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Full Length Original Research Paper

Pharmacognostical and Phytochemical analysis of leaf part of the Medicinal Herb: *Zaleya govindia*

Sharma Shailendra *[1]

Bhandari Anil [1]

Choudhary Deepak [1]

Sharma Rambabu[1]

[1]Faculty of Pharmaceutical Sciences, Jodhpur National University

Corresponding Authors:
*Shailendra Sharma
Assistant Professor,
Faculty of Pharmaceutical Sciences, Jodhpur National University, Jodhpur, Rajasthan, India.
Email: herbsinfo2020@gmail.com,

Abstract:
The aim of the study is to cover the pharmacognostical and preliminary phytochemical screening of *Zaleya govindia*. The leaves of *Zaleya govindia* belonging to the family Aizoaceae is a widely grown plant throughout India. Pharmacognostical study included macroscopical characters, physico-chemical constants and fluorescence analysis. The powder characteristics showed presence of calcium oxalate crystals, starch grains, fibers, trichome, mucilage and lignified cells. Different ash values were determined to find the inorganic content in the sample. Physiochemical studies revealed, foreign matter (0.52±0.01w/w), total moisture content (Leaf-16.16%w/w), total ash (Leaf-23.5w/w%), acid insoluble ash (Leaf-5%w/w), water-soluble ash (Leaf-15%w/w), alcoholic soluble extractive value (Leaf-13.33%w/w), chloroform soluble extractive value (Leaf-5.33%w/w), pet-ether soluble extractive value (Leaf-1.6%w/w), and water soluble extractive value (Leaf-32%w/w). Solvents of different polarity were used to find out the extractive value for leaf of *Zaleya govindia*. Carbohydrate, glycoside, alkaloid, flavonoids, tannin and resin compounds were found in preliminary phytochemical screening. Ultraviolet analysis exhibited considerable variation. Phytochemical investigation indicated the preparation of different extracts using different solvents and phytochemical tests for confirmation of the presence of carbohydrate, alkaloids, glycosides, triterpenes, phytosterols, phenolic compounds, tannin, saponins, and flavonoids. T.S of leaf with different reagents shows the presence mesophyll, spongy parenchyma, lower epidermis, lignin, lignified xylem, calcium oxalate crystals, collenchyma etc.

Keywords: Pharmacognostical, Extractive value, phytochemical analysis, Fluorescence analysis.

Introduction:

Zaleya govindia is a prostrate, glabrous, succulent and annual found almost throughout India as a weed in cultivated and waste land. The plant belongs to the family Aizoaceae. *Zaleya govidia* has been used in various parts of Asia, Africa, Australia and South America for curing various diseases[1]. In some African countries the plant has been popular use for skin diseases, wound healing, fever and tooth aches. In India it is used in the treatment of ophthalmic disease. The root applied to the eye cures corneal ulcers, itching, dimness of sight and night blindness. The juice of leaves is used to treat the black quarter. The bitter roots are used for curing bacterial infections and it is also given in combination with ginger as a cathartic. The leaves contains huge amount of vitamin C which is used to treat edema. The decoction of the herb is used as a vermifuge and is useful in rheumatitis. It is also an antidote to alcoholic poison[1,2]. Different names are there of this plant *Trianthema petendra*, Portulacastrum juss. Meedik, Papularria Forssk[4,5,6,]. The genus *Trianthema* consists of 20 species but only a few species have been phytochemically reported. ***Trianthema*** is a genus of annual or perennial plant characterized by usual fleshy, opposite, unequal, smooth-margined leaves; prostrate growth form; flowers with five perianth segments; flowers

subtended by a pair of bracts; superior fruit a circumscissile capsule with a winged lid; and net primary production represents the biomass or biocontent which is incorporated into the plant parts (Total photosynthesis less respiration) during a specified time interval. On the other hand, gross primary production represents gross photosynthesis or the total assimilation of organic matter or biomass during a specified time period. Methods like harvest, gaseous exchange, disappearance of raw material, determination of radioactive materials and chlorophyll estimations are directly or indirectly employed for evaluating net primary production. Gaseous exchange method is used for measuring both net as well as gross productivity since both O_2 and CO_2 changes are measured simultaneously. However, this method is disadvantageous, for the experiment is carried out under unnatural conditions. It has measured the net production and respiration by the respective increase and decrease in the dry matter while the gross production from the sum total of these two values, a more advantageous [3]. The crude extract of the whole plant has been reported to be superior as a wound dressing material. The extract also effectively suppressed the inflammation produced by mediators *viz.* histamine and serotonin[14,15].

