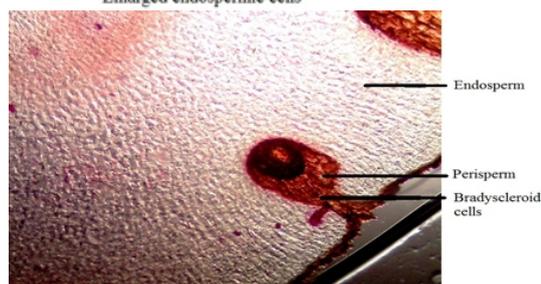
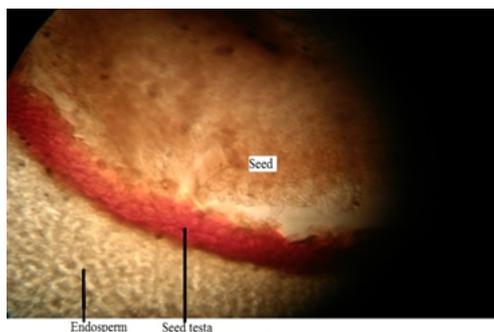
Picture no.6 showing seed of *Embelia robusta* auct. Non roxb.

Macroscopic characteristics of *Embelia robusta* auct.Non roxb.:

Fruit were reddish black, globular 3-5 mm in diameter. It had warty surface with a beak like projection at apex. The pericarp was brittle enclosing a single seed covered by a thin membrane. The entire seed was brown and covered with yellowish spots (chitra tandula). Its odour was characteristic, taste sweet & slight astringent.



Picture no.7 showing microscopic structures of fruits of *Embelia robusta* auct.Non roxb.



Picture no.8 showing microscopic structures of fruits of *Embelia robusta* auct.Non roxb.

Microscopic characteristics of *Embelia robusta* auct.Non roxb.:

Transverse section of fruit shows epicarp which was pink in colour consisting of 2-3 layers of tabular cells of epidermis, usually obliterated. In surface view, cells were rounded. Mesocarp consisted of a number of layers of brown coloured cells of irregular shape. Inner part of mesocarp and endocarp composed of bradyscleroid cells. Seed testa showed 6-7 layered reddish-brown coloured cells. Perisperm was consisting of bradyscleroids cells with no intercellular space which were radially distributed on outer surface of endosperm. In *Embelia robusta* auct.Non roxb. also, endosperm occupied major portion of seed. Numerous endosperm cells which were irregular in shape were present with dense cytoplasm containing fixed oil and protein masse^[17].

Table 1 & 2 shows a comparison between *Embelia ribes* Burm.f. & *Embelia robusta* auct.Non roxb. in their macroscopic & microscopic structures.

Conclusion:

Major parameters of *Embelia ribes* Burm.f. complies with Ayurvedic pharmacopeia of India which depicts the sample are authentic one.

Primary cell organs of both species i.e. *Embelia ribes* Burm.f. & *Embelia robusta* auct.Non roxb. are similar. Major macroscopic differences between two species are in size, shape & colour of fruits. Major microscopic differences are in arrangement & density of cells, intercellular space, number of layers of cells etc.

Basic features of genus in both species are same. But differences may be due to different species. Their differences justify their same genus but different species. So these specific physical characteristic differences can be used for identification of the original & adulterated species from the market.

Macroscopic differences:

S.no.	Parameters	<i>Embelia ribes</i> Burm.f.	<i>Embelia robusta</i> auct.Non roxb.
1.	Colour	Light black	Reddish black
2.	Size	2-3mm	3-5mm
3.	Seed colour	Black	Reddish brown
4.	Spots	A few spots present on seeds.	Numerous spots
5.	Odour	Slightly aromatic	Characteristic
6.	Taste	Pungent	Sweet & slight astringent

Table no. 1 showing macroscopic differences between *Embelia ribes* Burm.f. & *Embelia robusta* auct.Non roxb.

Microscopic differences:

S.no.	Parameters	<i>Embelia ribes</i> Burm.f.	<i>Embelia robusta</i> auct.Non roxb.
1.	Mesocarp	Comparatively less layers	More layers of mesocarp
		Less intercellular space	More intercellular space
2.	Bradyscleroid cells	Scleroid density is less	Density is more
		Scleroid cells are big in size	Small in size.
3.	Endosperm	More number of perisperms	Less number of perisperms
		Irregular shape & crystalline sized cells with more intersellular space	Semi crystalline size, irregular shape cells with less intercellular space in robusta.
4.	Seed testa	Thin	Thick
5.	Perisperm	Less empty space	More empty space in between
		Intercellular space is more & density is low.	Intercellular space is less with high density.

Table no. 2 showing differences in microscopy of *Embelia ribes* Burm.f. & *Embelia robusta* auct.Non roxb.

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