

PHARMACOGNOSTIC STANDARDIZATION OF STEMS OF *VANDA ROXBURGHII* ROXB.

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ABSTRACT

Objective: There is an expanding demand of herbal medicines due to their compelling and more secure method for treating different diseases. In the present situation, these drugs are much productive for the treatment of different issues as they have negligible reactions in contrast with the allopathic pharmaceuticals. *Vanda roxburghii* is an epiphytic plant that finds a mention in the indigenous systems of medicines such as Ayurveda and Unani and has been used traditionally in Bangladesh. In the present investigation, various pharmacognostic standards have been investigated to prove the authenticity of the plant for the claimed traditional uses.

Methods: The powdered drug was used for estimating the loss on drying, volatile oil content, ash values, fluorescence studies, extractive values, and phytochemical screening. Macroscopic and microscopic studies were also conducted on the powdered drug.

Results: Phytochemical screening has shown the presence of various phytoconstituents such as glycosides, alkaloids, polyphenols, tannins, steroids, flavonoids, resins, and carbohydrates.

Conclusion: *V. roxburghii* has been found to be useful as aphrodisiac, antibacterial, antifungal, antiulcer, anticonvulsant, and antioxidant agent. The present study provides the information on pharmacognostic characteristics, phytochemical screening, and physicochemical parameters.

Keywords: *Vanda roxburghii*, Orchidaceae, Phytochemical screening, Epiphytic.

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INTRODUCTION

Vanda roxburghii Roxb. (Synonym - *Vanda tessellata*) is a medicinal epiphytic perennial plant from family Orchidaceae found in the Indian subcontinent [1]. The plant is commonly known as Rasna [2]. Orchids are the biggest and the most differing bunch among the angiosperms. They are developed for delightful blossoms [3]. Ayurveda and Unani practitioners have used different parts of the plant for the treatment of various ailments. Various parts of this plant have been used in hiccup, piles and boils on the scalp, secondary syphilis, and scorpion sting [1]. The plant has been utilized as antipyretic, sexual stimulant, alexiteric, and also in inflammation, bronchitis, rheumatism, and in nervous disorders [4]. The plant also forms an ingredient of an ayurvedic formulation Rasna Panchaka Quatha, which is used in the treatment of arthritis and rheumatism. The roots are used as antidote against scorpion sting and as a remedy for bronchitis [5]. In Bangladesh, the roots of the plant have been used as brain tonic and in the treatment of nervous system disorders including Alzheimer's disease [6]. Important constituents of the plant are alkaloids, glycosides, bitter principles, tannins, resins, saponins, sitosterols, and coloring matter. The plant has been screened for various biological activities and has given productive outcomes. *V. roxburghii* has been observed to be valuable as antibacterial, antifungal, antiulcer, anticonvulsant, and cell reinforcement specialist. The plant has additionally been tried for hepatoprotective, mitigating, wound healing, antinociceptive, pain relieving, and antidiabetic properties [7].

Geographical source

The plant is widely distributed in tropical Asiatic and Australian zones (Fig. 1). It is found in West Bengal, Bihar, Central Provinces, and West Peninsula [8].

Taxonomical classification [9]

Kingdom	Plantae
Subkingdom	Tracheobionta
Superdivision	Spermatophyta
Division	Magnoliophyta
Class	Liliopsida
Order	Orchidales
Family	Orchidaceae
Genus	Vanda
Species	Roxburghii

Synonyms [10]

Language	Common names of drug
Sanskrit	Rasna, Vandaka
Bengali	Rasna
Gujarati	Rasna
Hindi	Vanda
Kannada	Banda Nike
Telugu	Van Danika

Macroscopic characters

The stems of the plant are climbing in nature, woody, stout, and give out many thick fleshy roots. Stems are 1-2 m long and cylindrical having distinct nodes and internodes [10].

METHODS

The stems of *V. roxburghii* were purchased from Burdwan Eco Garden, Kolkata, West Bengal, India, and identified by Dr. Ambarish Mukherjee, Centre for Advanced Study, Department of Botany, The University of Burdwan, Golapbag, Burdwan. The stems were washed thoroughly with

tap water, then shade dried, homogenized to fine powder, and stored in airtight bottles.

Transverse section (TS) of the stem was cut to study its histological characters. Powdered drug was used for the determination of moisture content, volatile oil content, and ash values, and fluorescence studies were conducted by treating the powdered drug (0.5 g) with different reagents, and the color was observed in visible light, ultraviolet (UV) light of short (254 nm), and long wavelength (365 nm) under UV chamber. Photomicrography was done using Olympus C7070 camera [11].

