



A Brief Review on: “Study of Antimicrobial Activity Of Roystonea Regia On E.coli”

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ABSTRACT :

Roystonea regia is often called Florida royal palm or Cuban royal palm. It belongs to the Arecaceae family. This majestic tree plays vital role in traditional medicine in the southeastern United States. The tree can reach between 20 to 30 meters. The robust trunk is smooth grey-white. It has a unique bulge beneath verdant crown shaft. The foliage is made up of elongated leaves. These leaves can reach up to 4 meters in length.

KEYWORDS: Nutrients, Anti-diabetic, properties, Phyto-chemical Screening

INTRODUCTION :

The lifecycle of Roystonea regia ends in production of oval-shaped fruits. Initially green these fruits change in color. They change through red to purplish-black upon ripening. These fruits are of crucial importance ecologically. Avian and mammalian species consume them with eagerness. Roystonea regia has received attention. It has gained this attention due to its high level of medicinal potential. Researchers have documented its effectiveness in treating numerous ailments. These include diabetes. Leishmaniasis is also on the list. Benign prostate hyperplasia is another. The documentation underscores its pharmacologic versatility.

From the literature, research indicates Roystonea Regia has Anti-diabetic activity. It also shows Anti-leishmaniasis activity. Moreover, it reduces benign prostate hyperplasia. It also has an antioxidant effect. Our literature research study focused on presence or absence of antibacterial or antimicrobial activity. This investigation was based on proximate mineral and phytochemical composition screening of the peri-carps from dried ripe Roystonea Regia fruit. We carried out this study to explore its potential worth for bacterial or Antimicrobial activity.

AIM :

Screening for Antimicrobial Activity: We will conduct agar well diffusion assays. The goal is to assess inhibitory effects of Roystonea regia extracts on E. coli. Minimum Inhibitory Concentration (MIC) Determination: We will determine the MIC of Roystonea regia extracts. We'll use serial dilution methods to establish lowest concentration that inhibits bacterial growth.

DETAILED PROJECT REPORT :

Certainly! This project focused on exploring potential of Roystonea regia. It is commonly known as Florida royal palm. The focus was understanding its ability to combat Escherichia coli (E. coli) bacteria. E. coli bacteria can cause a variety of infections in humans. The fruits were meticulously cleaned. Then they were dried using natural air at room temperature.

Drying process is crucial. It helps preserve the integrity of the fruit's bioactive compounds. At the same time it removes excess moisture. Excess moisture could potentially impact subsequent extraction processes. Dry, the fruits were ground into fine powder. This was done using laboratory equipment. Step was essential. It increased the surface area of the fruit material. Thus it enhanced efficiency of the extraction process.

Subsequently powdered Roystonea regia fruits underwent extraction. Extraction was done using suitable solvent. The choice of solvent is critical. It determines its ability to extract bioactive compounds effectively from the plant material.

Ideal Properties of Roystonea regia

- **Relevance Addresses** :-a significant issue in antimicrobial resistance.
- **Clear Objective** :-Well-defined aim, such as evaluating the efficacy against E. coli.

- **Standardized Methodology:-** Consistent procedures and appropriate controls.
- **Quantitative Data :-** Use of measurable outcomes like inhibition zones and MIC.
- **Statistical Analysis:-** Proper data analysis to support conclusions

Classification of roystonea regia

Roystonea regia, commonly known as the royal palm, belongs to the plant kingdom (Plantae) and is classified within the angiosperms, a clade of flowering plants. It falls under the monocots, a group characterized by having a single cotyledon, and is part of the order Arecales. Within this order, Roystonea regia is a member of the Arecaceae family, which includes various species of palms.

Extraction: Bioactive compounds are extracted using solvents like ethanol, methanol, or water.

Phytochemicals: Key antimicrobial compounds include flavonoids, phenolics, tannins, and terpenoids.

Disk Diffusion: Plant extract-impregnated disks are placed on E. coli-inoculated agar plates to measure inhibition zones.

Broth Dilution: Determines the minimum inhibitory concentration (MIC) needed to inhibit E. coli growth.

Time-Kill Assay: Assesses the bactericidal activity of the extract over time to understand bacterial killing dynamics.

