

**CHARACTERIZATION OF PHARMACOGNOSTICAL AND PRELIMINARY PHYTO-CHEMICAL FEATURES OF SCAPE PART OF PALAYAMKODAN (*MUSA* × *PARADISIACA*. LINN)****Revathy V¹, Ravikrishna S², Suchitra N Prabhu³, Sreejith K⁴, Chaithra Hebbar⁵**

¹PG scholar, Department of Agadatantra, Shri Dharmasthala Manjunatheshwara college of Ayurveda, Kuthpady, Udupi, 574118, Karnataka, India

²Associate Professor, Department of Agadatantra, Shri Dharmasthala Manjunatheshwara college of Ayurveda, Kuthpady, Udupi, 574118, Karnataka, India

³Senior Research officer, Sri Dharmasthala Manjunatheshwara Centre for Research in Ayurveda & Allied science, Kuthpady, Udupi-574118, Karnataka, India

⁴Assistant professor, Department of Agadatantra, Shri Dharmasthala Manjunatheshwara college of Ayurveda, Kuthpady, Udupi, 574118, Karnataka, India

⁵Professor, Head of the department, Department of Agadatantra, Shri Dharmasthala Manjunatheshwara college of Ayurveda, Kuthpady, Udupi, 574118, Karnataka, India

Corresponding Author: revathyharish5@gmail.com

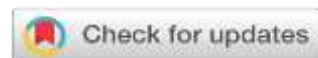
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**ABSTRACT**

Background: *Musa* × *paradisiaca*. Linn is one of the most cultivated crops in India. It is commonly called Plantain. In Ayurveda, it is called *Kadali*. The name itself explains that it attracts everyone owing to its qualities. *Palayankodan* is a variety of *Kadali*/Plantain which is identified as *Musa* × *paradisiaca*. Linn. and it has many medicinal qualities. It is essential to do drug discoveries from natural sources to upshot in a diversified medicine portfolio for human use. The current research is owing to the phytochemical analysis of the Scape juice of *Musa* × *paradisiaca*. Linn.

Aims & Objectives: To do preliminary phytochemical analysis and nutritional value assessment of *Palayamkodan Pindi* (Scape of *Musa × paradisiaca*. linn)

Method: The Scape of *Palayamkodan* was collected and fresh juice is extracted. Phytochemical analysis such as HPTLC, Nutritional value, and preliminary phytochemical analysis have been done.

Results: The phytochemical analysis showed the presence of Alkaloids, saponins, Tannins, Steroids, Coumarins, and Carbohydrates.

Keywords: *Musa × paradisiaca*. Linn, *Palayamkodan*, phytochemical analysis, Scape.

INTRODUCTION

Palayamkodan is a Variety of Plantain which is mostly available in Kerala. Kerala is a place known for its greenery and variety of drug sources. There is *Sampradaya* called *Keraleeya visha cikitsa* which deals with the management of poisoning, envenomation, etc. *Kriyakoumudi*, *Narayaneeyam*, *Lakshmanamrutam*, *Bhashavishavaidyakalika*, *Prayogasamucchayam*, etc are books by renowned Traditional *visha Vaidyas*. All parts of *Palayamkodan* are having therapeutic efficacy. The Scape juice of *Palayamkodan* was used in traditional medicine as a remedy for Cobra envenomation [1]. In *Keraleeya visha chikitsa*, many drugs are mentioned that are easily available and easy to prepare. Even Various parts of *Kadali* were quoted in different forms such as *Anupana*, *Lepa*, *Pana*, preparation of *Gutika*, etc.

The application of herbal drugs and naturally occurring compounds in the management of ailments & preventive care are getting more relevance.

Taxonomy

Kingdom: Plantae

Sub kingdom: Viridiplantae

Infra kingdom: Streptophyta

Super division: Embryophyta

Division: Tracheophyta

Subdivision: Spermatophytina

Class: Magnoliopsida

Super order: Liliales

Order: Zingiberales

Family: Musaceae

Genus: *Musa* L.

Species: *Musa × paradisiaca* L.

Vernacular names

- English: Plantain

- Hindi: Kela
- Kannada: Baalehannu, Rasa balai
- Malayalam: Kadalivaazha, kshetrakadali
- Sanskrit: Kadali
- Tamil: Kadali valai
- Telugu: Arati, araticettu
- Gujarati: Kela

Genotype classification [2]:

Musa × paradisiaca. Linn is a genotype of AAB.

