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Research Article

Pharmacognostical and Phytochemical Studies of *Dodonaea viscosa* (L).Jacq (Sapindaceae)

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Abstract

Background: *Dodonaea viscosa*, known as the broadleaf hop bush, is a species of flowering plant in the *Dodonaea* (hop bush) genus that has a cosmopolitan distribution in tropical, subtropical and warm temperate regions of Africa, the Americas, southern Asia and Australasia. *Dodonaea* belongs to sapindaceae, the soapberry family.

Methods: The macroscopic and microscopical characters were studied to identify the plant. The present work deals with studies on anatomy, phytochemistry, pharmacochemical characterization such as ash values, extraction values and organoleptic studies of *Dodonaea viscosa*

Conclusion: The organoleptic study of the leaf and bark plant powder of *Dodonaea viscosa* revealed the different colour, taste, odour, texture, and insect infestation to the properties of plant powder. It revealed the plant powder of different colour index due to the presence of organoleptic compounds. The total moisture content of the leaf of *Dodonaea viscosa* was (64.7). The total ash content of the leaf was found (87). The extraction values of the solvent of leaf for ethanol are greater than the other solvents. The same powder was also treated with flurimetry assay. It reveals a different colour index due to the presence of fluorescence compounds. The leaf ash contains various minerals such as potassium, iron, calcium, sulphur and magnesium. Preliminary phytochemical analysis of *Dodonaea viscosa* revealed the presence of alkaloids, tannins, saponins, phenols, glycosides, reducing sugar, flavonoids, anthroquinones, catechin, coumarin, terpenoids and xanthoprotein.

keywords: *Dodonaea viscose*, Flurimetry, Potassium, Iron, Calcium, Sulphur, Magnesium, Catechin, Coumarin, Xanthoprotein

INTRODUCTION

Medicinal plants are assuming greater importance in the primary health care of individuals and communities in many developing countries. Indian medicinal plants and their derivatives have been an invaluable source of therapeutic agents to treat various disorders.

Herbal products are often perceived as safe because they are natural.

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In recent years herbal medicine has been a major component in all traditional medicine systems, and a common element in siddha, Ayurveda, homeopathic, naturopathic, traditional Chinese medicine and native American medicine. Considerable efforts have been directed towards the development of natural products from various plant sources (Adema, et al., 1994).

Natural products especially from plant sources, including species have been investigated for their characteristics and health effects. Plants have designed the basis of classy traditional medicine practices that have been used for thousands of years by people in China, India and many other countries some of the earliest records of the usage of the plants are drugs are found in the artharvaveda, which is the basis for ayurvedic medicine in India, the clay tables in mespotamis (1700 BCE), and the eber papyrus in Egypt (1550 BCE). Plant chemicals are regarded as secondary metabolites because the plants that manufacture them may have little need for them. They are synthesized in all parts of the plant body; barks, leaves, stems, roots, flower, fruits, seeds etc. *i.e*. any part of the plant body may contain active components. This chemicals work with nutrients and fibers to form an integrated part of defense system against various diseases and stress condition. These chemical substances are called secondary metabolites. The most important of these bioactive groups of plants are alkaloids, terpenoids, tannins, saponin and phenolic compounds. Correlation between the phytoconstituents and the bioactivity of plants is desirable to know for the synthesis of compounds with specific activities to treat various health ailments and chronic disease as well. Generally, the presence of different phytochemicals in crude plant extracts has been linked to the detrimental effects of leachates, root exudates or decomposing residues of such plants on the other vegetation or succeeding crops (Arun, et al., 2008).

People are becoming more aware of medicinal plant resources and utilize these therapeutic interventions and their products in maintaining health and preventing diseases with an ecofriendly touch. Herbal medicines are the promising choice over modern synthetic drugs. They show minimum or no side effects and are considered to be safe. Generally herbal formulations involve use of fresh or dried plant parts. They also provide raw materials for pharmaceutical industries and represent a substantial proportion in global drug market.

