



**SREE NARAYANA COLLEGE**

(Affiliated to the University of Calicut )  
NAAC Accredited with B Grade

Erattakulam P.O, Alathur 678682

sncalathur1970@gmail.com

04922 222 391

[www.sncollegealathur.ac.in](http://www.sncollegealathur.ac.in)



### **CRITERION: 3**

**RESEARCH, INNOVATIONS AND  
EXTENSION:**

**RESEARCH PUBLICATION AND  
AWARDS**

**SREE NARAYANA COLLEGE**

(Affiliated to the University of Calicut )  
NAAC Accredited with B Grade

Erattakulam P.O, Alathur 678682

sncalathur1970@gmail.com

04922 222 391

[www.sncollegealathur.ac.in](http://www.sncollegealathur.ac.in)

<b>CRITERION</b>	3: Research, Innovations and Extension
<b>KEY INDICATOR</b>	3.3- Research Publication and Awards
<b>METRIC NO</b>	3.3.2 Number of books and chapters in edited volumes/books published and papers published in national/ international conference proceedings per teacher during last five years
<b>FILE DESCRIPTION</b>	<ul style="list-style-type: none"><li>• Front pages of the books/conference proceedings etc.</li></ul>

# Evaluation of the histopathological and biochemical effects of fenoxycarb in the ovaries of *Spodoptera mauritia* (Lepidoptera: Noctuidae)

C. Ayisha Banu<sup>1</sup> · Cheruparambath Praseeja<sup>1,2</sup> · E. M. Manogem<sup>1</sup>

Received: 30 September 2021 / Accepted: 17 February 2022  
© African Association of Insect Scientists 2022

## Abstract

Insect development is disrupted by juvenile hormone (JH) and their mimics in several ways. Many of them have been thoroughly investigated and are already being used to manage pest insects with commercially available agents. This research aims to explore the potentials of juvenile hormone analogue fenoxycarb on morphological, histopathological, and biochemical changes in the ovary of *Spodoptera mauritia*. Newly emerged female pupae were treated topically with sublethal doses (LD<sub>10</sub>, LD<sub>25</sub>) of fenoxycarb to determine their effects on reproduction. The results reveal that this juvenile hormone analogue affects the normal development of the ovary tissue by reducing the number of oocytes and oogonia in the ovaries of *S. mauritia*. Fenoxycarb treated pupae showed a substantial decrease in the reclaimed adultoids ovaries development and reduction in length of ovarioles, area of basal oocytes and the total number of eggs laid. A microscopic examination exhibited reduced pulsating movements, tumour-like bulbous masses and the germarium region exhibited hypertrophy. Histological investigation of ovaries indicated a degeneration of ovarian follicle cells, deformed oocytes with deteriorated trophocytes, malformed egg chamber, vacuolated ooplasm and defective vitellogenesis in malformed adult female's ovarioles. The effect of fenoxycarb could be correlated with quantitative depletion of proteins, lipids, and carbohydrates in gonads of the treated groups and there were no significant changes in sodium dodecyl sulphate (SDS)-protein pattern. This study forms baseline data suggesting that fenoxycarb respond considerably for the control of the lepidopteran pest of paddy (*S. mauritia*) effectively.

**Keywords** Juvenile hormone analogue · Fenoxycarb · *Spodoptera mauritia* · Ovarian biochemistry · Ovarian histology · SDS-protein pattern

## Introduction

Insect juvenile hormones (JH) are essential for development and reproduction. The hormone retains larval characteristics of the insects that make it possible for the larval form's continued growth (Wigglesworth 1964). Further, it can also act like an adult gonadotropin (Dahm et al. 1976). JH plays a prominent role in coordinating the different tissues activities

to produce the gametes and behaviours related to mating and oviposition occurring at the appropriate time. This involves JH responses in the fat body, nervous system, muscles, gonads and reproductive accessory glands. Juvenile hormone prevents significant morphological and physiological changes from the larva to the adult. It has entirely different adult female functions, regulating oocyte growth and maturation, including vitellogenin production and its uptake by developing oocytes (Tobe and Stay 1985).

Insects treated with exogenous JH during low endogenous JH titer disrupt metamorphosis and ovaries development. Additional doses of either juvenile hormones or juvenoids administered to larvae and pupae cause severe abnormalities in the ovaries (Metwally et al. 1972; Rohdendorf and Sehna 1972). Synthetic formulations of Juvenile hormone, fenoxycarb is a potent juvenile hormone analogue (JHA) that prevents insects from attaining the reproductive stage. The destructive effect of juvenoids overpowers the homeostatic

---

✉ C. Ayisha Banu  
ayisha916@gmail.com

✉ E. M. Manogem  
manogemvinod@gmail.com

<sup>1</sup> Division of Insect Endocrinology, Department of Zoology, University of Calicut, 673635 Kerala, India

<sup>2</sup> Department of Zoology, Sree Narayana College, Nattika, Thrissur, 680566 Kerala, India

## A study on medicinal properties of *Coccinia grandis*

S. Dhiva, R. Bindu\*, Aswani, K.S., Devika, D. and Vishnu K Vijay

### Article History

Received: 20.05.2020

Revised and Accepted : 19.07.2021

Published: 24.09.2021

### Abstract

*Coccinia grandis* is used as a vegetable in south Asian countries. All parts of this plant is considered to have medicinal properties and are used to treat various diseases viz., skin diseases, jaundice, diabetes etc.. The present study clearly established that *Coccinia grandis* is antimicrobial against both gram positive and gram negative bacteriae and also anti-amylolytic.

**Key words:** anti-amylolytic, antibacterial, *Coccinia grandis*, diabetes, jaundice, medicinal plant swarming motility

### INTRODUCTION

Diabetes, a chronic, metabolic disease that leads to high blood sugar and over time it leads to damage to various organs such as eyes, kidneys, nerves etc., It occurs in three stages, such as prediabetic, where the level of blood sugar is higher than normal level which cannot be diagnosed. Similarly, Type 1 diabetes is an autoimmune disease and Type 2 diabetes occurs when pancreas produces little or no insulin., Globally 422 million people are diabetic and majority of them are from developing and under developed countries and annual death rate due to diabetes are 1.6 million . Number of new cases and prevalence of the diabetes increases for the past 10 years (WHO 2021).

The *Coccinia grandis* commonly called as Ivy guard, is used as vegetable and grown in South Asia. It is a creeping plant. All the parts of the plant are edible and have got various medicinal uses such as anti-bruises and anti-itching from insect bites, treatment against cataract, skin diseases such as leprosy, fever, jaundice, mastcell-stabilizing,

antianaphylactic and antihistaminic potential, urinary tract infections, respiratory tract infections, ulcerations etc., Similarly it is used as an antioxidative, anti-inflammatory and antimicrobial agent (Ramachandran et al., 2014). Very limited information is available on its anti-diabetic effect so the present study aimed to analyse the anti-diabetic activities *in vitro*. In addition to this its antimicrobial activities were also studied using the two different extracts such as ethanolic and isopropyl alcohol extracts of *Coccinia grandis*.