Whereas A indicates *Musa Acuminata* and B indicates *Musa balbisiana*. *Musa paradisiaca*. linn is a hybrid of *M. acuminata* and *M. balbisiana*

Musa × paradisiaca. Linn Pseudo stem

The inner most part of the plant is the modification of the flower stalk which is present as the stem. It is rich in fibre and helps in detoxification. The stem is formed by rolled leaf bases and it is known as a pseudo stem, Scape emerges through this pseudo stem. It is used either cooked or raw in the form of juice. The stem is used immediately for better quality and taste. The outer parts are removed and the inner part is used as food as well as medicine. The reference to its antitoxic quality is available in *Keraleeya visha chikitsa* textbooks such as *Kriyakoumudhi*, *Neelakandeeeyam*, *Sahasrayogam*, etc.

MATERIALS & METHODS:

Scape juice of *Musa × paradisiaca*. Linn is prepared instantly and done phytochemical analysis. The Scape is collected from Alleppey, Kerala, and Udupi, Karnataka.

The Phytochemical analysis such as HPTLC and preliminary tests performed at SDM Center for Research in Ayurveda, Udupi.

Collection of Sample

Scapes of *Palayamkōdan* were collected from Alleppey, Kerala. The authenticity of the plant was confirmed by consulting Botanist

Preliminary phytochemical tests

Tests were done to detect the presence of Alkaloids, Steroids, Carbohydrates, Tannins, Saponins, coumarins, and Resin^[3]

Nutritional value assessment

The scape of *Palayamkōdan* was made into small pieces and dried (Figures 3 & 4), determination of fat, fiber, protein^[4], and Carbohydrates^[5] was done using standard procedures.

HPTLC

10.0 ml of scape juice of *Palayamkōdan* was fractionated in a partition funnel with 20.0 ml of n-Butanol. Butanol fraction was collected after 24 hours and dried at room temperature. This residue is dissolved in 10.0 ml of methanol. Methanol fraction was used for HPTLC. 4,8,12 µl of the extract was applied on a pre-coated silica gel F₂₅₄ on an Aluminum plate to a bandwidth of 7mm using a Linomat 5 TLC applicator. The plate was developed in Toluene: Ethyl acetate: Acetic acid: water (3.0: 3.0: 0.8: 0.2). The developed plates were visualized under short UV, Long UV and then derivatized with Vanillin sulphuric acid (VSA) and scanned under UV 254nm, 366nm and 620nm (post derivatization). R_f, the color of the spots, and the densitometric scan were recorded^[6,7].

OBJECTIVES

- To analyze the phytochemical constituents of *Musa × paradisiaca*. Linn
- To analyze the nutritive value of *Musa × paradisiaca*. Linn

RESULTS

Preliminary phytochemical analysis of the Scape of *Palayamkōdan* showed the presence of Alkaloids, Steroids, Carbohydrates, Tanins, Coumarins, and Resins as per Table 1.

HPTLC of Scape of *Palayamkōdan* showed one band was observed under Short UV and 3 bands were observed under Long UV as per Figure 1. There was no band was seen under post-derivatization. In the Densitometric scan, 4 peaks were evident at 254nm, and as per Figure 2

Nutritional value assessment of the Scape of *Palayamkōdan* Showed the Values of Total fat (3.9%), Total fiber (22.37%), Total Carbohydrates (46.78%), Total Proteins (4.36%), Total nutritive value (239.66%) as per Table 2.

DISCUSSION

Alkaloids

Any naturally occurring organic nitrogen-containing class bases are called Alkaloids. It plays an important role in both human medicine and in an organism's natural defense. Therapeutically, alkaloids are particularly well-known as anesthetics, Cardioprotective and anti-inflammatory agents.^[8]

The scape of *Palayamkōdan* was appreciated with the presence of Alkaloids in Phytochemical examination.

Steroids

Steroids are important hormones in animals and plants. Glands are absent in plants to produce hormones, but each cell has the capability to secrete hormones. They are essential for plant growth, reproduction, and responses to biotic and abiotic stresses.^[9] Synthetic steroids are widely used in the management of Infections. The phytochemical examination of the Scape of *Palayamkōdan* shows the presence of Steroids.

Carbohydrates

Carbohydrates are the direct product of photosynthesis and primary energy storage compounds, and which is most abundant in the plant kingdom is cellulose and responsible for the fundamental structure of cell walls.^[10] Carbohydrates are pervasive and perform a wide array of biological roles. It is used as a base as well as in modified form in the management of Cardiovascular and hematological disorders which includes inflammatory diseases to wound healing.^[11]

Carbohydrates were present in the Scape of *Palayamkōdan* in Phytochemical examination.