Generally plants play an important role in medicinal properties for both preventive and curative. Phytochemicals are plant derived substances have recently become great interest owing to their versatile application. Medicinal plants are richest bio resource of drugs in the traditional system of medicine and it also responsible for different colours, flavors and smells of plant. They also function as medicaments. These medicinal values of plants lie in some chemically active substance that produces a definite physiological action on the human body. There are thousands of species of medicinal plants used globally for the cure of different infections. These plants are used as antimicrobial agents and several works have been carried out by scientists to find out their scientific basis.

Plants have been the traditional source of raw materials for medicine. A rich heritage of knowledge to preventive and curative medicine is available in ancient scholastic works included in the atharva veda, charaka, sushruta, etc. An estimate suggests that about 13,000 plant species worldwide are known to have used as drugs. The trend of using natural products has increased and the active plant extracts are frequently for new drug discoveries and for the presence of active phytotherapeutic materials (Brinda, et al., 1981).

Dodonea viscosa Linn

Classification:

Kingdom: Plantae.

Division: Spermatophyte.

Sub-division: Angiospermae.

Class: Dicotyledonae.

Sub-class: Magnoliales.

Order: Sapindales.

Family: Sapindaceae.

Genus: *Dodonaea*.

Species: *Viscosa*

Distribution

Dodonaea viscosa Jacq a shrub of flowering plant in the soapberry family, sapindaceae that has cosmopolitan distribution. The center of origin is believed to be Australia, but it occurs throughout the tropics and subtropics, widely distributed in temperate regions of Australia, Africa, Mexico, New Zealand, India, Northern Mariana Islands, Virginia Islands, Florida, Arizona, South America and elsewhere (Karunyadevi, et al., 2009).

Description

The plant *Dodonaea viscosa* is a dioecious or monoecious multi stemmed shrub or single stemmed small tree up to 7 m tall; blackish, of variable roughness, thin and exfoliating in long thin strip; twigs blacks or reddish brown, glandular, developing vertical fissures, uppermost part of young branches greenish and prominently angled. Leaves alternate, simple; stipules absent; petiole very short, up to 2.5 mm long, or absent; blade oblanceolates or broadly to narrowly elliptical, narrowly cuneate at base, obtuse but minutely apiculate at apex, margins entire, both surfaces glabrous but glandular and coated.

Medicinal uses of *Dodonaea Viscosa*

Dodonaea viscosa Jacq is a truditional medicine and is utilized in the folklores medicine in sub uropic regions of Pakistan for the treatment of variou fungal skin diseases likes lineg capitis, tinea pedis, tinea manum, and tinea corporis etc.

The powdered leaves of *Dodonaea viscosa* applied over a wound in case of burns and scalds was found to posess febrifuge properties and hence useful for the remedy of different skin diseases.

The *Dodonaea viscosa* plays an efficient role in inhibiting the adherence of *Candida albicans* to oral epithelial cells. preventing the initial step of colonization in the process of infection and this plant has a very high therapeutic potential at sub inhibitory concentration (Khalil, et al., 2006).

A traditional use of the plant as an antispasmodic. An antu-inflammatory (roots), an antipyretic and an antimicrobial agent has been reported. Useful compounds and classes of constituents like flavonoids, tepenes, coumarins and steronds are isolated from this specie. *Dodonaea viscosa* is used for the treatment to rheumalusm, skin iniecions, diarthea, stomachaches. Pains oI hepaic or splenic origin, uterine colie and other disorders involving smooth muscles.

It is also used as an antipuritic in skin rashes and for the treatment of sore throat dermatitis and hemorrhoids, *Dodonaea viscose* Jacq is a stiff bushy plant which is used by muthuvan tribes and Tamilnadu native who reside in the shola forest regions of Kerala for headaches and backaches. This is commonly known as virali Water boiled with leaves is used to foment swellings. Backaches and used for steam inhalation in cough and colds. *Dodonaea viscosa* is used for stomach pain and piles. It is also used to heal simple ulcer.

The *Dodonaea viscosa* has been reported to have anti-inflammatory and antimicrobial activity. It has been also reported to have local anesthetic and smooth muscle relaxant activity.