### MATERIALS AND METHODS

#### Preparation of Plant Extracts

The collected leaf samples were washed air dried and grinded into powder. The powder was suspended in both acetone and isopropyl alcohol solution at a concentration of 20%. The mouth of the test tubes were covered with aluminium foil and was kept at room temperature for 3 days. After that, it was placed on a platform shaker for 1 day. Then the mixture were transferred to tubes and centrifuged for 10 minutes at 4000rpm at 25°C. The supernatant was collected and dried at 50°C, the dried powder was mixed with distilled water in eppendorf tube and stored at 4°C.

#### Detection of Phytochemicals

##### Detection of Glycoside: Concentrated Sulphuric acid test

To one ml of the extract one ml of concentrated sulphuric acid was added and allowed to stand for two minutes. A reddish color precipitate indicates the presence of glycosides.

##### Detection of Phenols: Ferric Chloride Test

To 3-4 drops of ferric chloride solution, add two ml of plant extract was added. Bluish black colour confirms the presence of phenol.

##### Detection of Terpenoids: Salkowski test

Extract (5ml) was mixed with chloroform (2ml) and concentrated sulphuric acid (3ml) was carefully added to form a layer. A reddish brown coloration formed at



R. Bindu

email: manistet@gmail.com

<sup>1</sup>Department of Microbiology, Sree Narayana College, Alathur, Palakkad, Kerala - 678682

<sup>2</sup>Department of Botany, Sree Narayana College, Alathur, Palakkad, Kerala - 678682

## Post Flood Water pollution and its impact on rural health; A microbiological analysis on waterbodies of Alathur grampanchayat, Kerala, India - After Flood - 2018

S. Dhiva<sup>1</sup> and R. Bindu<sup>2</sup>

### Article History

Received: 25.06.2021

Revised and Accepted : 10.10.2021

Published: 15.12.2021

### Abstract

There was a clear contamination of drinking water bodies of Alathur Block panchayat, Kerala, India. The Physico chemical changes were observed. There is a clear indication of microbiological contamination by total coliforms, with an indication of formation of gas in most of the MPN tubes but few non lactose fermenting non-pathogenic organisms like klebsiella sp. were detected from the well water and no fecal coliforms were observed in the completed test. Similarly when the well water samples were inoculated in specific media to detect the presence of other pathogenic Total coliforms such as Salmonella sp., shigella sp., cholera, etc., it was clear that no pathogenic organisms were isolated from the above mentioned samples. This clearly indicates that the Health department has taken proper preventive measures such as repeated chlorination of all the drinking water bodies immediately after the flood to prevent the outbreak of above mentioned threatening diseases, which is a good initiative.

**Key words:** Flood Water, microbial contamination, pollution, rural health, water quality.

### INTRODUCTION

Kerala, India, is well known as GOD'S OWN COUNTRY for its Beauty of Greenery and rich water resources. The state has 44 rivers, 27 backwaters (mostly in the form of lakes and ocean inlets), 7 lagoons, 18681 ponds and over 30 lakh wells. Palakkad of Kerala is said to be the gateway to Kerala due to the presence of the Palakkad Gap, in the Western Ghats. It has many small and medium rivers, which are tributaries of the Bharathapuzha River. So there are many dams in Palakkad district, the largest one is Malampuzha dam (Qureshmatva and Maurya *et al.*, 2015)



S. Dhiva

email: [dhivasaju@gmail.com](mailto:dhivasaju@gmail.com)

<sup>1</sup>Assistant Professor, Department of Microbiology, Sree Narayana College, Alathur, Kerala, India

<sup>2</sup>Assistant Professor, Department of Botany, Sree Narayana College, Alathur, Kerala, India

Gayathri River Basin, one among the major tributaries of river Bharathapuzha spread over 980.38 sqkm, 67 microwater sheds traversing the boundaries of 31 Gramapanchayaths, 5 Block panchayaths and 2 districts. It is one among the two tributaries sustaining the life of River Bharathapuzha with its origin from portions of Western Ghats, south of Palakkad gap, catchment of four major reservoirs Mangalam, Pothundy, Meenkara and Chulliyar serving the irrigation requirements of the extensive paddy tracts of Alathur, Nenmara and Kollengode blocks of Palakkad district, still rich in its traditional farming and water harvesting systems. The Climate of Palakkad is a tropical wet and dry. Temperatures remain moderate throughout the year, with exception in March and April being the hottest months. A very high amount of precipitation is received in Palakkad, mainly due to the South-West monsoon. July is the wettest month, and the total annual rainfall is around 83 inches (211 cm).

Rainfall over Kerala during southwest monsoon season 2018 (1 June to 19 August, 2018) has been exceptionally high. Kerala received more than 2346.6 mm against normal of 1649.5 mm (above normal by 42%). Studies indicate that the second highest excess rainfall is recorded in Palakkad district (72% above normal) just next to Idukki District (92% above normal) (Government of India 2018).

Well water is the main source of drinking water in many places of Alathur Grama Panchayat, Kerala, India. Many people depend on Grama Panchayat water supply for their drinking and domestic purpose. Since there was a sudden flood in these areas due to Monsoon change during August 2018, there was floods and contamination of the drinking water supplies as indicated by an observable change in the colour, taste and hardness of the water.

### AIM AND OBJECTIVES OF THE STUDY

The aim of this study is to analyze the impacts of flood on the potable water bodies with respect to physico-

## Bioactivity and Plant Growth Stimulation Studies using *Mangifera indica* L. Gum

Antony V. Samrot<sup>1\*</sup>, Lee Si Jie<sup>1</sup>, S. Abirami<sup>2</sup>, R. Emilin Renitta<sup>3</sup>,  
S. Dhiva<sup>4</sup>, P. Prakash<sup>5</sup>, S. Saigeetha and N. Shobana<sup>5</sup>

<sup>1</sup>School of Bioscience, Faculty of Medicine, Bioscience and Nursing, MAHSA University, Jenjarom, Selangor 42610, Malaysia.

<sup>2</sup>Department of Microbiology, Kamaraj College, Thoothukudi – 628 003, Tamil Nadu, India.

<sup>3</sup>Department of Food Processing Technology, School of Agriculture and Biosciences, Karunya Institute of Science and Technology, Karunya Nagar, Coimbatore - 641 114, Tamil Nadu, India.