(Royal Palm) on Escherichia coli (E. coli)

Roystonea regia: Botanical Classification and Background

Kingdom: Plantae

Clade: -Angiosperms

Clade: - Monocots

Order: Arecales

Family: Arecaceae

Genus: Roystonea

Species: Roystonea regia

EXTRACTION OF SAMPLE :

Methyl acetate extracts sample were prepared by Soxhlet extraction method. 50 gm of sample extracted separately in 250 ml of absolute methyl acetate at 40-50°C temperature for 2 to 3 hrs. The extraction of the sample completed in 18-20 cycles of Soxhlet extraction method. The resulting mixture was filtered with Filter papers. The extracted sample was store in conical flask at cool temperature and subsequently used for phyto-chemical screening. The extraction of samples using the Soxhlet method, such as with methyl acetate, can be applied in various fields:

fig: The extraction of samples using the Soxhlet method



- **Phytochemical Screening:** Identify bioactive compounds in plants or natural products.
- **Analytical Chemistry:** Extracting compounds for analysis in research or quality control.
- **Environmental Analysis:** Extracting pollutants or contaminants from environmental samples.
- **Pharmaceuticals:** Extracting active pharmaceutical ingredients from natural sources.
- **Food and Beverage Industry:** Extracting flavours or active compounds from raw materials.
- **Research and Development:** Used to isolate specific compounds for further study.

PHYTOCHEMICAL SCREENING :

Alkaloids: Detected using Dragendorff's and Mayer's reagent tests Positive result indicated by orange-red and cream-colored precipitates respectively, suggesting pharmacological activities like analgesic and antimicrobial properties.

Flavonoids: Identified with Shinoda test (yellow/orange colours) and Lead acetate test (yellow precipitate), indicating antioxidant, anti-inflammatory, and anti-cancer properties.

Tannins: Detected with Ferric chloride test (blue-black/greenish-black coloration) known for astringent properties and potential roles in wound healing and gastrointestinal health.

Saponins: Detected using Froth test (stable froth formation), indicating hemolytic and cholesterol-lowering effects beneficial for cardiovascular health.

Glycosides: Detected via Bornträger's test (colored precipitates upon hydrolysis), exhibiting pharmacological activities such as cardiac stimulation and anticancer effects.

Terpenoids: Identified by Salkowski test (reddish-brown coloration), showing antimicrobial and anti-inflammatory properties.

TEST FOR TANNINS

| TEST | OBSERVATION | RESULT |
|----------------------------------|-----------------------------|--------|
| 1) 5% FeCl ₃ solution | Deep blue-black colour | Pass |
| 2) Bromine water | Discoloration bromine water | Pass |
| 3) Potassium dichromate | Red ppt | Pass |
| 4) Lead acetate solution | White ppt | Pass |
| 5) Dilute iodine solution | Transient red colour | Pass |

TEST FOR FLAVONOIDS

| Test | Observation | Result |
|--|--|--------|
| 1) Shinoda test-Extract conc. HCL + few drop 0.5 g magnesium turning | Orange, pink, red to purple colour appears | Pass |
| 2) Sulphuric acid test-Extract + 60% or 80% sulphuric acid | Flavones and flavonoid give deep yellow solution and chalconesaurones give red and red bluish solution | Pass |
| 3) Alkaline reagent test-Test solution few drop NaOH solution few drop dil. acid | | Pass |
| 4) Zinc Hydrochloric test Test solution + mix. Of zinc dust and conc. HCL | | Pass |

ANALYSIS OF ANTIMICROBIAL/ ANTIBACTERIAL ACTIVITY OF FROYSTONE AREGIA

Preparation of bacteriological media Nutrient agar media: It is simple formulation which provides the Nutrients necessary for the growth, replication of a large number of bacteria (Microorganisms) (Chandrakant kokate 2019)

| Compound | Amount | Uses of compound |
|----------------------------|---------------|---|
| 1. Yeast/meat/beef extract | 1 gm | Sources of carbohydrates amino acids and others growth factor |
| 2. Peptone | 1 gm | Source of amino acids N,S,P and growth factor |
| 3. Sodium chloride | 0.5 gm | Electrolyte |
| 4. Agar | 2 gm | Solidifying agent |
| 5. Distilled water | To make 100ml | Vehicle |

COMPOSITION OF NUTRIENT AGAR (100ML) :**PREPARATION**

To prepare Nutrient Agar media in a 100 ml volume, first weigh and dissolve 1 g of peptone, 0.3 g of beef extract, and 0.5 g of sodium chloride in 90 ml of distilled water in a sterile glass beaker. Use a magnetic stirrer to aid dissolution, optionally applying gentle heat if needed. Adjust 100ml volume with the distilled water. Transfer the mixture to a conical flask and add 1.5 g of agar. Close the flask with a cotton plug, seal with paper and a rubber band, and autoclave at 121°C and 15 psi for 20 minutes. After sterilization, mix thoroughly and pour into sterile Petri plates (20-25 ml per plate). Allow to

solidify before storing inverted at room temperature or refrigerated until use. This ensures a sterile medium suitable for bacterial culture in laboratory settings.