There is some modern investigation of the plant effects on high blood pressure. The ethanolic extract of the plant bark (TPBE) and leaf (TPLE) were evaluated for its effect on blood sugar, against the Streptozotocin (STZ) induced diabetic rats and compared it with standard drug glibenclamide (Mubashir, et al., 2011).

MATERIALS AND METHODS

Collection and processing of plant

Dodonaea viscosa collected from tiger falls, Tenkasi District. Leaves were analyzed for their morphology, phytochemistry, pharmacognostical studies. Plant leaves were dried under shade and pulverized by mechanical grinder. The powdered material was stored in a well closed plastic container.

Dodonaea viscosa Jacq (Sapindaceae)

Vernacular Names

English: The switch sorel

Tamil: Virali

Hindi: Aliyar, Sanaat

Telugu: Bandaru, Bendedu

Sanskrit: Aliyar, Sanatta

Macroscopic studies

The plant was collected during the month of February and morphological characters were studied.

Anatomical studies

The fresh medium sized twig of the plant part was collected and cut small pieces and fixed in formalin acetic acid. The transverse section of leaf was taken by hand. The sections were stained with safranin and Toluidine Blue (TB) and microphotograph of the sections were taken.

Physicochemical characters

The percentage of loss of weight on drying total ash, water soluble ash, sulphated ash and acid insoluble ash were obtained by employing standard methods (Pandey, et al., 2013).

Analysis of minerals

The leaf powder was dried and collection as a fine powder. This ash dissolved in dilute HCL or H_2SO_4 and filtered. The filtrate was used for the analysis of minerals in the sample.

Determination of loss of weight on drying

A known quantity of leaf and bark of *Dodonaea viscosa* was weighed and allowed to dry under shade until a constant weight was obtained from the initial and final weights; the percentage of loss of weight on drying was calculated.

Moisture content (% W/W)=(Initial weight of sample-final weight of sample) x 100/weight of sample

Determination of ash

The ash remaining following ignition of herbal materials is determined by three different methods which measure total ash, acid insoluble ash and water soluble ash. The total ash method is designed to measure the total amount of material remaining after ignition. This includes both “physiological ash”, which is derived from the plant tissue itself, and “Non-physiological ash”, which is the residue of the extraneous matter (e.g. sand and soil) adhering to the plant surface. Acid insoluble ash is the residue obtained after boiling the total ash with dilute hydrochloric acid, and igniting the remaining insoluble matter. Water soluble ash is the difference in weight between the total ash and the residue after treatment of the total ash with water.

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Total ash

Place about 2-4 g of the ground air-dried material, accurately weighed, in a previously ignited and weighed silica crucible. Spread the material in an even layer and ignite it by gradually increasing the heat to 500°C-600°C until it is white, indicating the absence of carbon. Cool in desiccators and weigh. If carbon free ash cannot be obtained in this manner, cool the crucible and moisten the residue with about 2 ml of water or a saturated solution of ammonium nitrate. Dry on a water bath, then on a hot-plate and ignite to constant weight. Allow the residue to cool in suitable desiccators for 30 minutes, and then weigh without delay. Calculate the content of total ash in mg per g of air dried material.

Total ash (%w/w)=(weight of ash) x 100/weight of sample

Acid insoluble ash

To the crucible containing the total ash, add 25 ml of hydrochloric acid, cover with a watch glass and boil gently for 5 minutes. Rinse the watch glass with 5 ml of hot water and add this liquid to the crucible. Collect the insoluble matter on an ash less filter paper and wash with not water until the filtrate is neutral. Transfer the filter paper containing the insoluble matter to the original crucible, dry on a hotplate and ignite to constant weight. Allow the residue to cool in suitable desiccators for 30 minutes, and then weigh without delay. Calculate the content of acid insoluble ash in mg per g of air dried material.

Acid insoluble ash (% W/W)=(Weight of ash)/Weight of sample

Water soluble ash

To the crucible containing the total ash, add 25 ml of water and boil for 5 minutes. Collect the insoluble matter in a sintered glass crucible or on an ash less filter paper. Wash with hot water and ignite in a crucible for 15 minutes at a temperature not exceeding 45°C. Subtract the weight of this residue in mg from the weight of total ash. Calculate the content of water soluble ash in mg per g of air dried material.