<sup>4</sup>Department of Microbiology, Sree Narayana College, Alathur, Palakkad, Kerala - 678 682, Kerala, India.

<sup>5</sup>Department of Biotechnology, School of Bio and Chemical Engineering, Sathyabama Institute of Science and Technology, Chennai - 600 119, Tamil Nadu, India.

### Abstract

The potential of plant gum as bioactive agent and plant growth enhancer have not been exploited well and plant gums are suitable for such purposes as they are non-toxic and biodegradable. Therefore, the aim of this study was to verify the potential of *Mangifera indica* (MI) gum as bioactive agent and plant growth enhancer. Plant gum was collected from the bark of MI and polysaccharides were extracted, purified and characterized with ultraviolet-visible (UV-Vis) spectroscopic, Fourier-transform infrared spectroscopy and gas chromatography (GC) analyses. Crude and purified polysaccharides were tested for their antibacterial and antioxidant activity. The crude gum was subjected to plant growth stimulation study like germination percentage, shoot length, root length and wet weight of chili (*Capsicum frutescens*). The effect of MI gum on soil porosity and water holding capacity (WHC) was also tested. UV-Vis and GC analyses of gum polysaccharide showed the presence of several types of monosaccharides in MI gum. The plant gum did not show any antibacterial activity against *Escherichia coli*, *Pseudomonas sp.*, *Bacillus sp.* and *Staphylococcus aureus*, but was found to exhibit low antioxidant activity. The gum was found to enhance the seed germination and seedling growth *in-vitro* and *in-vivo*.

**Keywords:** *Mangifera indica* L, Gum, Bioactivity, plant growth

\*Correspondence: antonysamrot@gmail.com

(Received: June 19, 2021; accepted: September 01, 2021)

**Citation:** Samrot AV, Jie LS, Abirami S, et al. Bioactivity and Plant Growth Stimulation Studies using *Mangifera indica* L. Gum. *J Pure Appl Microbiol.* 2021.

© The Author(s) 2021. **Open Access.** This article is distributed under the terms of the Creative Commons Attribution 4.0 International License which permits unrestricted use, sharing, distribution, and reproduction in any medium, provided you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license, and indicate if changes were made.

Review

# The Synthesis, Characterization and Applications of Polyhydroxyalkanoates (PHAs) and PHA-Based Nanoparticles

Antony V. Samrot <sup>1,\*</sup>, Sree K. Samanvitha <sup>2</sup>, N. Shobana <sup>3</sup>, Emilin R. Renitta <sup>4</sup>, P. Senthilkumar <sup>5</sup>, Suresh S. Kumar <sup>6,\*</sup>, S. Abirami <sup>7</sup>, S. Dhiva <sup>8</sup>, M. Bavanilatha <sup>3</sup>, P. Prakash <sup>3</sup>, S. Saigeetha <sup>3</sup>, Krithika S. Shree <sup>3</sup> and R. Thirumurugan <sup>9</sup>

- <sup>1</sup> School of Bioscience, Faculty of Medicine, Bioscience and Nursing, MAHSA University, Jalan SP2, Bandar Saujana Putra, Jenjarom 42610, Selangor, Malaysia
  - <sup>2</sup> Department of Biotechnology, Shanmugha Arts, Science, Technology & Research Academy, Thanjavur 613401, Tamil Nadu, India; sreesamanvitha95@gmail.com
  - <sup>3</sup> Department of Biotechnology, Sathyabama Institute of Science and Technology, School of Bio and Chemical Engineering, Chennai 600119, Tamil Nadu, India; shobanan1993@gmail.com (N.S.); bavagold@gmail.com (M.B.); kpprakashmtech@gmail.com (P.P.); rajjvarsha2000@gmail.com (S.S.); krithikasivasuriyan09@gmail.com (K.S.S.)
  - <sup>4</sup> Department of Food Processing Technology, Karunya Institute of Science and Technology, School of Agriculture and Biosciences, Karunya Nagar, Coimbatore, 641114, Tamil Nadu, India; renitta@karunya.edu
  - <sup>5</sup> Department of Chemical Engineering, Sathyabama Institute of Science and Technology, School of Bio and Chemical Engineering, Chennai 600119, Tamil Nadu, India; sensen10@gmail.com
  - <sup>6</sup> Centre for Materials Engineering and Regenerative Medicine, Bharath Institute of Higher Education and Research, Chennai 600126, Tamil Nadu, India
  - <sup>7</sup> Department of Microbiology, Kamaraj College, Thoothukudi 628003, Tamil Nadu, India; abisasi@gmail.com
  - <sup>8</sup> Department of Microbiology, Sree Narayana College, Alathur, Palakkad 678682, Kerala, India; dhivasaju@gmail.com
  - <sup>9</sup> Department of Transfusion Medicine, Jawaharlal Institute of Postgraduate Medical Education and Research, Puducherry 605006, India; thirumuruganphd@gmail.com
- \* Correspondence: antonyvamsamrot@gmail.com (A.V.S.); sureshkudsc@gmail.com (S.S.K.)



**Citation:** Samrot, A.V.; Samanvitha, S.K.; Shobana, N.; Renitta, E.R.; Senthilkumar, P.; Kumar, S.S.; Abirami, S.; Dhiva, S.; Bavanilatha, M.; Prakash, P.; et al. The Synthesis, Characterization and Applications of Polyhydroxyalkanoates (PHAs) and PHA-Based Nanoparticles. *Polymers* **2021**, *13*, 3302. <https://doi.org/10.3390/polym13193302>

Academic Editor: Diego Antonioli

Received: 22 July 2021

Accepted: 31 August 2021

Published: 27 September 2021

**Publisher's Note:** MDPI stays neutral with regard to jurisdictional claims in published maps and institutional affiliations.



**Copyright:** © 2021 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

**Abstract:** Polyhydroxyalkanoates (PHAs) are storage granules found in bacteria that are essentially hydroxy fatty acid polyesters. PHA molecules appear in variety of structures, and amongst all types of PHAs, polyhydroxybutyrate (PHB) is used in versatile fields as it is a biodegradable, biocompatible, and ecologically safe thermoplastic. The unique physicochemical characteristics of these PHAs have made them applicable in nanotechnology, tissue engineering, and other biomedical applications. In this review, the optimization, extraction, and characterization of PHAs are described. Their production and application in nanotechnology are also portrayed in this review, and the precise and various production methods of PHA-based nanoparticles, such as emulsion solvent diffusion, nanoprecipitation, and dialysis are discussed. The characterization techniques such as UV-Vis, FTIR, SEM, Zeta Potential, and XRD are also elaborated.

