International Journal of Science and Research (IJSR)
ISSN: 2319-7064
SJIF (2022): 7.942

Role of Phytochemicals Present in Borassus Flabellifer L. in the Conservation and Preservation of Manuscripts of Tala Patra (B. Flabellifer L.)

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Abstract: ***Phytochemical analysis of plant leaves extract involves the identification and quantification of various bioactive compounds present in the plant material. Thel extract obtained from powdered leaves and further fractions were prepared. Additionally, phytochemicals often work synergetically, contributing to the overall therapeutic effects of the plant extract. In this study, we have chosen Palm Leaves - Tala Patra B flabellifer L. . Mainly the outcome of the study will help to find out the role of phytochemicals in conserving and preserving the tala patra manuscripts.***

Keywords: Phytochemicals, B. flabellifer L., Soxhlet apparatus, Metabolites

1. Introduction

Tala Patra - B. flabellifer L. Manuscripts are the richest collection of written documents in different languages that provide information on the existence of different civilizations and the cultural affluence of the country. It's our prime responsibility that we must preserve the manuscripts. Even if the text manuscripts are printed, it is our duty to look after the manuscripts as a token of gratitude and to get an idea about the amount of strain our forefathers took to pass on the light of knowledge. Accurate identification of the Palm leaves is very essential and important for their safety to assess their potential for further preservation. There are several sub - families of palm are available, but for our study only one genus of palms has selected, i. e., **Borassus flabellifer** L.

Description
Plants have evolved various different defence mechanism (physical, chemical…. . so on) to protect themselves from pathogens, herbivores, and environmental factors/stresses. Among them chemical defence mechanism plays a very important role. Plants produces various small organic molecules through the metabolic processes occurring within plant cells and are referred as Chemical metabolites. These metabolites play crucial roles in the growth, development, defence, and overall functioning of plants.

Primary metabolites; As part of their normal growth, development, and reproduction, plants produce some essential compounds which are necessary for the fundamental roles in basic cellular functions and for the survival of the organism. These compounds are synthesized through various metabolic pathways, including photosynthesis, glycolysis, the citric acid cycle, and the pentose phosphate pathway. Eg; Carbohydrates, proteins, lipids, amino acids, nucleic acids, phytohormones etc.

Secondary metabolites; these are the bioactive naturally occurring chemicals compounds found in various parts of plant (such as leaves, stems, roots, fruits, and seeds) which can be toxic or unpalatable to herbivores and pathogens.

Phytochemicals are the essential secondary metabolites produced by all plants which contribute to the medicinal and nutritional properties of the plant. Borassus flabellifer L. is also produces different phytochemicals. Few common phytochemicals that are often analyzed in plant leaves are Alkaloids. Flavonoids, Tannins, Phenolic compounds, Terpenoids etc.

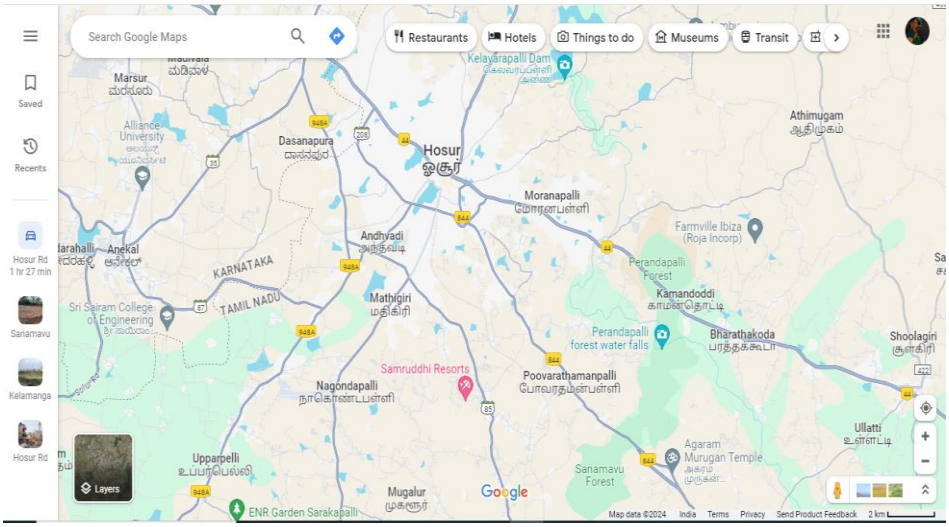
2. Materials and Methods

B. flabellifer L. leaves are the selected plant sample which were collected from their natural habitats. Their natural habitats include roadsides, open fields, palm tree cultivated land near Bangalore, Tumkur and Hosur.