Tannins

The complex chemical substance is a derivative of Phenolic acid called Tannins. Phenolic acid is also called Tannic acid. Synergistically they increase the effectiveness of active principles. Tannins promote rapid healing and use in the management of heavy metal poisoning as an antidote.^[12] The tannins

extracted from *Mimosa pudica* were found to be neutralizing the Cobra venom.^[13]

The phytochemical examination of the Scape of *Palayamkodan* showed the presence of Tannins.

Saponins

Saponins are natural glycoside compounds often called natural detergents due to their foamy texture.^[14]

It has antimicrobial, and antioxidant properties that improve immune function by stimulating the production of T-cells.^[8] It lowers cholesterol and fat level.

The scape of *Palayamkodan* showed the presence of Saponins in the phytochemical examination.

Coumarins

Coumarins are the secondary metabolites that protect the plant against Microbes and herbivores. Humanity uses it in the way to drug sources, aromatization, etc. Coumarin belongs to the benzopyrone family, and they are thermally stable. They are reported as antidiabetic, antioxidant, hepatoprotective, and anti-inflammatory.^[15]

Coumarins were present in the Scape of *Palayamkodan* in Phytochemical examination.

Resin

Resins are natural or synthetic organic compounds consisting of non-crystalline or viscous liquid substances. They are formed in plant secretions and soluble in various organic liquids except for water. In the current era, natural resin is replaced by synthetic resin.^[16]

The resin was present in the Scape of *Palayamkodan* in a phytochemical examination.

HPTLC

HPTLC of Scape juice of *Musa × paradisiaca*.L. shows under Short UV one band is observed at R_f 0.79 (Green). Under long UV, 3 bands are observed under R_f 0.05, R_f 0.07, and R_f 0.79 (All Fluorescent Blue). There were no bands observed under post-derivatization. A densitometric scan at 366nm was evident with 4 bands, among these R_f 0.96 at 366nm long UV with the area of 1.08% which indicates the presence of Gallic acid. Densitometric scan at 254nm shows 4 peaks in these 0.07(44.48%) and 0.87 (12.0.6%) were evident ones. After derivatization when the plate was scanned at 620nm showed only one peak.

Gallic acid which is phenolic in nature and was a chemical constituent eluted from the juice could be attributed to therapeutic purpose.

Fat

Fat is an essential part of a healthy and balanced diet. It is a source of essential fatty acids. And it helps in the absorption of fat-soluble vitamins (Vit A, D, E, K). Fat plays an important role in sustaining nerve impulse transmission, memory storage, and tissue culture.^[17]

The fat content in *Palayamkodan* is estimated at 3.9%

Fiber

Fiber is a type of carbohydrate that the body can't digest. Fiber cannot be broken down into sugar molecules instead it passes through the body undigested. Fiber appears to lower the risk of developing various conditions including Cardiac diseases, Diabetes, Diverticular disease, and constipation.^[18]

The total fiber in *Palayamkodan* is estimated at 22.37%

Carbohydrates

Carbohydrates-based therapeutics are used extensively in Cardiovascular and hematological treatments ranging from inflammatory disease and anti-thrombotic treatments to wound healing.^[11]

The total carbohydrates estimated from the Scape of *Palayamkodan* is 46.78%

Proteins

Protein is made from twenty-plus basic building blocks called amino acids. Proteins have multiple functions, they are required for the structure, function, and regulation of tissues and organs in the body. It transmits signals to coordinate biological processes between different cells & their repairing.^[19]

The protein value is estimated as 4.36%

CONCLUSION

Naturally occurring compounds have beneficial effects on the body when they are used in the proper way. As per the phytochemical examination of the Scape juice of *Musa paradisiaca*. Linn, it can be concluded that Alkaloids, Steroids, Carbohydrates, Tannins, Saponins, Coumarins & Resins are present in the

sample of Scape juice which indicates its scope of application in medicine whereas in the current era same components are used from a synthetic source. The nutritive value assessment showed that the Total fat content is 3.9% which helps in the balancing of Cholesterol levels and reduces obesity. The total fiber content is 22.37% which in better absorption and bowel health. It is also a Carbohydrate that helps in reducing Cardiac disorders, Constipation, etc. The Carbohydrates level is 46.78% which is a rich source of calories. Proteins have an important role as nutrients which are essential for the repairing and balancing of tissues. 4.36% protein was present in the scape of *Musa × paradisiaca*. Linn.