**Keywords:** polyhydroxyalkanoates (PHAs); nanoparticles; extraction; synthesis; applications

## 1. Introduction

Polyhydroxyalkanoates (PHAs) are polyesters that contain a characteristic bond of esters, which are accumulated as carbon and energy reserve along with limited nitrogen source and assist in providing energy [1–5]. The structure of PHAs is composed of 3-hydroxy fatty acid monomers [6–8]. They are believed to be biodegradable and biocompatible in nature [9]. PHAs are divided into groups based on the number of carbon atoms present in the monomer units produced by them: Short Chain Length (scl-PHAs)—these contain three to five carbon atoms in a monomer; Medium Chain Length (mcl-PHAs)—these contain 6 to 14 carbon atoms in a monomer [10]; Long Chain Length (lcl-PHAs)—these

# Evaluation Of Bioactivities Of *Annona Squamosa* Linn

S. Dhiva<sup>1†</sup>, Mahima. M<sup>1</sup>, Shylanath. G<sup>1</sup>, Aparna. R<sup>1</sup>, Wilson S<sup>2</sup>, Antony V Samrot<sup>3\*</sup>, Suresh V. Chinn<sup>4,5</sup>, Shobana N<sup>6</sup>, Senthikumar Pachiyappan<sup>7</sup>

<sup>1</sup>Department of Microbiology, Sree Narayana College, Alathur, Palakkad 678682

<sup>2</sup>Department of Botany, St. John's College, Palayamkottai, Tirunelveli 627 002, Tamil Nadu, India.

<sup>3</sup>School of Bioscience, Faculty of Medicine, Bioscience and Nursing, MAHSA University, Jalan SP2, Bandar Saujana Putra, Jenjarom, 42610, Selangor, Malaysia

<sup>4</sup>Department of Biochemistry, Faculty of Medicine, Bioscience and Nursing, MAHSA University, Jenjarom, Selangor 42610, Malaysia

<sup>5</sup>Department of Periodontics, Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences, Chennai, India,

<sup>6</sup>Department of Biotechnology, School of Bio and Chemical Engineering, Sathyabama Institute of Science and Technology, Chennai, 600 119, Tamil Nadu, India

<sup>7</sup>Department of Chemical Engineering, Saveetha Engineering College, Thandalam, Chennai 602105, Tamil Nadu, India.

\*Corresponding author: [antonyamrot@gmail.com](mailto:antonyamrot@gmail.com); [dhivasaju@gmail.com](mailto:dhivasaju@gmail.com)

DOI: 10.47750/pnr.2022.13.509.83

## Abstract

Diabetes is a disorder in which blood glucose levels rise as a result of the body's cell's inability to adequately utilize glucose. Several drugs are used to lower the blood glucose level. *Annona squamosa* is an important plant that is used as an antidiabetic, antioxidant, and antimicrobial agent. In the present study, acetone and isopropyl alcohol extract of *Annona squamosa* have been used to find out its biological property and found that it has potential antimicrobial property which was identified by using Agar well diffusion assay and confirmed by using Minimal inhibitory concentration. Effect of extract on swarming motility of the test pathogens were also tested. The extract of the leaves was tested for amylase inhibition activity using plate assay method with crude amylase enzyme isolated from *Bacillus* sp. From the findings, it was clear that *Annona squamosa* L. is an effective bioactive agent which has antimicrobial and anti-amylolytic properties.

**Keywords:** *Annona squamosa* L.; antibacterial activity; amylase inhibition activity.

## INTRODUCTION

Diabetes is a metabolic disease caused by a combination of hereditary and lifestyle factors and is becoming more common in both rural and urban populations around the world<sup>1</sup>. Hyperglycemia, blindness, heart attack, stroke, kidney and liver failure, gangrene, and neuropathy are its possible effects<sup>2</sup>. It mainly occurs due to the destruction of beta cells in the pancreas. Type 2 diabetes has more complications than Type 1 diabetes<sup>3</sup>. Food choices and hormonal changes are major factors that affect insulin production. Diabetes can be managed with regular blood glucose monitoring, medications, a nutritious diet, regular exercise, insulin treatment, or a lifestyle change<sup>4,5</sup>. Many of these medications have adverse effects that might cause hypoglycemia, nausea, vomiting, hyponatremia, diarrhea, and other health issues<sup>6</sup>.

Phytochemicals are abundant in plants, conferring a wide range of bioactivities with majority of ailments being treated with medicinal herbs<sup>7-11</sup>. It is well known that administering several herb extracts can reverse alterations in serum enzyme activity such as alkaline phosphatase, acid phosphatase, and transaminases, and others<sup>12</sup>. Many herbal plants are utilized in India to prevent diabetes. *Annona squamosa* Linn. is a multi-purpose tree with edible fruits that is used to make medicinal and industrial products. It is a member of the Annonaceae family and is popularly called as "Sugar-apple", "Custard apple", "Sitaphal", "Cherimoya", native to West Indies and South America<sup>13-14</sup>. It's a fruit-bearing tropical tree which starts off as a young sapling, growing to a height of 3 to 8 m, with big, randomly spaced branches, brownish or light brownish bark, and thin leaves<sup>15</sup>. Based on the various literature studies, *Annona squamosa* L. carries various phytochemicals such as phenols, alkaloids, saponins, foam etc., which are bioactive in nature which can be estimated using the standard phytochemical procedures. Due to the presence of many phytochemicals such as tannins, fixed oils, carbohydrates, alkaloids, and phenolic compounds, various parts of the plant have antioxidant, anti-diabetic, hepatoprotective, cytotoxic, antibacterial, antifungal, and anti-tumor activities<sup>15-16</sup>. *Annona squamosa* L.'s young leaves are commonly used by tribes in Uttar Pradesh, India, to treat diabetes<sup>17</sup>. Dysentery, epilepsy, bleeding, fever, soothe the boils, heal ulcers, and tumors have all been reported to be treated with extracts obtained from various sections of the *Annona squamosa* plant<sup>18</sup>. When the leaves are bruised, they can be used to extract guinea worms, and when processed to powder, they can be used to kill cattle lice<sup>19</sup>. Supplementing with its aqueous extract helps manage blood glucose levels, lipid metabolism, enhances insulin in plasma, and protects against the side effects of diabetics<sup>1</sup>. The focus of



# Superparamagnetic Iron Oxide Nanoparticles (Spions) As Antibacterial Agent And For Biomedical Applications

Antony V Samrot <sup>1,\*</sup>, Prashooth Suresh<sup>1</sup>, Rajalakshmi D<sup>2</sup>, Emilin Renitta R<sup>3, \*</sup>, Wilson S<sup>4</sup>, Suresh V. Chinni<sup>5,6</sup>, Senthilkumar Pachiyappan<sup>7</sup>, Dhiva S<sup>8</sup>

<sup>1</sup>School of Bioscience, Faculty of Medicine, Bioscience and Nursing, MAHSA University, Jenjarom, Selangor 42610, Malaysia

<sup>2</sup>Department of Biotechnology, Sathyabama Institute of Science and Technology, Rajiv Gandhi Salai, Chennai, Tamil Nadu - 600 119, India

<sup>3</sup>Department of Food Processing Technology, School of Agriculture and Biosciences, Karunya Institute of Technology and Sciences, Coimbatore, Tamil Nadu, 641114, India.

