Phytochemicals, physiochemical composition, and mineral analysis of seeds of *Phyllodium longipes* (Craib) Schindl, Fabaceae

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Abstract

The study investigates phytochemical, physicochemical screening and mineral composition of seeds of *Phyllodium longipes* (Craib) Schindl, Fabaceae a plant traditionally used in medicine for various purposes such as kidney stones, bodily discomfort and cancer. The present study deals with the phytochemical evaluation of secondary metabolites and physiochemical parameters like moisture content ,ash value, and solvent soluble extractive values. Mineral analysis of crude seed extract was also conducted. Phyllodium seeds were physiochemically evaluated in order to establish them as diagnostic indices for the validation of the raw material, which guarantees the medicinal plant's purity, safety, and effectiveness.

Keywords: Phytochemical, Physiochemical, Mineral analysis

1 Introduction

Importance of plant derived drugs and their therapeutic activities has gained much value now a days. Plants contain various classes of compounds with high chemical actions. They gain popularity because of belief in natural products that are safe for consumption and devoid of serious side effects. Herbs, which were easy to gather, were employed as medicinal agents and medicaments by prehistoric humans. Nature has provided an abundant supply of plants that have medicinal properties for all living things. Herbal medicines are naturally occurring plant-derived substances used to cure diseases. These compounds are complex combinations of organic substances derived from any raw or processed plant portion. They are high in secondary metabolites and a potential source of medicines. Some plants' vital values have long been documented, but many more have yet to be discovered. Secondary metabolites such as phenolic compounds, terpenes, alkaloids, glycosides, and other chemicals found in plants are thought to

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contribute to their medicinal properties. They also exhibit a wide range of bioactivities such as antimicrobial, antidiabetic, antioxidant, antihemminthic and other hepatoprotective activities. (Vinayaka KS, 2021)

The genus *Phyllodium longipes*, also referred to as "Fish Scale" or "Dragon's Tongue," belongs to the tribe Desmidieae. Two Greek words make up the genus name: phyllon, which means leaf, and -odio, which means both smallness and similarity. (Jabbour *et.al*.,2018). The major bracts of the inflorescences, which resemble tiny leaves, are referred to by both terms. It is a little, perennial shrub that can reach a height of two meters. The shrub has trifoliate leaves, with the terminal leaflet being much longer than the lateral ones. The leaves are velvety, strongly veined, and covered with brown hair. The stem has thick brown hair and is pubescent. The tiny, barely noticeable white to creamy yellow flowers are held aloft by two green, leaf-like bracts that are grouped. The stem has thick brown hair and is pubescent. The tiny, barely noticeable white to creamy yellow flowers are held aloft by two leaf-like green bracts that are placed along the pendulous blossoming stalk. It has several therapeutic qualities. This plant has long been used extensively in India to cure throat cancer and piles. Applying the leaves directly to wounds can speed up healing, and consuming the shrub's leaf decoction along with banana blossoms can help prevent cancer.(Anjusha *et. al.*, 2022). The decoction made from this plant can be used to treat jaundice and aid women during the postpartum period (Limsuwan *et al*., 2019).

2 Review of literature

The plant's leaf's macroscopic, microscopic, and certain physicochemical characteristics were assessed. (Anjusha,2024). The powdered fruit of *Averhoa carambola* has also undergone preliminary phytochemical examination. As the fruit ripened, the extractive qualities that were soluble in water and alcohol gradually reduced. Alkaloids, flavonoids, saponins, and tannins were found in preliminary phytochemical investigation (Thomas S *et.al*.,2008). The powdered leaves of *Barringtonia acutangula* were found to include terpenes, flavanoids, carbohydrates, tannins, steroids, and glycosides, according to preliminary phytochemical analyses. The presented physico-chemical, morphological, histological, and High Performance-Thin Layer Chromatographic (HPTLC) profile could be suggested as criteria to prove the legitimacy of *B.*

acutangula. It might also be useful in distinguishing the medication from its other species and in determining the pharmacognostic profile of the leaves (Padmavathi D *et.al.,*2011)

3 Methodology

3.1 Plant material

Phyllodium longipes seeds were gathered from several locations within the districts of Kasargod and Kannur. The *P. longipes* seeds were carefully cleaned under running water, allowed to dry in the shade at room temperature, and then ground into a fine powder using a mechanical grinder before being sealed in an airtight container for phytochemical, physicochemical, and mineral examination.

3.2 Preparation of extracts

The dried sample was ground into a coarse powder and put into a thimble, which is then put into the Soxhlet extractor's main chamber. Weighted seed powder was extracted using the solvent's corresponding volume and boiling point. Depending on their increasing polarity, a selection of solvents (water, methanol, hexane, and chloroform) were used for the extraction.

3 Preliminary phytochemical screening and quantitative estimation

Phytochemical tests for Phenol, tannin, flavanoids, glycosides, saponins, terpenoids and steroids were performed on the different extracts using standard methods(Trease and Evans, 2002).