RESULTS AND DISCUSSION

Microscopical examination of stem

The TS of stem showed epidermis with a thick cuticle and ground parenchymatous tissue. The ground tissue contained scattered vascular bundles. The vascular bundles consisted strands of xylem and phloem. The extremities were thick and lignified. The TS of stem of *V. roxburghii* is represented in Fig. 2.

Microscopical examination of powdered stem

The stem powder was examined under microscope, and prisms of calcium oxalate, pitted xylem vessels, vascular bundles, and trichomes were observed and shown in Figs. 3-6.

Preliminary phytochemical screening

Preliminary phytochemical screening was carried out according to the standard procedures [12]. Various phytochemical tests were performed to check the presence of alkaloids, glycosides, carbohydrates, flavonoids, and tannins in the plant extracts. The results of phytochemical

screening have shown the presence of various phytoconstituents such as flavonoids, carbohydrates, tannins, alkaloids, phenols, and saponins; the results are given in Table 1.

Fluorescence studies of powdered drug

The fluorescence characteristics of stem powder were studied in visible light and UV light (254 and 365 nm) after treatment with various reagents. The results are represented in Table 2 [13].

Physicochemical parameters

The physicochemical parameters are mainly used to judge the purity and quality of the drug. The ash values of a drug give an idea of the earthy matter or inorganic composition or other impurities. The loss on drying at 105°C in stem was found to be 7.43±0.5%. The total ash value was found to be 2.38±0.07%, whereas the acid insoluble ash and the water-soluble ash value were found to be 0.65±0.05% and 0.62±0.04%, respectively. Extractive values give an idea about the chemical composition of the drug and are also useful in the determination of exhausted or adulterated drugs. The extractive values of *V. roxburghii* petroleum ether, dichloromethane, ethanol, and water extract were found to be 1.3% w/w, 2.32% w/w, 3.32% w/w, and 3.18% w/w, respectively. The volatile oil content found in the powdered stems was 1.57% w/w. The results are represented in Table 3.

Extraction of phytoconstituents

The dried stems were powdered and extracted with petroleum ether, dichloromethane, ethanol, and water in Soxhlet apparatus. The percentage yield was determined. The results are given in Table 4.



