



Cardinal Identification Features Of *Bharangi* And Its Market Samples

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ABSTRACT

Adulteration may be defined as mixing or substituting the original drug material with other spurious, inferior, defective, spoiled, useless other parts of same or different plant or harmful substances or drug which do not confirm with the official standards. Adulteration in market samples is one of the greatest drawbacks in promotion of *Ayurvedic* products. *Bharangi* i.e. root of *Rothea serrata* (L.) Steane & Mabb. is among those drugs which are commonly used in the indigenous system of medicine. This study was based on author's P.G. thesis (Singh & Murthy 2014, NIA Jaipur) work "Phytochemical study of certain genuine medicinal plant and their market samples" and after studying market samples of *Bharangi* it was found that all samples were adulterated and no any market sample had genuine drug *Bharangi*. Quality assurance of medicinal plant starting materials is of paramount importance to offer predictable efficacy of the *Ayurvedic* formulations. Since both the industry and the individual physician use these plants in a dry form, therefore a method to assess their genuineness in the dry form is the need of hour. Present era is the era of modern advancements but modern methods like microscopy, chemical assay etc. are the methods that require trained personals and well equipped laboratories that are not available to common physician. That's why in this article efforts have been made to focus on cardinal organoleptic identifying features of genuine sample of *Bharangi* and its markets samples which helps to common physician for easy identification of genuine drug with adulterants.

Key Words – Adulteration, *Bharangi*, Market samples,

Introduction

The authentic source of the *Bharangi* is dried roots of *Clerodendrum serratum* (Linn.) Moon (Fam. Verbenaceae). It is a shrub distributed throughout the country (API Part I Vol. III Page no. 25). At present the botanical name of *Bharangi* has been changed and it is named as *Rothea serrata* (L.) Steane & Mabb.^{[1][2]} But both the botanical names are treated as synonym for each other. It is currently classified in the Subfamily Ajugoideae, being one of several genera transferred from Verbenaceae to Lamiaceae in the 1990s, based on phylogenetic analysis of morphological and molecular data.^[3]

Bharangi has been used in the indigenous system of medicine since a long time. It is well known *Kapha* and *Vata* suppressant medicine. This drug is much frequently used in our classics for the disorders like bronchial asthma, cough, piles, alcoholism, goitre & other adenitis, inguinal hernia and accidental wound.^[4]

According to modern researches *Clerodendrum serratum* (Linn.) Moon has been proved for its bronchodilator, anti-allergic, anti-inflammatory antibacterial, wound healing, anticarcinogenic, antioxidant, antiangiogenic and vasorelaxant activities.^[5]

Bharangi kept in following groups according to Ayurveda^[6] –

1. In Charak Samhita – *Pureeshasangraheeya Mahakashaya*
2. In Susrut Samhita – *Pippalyadi Gana*
3. In Ashtang Sangraha – *Pippalyadi Gana*

Bharangi is an important medicinal plant and commonly used in different preparation of Ayurvedic medicines. Due to increased demand there is concerning reduction in availability, it is adulterated by other spurious, inferior, defective, spoiled, useless other parts of same or different plant.

Since both the industry and the individual physician use plants in a dry form, so there is an urgent need to evolve exclusive identifying features of raw drugs at multiple levels so as to serve as a ready reference for all physicians and pharmaceuticals units in identification of genuine medicinal plant raw materials. Therefore quality assurance of medicinal plant starting materials is of paramount importance to offer predictable efficacy of the Ayurvedic formulations.