MATERIALS AND METHODS

Collection & Identification

The leaves of *Zaleya govindia* were collected from the local areas of Jodhpur, Barmer, Rajasthan. These herbs were authenticated by Botanical Survey of India, Jodhpur having authentication number JNU/PH/2011/Zg C 6.

Drying and size Reduction of Plant

The leaf material of *Zaleya govindia* was subjected to shade drying for about 3 weeks. The dried plant material was further crushed to powder and the powder was passed through the sieve mesh 40 and stored in air tight container for further analysis.

Organoleptic Study of Plant Material

In some cases, general appearance of the herb is similar to related species. Thus, detailed study of the morphological characters can be helpful in differentiating them. The organoleptic study of a drug includes its visual appearance to the naked eye along with its characteristics likes odour, taste, texture etc. For each particular organoleptic group, a particular systemic examination can be carried out[4].

DETERMINATION OF PHYSICOCHEMICAL CONSTANTS OF PLANT MATERIALS[5].

Microscopical studies:

The required samples of *Zaleya govindia* leaf were sectioned with the help of fresh blade. The sections were cleared and then stained with phloroglucinol, sulphuric acid and concentrated acetic acid. Sections were also stained with Iodine solution for starch, safranin. Quantitative microscopy was also performed like stomatal number, stomatal index, palisade ratio, vein islet, vein termination. Photographs were taken with Canon IXUS-75 digital camera[13].

Powder microscopy:

Shade dried leaf were powdered with the help of an electric grinder till a fine powder was obtained. This fine powder of the leaf was subjected to powder microscopy, as per standard procedures mentioned.

Determination Of Fluorescence Character:

Fluorescence characters of powdered leaf material with different chemical reagents were determined under ordinary and ultraviolet light[6,7].

***Determination Of Physicochemical Parameters*:**

The dried plant material was subjected for determination of physicochemical parameters such as total ash value, acid insoluble ash value, water soluble ash value, LOD, alcohol soluble extractive and water soluble extractive values, etc[8,9].

***Extraction of Powdered Plant Material*:**

The shade dried powdered plant material was subjected to soxhlet extraction using the solvents of different polarity such as chloroform, ethanol, water and petroleum ether. The extracts were collected and evaporated to dryness and the percent yields of all the extracts were determined. All the extracts were then stored in a refrigerator till further analysis[10,11].

EXTRACTIVE VALUES[12].

***Cold Extractive Values*:**

The air-dried coarse drug powder (4g) was macerated separately with solvents (Petroleum ether, chloroform, methanol and water) of volume 100 ml in a closed flask for 24 hours, shaken frequently during six hours and allowed to stand for 24 hours. It was filtered rapidly, taking precaution against loss of solvent, the filtrate evaporated to dryness in a tarred flat bottom dish and dried on water bath, to constant weight and weighed.

***Hot Extraction Values*:**

The powdered material of the drug (100g) was packed in a Soxhlet apparatus separately for each solvent like petroleum ether, chloroform and methanol but in case of water extract drug was prepared by decoction method. Each extract was evaporated to dryness and constant extractive value recorded.

PHYTOCHEMICAL INVESTIGATION:

After collection and authentication, the plant material was shade dried and powdered. It was passed through sieve no. 40 and subjected to extraction. Weighed quantity of plant material was extracted separately with petroleum ether, chloroform, methanol and water by Cold extraction method. The plant material was also extracted with different solvents like petroleum ether, chloroform, methanol in soxhlet apparatus while water extract was prepared by decoction. The extracts were evaporated to dryness under reduced pressure and controlled temperature (40-50 ºC)[10]. The extracts were subjected to preliminary phytochemical investigation for the detection of following compounds; carbohydrates, protein, amino acids, fats and oils, sterols and steroids, glycoside, flavonoids, alkaloids, tannins and phenolic compounds, saponins, resins etc[11].