In *Keraleeya visha chikitsa*, it is specifically mentioned the use of Scape juice of *Palayankodan* in the management of Cobra venom. The phytochemical examination showed the presence of Tannins & steroids. Whereas steroids are beneficial in counteracting infection and Tannins can reduce the action of the poison. The efficacy of tannins against Cobra venom is already proved by research. This study paves a way for use of naturally extracted tannins, steroids, etc in the management of different ailments.

Further research is required for the analysis of the drug to explore its therapeutic potency and different mode of application

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TABLES & FIGURES

Table 01: Results of preliminary phytochemical screening of *Musa ×pardisiaca* Linn. scape juice

| Test | Inference |
|-----------------|---|
| | <i>Musa ×pardisiaca</i> Linn. scape juice |
| Alkaloid | + |
| Steroid | + |
| Carbohydrate | + |
| Tannin | + |
| Flavanoids | - |
| Saponins | + |
| Terpenoid | - |
| Coumarins | + |
| Phenols | - |
| Carboxylic acid | - |
| Amino acids | - |
| Resin | + |
| Quinone | - |

(+) – present; (-) – negative

Table 02: R_f values of *Musa paradisiaca*. Linn

| Short UV | Long UV | Post derivatization |
|--------------|----------------|---------------------|
| - | 0.05 (F. blue) | - |
| - | 0.07 (F. blue) | - |
| 0.79 (Green) | 0.79 (F. blue) | - |

• **F- fluorescent**

Table 03: Nutritional content of *Musa × paradisiaca*. Linn Scape

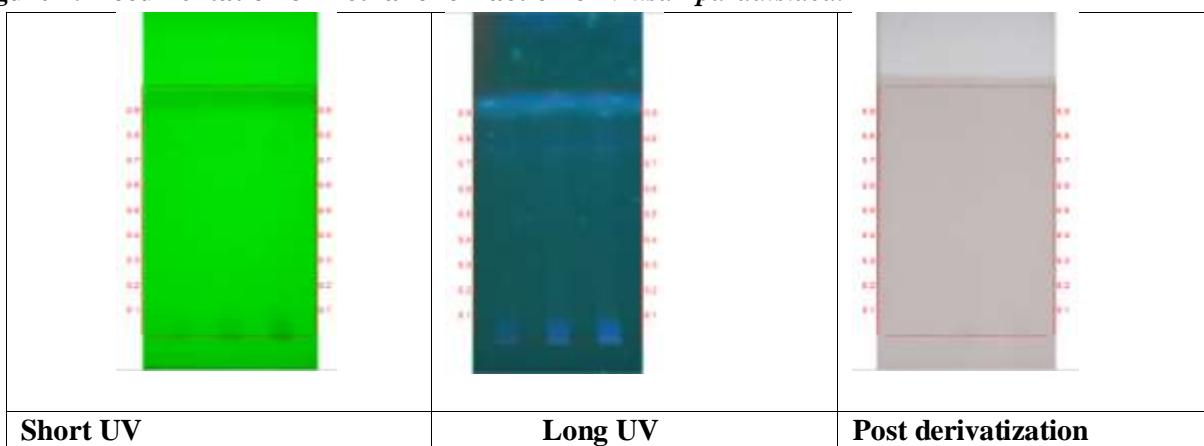
| Parameter | Results n = 3 %w/w |
|----------------------------|--------------------|
| Total fat (%) | 3.9 |
| Total fiber (%) | 22.37 |
| Total carbohydrates (%) | 46.78 |
| Total proteins (%) | 4.36 |
| Nutritive value (cal/100g) | 239.66 |

Table 4: Carbohydrate estimation

| Conc (µg/ml) | Absorbance |
|--------------|------------|
| 10 | 0.135 |
| 20 | 0.170 |
| 40 | 0.267 |
| 60 | 0.380 |
| 80 | 0.715 |