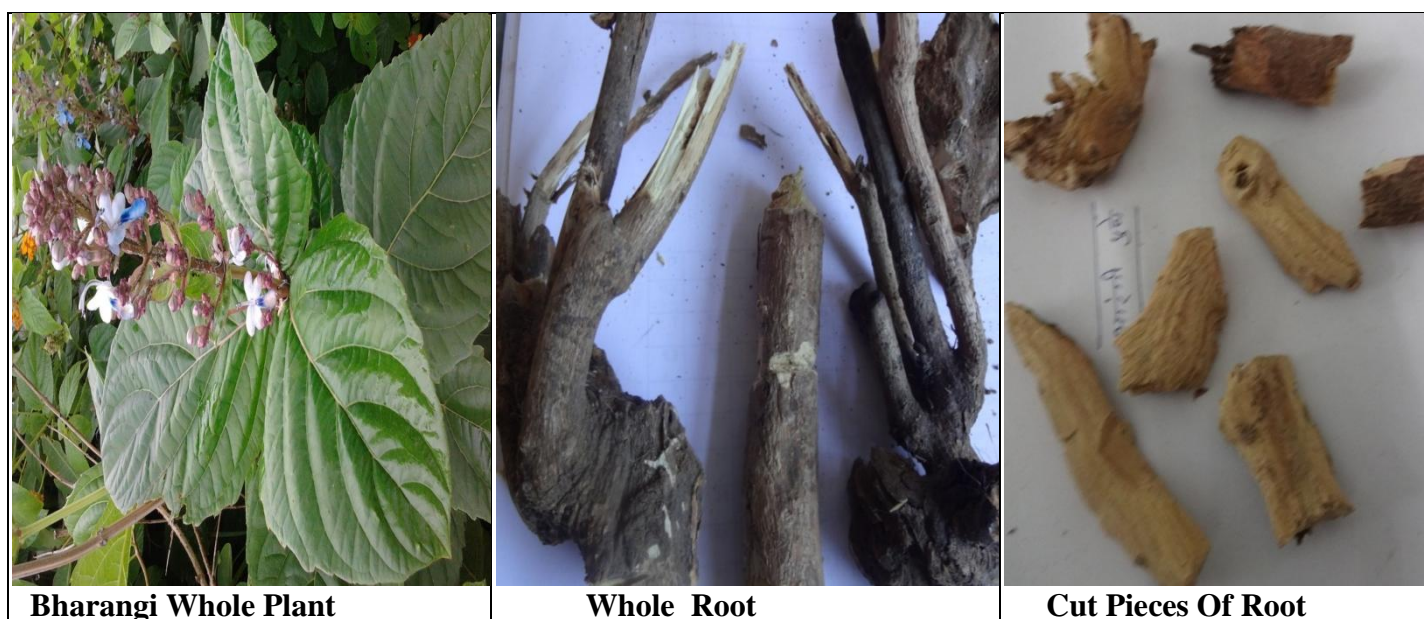
The chief methods employed in evaluating drugs are Organoleptic i.e. practical & on the spot tool, Physical & Phytochemicals – Lab based tools, Experimental and Clinical-final confirmative tools. Drugs are used by various stake holders at different levels e.g. individual physician at clinic level, small pharmacies, Ayurvedic hospitals and big pharmaceutical houses. Each stake holder has their own level of infrastructure, man power and requirement. Therefore a single tool of identification might not be feasible for application of all the stake holders. Organoleptic tools are more beneficial for smaller pharmacies and for individual physician at clinic level.

MATERIAL AND METHODS

- All the literary materials about the drug that have been taken for study with their adulterant/ substitute were collected from different ancient and contemporary modern books from all types of sources – print, electronic, folklore, etc. and was studied & analyzed thoroughly.
- The genuine sample was collected by author from Western Ghat at Khandala and Mulsi road, Distt – Pune, Maharashtra after identifying the source of plant as per standard description.
- The dried specimen was pasted on the herbarium sheets of standard size with proper labelling. The authentication of plant material collected for study was done at Botanical Survey of India, Allahabad U.P. (Certificate No. B.S.I./C.R.C./2013-14/TEC./185)
- The market samples were also collected from four major raw drug selling markets of India namely Kolhapur, Jaipur, Delhi and Kochi.
- Above collected genuine sample studied organoleptically in dried condition. The market samples and its adulterant/ substitutes drugs were also examined organoleptically and compared with the authentic genuine sample.

BOTANICAL DESCRIPTION [Fig no. 1]

Fig 1. Genuine sample of *Bharangi*



Rothica Serrata is belonging to family Lamiaceae but in older classification to family Verbenaceae.

Distribution: It is more or less throughout India, ascending to 1524 m. altitude from sea level. In India it is specially found in Karnataka (Koppa, Manipal, Mudbhidri), Tamilnadu, forest of Kerala, Konkan region of Maharashtra. *Clerodendrum serratum* is a slightly woody shrub with blunt stems and branches, about 2-8 ft high.

Root: Mature root hard, woody and cylindrical; up to 5 cm thick; external surface light brown having elongated lenticels.

Stem: Usually quadrangular (four-angled).

Bark: Thin and easily separated from a broad wood which shows marked Medullary rays and concentric growth rings in a transversely cut surface; short fractures; acrid taste.

Leaf: Leaves usually three at a node, sometimes opposite oblong or elliptic, serrate, alternate without stipules.

Flower: Blue, many in long cylindrical thyrsus. They are bisexual, zygomorphic, rarely sub-actinomorphic, and bracteolate or not. Corolla with a slender tube, lobe-5, spreading; stamens epipetalous, 4 or 2, free; anther 1 or 2-celled usually dehiscent longitudinally; disc persistent. Ovary superior, 2-celled and each cell 2-ovuled; and style sub-terminal and gynobasic.

