RESEARCH PAPER

PHARMACOGNOSTIC AND PHYTOCHEMICAL EVALUATION OF LAUNAEA SARMENTOSA (WILLD) KUNTZE AND CARISSA CARANDAS LINN

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Abstract

Introduction: Pharmacognostic and phytochemical analyses of Launaea sarmentosa (Willd.) leaves and roots Carissa carandas Linn were the rich source of antioxidant can be use as medicinally.

Objective: To study the Pharmacognostic and phytochemical parameters of Launaea sarmentosa (Willd.) leaves and roots Carissa carandas Linn.

Material and Methods: of Launaea sarmentosa plant leaves that had just been picked Ahmednagar, Maharashtra region and roots of Carissa carandas Linn were purchase from local market. The plants material were washed and subjected to pharmacognostic tests that examined morphological, microscopic, and organoleptic features. Microstructures of stained leaf and root sections were photographed using the photomicroscope. The same leaves' shade-dried powder was used to investigate the properties of the powder. Petroleum ether, methanol, ethanol, and water were used to perform a preliminary phytochemical screening on the fractionally extracted extract. Separate solvent extracts were dried, weighed, and utilized for analysis of phytochemicals.

Result: The macroscopic and microscopic characteristics of the leaf were revealed by pharmacognostic analysis. The midrib of the leaf, which has a collenchymas, characteristic phloem tissue, and well-developed xylem tissue toward the dorsal side, displays the upper, mesophyll, and lower epidermis presence in Launaea sarmentosa. In Carissa carandas of anomocytic stomata has only been observed in the top epidermis and lower epidermis respectively. Calcium oxalate crystals in the form of prisms, clusters, and elongated, non-lignified fibers were found in the powder characteristics investigation. Alcoholic extracts was evaluated for the presence of glycosides, flavonoids, tannins, phenolic chemicals, amino acids, and proteins, according to preliminary phytochemical screening, while petroleum ether extracts contained steroidal groups.

Conclusion: It is evident from the results of the aforementioned research that leaves of Launaea sarmentosa and Carissa carandas contain active phytoconstituents that have a variety of applications.

Keywords: Launaea sarmentosa, Carissa caranda, Pharmacognostic analysis, powder characteristics investigation.

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Introduction

Known locally as "Linharn" in Phuket, Thailand, L. sarmentosa (Willd.) Kuntze is a member of the Compositae (Asteraceae) family. Located mostly on the sandy beaches of southwest Thailand, especially Prachuap Khiri Khan, Ranong, Phangnga, Phuket, and Krabi, this rare plant species is found. About 54 species are found in the genus Launaea as shown in figure 1. They can grow and adapt to the arid, salty, and sandy environments for the most part (1). Fruit-bearing Carissa carandas Linn. is a small shrub in the Apocynaceae family that grows abundantly in tropical and subtropical areas as shown in Figure 2. It has been used for centuries as a medicinal herb in Homeopathic, Ayurvedic, and Unani systems (2). Also known as which is still a little-known despite having substantial commercial, economic, medicinal, and nutritional potential. Other names for it include Ci-Huang-Guo, Karamcha, Karonda, and Crane berry (3). The Siwalik Hills, the Western Ghats, Nepal, Afghanistan, India, Sri Lanka, Java, Malaysia, Myanmar, Pakistan, Australia, and South Africa are among its locations, which range in elevation from 300 to 1800 meters in the Himalayas. It is grown in the Western Ghats, Maharashtra, Bihar, West Bengal, Chhattisgarh, Orissa, Gujarat, Madhya Pradesh, and Rajasthan in India (4).

Taxonomical classification:

Glycosides, flavonoids, amino acids, proteins, steroids, tannins, and phenolic substances are all present in L. sarmentosa leaves. The plant's aerial portions are used to cure gout and rheumatoid arthritis, while the leaves are used to treat rheumatism and skin injuries from fishing-related fish spines (5). While Anthocyanins, phenolic acids, flavonols, alkaloids, and terpenoids are said to be present in Carissa carandas (3).

In L. sarmentosa anomocytic stomata, xylem veins, unicellular covering trichomes, and calcium oxalate crystal prisms are among the diagnostic microscopic features seen in powder (6). Only the top and bottom epidermis of Carissa have been found to have carandas with anomocytic stomata. The powder characteristics analysis revealed calcium oxalate crystals in the shapes of prisms, clusters, and long, non-lignified fibers.