Water soluble ash (% W/W)=(Total ash–water insoluble residue in total ash) x 100/Weight of sample

Sulphated ash

Heat a silica crucible to redness for 10 minutes, allow to cool in a desiccators and weigh, transfer to the crucible 1 gram of sample and weigh the crucible and the contents accurately, ignite, gently at first, until the substance is thoroughly charred cool moisten the residue with 1 ml of sulphuric acid, heat gently until the white fumes are no longer evolved and ignite at 800°C ± 25°C until all black particles disappear conduct the ignition in a place protected from air currents. Allow the crucible to cool, add few drops of sulphuric acid and heat. Ignite as before, allow cool and weighing. Repeat the operation until two successive weighing do not differ by more than 0.5 mg.

Determination of water soluble extractive value

4 g of the sample was taken in a glass stopper flask. 100 ml of distilled water was added. The flasks were shaken occasionally for 6 hours and then allowed to stand for 18 hours. The extract was filtered and 25 ml of the filtrate was pipette out in a pre-weighed 100 ml beaker and evaporated to dryness on a water bath. It was kept in a hot air oven for 5 hr at 105°C, cooled in desiccators for 30 minutes and weighed. The procedure was repeated till constant weight. The water soluble extractive value indicated the presence of sugar, acids and inorganic compounds (Pirzada, et al., 2010).

Determination of alcohol soluble extractive value

Same procedure as for the water soluble extractive value was followed. Instead of water, rectified spirit was taken as a solvent. The alcohol soluble extractive values indicated the presence of polar constituents like phenols, alkaloids, steroids, glycosides, flavonoids and secondary metabolites present in the plant sample.

Alcohol soluble extractives (%W/W)=(Weight of residue) x 4 x 100/Weight of sample

Organoleptic studies

This refers to drug evaluation by means of organs of sense and includes sensory organs like colour, odour, taste, size, shape, and texture. It includes the study of morphology and sensory characters.

Fluorescence analysis

The drug powders were treated with acids like 1N HCl, concentrated HCl, 50% H_2SO_4, concentrated H_2SO_4, 50% HNO_3, concentrated HNO_3, picric acid, acetic acid, alkaline solutions like aqueous sodium hydroxide, alcoholic sodium hydroxide and solvents like acetone, benzene, chloroform, petroleum ether, methanol and ethanol. They were subjected to fluorescence analysis in daylight and in short UV-light (254 nm) and long UV-light (365 nm).The fluorescence analysis was carried out as per the standard procedures.

Preparation of plant extract

The powder leaf of *Dodonaea viscosa* was extracted by soaking method with different solvents such as petroleum ether, chloroform, acetone, ethanol, and water. For the extract, the solvent was

removed by evaporation under reduced pressure not exceeding 50% C. Aliquot of extracts were used for further analysis.

Phytochemical analysis

The phytochemical tests for various phytoconstituents in the extracts were carried out as described by Brindha, et al.

Analysis of minerals: The whole plants were dried, burnt and collected as a fine powder. This ash was dissolved in dilute HCl or H_2SO_4 and filtered. The filtrate was used for the analysis of minerals in the sample.

RESULTS

Exomorphic features

Habit: It is a small tree or shrub reaching a height of about 10 m and up to 60 cm in trunk diameter up on maturity. This evergreen tree is bushy when young but thins out with age. It grows to 13 m (40 ft) or more with a spread of 3-6 m (10-20 ft). It grows rapidly under favourable conditions.

Stem: The plant *Dodonaea viscosa* is a dioecious or monoecious multi stemmed shrub or single stemmed small tree up to 7 m tall; blackish, of variable roughness, thin and exfoliating in long thin strip; twigs blacks or reddish brown, glandular, developing vertical fissures, uppermost part of young branches greenish and prominently angled.

Leaves: Leaves alternate, simple, stipules absent, petiole very short, up to 2.5 mm long, or absent; blade oblanceolates or broadly to narrowly elliptical, narrowly, cuneate at base, obtuse but minutely apiculate at apex, margins entire, both surfaces glabrous but glandular and coated (especially when young) with viscid glandular exudates, with a conspicuous on midrib on both sides and 15-20 often indistinct pairs of lateral veins.