Fruit: Four lobed purple drupe.

Seed: With or without endosperm.

Cardinal Identification Features of Bharangi and its market sample

Identification Features of *Bharangi*

Bharangi (*Rotheca serrata* (L.) Steane & Mabb.) can be identified on following basis:-

- ❖ Different synonyms of *Bharangi* indicate external morphological characters as well as pharmacological activities like *padma* (flower look like that of lotus), *kharashaka* (leaf is rough in texture), *Bharangi* (it destroys the diseases or it is having the power equivalent to sun), *vadari* (an enemy of *vata* dosa), *kasaghni* (which alleviates cough).^[7]
- ❖ Root of *Bharangi* is cylindrical, hard and woody having yellowish-brown colour and have elongated lenticels.
- ❖ After breaking, the fractured portion is white in colour showing marked Medullary rays and concentric growth ring at peripheral region.
- ❖ It has bitter taste.

Macroscopic Features *Rothica Serrata* (Root)

The collected root samples of *Rothica serrata* are cylindrical, hard, and woody in shape. Collected roots are 15-20 cm. long in length, 2-5 cm. in thickness. External surface is reddish-yellowish brown in colour, having elongated lenticels. Lateral roots are developed around main roots. Rootlets are 2.5-3 mm. in diameter having yellowish-brown colour. Secondary growth is present. Bark is not very well developed, thin and easily separated from a broad wood. Fracture- short. Transversely cut surface shows marked Medullary rays and concentric growth rings at peripheral region. Cutting portion is white in colour, pith is narrow centrally located, storage tissue well developed. Odour - not specific; Taste- Acrid.

Study of Market Sample [Fig no. 2 & Table no. 1]

After analyzing the organoleptic characters of samples of *Bharangi* brought from the major markets of India with the collected and authenticated *Bharangi*, it is concluded that no one sample of any market matches with the genuine drug.

Fig 2. Market sample of *Bharangi*



Table -1: Summarized Macroscopic Features

S. no.		<i>Rothica serrata</i> (Root)	Kochi	Kolhapur	Delhi & Jaipur
1.	Size	Upto 15-20 cm. long in length, 2-5 cm. in thickness.	Root are 6-10 cm. long in length and 1.4-1.7 mm. in thickness while knotted portion are 2-5 cm. long in length and 2-3 cm. in thickness.	6-9 cm. long in length and 1-3 cm. wide.	5-9 cm. in length and 2-4 cm. in thickness
2.	Appearance	Cylindrical, hard, and woody in shape having elongated lenticels. Lateral roots are developed around main roots. Secondary growth is present. Bark is not very well developed, thin and easily separated from a broad wood.	Branched, thick and knotted. From such a tumour like structure many lateral roots are developed.	Woody, cylindrical, straight, smooth, having some blackish scars and brownish lenticels.	Flat, more or less curved having some protuberance which is transversely lying. Inner surface is also smooth, longitudinal striation is present.
3.	Colour	Reddish-yellowish brown in colour.	Brown-yellowish in colour.	Yellowish-brown in colour.	Yellowish in colour.
4.	Odour	Not specific.	Odourless	Odourless	Odourless
5.	Taste	Acrid.	Bitter	Astringent	Not specific.
6.	Fracture	Short. Transversely cut surface shows marked Medullary rays and concentric growth rings at peripheral region. Cutting portion is white in colour, pith is narrow centrally located, storage tissue well developed.	Short	Tough and splintery	Tough. Some pieces on fracture are short in outer layer and fibrous in inner layer

1. Kochin Market

In Kochin Market, the drug *Bharangi* is being sold under the name of *Cheruthekhu* and is sold at the rate of 210/- per kg. Sample collected from Kochin market are profusely branched, thick and knotted. At number of places it becomes a swollen and tumour like. From such a tumour like structure many lateral roots are developed varying in size 6-10 cm. long in length and 1.4-1.7 mm. thickness, while knotted portion are 2-5 cm. long in length and 2-3 cm. in thickness. These knotted portions are hard, brown-yellowish in colour. Many lenticels are present on swollen tumour like structure. Fracture- short; Odour- odourless; Taste- bitter.