Historical background collected during field visit;

- Many information was collected when visited to the cultivation land of Palm tree near Hosur and Kelamangalam from the farmers;
- The Palm tree grows up to 30 meters and has a maximum life span of 100 years.
- From 15 years farmers growing palm tree in the area with plenty of water.
- In the located area many farmers worship the tree as **"Karpakatharu**" in Tamil means a wish tree in English. They have given the name because of the economic usage of the entire parts of the plant and it has the capacity to withstand extreme drought and also climate change.

Source of Plant leaves collection;
Palm tree leaves samples were collected from the selected species by frequent visit to their natural habitats in and around different localities of Bangalore and also from Hosur, Kelamangalam, Bodasandram, Moranapalli, Sanamavu of Tamil Nadu for preliminary studies, collection was made by hand were used to study morphological features.



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Location region of sample collection

Morphological identification of collected leaves sample:

Color	Green
Texture	Hard and powdery
Size	Older mature leaves - 94cm
	Medium leaves - 40cm
	Younger small leaves - 34cm
Weight	233.08gms

Surface characteristics of Tala Patra;

Particulars	Detail
Texture	Hard and powdery
Size	Older mature leaves - 94cm
	Medium leaves - 40cm
	Younger small leaves - 34cm
Shape	Long
Color/Pigmentation	Light green color
Margins/Edge	Rough sharp edge
Elevation	Flat hard surface

Surface sterilization of leaves sample;
The leaves were cleaned with Distilled water to remove the dust particles. Then with 70% alcohol to remove any surface microorganisms, if presents to get a cleaned and sterilized sample for further study.

Figure 1: B. flabellifer L leaves

3. Research Methodology

Preparation of leaf extracts;
The collected leaves were cut into small pieces after shade dried at room temperature. Then the leaves powdered using a grinder and sieved manually to get the fine powder of the leaves of B. flabellifer. Then taken to laboratory for the extraction.

Figure 2

Figure 3

Small pieces of B. flabellifer L. leaves Powdered leaves sample of B. flabellifer L.

Methanol Soxhlet extraction

The powdered samples were subjected for the extraction of secondary metabolites with methanol.40g of powdered sample was filled in a Whatmann filter paper and placed inside timble.200mL of the solvent was added in timble. The timble was fit into a round bottom flask containing 700mL of the solvent and run for 6 - 8 hours at the temperature based on the boiling point of the respective solvent using soxhlet apparatus. Later the extract was subjected for the distillation for 2 - 3 hours. The extract was placed in hot air oven at 40ºC for drying. The dried extract thus obtained were used for various analysis.

Figure 4: Soxhlet apparatus for the extraction of leaves sample.

