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Phytochemical Screening of Rhizome-Nelumbo nucifera, Gaertn.; (Family- Nymphaeaceae)

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Abstract: Herbal medicines are valuable as well as a precious gift of nature. They have established their existence even before the human being made their existence in earth. Plants have been known as a traditional source of medicine because they contain secondary metabolites of high chemical diversity. Phytochemicals are the chemicals that are present naturally in plants. Nowadays the phytochemicals become more and more popular due to their important medicinal uses. The medicinal properties of phytochemicals play a vital role in many treatments for diseases. Phytochemistry deals with the knowledge of bioactive natural products or phytochemicals isolated from natural products. They have a beneficial effect on human health and play an important role in the treatment of diseases. The rhizomes of lotus are consumed as a vegetable in Asian countries. They are used as health foods because of their mineral content. The present study aims to find out the phytochemical constituents present in the ethanol and methanol extract of lotus rhizome.

Keywords: Nelumbo, Rhizome, Secondary metabolites

I. INTRODUCTION

Herbal medicines are valuable as well as a precious gift of nature. They have established their existence even before the human being made their existence in earth. Plants have been known as a traditional source of medicine because they contain secondary metabolites of high chemical diversity. Phytochemical diversity is one among several important factors that has given rise the interest in natural products research. Pharmaceutical industries view plant wealth as a source of income. The medicinal plants have a huge demand due to the easy availabilities and actions without any side effects. So it has increasing value in all over the world. According to World Health Organization (WHO), about 85% of traditional used for the primary healthcare are derived from plants. Over 7500 plant species are used by 4635 communities for human and veterinary healthcare. It is estimated that of 20,000 species of agricultural form in India alone, about 9,500 species are of ethno-botanical importance. India is tenth among the plant rich countries of the world and fourth among the Asian countries.

II. MATERIALS AND METHODS

A. Study Area: (Plate 1 and 2)

Thirunavaya is a town situated 8 km south of Tirur in Malappuram district, Kerala. Yearly average rainfall of the census town is 2769 mm. Maximum temperature here reaches up to 32°C and minimum temperature goes down to 25°C. The north-west monsoon season is between October-November. Soil type is loamy sand soil.

Plate 1- Location map

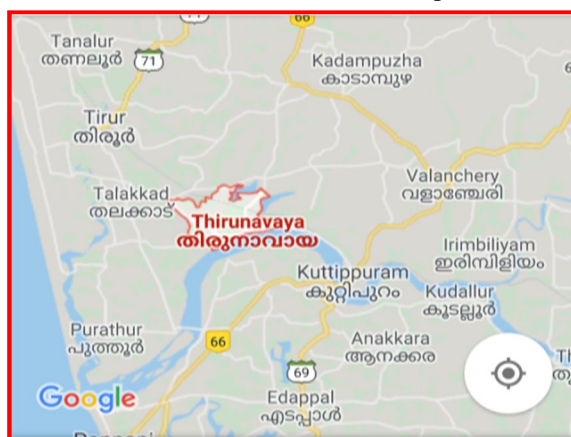


Plate 2- Study area



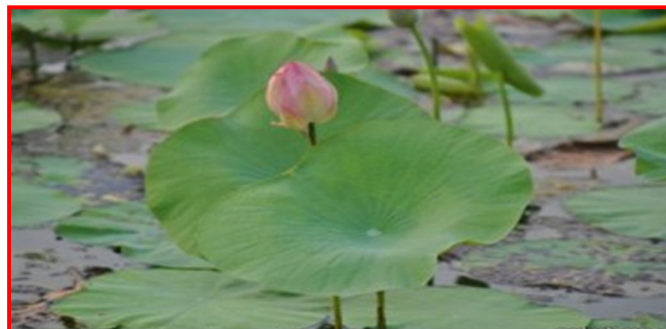
B. Selected Sample: (Plate-3)

For the present study the sample is selected from Thirunavaya town, Malappuram, to find out the phytochemical activities. The whole plant is collected for the study. Plant sample were collected during in the month of November. After collecting, the plant sample is washed gently under tap water to remove mud and small water bugs.

Systematic Position

Plate: 3- Habit of selected sample

Kingdom : Plantae
 Clade : Angiosperms
 Clade : Eudicots
 Order : Proteales
 Family : Nelumbonaceae
 Genus : Nelumbo
 Species : *N. Nucifera*, Gaertn.;



C. Distribution

- 1) *N. Nucifera Gaertn.*; is native to Asia and flourishes in a wide range of climates from India to China. It is an aquatic perennial. It is commonly called as sacred Lotus, Indian Lotus and sacred water-lily. The roots are implanted in the soil of a river or pond, and the leaves float on the surface. Different parts of *N. nucifera*, including the leaves, rhizomes, flowers and seeds have been reported to have therapeutic potential in traditional medicine for the treatment of various diseases.
- 2) *Uses:* The rhizomes of lotus are consumed as a vegetable in Asian countries. They are used as health foods because of their mineral content. Abundant starch grains are present throughout the tissue, which shows no characteristic taste or odor. The flour of lotus rhizome is a good source of dietary proteins and sugars. It possesses appreciable functional properties which give it an advantage of being used in bakery and food products. Lotus rhizome is one of the moderate calorie root vegetables. Around 100g rhizome provides 740 calories. Nevertheless, it composed of many health benefitting phytonutrients, minerals and vitamins. Dietary fiber together with slow digesting complex carbohydrates in the lotus roots help to reduce blood cholesterol, sugar, and body weight and constipation conditions.