Root: The root of branched tap root.

Inflorescence: Inflorescence a loose thyrsoid panicle at the end twigs. The inflorescences are terminal or axillary thyrses with polygamous, apetalous, small and greenish yellow flowers.

Flowers: *Dodonaea viscosa* flowers are inconspicuous, with no petals. These flowers occur during spring and summer and are less than a centimeter in size. The plants are dioecious; *i.e.,* the flowers are male or female and usually on separate plants. The pollen is wind dispersed. However, fertilization does not need to occur for capsules to fertilized capsules can take up to 11 months to mature with unfertilized capsules maturing faster. Over this time the will change colour from a green or cream colour through to a brilliant red. These winged capsules are only produced on female or bisexual flower and are approximately 2 cm in size. The fruits are very conspicuous, pinkish to light brown colored three lobed capsules having membranous wings (**Figures 1-7**).

Exomorphic features photographics was taken by Nikon stereo microscope type 104.

Figure 1. *Dodonaea viscosa* habit with flower.

Figure 2. Leaf and fruit.

Figure 3. Flower with tricuspid Stigma.

Figure 4. L.S of Flower.

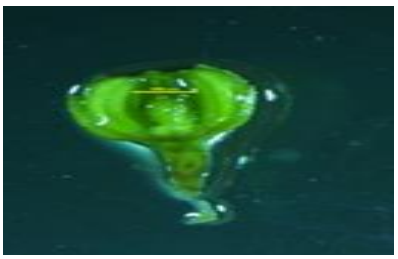


Figure 5. Various stages of fruit.

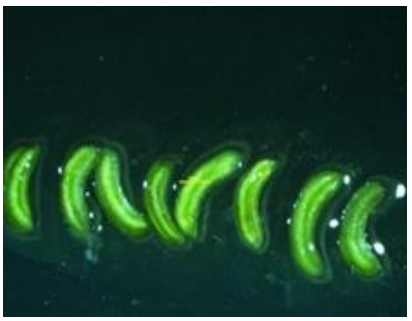


Figure 6. L.S. of fruit.

Figure 7. C.S. of ovary.

Microscopic Studies

Transverse section stem: In the transverse section, the stem is teeter in outline with growth boundaries marked by the presence of marginal parenchyma. Periderm is internal and originated from multilayered phellogen. In the Periderm tissue, plenty of brownish yellow viscous continuous wavy sclerenchymatous rings could be seen associated with the phelloderm vessel members are both solitary and grouped in radial multiplies of 2-4. Axial parenchyma is scanty paratracheal to vasicentric. Gum-like deposits are present in some of the vessels. The tangential section reveals alternately arranged round shaped intervessel pits with a slit like aperture, simple perforation pate prismatic crystals in chambered axial parenchyma and the non septate libriform fibers. Ray parenchyma is composed of procumbent and sometimes square cells, infrequently with a marginal row of square cells (**Figures 8 and 9**). Photographs were taken by nikon fluoresant microscope model: Eclipse Niu-H6002.

Figure 8. T. S of the entire view of the stem.

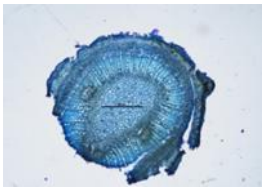
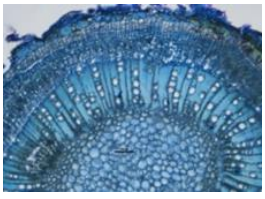


Figure 9. T.S of stem-A portion enlarged (10 X).



Transverse section of leaf

The thin transverse sections of leaf were treated with appropriate reagents and mounted on a glass slide. The transverse section of a leaflet shows a dorsiventral structure. The following are the important tissues in the lamina and the midrib region.

