ISSN: 2249- 5746
International Journal of Ayurvedic and Herbal Medicine 11:6 (2021) 4069–4076
Journal homepage: http://interscience.org.uk
DOI:10.47191/ijahm/v11i6.03
Impact Factor: 6.012

Comparative Pharmacognostical Investigation on Five Ethanobotanicals Traditionally Used as Morat in India

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ABSTRACT: Morat is considered as a significant medicinal plant in the indigenous system of medicine [Ayurveda] as it has wide application as single drug. It is very effective in various Urinary disorders. It is a controversial plant and many plants are being used in the name of Morat. Pharmacognosy investigation becomes a vital role in identification of controversial plants. The causes for controversy could be either different plants of different area are often known by common name, several names for one plant or commercial substitution in non-availability of classical drug with local drug. The genuine basic raw material is very much essential for good quality medicines. Present study aims to define standards for identifying five source plants of Morat botanically and chemically. Morphological evaluation carried out by qualitative assessment based on morphological and sensory profile. Microscopical evaluation done for histological characters by using microscope and micro photography By Chemo-microscopy chemical method, evaluation is done with powders of plants. Preliminary phytochemical screening is done by qualitative chemical tests for establishing chemical profile. Five plants showed different cell structures, cell contents and different physical standards and phytochemicals. Differentiation in cell, cell content, and presence of phytoconstituents suggests, the five source plants have their different diagnostic value. Five source plants of Morat have different marker parameters.

KEYWORDS: Urinary disorders, Leea macrophylla Roxb., Saccharum officinarum L., Marsdenia tenacissima Wight.& Arn., Maerua arenaria Hook, Chonemorpha fragrans Moon,

INTRODUCTION

Over 2500 species of medicinal plants are documented in the classical texts of Ayurved. Beside the usefulness of plants in various disorders, today we are using comparatively very smaller number of plants for various ailments, because many of them have not been identified properly. Moreover, the same synonyms may be given to more than one plant, causing confusion in identifying the genuine plant. This confusion is compounded by the lack of a technically precise description of the complete plant. As per the Ancient Indian Literature, Controversial plant or Sandigdha drayas is a term used for medicinal plants having notorious botanicals as sources. *Morat* is one of the controversial plants useful in Dysuria, Anuria, Urinary calculi, Cephalalgia, and internal abscesses [1]. Under the name of 'Morat', about six different plant species were to be taken by Ayurveda practitioners in different parts of the country. Botanical identity such as *Leea macrophylla* Roxb. (LM), *Saccharum officinarum* L.

(SO), *Marsdenia tenacissima* Wight. & Arn. (MT), *Maerua arenaria* Hook (MA) & *Chonemorpha fragrans* Moon (CM) are traditionally used as *Morat*[2]. Therefore present study is launched to carry out a preliminary pharmacognostic, microscopical, and phytochemical investigation on above mentioned species which are being used as Morat in different regions of India. These diagnostic characters will be useful to screen out original drug material.

MATERIALS AND METHODS

Plant Material: LM was self-collected during month of September from its natural habitat 'Vile' village, located at the foothills of 'Tamhini hills' in Raigad district in north Konkan driving time about 2 hours from Pune during month of September 2017[3]. Specimen Voucher No. 13944, F. No. 3-1 / RAIFR / 2017-18 / Tech / Authentication / 1054.

CM was self-collected during month of May 2017 from near sacred groves 'Nagachi Devarai' in Amboli Ghat in south Maharashtra[4]. Specimen Voucher No. 13945, F. No. 3-1 / RAIFR / 2017-18 / Tech / Authentication / 1054.

MT was self-collected during month of April 2017 from hilly region of Chitrakoot, a town in the Satna district in the state of Madhya Pradesh, India[5]. Specimen Voucher No. 13943, F. No. 3-1 / RAIFR / 2017-18 / Tech / Authentication / 1054.

SO was collected from Sugarcane farm near the village Mahadev wadi, Tal. Bhor, Dist. Pune, Maharashtra during month of April 2017[6]. Specimen Voucher No. 1312, F. No. 3-1 / RAIFR / 2017-18 / Tech / Authentication / 1058.

MA was self-collected during month April 2017 from Khambatki Ghat, a mountain pass on Pune-Kolhapur section of National Highway 48 in the Sahyadri mountain ranges (Western Ghats) Maharashtra, India[7]. Specimen Voucher No. 1313, F. No. 3-1 / RAIFR / 2017-18 / Tech / Authentication /1058.

All plants were identified by Dr. S. D. Jagtap (Senior Taxonomist & Head of Department, Herbal Biotechnology, IRSHA, Bharati Vidyapeeth, Pune, India.) & Voucher specimens of all five plants have been deposited in Regional Ayurveda Institute for Fundamental Research, Pune, India.

Studies on Macroscopic and Organoleptic characters: Leaf, stem, root, flower and fruit morphology of all samples were studied and recorded. Organoleptic characters such as appearance, shape and size, colour, surface characteristics, texture, odour and taste of roots of all five species were recorded following the methods described in API guidelines.