Total phenolic contents were determined by the Folin–Ciocalteu reagent method and expressed in terms of gallic acid equivalent (µg/g of dried sample) (Mallick and Singh,1980). Content of tannins in sample was determined by Folin-Ciocalteu method and expressed in terms of tannic acid equivalent (µg/g of dried sample). Cardiac glycosides develop an orange red colour complex with Baljet's reagent and expressed in terms of digitoxin equivalent (µg/g of dried sample) (Solish P *et.al.,* 1992) .Total alkaloid is estimated based on the reaction with Bromocresol Green (BCG) expressed in terms of digitoxin equivalent (µg/g of dried sample) (Sasikumar *et.al*.,2014).

3.4 Physiochemical analysis

Physicochemical parameters such as ash value, acid soluble ash, moisture content, extractive values were determined according to the procedures mentioned in WHO quality control methods for herbal materials. The solvents used were hexane and methanol.

3.5 Mineral analysis

Macroelements were estimated by standard methods. Sodium, Potassium Calcium is estimated by flame emission spectrometry. The emitted wavelengths of gaseous atom of solubilised ash are specific for specific elements and the intensity determines its concentration. Iron content by Phenanthroline method and Phosphorous is determined by coloured reaction of Ammonium molybdate and antimony potassium tartrate which is proportional to the phosphorus concentration (Subramanian R *et.al.,*2012)

4 Discussion

Extractive values are a vital quality parameter in the standardization and evaluation of herbal medicines, offering an assessment of the drug's potency and the amount of bioactive compounds present and extractable.

To ensure purity and quality, physicochemical analysis also includes measuring the ash content of the crude drug. This measure of inorganic contents helps detect potential contamination or adulteration. Specifically, a high level of acid-insoluble ash suggests significant contamination by inorganic impurities.

The neutraceutical potential of a plant, such as the leaves and bracts of *Phyllodium longipes*, is suggested by its mineral content. Moreover, phytochemical screening of its crude extract reveals the presence of phenolic compounds. These compounds possess strong antioxidant properties because they act as free radical neutralizers, preventing oxidative damage through the donation of electrons or hydrogen atoms.

The application of these analytical methods—covering factors like extractive value, ash content, and phytochemical and mineral content—provides essential preliminary pharmacognostic tools for standardizing drugs and confirming their identity against possible adulterants.

5 Result

5.1 Percentage yield and Phytochemical screening

The sample's physical characteristics, including consistency, colour, and extract yield percentage, were noted.

Table 1: Extraction yield from *Phyllodium longipes* seeds with various solvents.

	Solvent used	Consistency	Extract colour	Yield (%)
Seed	Hexane	Sticky	Yellow	4.7
	Chloroform	Sticky	Green	3.6
	Methanol	Sticky	Yellow	1.8
	Aqueous	Sticky	Dark Brown	1.75

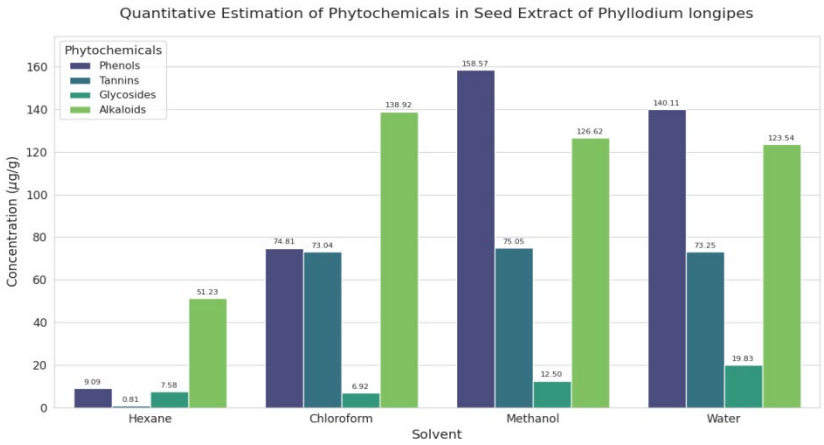
The results of the phytochemical composition of the seeds of *P.longipes* in solvent extracts were given in Table 2

Table 2: Phytochemical analysis of *Phyllodium longipes* seed crude extracts

Sl. No:	Name of test	Seeds			
		Hexane	**Chloroform**	**Methanol**	**Water**
1	Phenol	++	+++	+	+++
2	Tannin	+	+++	++	+++
3	Flavonoid	+	+++	++	+++
4	Saponin	-	+	+	-
5	Terpenoids	+	+	-	++
6	Alkaloid	+	+++	+	+++
7	Glycoside	-	++	++	+++
8	Quinones	+	+++	++	++
9	Fatty acid	-	-	+	-
10	Steroid	+	++	+++	+

Phenol, Tannin, and Flavonoid appear to be the most prevalent groups in the seed extract soluble in Chloroform and water. Alkaloid, Quinones, Glycoside, and Steroid are also significantly abundant. Fatty acid, Saponin, and Terpenoids were detected in low to trace amounts, or were absent in many extracts. '+' marks indicates the intensity of the compound. (Table 2)

5.2 Quantitative estimation of phytochemicals



Methanol extract generally yielded the highest concentrations for Phenols (158.57µg /g) and Tannins (75.05µg/g). Chloroform extract resulted in the highest concentration of Alkaloids (138.92 µg/g).Aqueous extract contained he highest concentration of Glycosides (19.83 µg/g).