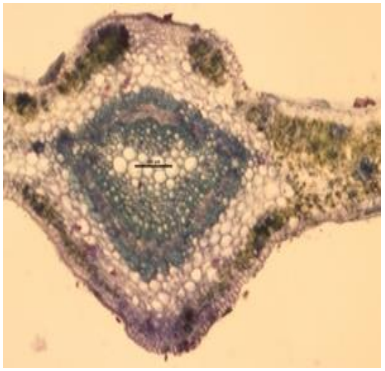
Lamina

The upper epidermis is a single layer with more or less rectangular cells covered with a thick cuticle. Stomata are seen at regular intervals.

Mesophyll is differentiated into upper palisade and lower spongy parenchyma. Palisade parenchyma is two layers in thickness and made up of compactly arranged columnar cells and extends up to the midrib region. Spongy parenchyma many layered, oval, loosely arranged.

Palisade and spongy parenchyma are provided with chloroplasts. The lower epidermis is very similar to the upper epidermis (**Figure 10**).

Figure 10. T.S of leaf.



Midrib

A large conspicuous, concentric vascular bundle is present in the midrib region. Xylem and phloem are arranged in a ring. The xylem ring is present towards the center and is surrounded by a phloem ring. Around the vascular tissues a sclerenchymatous tissue occurs as bundle sheath. A strip of collenchyma appears below the upper epidermis and a patch of chlorenchyma appears above the lower epidermis (Thilagavathi, et al., 2015).

Macerarion analysis of Stem of *Dodonaea Viscosa*

Tables 8 and 9 shows the mean, median, mode and standard deviation of length, breath of fibers, vessels and parenchyma and fibers are few, lignified well developed sclerenchymatous thikenings, the average length of isolated fibers measure 400 microns in length and 10 microns in breadth. The average lengths of vessel are 240 microns and 4 micron in breath with pitted thickenings. The average length of parenchyma is 400 microns and 2 micron in breath pitted thickenings (**Figures 11-16**).

Figure 11. Fibers.

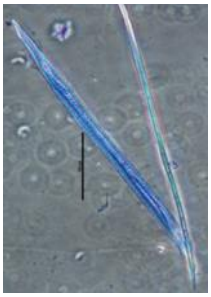


Figure 12. Xylem vessels.

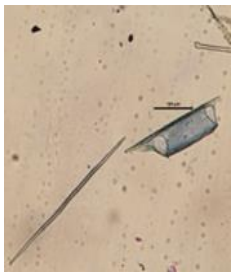


Figure 13. T.S of stem+odine solution.

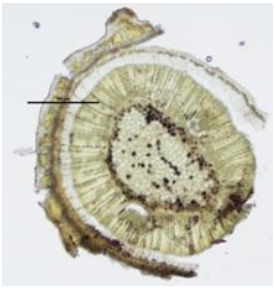


Figure 14. T.S of stem+iodine solution+H_2SO_4.

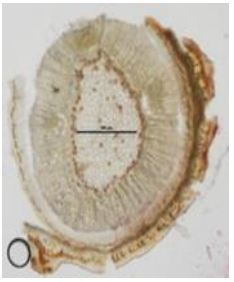


Figure 15. T.S of stem+safranin.

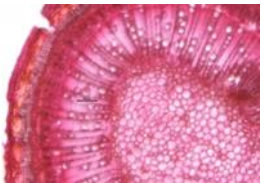
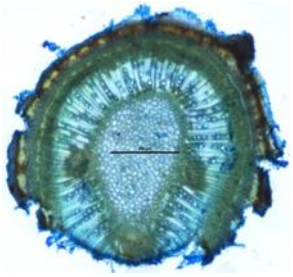


Figure 16. T.S of stem+methylene blue.



Histochemical studies

Tables 1 and 2 showed the histochemical colour reactions of leaf (35-40) and stem (30-33) of *Dodonaea viscose*

Table 1. Histochemical colour reactions of *Dodonaea viscosa* leaf.

S.no	Reagents used	Test	Colour formation	Histochemical zone	Degree of Intensity
1	T.S of plant parts+iodine solution	Starch	Blue	Spongy paranchyma	+++
2	T.S of plant parts+iodine solution+H_2SO_4	Cellulose	Bright yellow	Chlorenchyma	+++
3	T.S of plant parts+safranin	Lignin	Red	Vascular zone	+++
4	T.S of plant parts+methylene blue	Mucilage	Deep violet	Spongy paranchyma	+++
+++ High					

Table 2. Histochemical colour reactions of *Dodonaea viscosa* stem.

