

Phytochemical Screening and Anti-microbial Activity Of Leaves And Rhizomes of *Acoruscalamus* Linn.

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Abstract-The present communication attempts to evaluate the comparative Phytochemical screening and Anti-microbial activity of leaves and rhizomes of *Acoruscalamus* Linn. (Araceae family). *Acoruscalamus* Linn. is a well-known medicinal plant in traditional medical systems having various ethanopharmacological uses. As the official source of plant was roots and rhizomes and it had been studied extensively. Previously leaves of *Acoruscalamus* were not regarded as useful part of plant, but now-a-days there is growing interest in leaves of this plant as there is no detailed work reported so far on its leaves. Antimicrobial activity was performed using methanolic and aqueous extract through cold percolation method against *Staphylococcus aureus*, *Pseudomonas aeruginosa*, *Escherichia coli* and *Salmonella typhi*. The extract was found to have positive results against all.

Keywords: *Acoruscalamus* Linn., Methanolic extract aqueous extract, Antimicrobial activity.

Introduction

Acorus calamus Linn. is semi-aquatic herb with creeping rhizomes and sword shaped long leaves, found near marshy places, river banks and lake.¹ It is up to 6 feet tall, aromatic, sword shaped leaves bearing small yellow/green flowers and branched rhizome. It is widely distributed throughout India and Ceylon, in marshes, wild or cultivated, ascending the Himalayas up to 6000 feet in Sikkim, marshy tracts of Kashmir and Sirmoor in Manipur and Naga

Hills.² The roots and rhizomes of *Acoruscalamus* Linn. are used medicinally since ancient times. They possess antispasmodic, carminative and anthelmintic properties and are also used for the treatment of epilepsy, mental ailments, chronic diarrhea, dysentery, bronchial catarrh, fever and glandular and abdominal tumours.^{3,4} They are also employed for kidney and liver troubles, rheumatism, sinusitis, eczema and anti-cellular activities.⁵ Recently roots and rhizomes identified as antibacterial agent against fish pathogen⁶ and also shows insulin sensitizing activity.⁷ Whereas mature green leaves exhibit various activities including insect repellent, when cut and stored with dry foods⁸, antihyperlipidemic activity, anti-diabetic activity⁹, antipsychotic activity¹⁰, antimicrobial and analgesic actions.¹¹ As we all know that it is increasingly being realized that majority of the diseases today are due to the shift in the balance of pro-oxidant and the antioxidant homeostatic phenomenon in the body. Keeping in view of the above observations, in the present study, methanolic and aqueous extract of leaf and rhizome of the plant were subjected to evaluate the comparative Phytochemical Screening and Anti-microbial activity.

Material and Methods

Leaves and rhizomes of *Acorus calamus* Linn. were collected from locality of Faridabad, Haryana. Plant material was authenticated by **Dr. Maya Ram Uniyal** (Ex. Advisor medicinal plant UP/UK).

Chemicals- 10% aqueous (DMSO) Dimethyl sulfoxide, (Ofloxacin (4 µg/ml).

Methodology¹⁵

Zone of inhibition (Diffusion Method)-The dried extract was dissolved in 10% aqueous dimethylsulfoxide (DMSO) to a final concentration of 500mg/ml and sterilized by filtration through a 0.45µm membrane filter. Antibacterial activity was determined by agar well diffusion method. Bacteria were cultured at 30°C for 24 hrs in Muller Hinton Broth (MHB, Hi-media). An inoculum consisting of 10⁶CFU/ml was used. Antibiotics such as Ofloxacin (4µg/ml) and solvent 10% DMSO without the test compound were used as positive and negative controls respectively. The tests were conducted in triplicate.

Determination of minimum inhibitory Concentration

The minimum inhibitory concentration (MIC) of the methanol extract was evaluated by Tube dilution method. The methanol

extract MIC was determined by dilution of the extract to various concentrations (15.625-500mg/ml). All the tubes were incubated to suitable temperature for 18-24hrs. The tubes were observed for any growth. The MIC was interpreted as the lowest concentration of the extract that did not show any visible growth when compared with control tubes.

Results And Discussions

Results obtained from the present study show that the leaf and rhizomes of *Acorus calamus* Linn. contain alkaloids, saponins, terpenoids, flavonoids, resins, essential oil, carbohydrate and tannin,. Results are reported in Table-1 and 2. Phytochemical screening of successive fractions from Soxhlet: (+) shows presence, and (-) shows absence of content.