5.3 Physiochemical analysis

Extractive values of seeds in petroleum ether was 1.08±0.36%w/w and that in methanol was 4.95±0.47%w/w .Polar compounds seems to be major composition in seeds

Ash content of seeds was 4.35±0.08%w/w. Acid soluble ash was 2.05±0.19%w/w s. Foreign matter was negligible.

Moisture content of seeds was 14.75±0.92%w/w. High moisture content of crude can affect the drug's shelf life.

5.4 Mineral analysis

Seeds found to have comparatively higher amount of Potassium and calcium, and relatively low amount of Sodium and iron. Phosphorous seen only in trace amounts**.**

Table 4: Mineral composition of seeds of P.Longipes

Na	14.14±0.86 mg/100g
K	273.01±2.09mg/100g
Ca	55.95±0.83 mg/100g
Fe	14.69±1.07 mg/100g
P	0.019±0.008mg/100g

6 Conclusion

The phytochemical analysis of *P. longipes* seeds revealed a rich composition, with phenols, flavonoids, and tannins present in abundance, and alkaloids, glycosides, quinones, and steroids found in adequate amounts. This chemical profile lends support to the traditional use of the plant for treating various ailments. The data collected on the chemical constituents and physicochemical characteristics of *P. longipes* seeds is essential. This information will be beneficial for standardization and the successful formulation of herbal drugs designed to treat a range of diseases.

References

1. Anjusha, P. V. (2024). Pharmacognostical and preliminary phytochemical studies on the leaves of *Desmodium longipes* (C.) Schindl. *World Journal of Pharmaceutical and Medical Research (WJPMR)*.
2. Jabbour, F., Gaudeul, M., Lambourdière, J., Ramstein, G., Hassanin, A., Labat, J. N., & Sarthou, C. (2018). Phylogeny, biogeography and character evolution in the tribe Desmodieae (Fabaceae: Papilionoideae), with special emphasis on the New Caledonian endemic genera. *Molecular Phylogenetics and Evolution, 118*, 108–121.
3. Kokate, C. K. (1991). *Practical pharmacognosy* (3rd ed., pp. 107–121). Vallabh Prakashan.
4. Limsuwan, S., Nimlamool, W., Khuntirat, B., & Srithi, K. (2019). Ethnobotanical study of the Karen in northern Thailand: Medicinal plants used in women's healthcare. *Plants, 8*(12), 600.
5. Malik, C. P., & Singh, M. B. (1980). *Plant enzymology and histoenzymology* (p. 286). Kalyani Publishers.
6. Padmavathi, D., Susheela, L., & Bharathi, R. V. (2011). Pharmacognostical evaluation of *Barringtonia acutangula* leaf. *International Journal of Ayurvedic Research, 2*(1), 37–41.
7. Rao, C. V., Ravishankar, B., & Mehrotra, S. (2004). [Title not provided]. *Journal of Ethnopharmacology, 95*, 259–263.

8. Sasi Kumar, R., Balasubramanian, P., Govindaraj, P., & Krishnaveni, T. (2014). [Title not provided]. *Journal of Pharmacognosy and Phytochemistry, 2*(6), 74–78.
9. Solich, P., Sedliakova, V., & Karlicek, R. (1992). Spectrophotometric determination of cardiac glycosides by flow-injection analysis. *Analytica Chimica Acta, 269*(2), 199–203.
10. Soni, H., Nayak, G., Patel, S. S., Mishra, K., Singh, R. V., & Singhai, A. K. (2011). Pharmacognostic studies of the leaves of *Tinospora cordifolia*. *IJPI's Journal of Pharmaceutical Herbal Formulations, 1*(3).
11. Subramanian, R., Gayathri, S., Rathnavel, C., & Raj, V. (2012). Analysis of mineral and heavy metals in some medicinal plants collected from local market. *Asian Pacific Journal of Tropical Biomedicine*, 74–78.
12. Thomas, S., Patil, D. A., Patil, A. G., & Chandra, N. (2008). Pharmacognostic evaluation and physicochemical analysis of *Averrhoa carambola* L. fruit. *Journal of Herbal Medicine and Toxicology, 2*(2), 51–54.
13. Trease, G. E., & Evans, W. C. (2002). *Pharmacognosy* (15th ed.). Bailliere Tindall.
14. Vinayaka, K. S., & Ramesh, H. (2021). *Ethnomedicinal uses, phytochemistry and pharmacological activities of Phyllodium pulchellum (L.) Desv.: A review*. Akinik Publications.
15. Wallis, T. E. (1985). *Textbook of pharmacognosy* (pp. 572–575). CBS Publishers.
16. World Health Organization. (1992). *Quality control methods for medicinal plant material* (pp. 22–34). WHO.