S.n o	Reagents used	Test	Colour formation	Histochemical zone	Degree of intensity
1	T.S of plant parts+iodine solution	Starch	Blue	Chlorencyma	++
2	T.S of plant parts+iodine solution+H_2SO_4	Cellulose	Bright yellow	Chlorenchyma	++
3	T.S of plant parts+safranin	Lignin	Red	Vascular zone	++
4	T.S of plant parts+methylene blue	Mucilage	Deep violet	Spongy parenchyma	-
++ Moderate, - Negative					

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Organoleptic studies

Organoleptic studies of the leaves of *Dodonaea viscosa* were studied. The leaf powder was subjected to different chemical treatments and the colour changes were observed and tabulated (**Tables 3 and 4**).

Table 3. Determination of ash value of leaf powder of *Dodonaea viscosa*.

S.no	Description	Percentage%
		Leaf
1	Loss of weight on drying	64.7
2	Total ash	87
3	Acid insoluble ash	98.5
4	Water soluble ash	4.5
5	Sulphate ash	90

Table 4. Extraction values the leaf powder of *Dodonaea viscosa*.

S.no	Description	Percentage%
		Leaf
1	Petroleum ether	43
2	Acetone	43
3	Ethanol	49
4	Chloroform	45
5	Water	44

Physicochemical parameters of the *Dodonaea Viscosa*

The physicochemical parameters of the leaf such as the percentage of total ash, water soluble ash and acid soluble and extractive values in different solvents were calculated and the results are given in **Tables 5 and 6**. The total ash content of the powdered leaf of *Dodonaea viscosa* was 87%. The extractive value was the maximum in ethanol extract of the leaf (49%) of *Dodonaea viscosa* than in other solvent extracts. The moisture content of the leaf of *Dodonaea viscosa* was 64.7%.

Table 5. Fluorescence analysis of leaf powder of *Dodonaea viscosa*.

S.NO	Sample	Leaf	
		Normal light	UV (365 nm)
1	Powder	Light green	Green
2	NAOH	Dark green	Pale orange
3	1N aqueous NAOH	Green	Dark green
4	1N Alcoholic NAOH	Green	Dark green
5	50% Sulphuric acid	Dark green	Pale green
6	Picric acid	Green	Dark green
7	Ferric chloride	Light green	Green
8	Ammonia	Pale green	Fluorescent green
9	Nitric acid	Pale green	Green
10	Acetic acid	Green	Dark Green
11	1N HCL	Light green	Fluorescent green
12	50% HNO_3	Light green	Fluorescent green
13	10% Potassium chromate	Black	Green
14	5% Iodine solution	Black	Brown
15	1N H_2SO_4	Brown	Black

Citation: Bangajavalli S (2023). Pharmacognostical and Phytochemical Studies of *Dodonaea viscosa* (L).Jacq (Sapindaceae). IRJPS. 14: 051.

Table 6. Preliminary phytochemical analysis of leaf powder of *Dodonaea viscosa*.

Treatments	Acetone	Ethanol	Chloroform	PET	Water
Alkaloids	-	+	+	-	+
Anthraquinone	-	-	-	-	-
Catechin	-	-	-	-	-
Coumarin	+	+	+	+	+
Flavonoids	-	-	-	-	-
Phenol	+	+	+	+	+
Quinine	-	+	+	+	+
Saponin	-	+	-	-	-
Tannin	+	+	+	-	+
Reducing sugar	+	+	+	-	-
Glycoside	-	+	-	-	-
Xanthoprotein	+	+	+	+	+
Fixed oil	-	-	-	-	-

Fluorescence analysis

Table 7 presents the fluorescence analysis of the leaf powder of *Dodonaea viscosa*. It was examined under ordinary light and UV light (Long UV 365 nm). The powdered plant drug emitted the characteristic fluorescent green and fluorescent brown colour when treated with ammonia, 1N HCL, 50% HNO_3, 50%.

Table 7. Mineral analysis of leaf powder of *Dodonaea viscosa*.