HPTLC photo

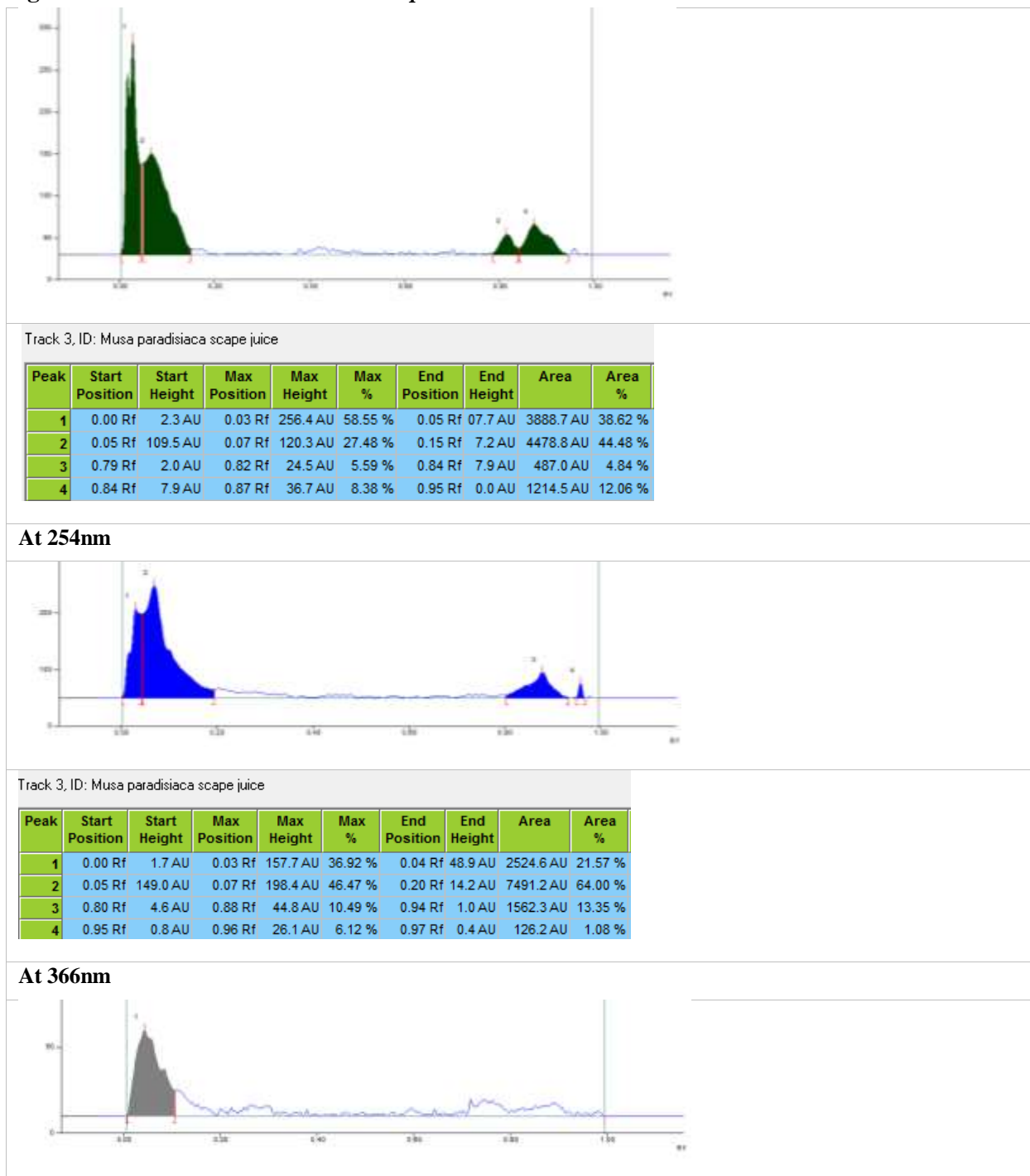
Figure 1: Documentation of methanolic fraction of *Musa × paradisiaca*. Linn



Solvent system - Toluene: Ethyl acetate: Acetic acid: water (3.0: 3.0: 0.8: 0.2)

- Track 1 – *Musa paradisiaca* – 4µl
- Track 2 – *Musa paradisiaca* – 8µl
- Track 3 – *Musa paradisiaca* – 12µl

Figure 2. Densitometric scan of *Musa × paradisiaca*. Linn



Track 3, ID: Musa paradisiaca scape juice

| Peak | Start Position | Start Height | Max Position | Max Height | Max % | End Position | End Height | Area | Area % |
|------|----------------|--------------|--------------|------------|----------|--------------|------------|-----------|----------|
| 1 | 0.01 Rf | 0.2 AU | 0.04 Rf | 49.9 AU | 100.00 % | 0.11 Rf | 15.0 AU | 1897.6 AU | 100.00 % |

At 620nm

Figure 3: Scape of *Palayamkodan* kept for drying



Figure 4: Scape of *Palayamkodan* after drying



Figure 5: Scape of *Palayamkodan*