RESULTS:

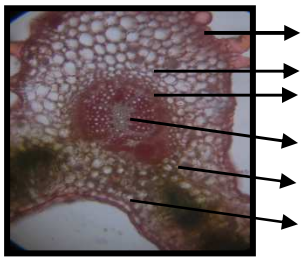
***Zayela govindia* (commonly known as Gudalio-Satto, Santhi)** is used for the treatment of various diseases. The plant is shown in **Figure 1**.

Figure 1: Plant of *Zayela Govindia*

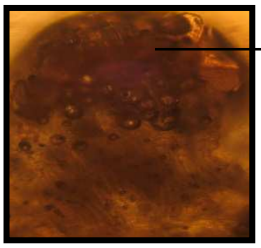
MICROSCOPICAL STUDIES:

Microscopy of leaf material was performed and results are shown in **Figure 2,3,4,5, and 6**

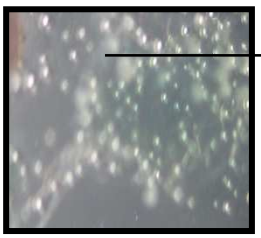
2. T.S With safranin



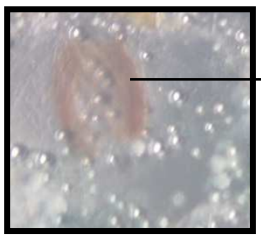
3. T.S With acetic acid



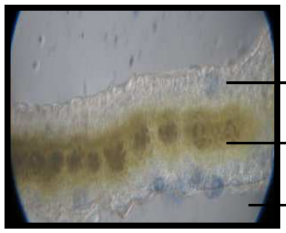
4(a) T. S of leaf with sulphuric acid



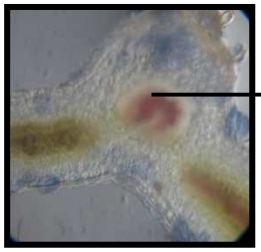
(b)



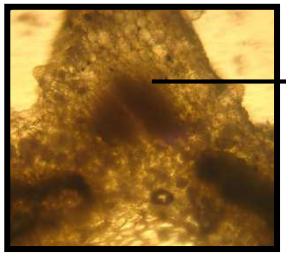
5. (a).T.S of leaf with phloroglucinol



(b)



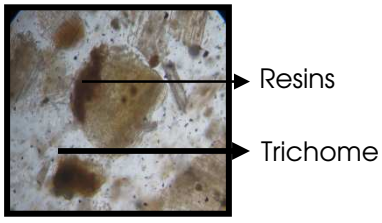
6. T.S Of leaf with Iodine Solution



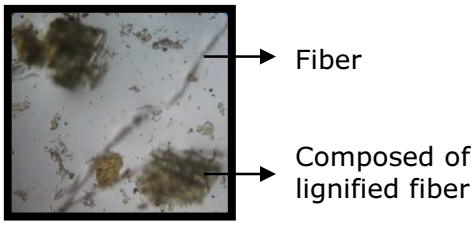
POWDER MICROSCOPY

Powder microscopy was performed treating fine powder with different reagents as shown in **Figure: 7, 8, 9, 10, 11 and 12.**

(7) With sudan red



(8) With iodine

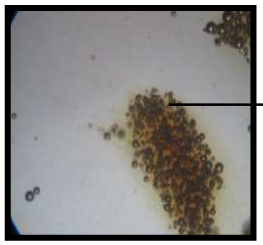


(9) With iodine

(10) With rhuthenium red

(11) With acetic acid

(12) With sulphuric acid



QUANTITATIVE POWDER MICROSCOPY:

Quantitative powder microscopy was performed treating fine powder with different reagents as shown in Figure: 13, 14.

Figure 13

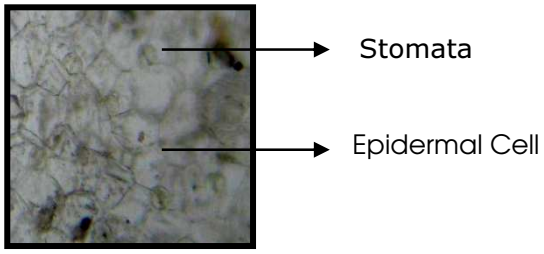
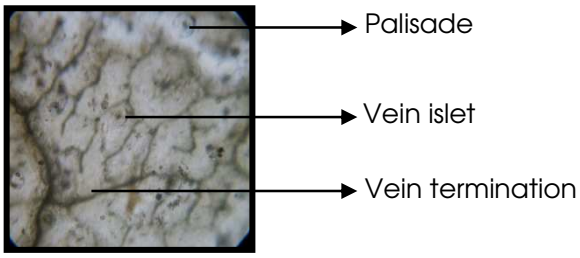