Microscopic studies: The macroscopic features of the fresh plant of LM, CM, MT, SO & MA were determined using the methods of Evans [8]. Anatomical sections, surface preparations of the fresh roots powdered samples for the microscopy were carried out according to the methods reported earlier [9-10].

Powder microscopic analysis: Root samples of different species were air dried at room temperature, powdered using a grinder and passed through steel sieve mesh No. 355 (Retsch®, AS 200, Germany). Powder microscopical studies were carried out following standard method [11, 12]. Samples powders were observed under ten microscopic fields and the relevant data were recorded.

Phytochemical characterization: Coarse powder of root was used to carry out physicochemical parameters viz. foreign matter [13], loss on drying at 110 C [14], ash value[15], acid insoluble ash[16], water soluble extractive[17], alcohol soluble extractive[18], pH value[19]. Various other metabolites i.e. sugar, starch, phenolics, flavonoids and tannin were also quantified as per standard protocols.

RESULTS AND DISCUSSION

Morphological and Microscopical Investigation: During this study, it was witnessed that, even though these five plants are traditionally used as Morat, they do not share any similarities in their habit and habitat. Also possess specific diagnostic characters that could be used to differentiate from one another, when the whole plant is available.

Table 1: Morphological features of plants considered as Morat

Character	Habit	Leaves	Flower	Fruit	Seeds
L. macrophylla	Large herbaceous shrub, 30-90 cm in height with perennial tuberous root	Alternate, compound, petioles 20 cm long, leaflets oblique, cordate at base, serrate at margin	Greenish white	Berries	seeds usually 6, 3-gonous,
S. officinarum	A perennial grass with slender culms of varying thickness & colour	Broad, long, borne alternately with leaf base encircling the stem	Pinkish panicle	oblong caryopsis	one-seed
M. tenacissima	Large stout, twining climber with whit latex	Broadly ovate, acuminate, deeply cordate at the base; densely velvety tomatoes when young, become almost glabrous above when old	greenish yellow	follicle	Flattened & ovate–oblong
M. arenaria	Large woody climber, with thick rootstock and thick leaves, flowers strongly scented	Oblong-ovate, 2-4.5 cm long, 0.7-2.5 cm broad, entire	greenish-white	Berry pale brown.	globose
C. fragrans	It giant stout climber with large, sweet scented, white flower with latex	broadly elliptic, base cordate, pubescent above & tomentose beneath	white	Follicle	White seed

Table 2: Macroscopic and organoleptic characters of plants considered as Morat

	Shape	Color	Surfaces	odor	Test
L. macrophylla	Swollen and hollow with longitudinal linings of ridges	Outer surface of tuber is yellowish brown to dark brown	Shiny & smooth	Characteristic	Astringent
S. officinarum	Fibrous, hairy& cylindrical	Grey to blackish brown	Solid & splintery	Characteristic	Sweet
M. tenacissima	Cylindrical twisted	Outer surface yellow to buff colored with dark brown patches	Longitudinally ridges and furrow present	Indistinct	Slightly bitter

M. arenaria	Large woody, hard	Light brown colour	Pilferous	Indistinct	Slightly sweet
C. fragrans	Woody & cylindrical	Outer color is brown & inner is yellow	Ridges, furrows & lenticels present	Characteristic	Slightly bitter

According to the observations shape, surface and taste seem to be the most distinguishing characters among all species of Morat.

Various microscopical features to be used as quality standards in raw material identification are summarized in Table 3 and illustrated in plates 2.

Table 3: Anatomical features of roots of plants considered as Morat

	Microscopic characters
L. macrophylla	In transverse section microscopic observations shows wavy outline. Pericle parenchymatous, vascular bundles with massive metaxylem. Pith small at the solid constrictions. Needles of raphides are present in parenchymatous cells
S. officinarum	cortex composed of , polygonal, sclerenchymatous cells filled with dark brown pigment, inner cortex composed of large aerenchymatous cells; endodermis composed of pericycle consisting of rectangular cells and vascular tissue; xylem and phloem. arranged in a ring; centre occupied by a large pith.
M. tenacissima	Cortex shows the rectangular cork cells. The secondary phloem comprised of parenchyma with a few sieve elements. calcium oxalate can be observed with infinite starch grains. Fibres are absent in phloem. Secondary xylem composed of vessels, tracheids, fibres, tracheids and xylem parenchyma Medullary ray are distinct in xylem and are in continuation with that of phloem.
M. arenaria	cortex made up of parenchymatous cells. The cambium form the secondary xylem inside In between the secondary xylem and phloem, there is a formation of secondary medullary rays. The primary xylem tissue pushing towards center, large number of secondary xylem tissue is formed, and Pith is absent
C. fragrans	Cortex consists of extensive vessel clusters including few wide and many narrow vessels, axial parenchyma diffuse-in-aggregates and scanty paratracheal, oval or rounded loosely arranged parenchymatous cells are observed. These cells may store food reserves. Vascular tissues are seen in radial arrangement. Xylem and phloem are separated by conjunctive tissue.