<sup>4</sup>Department of Botany, St. John's College, Palayamkottai, Tirunelveli 627 002, Tamil Nadu, India.

<sup>5</sup>Department of Biochemistry, Faculty of Medicine, Bioscience and Nursing, MAHSA University, Jenjarom, Selangor 42610, Malaysia

<sup>6</sup>Department of Periodontics, Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences, Chennai, India,

<sup>7</sup>Department of Chemical Engineering, Saveetha Engineering College, Thandalam, Chennai 602105, Tamil Nadu, India.

<sup>8</sup>Department of Microbiology, Sree Narayana College, Alathur, Palakkad, Kerala -678 682, Kerala, India

Correspondence author: Antony V Samrot, School of Bioscience, Faculty of Medicine, Bioscience and Nursing, MAHSA University, Jenjarom, Selangor 42610, Malaysia. E-mail: antonysamrot@gmail.com; emilinrenitta@karunya.edu

DOI: 10.47750/pnr.2022.13.S09.80

## Abstract

Nanotechnology has become a significant aspect of cutting-edge medical research in the last two decades. In this study, SPIONs were synthesized and characterized using UV-Vis spectroscopy, FTIR and Scanning electron microscopic analysis. The produced SPIONs were found to be 30 – 40 nm. It was then used subjected various bioactive compounds for antibacterial activity, antioxidant activity and for contaminants removal. It was found to have antibacterial activity against *Staphylococcus aureus*, but it was less only. It was found to have lesser antioxidant activity. It was found to remove crystal violet to an extend.

**Keywords:** SPIONs, antibacterial, antioxidant, gum

## INTRODUCTION

Nanotechnology has drawn a lot of interest in recent times because it permits for the production, identification and application of designed adaptable nanomaterials<sup>1</sup>. Development in nanoscience has improved the capacity to adjust the physicochemical characteristics of nanomaterials, making them more ideal for intended applications as compared to the related bulk materials. Iron oxide magnetic nanoparticles have peaked the scientific majority's interest in this regard due to its specific structural, visual, electrical and magnetic features. Iron oxide nanoparticles can have a variety of crystalline phases depending on their stoichiometry, including wüstite (FeO), goethite [FeO(OH)], ferrihydrite [Fe<sub>3</sub>HO<sub>4</sub>(4H<sub>2</sub>O)], magnetite (Fe<sub>3</sub>O<sub>4</sub>), hematite (α-Fe<sub>2</sub>O<sub>3</sub>) and maghemite (Fe<sub>2</sub>O<sub>3</sub>). Fe<sub>3</sub>O<sub>4</sub> and/or Fe<sub>2</sub>O<sub>3</sub> are extensively used in Superparamagnetic Iron Oxide Nanoparticles (SPIONs)<sup>2</sup>. SPIONs are cutting-edge drug-delivery vehicles. SPIONs are miniscule synthetic particles with an average diameter ranging from 10 to 100 nm<sup>3</sup>. These magnetic particles are coated with polymers like dextran or polyethylene glycol that has been accepted by the living tissue (biocompatible), which operate the chemical handles for the ligation of medicinal drugs and optimize their blood distribution profile<sup>4</sup>. SPIONs with suitable outermost layer have been broadly studied inside of the body (*in-vivo*) applications including contrast enhancement magnetic resonance imaging, regenerating tissue, assay, purification of biofluids, drug administration and cell isolation. One of the most actively studied research areas in the development of cancer therapy techniques is the administration of anticancer drugs to their specified location by pairing with nanostructured SPIONs<sup>5</sup>. SPIONs are shown to be effective as non-viral gene vectors, allowing plasmids to be introduced into the nucleus at rates that are several substantially faster than current technologies. SPION-induced hyperthermia is also used to eliminate malignant cells effectively<sup>5</sup>. Considering their promising biomedical application, several SPION-related toxicity issues that should be addressed including changes in gene coding sequences, disruption in metabolism, imbalance in antioxidant ability and abnormal cellular responses. SPION, which is specific to nanoparticles is vital for their usage as drug-delivery vehicles because these nanoparticles may practically pull drug molecules to their intended site in the body once subjected to a strong electric field is applied. Furthermore, after the applied magnetic field is withdrawn, the magnetic particles maintain zero magnetic force<sup>6</sup>. Sol-gel method and micro-emulsion are most often utilized techniques for synthesizing a homogenous iron-based nanoparticle core in solution<sup>7</sup>. Coating these nanoparticles with adequate polymers lends them several parameters that are necessary as drug-delivery vehicles<sup>8,9,10</sup>. The antibacterial activity of SPIONs are

# Superparamagnetic Iron Oxide Nanoparticles (Spions) As Antibacterial Agent And For Biomedical Applications

Antony V Samrot<sup>1,\*</sup>, Prashooth Suresh<sup>1</sup>, Rajalakshmi D<sup>2</sup>, Emilin Renitta R<sup>3,\*</sup>, Wilson S<sup>4</sup>, Suresh V. Chinni<sup>5,6</sup>, Senthilkumar Pachiyappan<sup>7</sup>, Dhiva S<sup>8</sup>

<sup>1</sup>School of Bioscience, Faculty of Medicine, Bioscience and Nursing, MAHSA University, Jenjarom, Selangor 42610, Malaysia

<sup>2</sup>Department of Biotechnology, Sathyabama Institute of Science and Technology, Rajiv Gandhi Salai, Chennai, Tamil Nadu - 600 119, India

<sup>3</sup>Department of Food Processing Technology, School of Agriculture and Biosciences, Karunya Institute of Technology and Sciences, Coimbatore, Tamil Nadu, 641114, India.

<sup>4</sup>Department of Botany, St. John's College, Palayamkottai, Tirunelveli 627 002, Tamil Nadu, India.

<sup>5</sup>Department of Biochemistry, Faculty of Medicine, Bioscience and Nursing, MAHSA University, Jenjarom, Selangor 42610, Malaysia

<sup>6</sup>Department of Periodontics, Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences, Chennai, India,

<sup>7</sup>Department of Chemical Engineering, Saveetha Engineering College, Thandalam, Chennai 602105, Tamil Nadu, India.