2. Kolhapur market

In the Kolhapur market, the drug *Bharangi* is being sold under the name of *Bharangi* and is sold in this market at the rate of 240/- per kg. Sample collected from Kolhapur market are woody, cylindrical, straight measuring 6-9 cm. long in length and 1-3 cm. wide. Outer surface is yellowish-brown in colour, smooth, having some blackish scars and brownish lenticels. Cork is well-developed. Fracture is tough and splintery. A transversely cut portion showing white storage tissue and centrally located pith. Odour- odourless; Taste- astringent.

3. Delhi Market

In Delhi market, the drug *Bharangi* is being sold under the name of *Bharangi* and is cost 120/- rupees per kg. Sample collected from Delhi market are flat, more or less curved measuring 5-9 cm. in length and 2-4 cm. in thickness. Outer surface is yellowish in colour, smooth having some protuberance which is transversely lying. Inner surface is also smooth, longitudinal striation is present. Fracture is tough; some pieces on fracture are short in outer layer and fibrous in inner layer. Odour- odourless; Taste- not specific.

4. Jaipur Market

In Jaipur market, the drug *Bharangi* is being sold under the name of *Bharangi* and is cost 80/- rupees per kg. Sample collected from Jaipur market are flat, more or less curved measuring 5-9 cm. in length and 2-4 cm. in thickness. Outer surface is yellowish in colour, smooth having some protuberance which is transversely lying. Inner surface is also smooth, longitudinal striation is present. Fracture is tough; some pieces on fracture are short in outer layer and fibrous in inner layer. Odour- odourless; Taste - not specific.

Discussion

The above collected market sample is to be matched with drug sample of National Repository of Authentic Drugs, N.I.A. Jaipur & organoleptic characters were also correlate with related studies (like Khobragade & Khemani 2011, N.I.A. Jaipur) and also discussed with local Vaidyas for first hand information of concerned market area. For confirmation of identity of samples TLC and other related phytochemical tests were also be done in *Dravyaguna* laboratory of N.I.A. Jaipur. On the above basis it was concluded as follows

The sample of Kochin market having almost all characters similar to that of root of *Premna herbacea*. So, the sample of Kochin market may be the root of *Premna herbacea* which sold the drug seller under the name of *Bharangi*.

The sample collected from Kolhapur market shows no resemblance with any one of the root which describe above. So, it is difficult to identify macroscopically. This drug sample seems a collection of stem pieces of genuine drug and stem pieces of other species of *Cleodendrum*.

The sample taken from Jaipur & Delhi market has no resemblance in any character when compared with the characters of root of *Clerodendron serratum*, *Clerodendron siphonanthus*, *Clerodendron indicum* & *Premna herbacea*. So, it is very difficult to identify organoleptically and could not guessed the botanical source. The sample found in above mentioned markets may be the bark pieces of another plant source. When I asked to the shop keepers of concern market, they told me that, this drug was supplied from Madhya Pradesh. In his book *Dravya Guna Vigyan*, Dr Gyanendra Pandey mentioned that bark of *Gardenia turgida*

and *Gardenia latifolia* is being sold in place of *Bharangi*, which procured from Madhya Pradesh. On the above basis, the possible source of these samples may be *Gardenia turgida* or *Gardenia latifolia*.

TLC findings of *Bharangi* and its market samples - As discussed earlier in context of organoleptic study that the sample of Kolhapur was similar with stem pieces of *Rothica serrata* or other plant of *Clerodendrum* sp. TLC profile suggests that this sample has almost similar phyto chemical constituents (i.e. have almost same Rf value) like genuine drug (i.e. root of *Rothica serrata*). Sample of Delhi & Jaipur market have similar TLC profile.

Sample of Kochin shows entirely different TLC than other samples of *Bharangi*. As discussed earlier that the Kochin sample was morphologically similar with root of *Premna herbacea*. A known mobile phase was selected (used by D. Thirumalai et, al for *Premna herbacea*)^[8]. It was found that the Rf values in different ways are same with that of reference study. Hence TLC profile of Kochin sample suggests that this sample has similar phyto chemical constituents like root of *Premna herbacea*.

Conclusion

- ✓ After studying market samples of *Bharangi*, it was found that all samples were adulterated & no one market sample was found as genuine drug.
- ✓ Sample of Kochin market having pharmacognosital similar characters to that of root of *Premna herbacea*. Keeping this in mind, TLC of this sample was compared with the published TLC of *Premna herbacea* and found to be the same. This confirms that the Kochin sample was *Premna herbacea*.
- ✓ Kolhapur sample may be stem pieces of *Clerodendrum* spp. And it has almost similar TLC profile to that of genuine drug.
- ✓ *Bharangi* market Sample of Jaipur & Delhi was stem bark of unknown plant which may be *Gardenia turgida* and *Gardenia latifolia*

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