The various phytoconstituents present in L. sarmentosa and Carissa carandas may be useful in treatment of chronic disorders including diabetes and inflammatory diseases.

Figure 1: ***Launaea sarmentosa***

A. Launaea sarmentosa (Willd.)

Botanical Name: Launaea sarmentosa (Willd.) Sch. Bip. Ex Kuntze
Local Name:Pathari
Kingdom: Plantae
Order:Asterals
Family:Asteraceae
Genus:Launaea
Species: Launaea sarmentosa

B) Carissa carandus Linn.

Figure 2: ***Carissa carandus***

Botanical Name: Carissa carandus Linn.
Local Name: Karvand
Kingdom: Plantae
Order: Gentianales
Family: Apocynaceae
Genus: Carissa
Species: C. carandas

Material and Methods:

2.1 Organoleptic traits:

The simplest and most effective method of identifying the identity and purity of a particular medication and ensuring its quality is through organoleptic evaluation, which can be performed using sense organs. They evaluate the size, shape, color, taste, odor, and fracture of the stem bark and leaf structure, among other organoleptic features.

2.2 Phytochemical study:

The existence of distinct phytoconstituents is investigated by employing recognized techniques to extract crude powder and/or crude medications in a variety of solvents (7-8). They are usually examined for triterpenes, steroids, alkaloids, flavonoids, tannins, phenols, cardiac glycosides, and saponins.

2.3 Macroscopic investigation:

A macroscopic study describes the morphology of plant parts that are visible to the naked eye or through a magnifying lens.

2.4 A microscopic examination:

For the microscopic examination, an anatomical investigation, a sufficient section of the plant parts under investigation is taken. Every distinct character can be recorded, and some are also preserved in the powder research. Clear sections are made using methyl orange, safranine, chloralhydrate, phenolglucinol, and other compounds (9).

2.5 Physico-chemical evaluation of crude drugs:

2.5.1 Determination of foreign organic matter:

5gm of air dried coarsely powdered drug was spreaded in a thin layer. The sample was inspected with the unaided eye or with the use of 10X lens. The foreign organic matter was separated manually as completely as possible. Sample was weighed and percentage of foreign organic matter was determined from the weight of the drug taken. The Determination of FOM was calculated by using following formula

% of Foreign organic matter =Weight of Foreign matter/ Weight of drug*100

2.5.2 Determination of moisture content:

Accurately weighed 2gm of powder sample was transferred to the porcelain dish, the weight was taken, and sample was distributed evenly and a depth not exceeding 10 mm. Then loaded porcelain dish was kept in an oven and was removed. The sample was dried to constant weight. After drying it was collected to room temperature in a desiccator. Weighed and the loss on drying was calculated in terms of percent w/w.

The Determination of Moisture content was calculated by using following formula,

% of Moisture content = W2 – W3/ W2-W1*100

Where,

W1 – Tared weight of porcelain dish
W2 – Weight of porcelain dish + sample
W3- Weight of porcelain dish + sample after drying

2.5.3 Ash value:

Ash value is used to determine quality and purity of crude drug. Ash value contains inorganic radicals like phosphates, carbonates and silicates of sodium, potassium, magnesium, calcium etc. sometimes inorganic variables like calcium oxalate, silica, carbonate content of the crude drug effects ‘total ash value’. Such variables are then removed by treating with acid and then acid insoluble ash value is determined.

2.5.3.1 Determination of Total ash:

Accurately weighed 2gm of air-dried crude drug was taken in a tared silica dish and incinerated at a temperature not exceeding 4400C until free from carbon, cooled and weight was taken. The percentage of ash was calculated with reference to the air-dried drug.

2.5.3.2 Determination of Water- soluble ash:

The ash was obtained as per method described above and boiled for 4 minutes with 24 ml of water, filtered and collected the insoluble matter on an ash less filter paper, washed with hot water and ignited for 15 minutes at a temperature not exceeding 4400C and weight was taken.

Subtracted the weight of the insoluble matter from the weight of the ash; the difference in weight represents the water-soluble ash. The percentage of water –soluble ash was calculated with reference to the air-dried drug.