Preliminary phytochemical and physicochemical analysis of plants: As a part of qualitative evaluation, when five plants are subjected for Physicochemical evaluation, the Foreign organic matter for all the five plants is within standard limits. Extractive values for five plants are highest in aqueous media and lowest in alcoholic media. The Total Ash, Water soluble ash in case of *M.tenacissima is* highest.

Table 4: Physico-chemical parameters of sample drugs

Sr. No	ame of Test	Result				
		L.M	M.T	C.M	S.O	M.A
1.	Loss on Drying	09.62%	09.26%	10.37%	08.12%	07.99%
2.	Total Ash	08.10%	09.03%	07.15%	06.39%	05.42%
3.	Acid Insoluble Ash	00.58%	01.04%	01.19%	01.30%	01.02%
4.	Water soluble Ash	02.28%	02.35%	02.24%	02.11%	02.12%
5.	pH	05.55%	05.86%	05.98%	05.65%	05.99%
6.	Water soluble extractive	15.15%	24.40%	10.15%	08.86%	14.60%
7.	Alcohol soluble extractive	04.93%	06.43	08.90%	07.36%	06.25%

Table 5: Preliminary phyto- chemical analysis of sample drugs

Sr. No	Name of Test	Result				
		L.M	M.T	C.M	S.O	M.A
1.	Alkaloids	Present	_	_	Present	Present
2.	Flavanoids	_	_	_	_	Present
3.	Saponins	-	Present	Present	_	_
4.	Tannins	Present	_	Present	_	_
5.	Phenol	_	_	_	_	_
6.	Glycoside	Present	Present	_	_	_
7.	Steroids	Present	Present	_	_	_

Glycoside & Steroids are present in *M.tenacissima & L. macrophylla*. Alkaloids present in *M.tenacissima, S. officinarum & Maerua arenaria*. Flavonoids present in *Maerua arenaria* Tannin present in *C. macrophylla & L. macrophylla* in both extracts. Saponin is present in *M.tenacissima & C. macrophylla.*

Plate 1: Morphological traits of plants considered as *Morat*.

1.1: *leea macrophylla* Roxb.



Plant in natural habitat Herbarium Dried root

1.2.: *Chonemorpha macrophylla* (Roxb) G.Don



Plant in natural habitat Dried root Herbarium

1.3: *Marsdenia tenacissima* (Roxb.) Moon.



Plant in natural habitat Dried root Herbarium

1.4 *Saccharum officinarum* L**.**



Plant in natural habitat Dried root Herbarium

1.5Maerua oblongifolia (Forsk.) A. Rich.

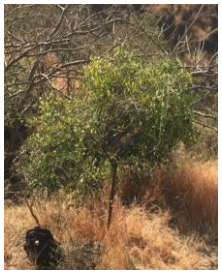
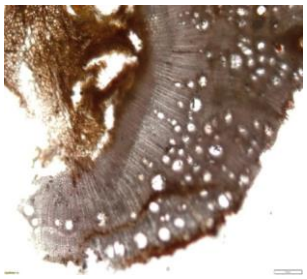


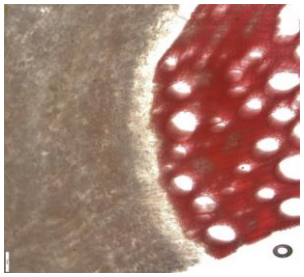
Plate 2: Microscopic characters of test drugs (root)



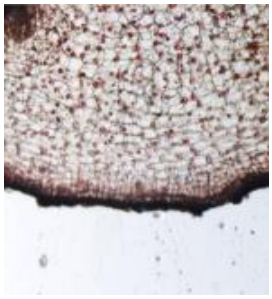
C. macrophylla

S. officinarum

L. macrophylla



M.tenacissima (Roxb.) Moon.



Maerua arenaria

CONCLUSION

In the work, we explored the parameter of differentiation such as pharmacognostical and phytochemical for ayurvedic medicine Morat Macroscopic & Microscopical examination provides several diagnostic characters. Transverse section shows peculiar characteristic arrangement of tissues of plants which provides a key to differentiate the plants. The powder microscopy also provides the presence of some diagnostic elements like fibers, vessels and cell deposits like starch grains etc. on the basis of which plants are identified. Plants contain variety of chemical compounds that act upon the body and can be used to treat the diseases. Detection of such active compounds may help in explaining probable mode of action of plants. Thus, the study fulfils in defining standards for identifying five controversial source plants of Morat, thereby fulfilling the aim of study. After study it is found that *C. macrophylla M. tenacissima* & *M. arenaria* are the creepers. Out of the above mentioned plants only *C. macrophylla* & *M. tenacissima* have latex. However root of C. macrophylla which is considered to be true Morat. There is still need to evaluate each plant for their comparative biological potency.

ACKNOWLEDGEMENTS

The authors would like to express their sincere thanks to Dr. S. D. Jagtap (Senior Taxonomist & Head of Department, Herbal Biotechnology, IRSHA, Bharati Vidyapeeth, Pune, India.) for helping in authentications of plant sample.

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