Table-1 Phytochemical Screening of Leaf of *Acoruscalamus* Linn.

S. No.	Constituents	Tests	Hexane	Chloroform	Ethylacetate	Methanol	Water
01.	Carbohydrates	Bendict's test	+	+	+	+	+
		Molisch's test	+	+	+	+	+
		Caramelisation	+	+	+	+	+
02.	Glycosides	Fehling test	-	+	+	+	+
03.	Steroids	Libermannburchard test	+	+	+	-	-
		Salkowski reaction	+	+	-	-	-
04.	Proteins & Amino-acids	Biurete test	-	-	-	+	+
		Ninhydrin	-	-	-	-	+
05.	Saponins	Foam test	-	-	-	+	+
06.	Tannins	FeCl ₃ test	+	+	+	+	+
		Alkaline reagent test	-	-	+	+	+
		Vanilin hydrochloride test	-	-	-	+	+
07.	Triterpenoids	Libermannburchard test	+	+	+	-	-
08.	Alkaloids	Dragndroff's test	-	-	-	-	-
		Mayer's test	-	-	-	-	-
09.	Resin	Resin	-	-	-	-	-
10.	Flavonoids	Alkaline reagent test	-	+	+	+	+
		Shinod'a test	-	-	+	+	+

Table-2 Phytochemical Screening of Rhizome of *Acoruscalamus* Linn

S. No.	Constituents	Tests	Hexane	Chloroform	Ethylacetate	Methanol	Water
01.	Carbohydrates	Benedict's test	+	+	+	+	+
		Molisch's test	+	+	+	+	+
		Caramelisation	+	+	+	+	+
02.	Glycosides	Fehling test	-	+	+	+	+
03.	Steroids	Liebermannburchard test	+	+	+	-	-
		Salkowski reaction	+	+	-	-	-
04.	Proteins & Amino-acids	Biurete test	-	-	-	+	+
		Ninhydrin	-	-	-	-	+
05.	Saponins	Foam test	-	-	-	+	+
06.	Tannins	FeCl ₃ test	+	+	+	+	+
		Alkaline reagent test	-	-	+	+	+
		Vanilin hydrochloride test	-	-	-	+	+
07.	Triterpenoids	Liebermannburchard test	+	+	+	-	-
08.	Alkaloids	Dragndroff's test	-	-	-	-	-
		Mayer's test	-	-	-	-	-
09.	Resin	Resin	-	-	-	-	-
10.	Flavonoids	Alkaline reagent test	-	+	+	+	+
		Shinod'a test	-	-	+	+	+

Antimicrobial Activity (Cup Plate Method)**Table-3 Zone of inhibition (mm)**

Sample	<i>E. coli</i>	<i>Staph. aureus</i>	<i>P. aeruginosa</i>	<i>Sal. typh</i>
Methanolic Extract of leaves	20	23	18	16
Aqueous Extract of leaves	14	19	17	15
Methanolic Extract of rhizome	22	30	20	17
Aqueous Extract of rhizome	12	17	15	11
Ofloxacin (+Ve Control)	28	30	24	22

Table-4 Minimum Inhibitory Concentration (mg/ml) of Extract

Sample	<i>E. coli</i>	<i>Staph. aureus</i>	<i>P. aeruginosa</i>	<i>Sal. typh</i>
Methanolic Extract of leaves	20	23	18	16
Aqueous Extract of leaves	14	19	17	15
Methanolic Extract of rhizome	22	25	20	18
Aqueous Extract of rhizome	12	14	16	12

Conclusion

It could be concluded that the methanolic and aqueous extract of *Acoruscalamus* Linn leaves and rhizomes have potentially good antimicrobial activity. The tested extracts of *Acoruscalamus* have shown antimicrobial efficacy against most of microbes examined. Differential antimicrobial activity of extracts against different bacteria might be due to present of different active phytochemicals. Among those antimicrobial compounds, phenolic compounds

terpenoids, and alkaloids are very important compounds in antimicrobial effects. Further study is required to determine the different active compounds from these under-utilized tropical fruits and their full spectrum of efficacy. These resources have the prospect of finding new clinically efficient antimicrobial compounds and the knowledge can be extended for future investigation into the field.

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