Preliminary phytochemical screening

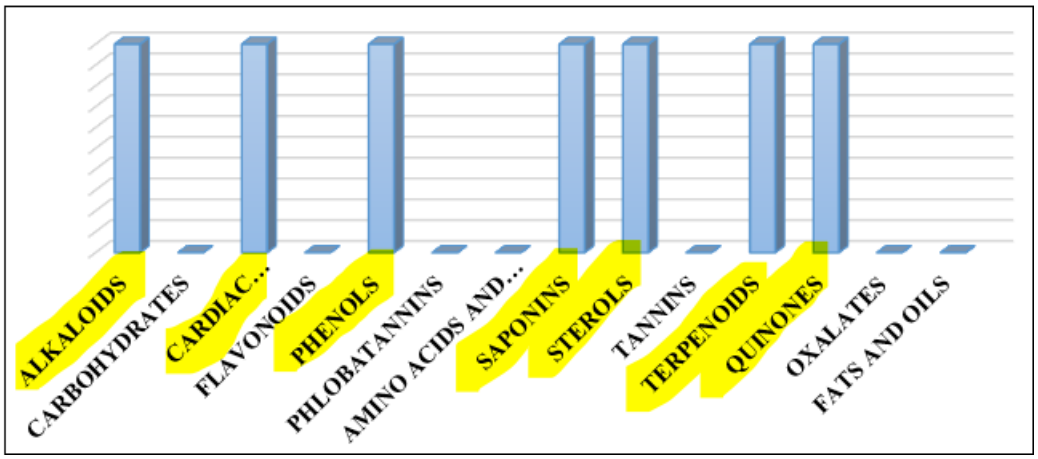
1) **Test for Alkaloids (Wagner's reagent)**
   A fraction of extract was treated with 3 - 5drops of Wagner's reagent [1.27g of iodine and 2g of potassium iodide in 100ml of water] and observed for the formation of reddish - brown precipitate (or colouration).
2) **Test for Cardiac glycosides (Keller Kelliani's test)**
   5ml of each extract was treated with 2ml of glacial acetic acid in a test tube and a drop of ferric chloride solution was added to it. This was carefully underlayed with 1ml concentrated sulphuric acid. A brown ring at the interface indicated the presence of deoxysugar characteristic of cardenolides. A violet ring may appear below the ring while in the acetic acid layer, a greenish ring may form.
3) **Test for Phenols (Ferric chloride test)**
   A fraction of the extracts was treated with aqueous 5% ferric chloride and observed for formation of deep blue or black colour.
4) **Test for Saponins (Foam test)**
   To 2mls of extract was added 6ml of water in a test tube. The mixture was shaken vigorously and observed for the formation of persistent foam that confirms the presence of saponins.
5) **Test for Sterols (Liebermann - Burchard test)**
   1ml of extract was treated with drops of chloroform, acetic anhydride and conc. H_2SO_4 and observed for the formation of dark pink or red colour.
6) **Test for Terpenoids (Salkowki's test)**
   1ml of chloroform was added to 2ml of each extract followed by a few drops of concentrated sulphuric acid. A reddish - brown precipitate produced immediately indicated the presence of terpenoids.
7) **Test for Quinones**
   A small amount of extract was treated with concentrated HCL and observed for the formation of yellow precipitate (or colouration).

4. Result and Discussion

The methanol extract of leaves of Borassus flabellifer L. was analyzed for the presence of major chemical constituents using qualitative phytochemical tests. Extract showed the presence of **alkaloids, cardiac glycosides, phenols, saponins, steroids, terpenoids, and quinones**. Because of the presence of these phytochemicals the Tala patra manuscripts has self defence mechanism which fights against few microorganisms and environmental factors.

Table 1: B. flabellifer L. leaves sample showing the positive result for few phytochemicals.

Tests	Sample 1	Sample 2
Alkaloids	+	+
Carbohydrates	-	-
Cardiac glycosides	+	+
Flavonoids	-	-
Phenols	+	+
Phlobatannins	-	-
Amino acids and proteins	-	-
Saponins	+	+
Sterols	+	+
Tannins	-	-
Terpenoids	+	+
Quinones	+	+
Oxalates	-	-
Fats and oils	-	-



Phytochemicals present in B. flabellifer L. leaf extract.

5. Conclusion

Since the Tala patra (B. flabellifera L.) leaves contains the phytochemicals listed above, the leaves act as self - defence to protect from few microorganisms.

The alkaloids present will naturally maintain the pH of the plant. The presence of cardiac glycoside (steroid hormone) used to treat heart failure and certain irregular heartbeats. The phenol present in the leaves sample which kills few bacteria and fungi and also act as disinfectant and antiseptic. The saponins lower the blood lipids and blood glucose response which in turn reduces the risk of cancer. The plants which produce terpenoids not only protect them against form insects and herbivores but also provide protection from fungal diseases.

Because of plant protecting phytochemicals gained in the B. flabellifer L. leaves sample, considerable interest of researchers working in the field of pharmaceuticals and health sciences have increased. The present study indicated that the Tala patra (B. flabellifer L.) Manuscripts can be conserved and preserved for further more years because of these phytochemicals and also by following the methods using for the purpose.

Acknowledgement

- First and foremost, with the divine grace of God I am able to complete this research work.
- I would like to express my sincere gratitude to Dr. Ramakrishna Bhat, Assistant professor and HOD Department of Manuscriptology, Karnataka Samskrit University, Bangalore
- I would like extend my thanks to the whole faculty and staff of Karnataka Samskrit University for their continuous support.
- Also like to extend my sincere thanks and gratitude to my family and friends for their continues and caring support.

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