The Determination of Water- soluble ash was calculated by using following formula,

% of Water-Soluble Ash = Weight of Water-Soluble Ash/ Weight of crude drug*100

2.5.3.3 Determination of Acid -insoluble ash:

The ash was obtained as per method described above and boiled for 4 minutes with 25 ml of 2M hydrochloric acid, filtered and collected the insoluble matter on an ash less filter paper, washed with hot water and ignited cooled in a desiccator and weighed. The percentage of acid –insoluble ash was calculated with reference to the air-dried drug.

The Determination of Acid -insoluble ash was calculated by using following formula,

% of Acid Insoluble Ash = Weight of acid insoluble Ash/ Weight of crude drug*100

2.5.4 Extractive values:

Different extractive values like alcohol soluble extractive, water soluble extractive values were performed by standard method

2.5.4.1 Determination of water-soluble extractive value:

Five gm of air dried coarsely powdered drug was macerated with 100 ml of chloroform water in a closed flask for 24 hours, and it was shaken frequently during first 4 hours and allowed to stand for 18 hours. Then it was filtered, 25 ml of the filtrate was evaporated in a flat shallow dish, and dried at 1040c and weighed. Percentage of water-soluble extractive value was calculated with reference to air-dried drugs.

The Determination of water-soluble extractive value was calculated by using following formula.

Figure 3: Whole plant *Launaea sarmentosa* and Roots of *Carissa carandas Linn*

Organoleptic traits:

Launaea sarmentosa leaves are of the easy-toothed variety and are typically 12 to 15 cm long. The leaves are distinctively scented and have a slightly bitter taste. Innocent of pith, the roots of Launaea sarmentosa exhibited lactiferous cells, pitted vessels, easy fibers, crystals of atomic number 20 salt, and alkaloids, amino acids, glycosides, tannin, carbohydrates, and steroids. Native to tropical Indian coastlines, Launaea sarmentosa (Willd) Schultz-Bip.ex Kuntze (Asteraceae) is a creeping herb that is locally referred to as Kulhafila in the Maldives. The roots of this plant are used as an ingredient in a common medicinal concoction (Hilibeys) that mothers take after giving birth, according to anecdotal evidence from Maldivians. In some regions of the Maldives and India, it is also used to treat a variety of other illnesses. This plant has not yet been documented scientifically. Native people and traditional healers are the sole sources of information available (10-11). The morphological traits of Launaea sarmentosa was found as depicted in Table 1.

Table No.1: Morphological and Organoleptic Characters of whole plant Launaea sarmentosa (Willd.) Kuntze

Sr. No	Part of plant	Organoleptic Character	Observation
1.	Leaves	Colour	Green
		Odour	Characteristics
		Taste	Slightly bitter
		Size	20-25cm X 6.0-8.0cm

% of Water-Soluble Extractive value = Weight of Residue/ Weight of Sample*100

2.5.4.2 Determination of Alcohol-soluble extractive value:

Five gm of air-dried coarsely powdered drug was macerated with 100 ml of ethanol of specified strength in a closed flask for 24 hours, and it was shaken frequently during first 4 hours and allows standing for 18 hours. Then it was filtered, during filtration precaution was taken against loss of ethanol, 25 ml of the filtrate was evaporated in a flat shallow dish, and dried at 1050c and weighed. Percentage of ethanol soluble extractive value was calculated with reference to air-dried drugs. The Determination of Alcohol-soluble extractive value was calculated by using following formula,

% of Alcohol Soluble Extractive value = Weight of Residue/ Weight of Sample*100

Results and Discussion:

Collection of Plant Materials:

Fresh samples of the roots of Carissa carandas Linn. (Family: Apocynaceae) and the entire plant Launaea sarmentosa (Willd.) Kuntze (Family: Asteraceae) were gathered as shown in Figure 3 from the rural parts of Maharashta, India's Ahilyanagar district and allowed to dry at room temperature in the shade. A grinder was used to ground the dried plant components into a coarse powder, which was then sieved through a 120-mesh screen to exclude any fine particles. For additional research, the coarse powders were utilized. Both macroscopical and microscopical studies were conducted using the fresh roots and leaf. The plant material's powders were employed for physicochemical analysis. The plant of Launaea sarmentosa (Willd.) Kuntze and Carissa carandas Linn was authenticated by Botonical survey of India, Koregaon, Pune with specimen no AVPLS-1 and AVPCC-2.