STERILIZATION OF CULTURE MEDIA AND GLASSWARE

After the preparation of agar (culture media) the tip of the conical flask close with cotton properly. Wrapped glassware in paper properly [4 petridish, pipette, test tube]. To sterilization of agar culture media and glassware used moist heat sterilization method by using autoclave.

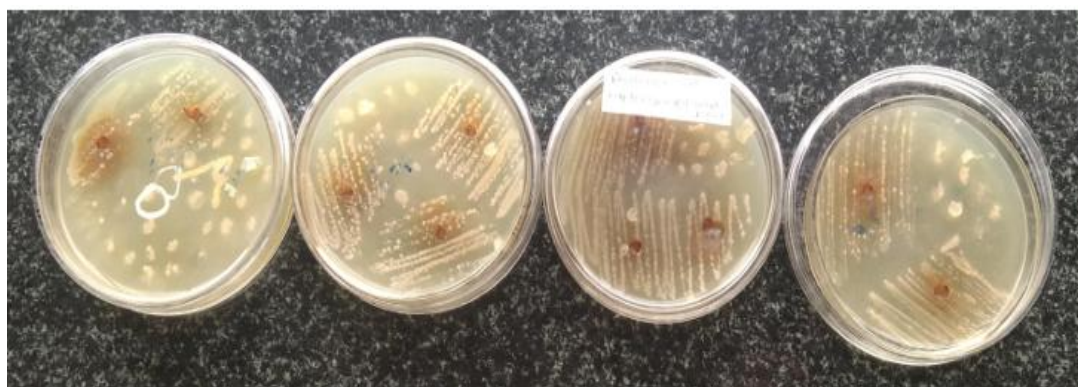
Firstly fill the water at the bottom of autoclave in proper amount, then put the agar media and wrapped glassware in Autoclave & close the autoclave. Adjust the Autoclave temp. 121-124 c for 15-20 min. (steam pressure is 15 psi). After 20 min switch of autoclave & slowly release Pressure knob, release the pressure slowly, after remove complete steam remove glassware

ISOLATION AND PRESERVATION OF SAMPLE OF PURE CULTURE

E. coli bacterial sample collected from the microbiology department Mda School of pharmacy, Kolpa. The E. coli isolated and preserved by the most widely used method that is streak plate method. Streak plate prepared by streaking a small amount of culture over the surface of the solid medium in a petri plate with sterile platinum or nichrome wire loop. 4 different petri plates are streaked by this method. Solidify Nutrient media with bacterial culture stored in incubator in inverted position for 48 hrs, the proper growth, replication of bacteria (E. coli). After 48 hours proper replicated Bacterial Petri plates are removed with proper care. Investigate the Antibacterial activity of methyl acetate extract sample on E. coli bacteria by Agar well diffusion method. Using 0.05 ml sample (1 drop). These petri plates are put into incubator for 48 hrs. After 48 hrs observe growth of bacteria is not inhibited bacterial growth by 0.05 ml methyl acetate extract sample. There is no estimate any antibacterial activity of extract.

RESULT AND DISCUSSION :

The phytochemicals are natural bioactive compounds present in plants that work with nutrients and dietary fiber for prevention of any disease. The result of phytochemical screening of dried ripe fruits of *Roystonea regia*. The result showed that flavonoids and tannins were highly present in dried ripe fruit sample. Medical and pharmaceutical activity of plant extract have been attributed to some of the phytochemicals. This suggests that the dried fruit of *Roystonea regia*, fruit would possess important pharmaceutical potential, but there we identify antibacterial activity of dried ripe fruit of *Roystonea regia* in methyl acetate extract. This 0.05 ml (1 drop) methyl acetate extract sample could not possess antibacterial activity against E. coli bacteria.



CONCLUSION :

From finding this study both ripe and unripe pericarp of *Roystonea regia* good availability for food and medicine. However further study of antibacterial activity on E. coli bacteria by using 0.05 ml methyl acetate extract of *Roystonea regia* fruit. Showed negative result, does not possess antibacterial activity against E. coli bacterial specifically. Based on the findings of this study, both ripe and unripe pericarp of *Roystonea regia* show promising availability for applications in both food and medicine. However, when tested for antibacterial activity against E. coli bacteria using 0.05 ml of methyl acetate extract from *Roystonea regia* fruit, the results were negative, indicating that the extract does not possess antibacterial properties against E. coli specifically.

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