<sup>8</sup>Department of Microbiology, Sree Narayana College, Alathur, Palakkad, Kerala -678 682, Kerala, India

Correspondence author: Antony V Samrot, School of Bioscience, Faculty of Medicine, Bioscience and Nursing, MAHSA University, Jenjarom, Selangor 42610, Malaysia. E-mail: antonysamrot@gmail.com; emilinrenitta@karunya.edu

DOI: 10.47750/pnr.2022.13.509.80

## Abstract

Nanotechnology has become a significant aspect of cutting-edge medical research in the last two decades. In this study, SPIONs were synthesized and characterized using UV-Vis spectroscopy, FTIR and Scanning electron microscopic analysis. The produced SPIONs were found to be 30 – 40 nm. It was then used subjected various bioactive compounds for antibacterial activity, antioxidant activity and for contaminants removal. It was found to have antibacterial activity against *Staphylococcus aureus*, but it was less only. It was found to have lesser antioxidant activity. It was found to remove crystal violet to an extend.

**Keywords:** SPIONs, antibacterial, antioxidant, gum

## INTRODUCTION

Nanotechnology has drawn a lot of interest in recent times because it permits for the production, identification and application of designed adaptable nanomaterials<sup>1</sup>. Development in nanoscience has improved the capacity to adjust the physicochemical characteristics of nanomaterials, making them more ideal for intended applications as compared to the related bulk materials. Iron oxide magnetic nanoparticles have peaked the scientific majority's interest in this regard due to its specific structural, visual, electrical and magnetic features. Iron oxide nanoparticles can have a variety of crystalline phases depending on their stoichiometry, including wüstite (FeO), goethite [FeO(OH)], ferrihydrite [Fe<sub>3</sub>HO<sub>8</sub>(4H<sub>2</sub>O)], magnetite (Fe<sub>3</sub>O<sub>4</sub>), hematite (α-Fe<sub>2</sub>O<sub>3</sub>) and maghemite (γ-Fe<sub>2</sub>O<sub>3</sub>). Fe<sub>3</sub>O<sub>4</sub> and/or Fe<sub>2</sub>O<sub>3</sub> are extensively used in Superparamagnetic Iron Oxide Nanoparticles (SPIONs)<sup>2</sup>. SPIONs are cutting-edge drug-delivery vehicles. SPIONs are miniscule synthetic particles with an average diameter ranging from 10 to 100 nm<sup>3</sup>. These magnetic particles are coated with polymers like dextran or polyethylene glycol that has been accepted by the living tissue (biocompatible), which operate the chemical handles for the ligation of medicinal drugs and optimize their blood distribution profile<sup>4</sup>. SPIONs with suitable outermost layer have been broadly studied inside of the body (*in-vivo*) applications including contrast enhancement magnetic resonance imaging, regenerating tissue, assay, purification of biofluids, drug administration and cell isolation. One of the most actively studied research areas in the development of cancer therapy techniques is the administration of anticancer drugs to their specified location by pairing with nanostructured SPIONs<sup>5</sup>. SPIONs are shown to be effective as non-viral gene vectors, allowing plasmids to be introduced into the nucleus at rates that are several substantially faster than current technologies. SPION-induced hyperthermia is also used to eliminate malignant cells effectively<sup>5</sup>. Considering their promising biomedical application, several SPION-related toxicity issues that should be addressed including changes in gene coding sequences, disruption in metabolism, imbalance in antioxidant ability and abnormal cellular responses. SPION, which is specific to nanoparticles is vital for their usage as drug-delivery vehicles because these nanoparticles may practically pull drug molecules to their intended site in the body once subjected to a strong electric field is applied. Furthermore, after the applied magnetic field is withdrawn, the magnetic particles maintain zero magnetic force<sup>6</sup>. Sol-gel method and micro-emulsion are most often utilized techniques for synthesizing a homogenous iron-based nanoparticle core in solution<sup>7</sup>. Coating these nanoparticles with adequate polymers lends them several parameters that are necessary as drug-delivery vehicles<sup>8,9,10</sup>. The antibacterial activity of SPIONs are



## Cardio protective activity of *Sargassum wightii* on isoproterenol induced myocardial stress in rats

R E Renitta<sup>\* a</sup>, S Rosario<sup>b</sup>, P J Jane Cypriana<sup>c</sup>, A V Samrot<sup>d</sup>, S Dhiva<sup>e</sup>, S Abiram<sup>f</sup> & P Prakash<sup>c</sup>

<sup>a</sup>Department of Food Processing Technology, Karunya Institute of Technology and Sciences, Karunya Nagar, Coimbatore, Tamil Nadu – 641 114, India

<sup>b</sup>Department of Biotechnology, Karunya Institute of Technology and Sciences, Karunya Nagar, Coimbatore, Tamil Nadu – 641 114, India

<sup>c</sup>Department of Biotechnology, School of Bio and Chemical Engineering, Sathyabama Institute of Science and Technology, Chennai, Tamil Nadu – 600 119, India

<sup>d</sup>School of Bioscience, Faculty of Medicine, Bioscience and Nursing, MAHSA University, Jalan SP2, Bandar Saujana Putra, 42610, Jenjarom, Selangor, Malaysia

<sup>e</sup>Department of Microbiology, Sree Narayana College, Alathur, Palakkad, Kerala – 678 682, India

<sup>f</sup>Department of Microbiology, Kamaraj College, Thoothukudi, Thirunelveli, Tamil Nadu – 628 003, India

\*[E-mail: emilinenitta@gmail.com]

Received 05 February 2022; revised 08 May 2022

The aim of this investigation is to determine whether the methanolic extracts of *Sargassum wightii* can protect rats against isoproterenol-induced myocardial infarction. Four different groups of rats (6 rats in each group) were taken; where group 1 comprised of normal untreated rats, group 2 was injected with Isoproterenol (synthetic catecholamine), group 3 was considered as standard and hence, was injected with Isoproterenol + Simvastatin and group 4 was treated with Isoproterenol + *Sargassum wightii*'s extract. Cardioprotective effects of *Sargassum wightii* was observed via the changes in the lipid profile, cardio marker enzymes and through histopathological studies. Rats treated with the extract of *S. wightii* showed a significant reduction in total cholesterol, LDL-cholesterol, serum triglycerides and increase in HDL- cholesterol level indicating an undamaged myocardial membrane. Likewise, low enzyme activity in *Sargassum wightii* treated rats clearly indicated the cardioprotective effects of *Sargassum wightii*. Histopathological studies were also done to observe the changes on the rats at the tissue level and no pathological changes were observed in *Sargassum wightii* treated rats. Hence, methanolic extract of *Sargassum wightii* is evidenced to possess cardioprotective activity against myocardial infarction.