S. No	Chemicals	Nature of precipitate	Presence or absence of element
		Leaf	Leaf
1	Test solution+Picric acid	Yellow precipitate	Presence of potassium
2	Test solution+Potassium ferrocyanide	Blue precipitate	Presence of Iron
3	Test solution+Ammonium molybdate	Greenish yellow	Absence of phosphorus
4	Test solution+Dilute H_2SO_4	Needle shaped crystals	Presence of calcium
5	Test solution+Barium chloride	White precipitate	Presence of sulphur
6	Test solution+DI-potassium hydrogen phosphate	Various shaped crystals	Presence of magnesium

The powdered plant drug emitted the characteristic dark green and brown colour when treated with powder, 1N aqueous NAOH, 1N alcohol, ferric chloride, picric acid and acetic acid. A dark green colour when treated with NAOH, 50% sulphuric acid and acetic acid. The powdered plant drug emitted the characteristic light green and black colour when treated with powder, ferric chloride, 1N HCL, 1 NH_2SO_4 and 50%. The powdered plant drug emitted the characteristic pale green colour when treated with powder, ammonia and nitric acid.

The distribution of different phytochemical constituents in ethanol, chloroform, acetone, petroleum ether and water of the leaf of *Dodonaea viscosa* was evaluated qualitatively and the results are presented in **Table 8**. The maximum number of the phytochemicals such as alkaloids, reducing sugar, coumarin, tannin, phenol, quinine, tannin, and xanthoprotein have been confirmed in the ethanol, chloroform, petroleum ether and water of leaf extract. Minimum number of phytochemicals saponins and glycosides present in ethanol extract. Anthraquinone, catechin, flavonoids and fixed oils were found to be absent in all extracts.

DISCUSSION

Preliminary phytochemical screening of various extracts of the Leaf of *Dodonaea Viscosa*

Table 8. Mean, median, mode and standard deviation value of length of fibers, vessels and parenchyma cells of *Dodonaea viscosa* stem.

	Fibers	Vessels	Parenchyma
Mean value of length	40.64425	40.9941	41.5201041
Median value of length	40	23	4

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Mode value of length	40	25	4
STDEVA value of length	10.82561	5.611977	2.17827867

Analysis of minerals

The result of mineral analysis of leaves of the *Dodonaea viscosa* is presented in **Table 9**. In *Dodonaea viscosa* all the minerals such as potassium, iron, calcium sulphur, and magnesium were present and the mineral phosphorus was absent.

Table 9. Mean, median, mode and standard deviation value of breath of fibers, vessels and parenchyma cells *Dodonaea viscosa*.

	Fibres	**Vessels**	**Parenchyma**
Mean value of breath	0.974359	0.973702	0.97231738
Median value of breath	1	4	2
Mode value of breath	1	4	1
STDEVA value of breath	0	1.137308	0.99488488

CONCLUSION

The presence of various different phytochemicals in plants yields different properties to the plants. The presence of alkaloids in plants is responsible for the ability of the plant to cure pain and also renders toxicity to the plants, the level of which depends on the type and amount of the alkaloids present. A class of phenols called polyphenols, on the other hand, is responsible for the antioxidant properties of the plant.

Phytochemical screening is very important in identifying new sources of therapeutically and industrially important compounds like alkaloids, flavonoids, phenoliccompounds, saponins, steroids, tannins, terpenoids. The phytochemical study of leaf reveals the presence of lupeol, lupenone, β-sistosterol and also acacetin, quercetin, vanillic, syringic, melilotic, and ferulic acid.

To ensure the quality of plant material, the macroscopic and microscopic description of medicinal plant is the first step towards establishing it identity and purity. For identification and evaluation of plant drugs by pharmacognostical studies is still more reliable accurate and is inexpensive.

This study revealed the characteristics in the macroscopy, microscopy, and pharmacognostic parameters of *Dodonaea viscosa*. This data is expected to be a reference for the selection of raw material for the production of crude drugs. The current macroscopical, microscopical observations, physicochemical characterization and phytchemcial screening of leaf of *Dodonaea viscosa* thus provides the useful information for quality control parameters for the crude drugs.

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