		Shape	Toothed, obovate
2.	Roots	Colour	Light yellowish brown
		Odour	Aromatic
		Taste	Sweet
		Size	10 cm to 1 m long, and 0.5-2 cm broad
		Shape	Simple tap

It is anticipated that Carissa carandas will become more significant in the future as a useful crop in arid and semi-arid environments due to its many applications. Since Carissa carandas is native to India, there is a vast amount of wealth based on its diverse morphological and biochemical characteristics, which justifies proper handling and documentation of the germplasm (12-13). The morphological traits of Carissa carandas was found as depicted in Table 2.

Table No. 2: Morphological and Organoleptic Characters of Roots of Carissa carandas Linn

Sr. No	Organoleptic Character	Observation
1.	Colour	Outer surface: Light brown to dark brown. Inner surface: yellowish or creamish white
2.	Odour	Faint and slightly earthy
3.	Taste	Bitter, with a slightly acrid
4.	Size	Varies in length
5.	Shape	Cylindrical or tapering roots, often branched

Microscopy Research:

A microscopical investigation was carried out using the methodology outlined by Khandelwal (2013). The roots of Carissa carandas Linn. and the leaves and roots of Launaea sarmentosa (Willd.) Kuntze were cut into transverse sections, stained with a variety of microchemical reagents, including diluted hydrochloric acid, diluted iodine solution, and phloroglucinol: hydrochloric acid (1:1), and examined under a microscope at 10X magnification (14). Results are as shown in Figure 4, 5 and 6.

Figure 4: Transverse section of leaf of *Launaea sarmentosa* (Willd.) Kuntze

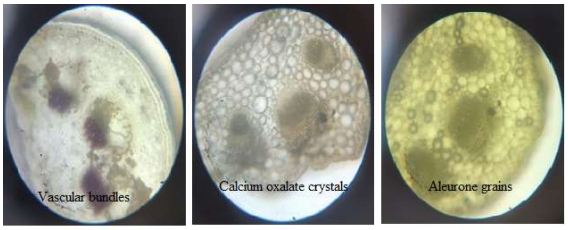

Figure 5:Transverse section of leaf of *Launaea sarmentosa* (Willd.) Kuntze

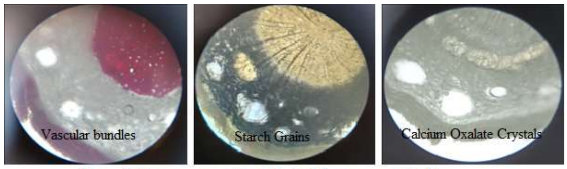

Figure 6: Transverse section of leaf of *Carissa carandas* linn

Microscopy of Powdered drug:

The powdered characteristics of whole plant Launaea sarmentosa (Willd.) Kuntze shows the in Figure 7 Powder is Greenish brown microscopic observation shows following characterisation.

The powdered characteristics of Roots Carissa carandas Linn shows the in figure 8 Powder is Yellowish Brown.

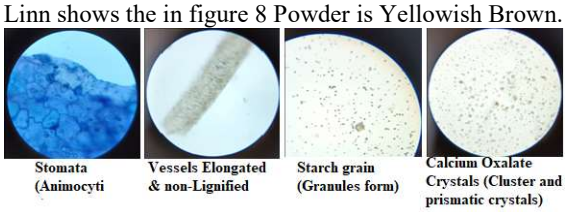

Figure 7: Powdered characteristics of whole plant *Launaea sarmentosa* (Willd.) Kuntze

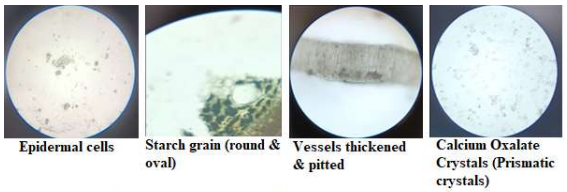

Figure 8: Powdered characteristics of Roots *Carissa carandas* Linn

Physico-chemical evaluation of crude drugs

Determination of foreign organic matter:

Foreign organic matter in whole plant Launaea sarmentosa (Willd.) Kuntze & Roots of Carissa carandas Linn, powder were found to be 8% w/w & 6% respectively when observed under 10X lens.