[**Keywords:** Acute myocardial infarction, Cardioprotective activity, Isoproterenol, Marine algae, *Sargassum wightii*]

### Introduction

Acute Myocardial Infarction (AMI), also known as 'heart attack' happens when the blood supply to the heart and heart muscle is compromised, which is mostly caused by the deposit of unstable cholesterol/fat, white blood cell, etc. in the blood vessels<sup>1</sup>. The occurrence of AMI is the initial indication of heart diseases and is found in approximately 50 to 70 % people and is one of the common causes for hospitalization. However, 64 % of the people with AMI do not experience any chest pain and it is described as 'silent' myocardial infarctions<sup>2</sup>. High levels of LDL (low-density lipoprotein), cholesterol, triglycerides, low levels of HDL high-density lipoprotein (HDL), obesity, alcohol intake, cigarette smoking, and other risk factors are significant contributors to the condition<sup>3</sup>. Hence, there

is a continued interest in developing different forms of strategies to combat the risks associated with AMI.

As a result of increased demand for efficient screening and therapeutic treatment of AMI, there is great interest in the investigation of cardioprotective effects of marine algae species where it has been reported to have cardioprotective activities<sup>4,5</sup>. The presence of high protein content along with the essential amino acids and minerals in the marine algae species are said to be a main factor in cardioprotective activity<sup>6,7</sup>. Among the marine algae species, *Sargassum* sp. are known to various metabolites like sterol, glycolipids, phycocolloids etc which responsible for various bioactivities including antimicrobial, antioxidant, anticancer etc<sup>8</sup>. *Sargassum wightii*, linear ovate and macroscopic algae present in large quantities in Tamil Nadu, India<sup>9</sup>. There are few

# Bioactivity and Characterization of Karaya Gum

Antony V Samrot<sup>1,\*</sup>, Aktaa Liana<sup>1</sup>, Emilin Renitta R<sup>2</sup>, Wilson S<sup>3</sup>, Suresh V. Chinni<sup>4,5</sup>, Senthilkumar Pachiyappan<sup>6</sup>, Dhiva S<sup>7</sup>, Sathiyasree M<sup>8</sup>

<sup>1</sup>School of Bioscience, Faculty of Medicine, Bioscience and Nursing, MAHSA University, Jalan SP2, Bandar Saujana Putra, 42610, Jenjarom, Selangor, Malaysia.

<sup>2</sup>Department of Food Processing Technology, School of Agriculture and Biosciences, Karunya Institute of Technology and Sciences, Coimbatore, Tamilnadu, 641114, India.

<sup>3</sup>Department of Botany, St. John's College, Palayamkottai, Tirunelveli 627 002, Tamil Nadu, India.

<sup>4</sup>Department of Biochemistry, Faculty of Medicine, Bioscience and Nursing, MAHSA University, Jenjarom, Selangor 42610, Malaysia

<sup>5</sup>Department of Periodontics, Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences, Chennai, India,

<sup>6</sup>Department of Chemical Engineering, Saveetha Engineering College, Thandalam, Chennai 602105, Tamil Nadu, India.

<sup>7</sup>Department of Microbiology, Sree Narayana College, Alathur, Palakkad, Kerala - 678 682, Kerala, India

<sup>8</sup>Department of Biotechnology, School of Bio and Chemical Engineering, Sathyabama Institute of Science and Technology, Chennai - 600 119, Tamil Nadu, India

Corresponding author: Dr. Antony V Samrot

School of Bioscience, Faculty of Medicine, Bioscience and Nursing, MAHSA University, Jenjarom, Selangor 42610, Malaysia

E-mail: [antonyv.samrot@gmail.com](mailto:antonyv.samrot@gmail.com)

DOI: 10.47750/pnr.2022.13.508.95

## Abstract

Natural Biopolymers has much applications and do possess various bioactivity. In this study, karaya gum was collected and used for bioactivity studies. Gum was subjected for phytochemical screening and characterized using thin layer chromatography (TLC), UV-Vis Spectrophotometer, FTIR. It was also subjected for bioactivity studies like antibacterial against *E.coli* and *S.aureus* and antioxidant activity. Karaya gum showed a good antioxidant and antibacterial activity against *E.coli* and *S.aureus*. UV-VIS spectroscopy analysis showed the presence of sugars like sucrose, glucose, xylose etc. FTIR analysis showed the presence of functional groups like alcohol, phenols, aldehydes, ketones.

**Keywords:** Karaya gum, bioactivity

## INTRODUCTION

Plant gums have been used widely in several medical applications, as it is the cheapest and most available raw material for polysaccharide production<sup>1</sup>. These gums are usually formed after a wound in a superior plant as a result of their protection mechanisms. The ability of these materials to be bio-safe and biodegradable, makes it perfect to create a drug delivery system to enhance drug-delivery matrix due to their elevated water-produced swelling, dispersible in tablets, availability, low cost, and thickening characteristics in oral-administered liquids<sup>2-5</sup>. But, the chemical composition of the gum is important since it can affect the extraction technique and also can define the uses of the gum<sup>6</sup>.

The karaya gum is an exudate from a big bushy tree known as *Sterculia urens*, this tree is originated from the family Sterculiaceae, that can be found in a dry forest located at the central and northern part of India. Another source for karaya gum is from *S.setigera* in Senegal and Mali, and minorsup-pliesform *S. villosa* in Sudan, India and Pakistan<sup>7-8</sup>. The production of these gums is so critical, the exudation will only begin after tapping the trunks by a manpower and then it continues for several days, the large exudes is dried in hot and dry weather, broken, cleaned to take out the unwanted materials and the bark, Then it will be categorized based on the quality and stored. The Gums harvested during the hot climate (April, May and June) are the one characterized with the highest quality and they are exported internationally as grade one. Grade one gum is usually found as a powder or granules and used in pharmaceutical and food industries since they have food solubility, high viscosity, moisture retention, and transparent color. World production is around 3000 tons a year, half of it originated from India and the rest originated from NorthAfrica<sup>7</sup>. It has an acetic flavor and odor; it can create a soft film when it's plastified with glycols. The chemical structure has been found to contain D-glucuronic acid, D-galacturonic acid, D-galactose and L-

# Extraction, Characterization and Applications of Latex of *Manilkara zapota*

Antony V. Samrot <sup>1\*</sup>, Ng Xiao Qi<sup>1</sup>, Senthilkumar Pachiyappan<sup>2</sup>, Saigeetha S<sup>2</sup>, Shobana N<sup>2</sup>, Suresh V. Chinni<sup>4,5</sup>, Dhiva S<sup>6</sup>, Rajalakshmi D<sup>2</sup>

<sup>1</sup>School of Bioscience, Faculty of Medicine, Bioscience and Nursing, MAHSA University, Jenjarom, Selangor 42610, Malaysia

<sup>2</sup>Department of Biotechnology, Sathyabama Institute of Science and Technology, Rajiv Gandhi Salai, Chennai, Tamil Nadu - 600 119, India

<sup>3</sup>Department of Chemical Engineering, Saveetha Engineering College, Thandalam, Chennai 602105, Tamil Nadu, India.