III. PRELIMINARY PHYTOCHEMICAL ANALYSIS

A. Preparation Of The Extract

Fresh rhizomes were washed well with running tap water to remove dirt and mud from it and cut into small pieces were dried. The dried samples were powdered using an electrical blender. Fine powder was made transferred into air tight containers with proper labeling for further analysis. 15 grams of the powdered sample was extracted with 100 ml of ethanol and methanol solvents in the shaker system for 48 hours. Then the results were noted and tabulated.

Plate- 4-Rhizome of selected sample



The phytochemical screening of rhizomes with ethanolic and methanolic extract of *N. nucifera* were analyzed by standard methods and it showed various phytochemical constituents (Harbone, 1984 and Wagner et al., 1984).

Table 1- Preliminary phytochemical screening analysis

Phytochemicals	Reagent	Indication
Carbohydrates	2 drops of Molish reagent, 2 ml conc. sulphuric acid	A brick red precipitate
Proteins	3% NaOH & few drops of 1% CuSO ₄	Solution turns from blue to purple
Amino acids	Few drops of 40% NaOH & 10% lead acetate	Black precipitate
Steroids	2 ml chloroform & 2 ml conc. sulphuric acid	Red chloroform layer
Glycosides	Glacial acetic acid, few drops of 5% ferric chloride & conc. sulphuric acid	Reddish brown coloration
Flavonoids	Few drops of 1% ammonia solution	Yellow coloration
Alkaloids	5 ml of 1% aq. HCL & 1ml Mayer's reagent	Yellow colour precipitate
Tannins	1-2 drops of ferric chloride	Blue colour-Gallic tannin
Saponins	2 ml distilled water	Persistent foam
Terpenoids	2 ml chloroform, 3 ml conc. sulphuric acid	Reddish brown precipitate

IV. RESULTS AND DISCUSSION

Preliminary phytochemical analysis of ethanol and methanol extracts of the rhizome of *N. nucifera* were carried out separately after keeping them in a shaker for about 48 hours. The extracts were filtered using a filter paper and the supernatant were collected. The supernatant were used for the phytochemical analysis. Ethanol extract and methanol extract of the rhizome showed the presence of same phytochemical constituents.

Table -3 Phytochemical analysis of Rhizome

S. No	Phytochemical constituents	Ethanol extract	Methanol extract
1	Carbohydrates	+	+
2	Proteins	+	+
3	Amino acids	+	+
4	Steroids	-	-
5	Glycosides	-	-
6	Alkaloids	-	-
7	Tannins	+	+
8	Flavonoids	-	-
9	Saponins	+	+
10	Terpenoids	+	+

+ indicates the presence of constituents

- indicates the absence of constituents

From the preliminary phytochemical analysis of ethanol and methanol extracts of rhizome of *Nelumbo nucifera* showed the presence of many phytochemical constituents. Carbohydrate with a brick red precipitate showed its presence in both ethanol and methanol extracts. Also both extracts showed the presence of protein- with a colour change from blue to purple, amino acid- with a black precipitate, tannins- with a blue colour, saponins- with foam formation, and presence of reddish brown precipitate. Steroids, glycosides, alkaloids and flavonoids were absent in both the ethanol and methanol extracts.

V. CONCLUSION

The selected sample is an aquatic perennial, native to Asia. The rhizome is a modified subterranean stem from which the petioles, peduncles and roots are sending out from its nodes. It is about 75-100cm long and 1-5 cm in diameter. Rhizome is yellowish white to yellowish brown in colour. Phytochemical analysis of lotus rhizome were done to identify the presence of many active constituents like carbohydrate, protein, amino acid, steroids, glycosides, alkaloids, tannins, flavonoids, saponins and terpenoids. The ethanol extract of the rhizome showed the presence of carbohydrates, proteins, amino acids and terpenoids. Steroids, glycosides, alkaloids and flavonoids were said to be absent. Also in the methanol extract of rhizome showed the presence of same phytochemical constituents.

Hence the present study deals with the preliminary phytochemical analysis of the rhizome of *Nelumbo nucifera*. The secondary metabolites are naturally synthesized in almost all parts of the plant body especially rhizome, leaves, flowers, fruits and seeds etc. Common people have to find their way back to the nature and natural medicines. Hence, the present study aims to improve our quality of life, and to increase the social, economical, commercial and aesthetical values of lotus in day to day life. The lotus flowers are much useful in releasing stress, tensions and help to maintain mental health by its attractive appearance. Flower has a sweet fragrance which gives a pleasant atmosphere in religious occasions. There is a large scope for this plant near future to be used in the pharmaceutical industries.

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