Determination of moisture content:

The results of moisture content for Launaea sarmentosa and Carissa carandas Linn are as depicted in Table 3.

Table No. 3: Determination of moisture content in Launaea sarmentosa and Carissa carandas Linn

Sr. No.	Evaluation Parameters	Loss of moisture (%w/w)	
		Launaea sarmentosa (Willd.) Kuntze	Carissa carandas Linn
1.	% of Moisture Content	5 %	4%

Determination of Ash value:

Results of various ash value of Launaea sarmentosa and Carissa carandas Linn was shown in Table 4.

Table No. 4: Observations of Ash value Launaea sarmentosa and Carissa carandas Linn

Sr. No.	Evaluation Parameters	Value (%w/w)	
		Launaea sarmentosa (Willd.) Kuntze	Carissa carandas Linn
1.	Total ash value	11.5	14
2	Water soluble ash value	2.5	3.5
3	Acid insoluble ash value	1.5	2

Extractive value:

The water and ethanol soluble extractive value of Launaea sarmentosa and Carissa carandas Linn was shown in Table 5.

Table No. 8: Observations of Extractive value of Launaea sarmentosa and Carissa carandas Linn

Sr. No	Extractive values	Extractive value (%w/w)	
		Launaea sarmentosa (Willd.) Kuntze	Carissa carandas Linn
1	Water soluble extractive values	0.8	1.1
2	Ethanol soluble extractive values	1.2	1.3

The crude drug Launaea sarmentosa and Carissa carandas was examine was examine morphologically and microscopically (15). In order to authenticate and standardize medicinal plants, pharmacognostic and microscopic analyses are crucial instruments. In order to properly identify plant materials and guarantee the safety and effectiveness of herbal compositions, these procedures offer structural and anatomical insights that are essential. To i4llustrate their diagnostic value, the pharmacognostic and microscopic traits of two medicinally significant plants—Launaea sarmentosa and Carissa carandas—are emphasized in this presentation.

The creeping perennial plant Launaea sarmentosa is typically found along the shore and has long been utilized for its anti-inflammatory, antibacterial, and hepatoprotective qualities.

Macroscopic characteristics of the plant include simple, alternating, glabrous, oblong-spatulate leaves that have a distinct smell and a slightly bitter flavor. Under a microscope, the leaf's transverse section shows a dorsiventral layout with spongy parenchyma and palisade that are clearly distinguished. A bundle sheath surrounds the collateral vascular bundles. Unicellular, non-glandular trichomes are sparingly dispersed across the epidermis. Anomocytic stomata are a key diagnostic characteristic that are primarily found in the lower epidermis. Our results are in agreement with previous records (16-19).

In contrast, the prickly shrub Carissa carandas, also called Karonda, is used extensively in traditional medicine to alleviate inflammation, fever, anemia, and gastrointestinal issues. The plant has simple, elliptic, opposite leaves, and when its berry-like fruits ripen, they change from red to purple. The leaves smell astringent and taste sour. Palisade tissues are found on both surfaces of the leaf, which exhibits an isobilateral architecture under a microscope. Thick cuticle covers the epidermis, which also has glandular trichomes and a multicellular coating. Both the upper and lower surfaces exhibit paracytic stomata. The mesophyll region also contains calcium oxalate crystals in the form of druses, and the vascular system is well-developed with noticeable xylem arteries (20-23).

Conclusion:

Identification, authentication, and standardization of Launaea sarmentosa and Carissa carandas depend on pharmacognostic and microscopic investigations. The detected diagnostic characteristics—such as trichome patterns, leaf structure, and stomatal types—are crucial in distinguishing authentic plant materials from fakes. These studies serve as a foundation for additional phytochemical and pharmacological research, advancing the safe and efficient use of herbal medications.

Both plants have unique microscopic and pharmacognostic characteristics that can be employed as diagnostic indicators. Carissa carandas has isobilateral leaves with paracytic stomata and more intricate trichome structures than Launaea sarmentosa, which has dorsiventral leaves with anomocytic stomata and few trichomes. The authenticity of crude medications made from them is aided by these anatomical differences.

Additionally, these investigations aid in the development of pharmacopoeial standards for herbal formulations by supporting standardization procedures. Ensuring the authenticity and integrity of these plant components is crucial, especially given the increasing usage of herbal medicine.

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