Figure 14



Quantitative microscopy parameters

S. No.	Parameters	Z. govnia Leaf
1.	Stomatal Number Upper Epidermis Lower Epidermis	6 18 20
2.	Stomatal Index Upper Epidermis Lower Epidermis	25 25 25
3.	Vein Termination Number	15
4.	Vein islet Number	8
5.	Palisade Ratio	6 to7

Determination of fluorescence character:

Fluorescence characters of powdered leaf material with different chemical reagents were determined under ordinary and ultraviolet light as shown in **Table: 2**

Table 2: Fluorescence Characters of leaf of *Zayela Govindia*

S. No.	Solvents	Visible	Short UV	Long UV
1.	Powder	Light green colour	Light green colour	Green colour
2.	P+Water	Light dark colour	Light green colour	Green colour
3.	P+5% KOH	Dark green colour	Green colour	Green fluorescence
4.	P+5% NaOH	Dark green colour	Light green colour	Green fluorescence
5.	P+5% $Fecl_3$	Light green colour	Light green colour	Green fluorescence
6.	P+Iodine	Dark brown colour	Light green colour	Green fluorescence
7.	P+Dil.H_2SO_4	Light brown colour	Light green colour	Green fluorescence
8.	P+Con.H_2SO_4	Light yellow fluorescence	Green fluorescence	Green fluorescence
9.	P+Dil.HCl	Light green colour	Green fluorescence	Green fluorescence
10.	P+Con.HCl	Light brown colour	Light green colour	Green fluorescence
11.	P+Dil.HNO_3	Light brown colour	Light green colour	Light green fluorescence
12.	P+Con.HNO_3	Light brown colour	Light green colour	Green colour
13.	P+Ammonia	Light brown colour	Dark green colour	Green colour
14.	P+Ethanol	Light brown colour	Dark brown colour	Light white fluorescence
15.	P+Methanol	Light green colour	Light green colour	White fluorescence

DETERMINATION OF PHYSICOCHEMICAL PARAMETERS:

Different physicochemical parameters were performed and results are shown in **Table: 3**

Table 3: Physicochemical Parameters of leaf of *Zayela Govindia.*

S. No.	Parameters	*Z.govinda leaf* (%w/w)
1	LOD	16.16
2	Total Ash	23.25
3	Water soluble Ash	15
4	Acid insoluble Ash	5
5	Water soluble extractive value	32
6	Alcohol soluble extractive value	13.33
7	Pet.ether soluble extractive value	1.6
8	Chloroform soluble extractive value	5.33

PHYTOCHEMICAL INVESTIGATION:

Different extracts of leaf were subjected for phytochemical screening as shown in **Table:4.**

Table 4: Phytochemical Investigaion of leaf of *Zayela Govindia*

S. No	Chemical Constituent	*Z.govindia* leaf aqueous extract	*Z.govindia* leaf chloroform extract	*Z.govindia* leaf alcoholic extract	*Z.govindia* leaf Pet.ether extract
1.	Alkaloids	-ve	+ve	+ve	+ve
2.	Glycosides	+ve	+ve	+ve	+ve
3.	Tannins	-ve	+ve	+ve	+ve
4.	Volatile oil	-ve	-ve	-ve	-ve
5.	Carbohydrates	+ve	+ve	+ve	+ve
6.	Proteins	-ve	-ve	-ve	-ve
7.	Resins	-ve	-ve	-ve	-ve
8.	Flavanoids	-ve	-ve	-ve	-ve

Discussion

For the purposes of quality control, assessment of purity and identification of any sample, standardization is very much essential. In the present research, pharmacognostic study, physiochemical analysis, of the leaves of *Zayela govindia* were carried out. Pharmacognostical studies and determination of different physiochemical parameters are very much essential for the standardization of drug and establishing its pharmacological efficacy. Hence, these studies help in identification and authentication of the plant material[16,17,18]. The present work was undertaken to lay down the standards that could be useful for establishing the authenticity of the drug material. The preliminary phytochemical screening will be useful in finding the chemical nature of drug.

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