Fig. 1: *Vanda roxburghii*

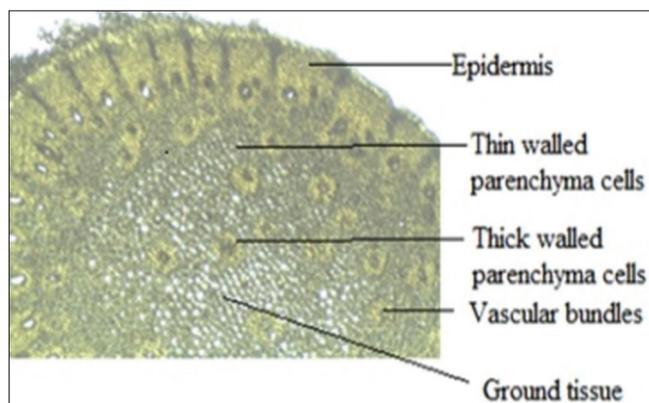


Fig. 2: T.S. *Vanda roxburghii* stem

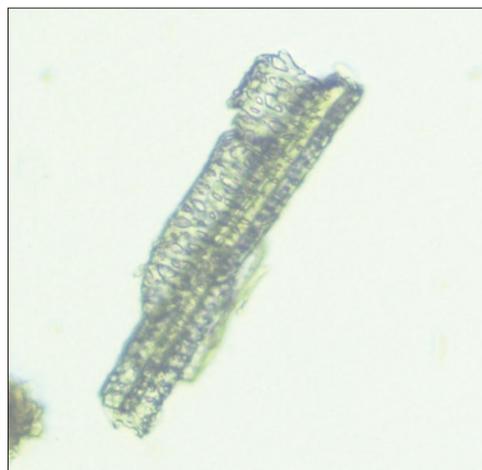


Fig. 3: Xylem vessels



Fig. 4: Calcium oxalate crystals

Table 1: Phytochemical screening tests of *V. roxburghii*

Phytoconstituent	Chemical test	Pet ether extract	Dichloromethane extract	Ethanol extract	Water extract
Alkaloids	Dragendorff's test	-	-	+	+
	Mayer's test	-	-	+	+
	Hager's test	-	-	+	+
	Wagner's test	-	-	+	+
Tannins	5% FeCl ₃	-	+	+	-
	Lead acetate test	-	+	+	-
Steroids	Salkowski reaction	-	-	+	-
	LiebermannBurchard reaction	-	-	+	-
Flavonoids	Shinoda test	-	+	+	+
	Lead acetate test	-	+	+	+
	NaOH test	-	+	+	+
Carbohydrates	Molisch's test	-	-	+	+
	Fehling's test	-	-	+	+
	Benedict's test	-	-	+	+
	Froth test	-	-	-	-
Saponin glycosides					
Anthraquinones	Borntrager's test	-	-	+	+
	Modified Borntrager's test	-	-	-	+
Cardiac glycosides	Baljet test	-	-	-	-
	Legal's test	-	-	-	-
	Keller-Killiani test	-	-	-	-
	Sodium picrate test	-	-	-	-
Cyanogenetic glycosides					
Proteins	Biuret test	-	+	+	-
	Millon's test	-	-	-	-
Amino acids	Ninhydrin test	-	-	-	-
	Tyrosine test	-	-	-	-

V. roxburghii: *Vanda roxburghii*

Table 2: Fluorescence analysis of *V. roxburghii*

Material/treatment	Observation under UV cabinet		
	Visible light	Short UV 254 nm	Long UV 365 nm
Drug powder as such	Greenish brown	Brown	Brown
Powder treated with concentrated ethanol	Greenish brown	Brown	Dark brown
Powder treated with petroleum ether	Light green	Green	Green
Powder treated with distilled water	Dark green	Dark brown	Dark brown
Powder mounted in nitrocellulose	Greenish violet	Violet	Violet
Powder treated with NaOH in methanol	Green	Dirty green	Dirty green
Powder treated with NaOH in methanol and mounted in nitrocellulose	Green	Greenish violet	Violet

V. roxburghii: *Vanda roxburghii*

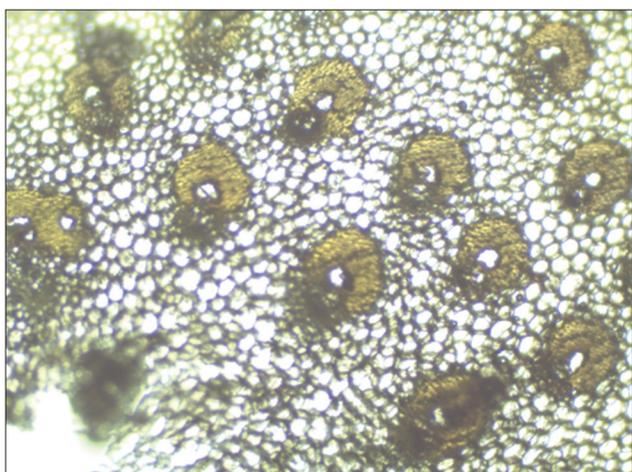


Fig. 5: Vascular bundles in the stem



Fig. 6: Trichome

CONCLUSIONS

Preliminary phytochemical screening and physicochemical investigations of *V. roxburghii* were performed in this study. These

parameters are necessary for the identification of drugs and investigation of the bioactive constituents in medicinal herbs [14]. The presence of various chemical constituents in *V. roxburghii* may be a potential cause of treatment of various disorders. The quality of

Table 3: Physiochemical parameters

Parameters	Values (% w/w)	Values (% w/w)	Values (% w/w)	Mean±SD (%w/w)
Loss on drying	7.30	8.0	7.0	7.43±0.5
Content of volatile oil	1.82	1.90	1.0	1.57±0.49
Total ash value	2.44	2.30	2.40	2.38±0.07
Water soluble ash	0.62	0.58	0.66	0.62±0.04
Acid insoluble ash	0.65	0.60	0.70	0.65±0.05

Table 4: Evaluation of extracts

Extract	Color of extract	Extractive value (% w/w)
Petroleum ether	Light green	1.3
Dichloromethane	Greenish brown	2.32
Ethanol	Dark brown	3.32
Water	Dark brown	3.18

the plant can be estimated by determining the physical parameters. These investigations are of great importance for carrying out the revalidation and estimation of its other pharmacological activities. It was concluded from the phytochemical study that the ethanolic extract contains flavonoids, glycosides, carbohydrates, and tannins which are responsible for various pharmacological activities such as anti-inflammatory, chemoprotective activity, antioxidant, antidiabetic, antianxiety, and antidepressant. The pharmacognostical standardization of the plant expresses idea about identification, physical evaluation, and monograph of plant. The present study on pharmacognostical characters of *V. roxburghii* may be helpful to supplement information with regard to identification and useful in establishing the standardization criteria.

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