<sup>4</sup>Department of Biochemistry, Faculty of Medicine, Bioscience and Nursing, MAHSA University, Jenjarom, Selangor 42610, Malaysia

<sup>5</sup>Department of Periodontics, Saveetha Dental College and

Hospitals, Saveetha Institute of Medical and Technical Sciences, Chennai, India,

<sup>6</sup>Department of Microbiology, Sree Narayana College, Alathur, Palakkad, Kerala - 678 682, Kerala, India

Correspondence author: Antony V Samrot, School of Bioscience, Faculty of Medicine, Bioscience and Nursing,

MAHSA University, Jenjarom, Selangor 42610, Malaysia

E-mail: [antonyv.samrot@gmail.com](mailto:antonyv.samrot@gmail.com)

DOI: 10.47750/pnr.2022.13.509.013

## Abstract

In this study, bioactivity and application of plant latex of *Manilkara zapota* in agriculture fields had been studied. Latex was collected, extracted and characterized with TLC, UV-Vis and GCMS analyses. Latex was also subjected for seed germination study, pot study and insecticidal activity. This latex was found to increase water holding capacity and soil porosity and soil structure was improved by latex. It was also inducing the root formation and enhances crop yields. It also shown insecticidal activity against mealy bugs.

**Keywords:** *Manilkara zapota*; latex; bioactivity; insecticidal activity.

## INTRODUCTION

Laticifers are highly specialized elongated secretory plant cell distributed over the whole plant. It is in charge of secreting and storing the plant latex<sup>1</sup>. Plant latex is a secondary metabolite of plant which normally in milky white, yellow or orange. Roots, stem, leaves, unripe fruits and barks are typically the part with high amount of latex<sup>2</sup>. In order response to turgor pressure in laticifers, latex is secreted only when the plant is suffering from mechanical injury such as insect bites or an incision on it. Various bioactive compounds can be detected in plant latex such as alkaloids, terpenoids, tannins, proteins, sugar, saponins, starches, resins, and gums. This is because it consists of content from vacuoles of laticifers and emulsion are formed from it. Hence, the plant latex acts as defence system of the plant. Latex normally will coagulate in a short time and cover the damaged tissue to protect the plant from attack by insect again during its recovery period<sup>3</sup>.

*Manilkara zapota* (sapodilla) is a latex bearing plant from the genus *Manilkara* which belongs to Sapotaceae family. It is also known as sapodilla, naseberry, chicku and chikoo. *M. zapota* is a tropical tree which mostly is found in India, Malaysia and South America<sup>4</sup>. Its latex, fruits and timber are commercially used. The latex produced by *M. zapota* is milky white colour. Traditionally, latex of it is used to manufacture the chewing gum which is chicle-based and acts as filling for tooth cavities. Latex of *M. zapota* mainly contain tannins, flavonoids, alkaloids, saponins, polysaccharide and polyphenolic compounds. These components contributed to different bioactivities.

Fertilizers are one of the factors which largely influenced the growth of plants. It increased the crop yields by enhancing and sustaining the soil quality. Agriculture fields employ insecticides to prevent their plantations from being destroyed by insects as well as microorganisms<sup>5</sup>. Massive usage of inorganic fertilizer and synthetic chemical insecticides resulting air pollution, water pollution, soil pollution<sup>6,7</sup>. Chemical insecticides also impact via food commodities. Apart from that, the health of workers in manufacturing chemical insecticides as well as agricultural farm workers are significantly affected since they long-terms exposed to toxic chemicals. Hence, latex from *M. zapota* had been used as fertilizer to determine whether it promotes the growth of the plant and natural insecticides to protect the attack from insects<sup>8,9</sup>. This study was done to determine the bioactivity of latex of sapodilla and its role in agriculture such as its ability to enhance the growth of plants and its potential as insecticides.

# Evaluation Of Bioactivity Of Chloroform Extract Of *Syzygium Aqueum* Leaves

S. Abirami<sup>1</sup>\*, Ivangelin Sneha<sup>1</sup>, Joe Vinushia A<sup>1</sup>, Antony V Samrot<sup>2,\*</sup>, Senthilkumar Pachiyappan<sup>3</sup>, R. Sanjay Preeth<sup>4</sup>, Dhiva S<sup>5</sup>, Suresh V. Chinni<sup>6,7</sup>

<sup>1</sup>Department Of Microbiology, Kamaraj College, Thoothukudi, Affiliated to Manonmanium Sundaranar University, Thoothukudi, Tamil Nadu, India.

<sup>2</sup>School of Bioscience, Faculty of Medicine, Bioscience and Nursing, MAHSA University, Jalan SP2, Bandar Saujana Putra, 42610, Jenjarom, Selangor, Malaysia.

<sup>3</sup>Department of Chemical Engineering, Saveetha Engineering College, Thandalam, Chennai 602105, Tamil Nadu, India.

<sup>4</sup>Department of Biotechnology, School of Bio and Chemical Engineering, Sathyabama Institute of Science and Technology, Chennai, Tamil Nadu, 600119, India

<sup>5</sup>Department of Microbiology, Sree Narayana College, Alathur, Palakkad, Kerala -678 682, Kerala, India

<sup>6</sup>Department of Biochemistry, Faculty of Medicine, Bioscience and Nursing, MAHSA University, Jenjarom, Selangor 42610, Malaysia

<sup>7</sup>Department of Periodontics, Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences, Chennai, India,

Correspondence author: S.Abirami - abisasi@gmail.com; Antony V Samrot - antonysamrot@gmail.com

DOI: 10.47750/pnr.2022.13.509.81

## Abstract

Urinary tract infection (UTI) in immunologically compromised persons is threatening millions of people's life worldwide. The synthetic drugs are slowly not effective and also causing more side effects. Bio-derived agents are known to be less toxic and effective in treating UTI. In this study, chloroform extract of *Syzygium aqueum* was subjected for antimicrobial, antioxidant, antidiabetic and antiproliferative activities. Due to the presence of numerous bioactive compounds, it showed excellent bioactivity.

**Keywords:** Leaf extract, Chloroform, Antimicrobial, Antioxidant, Anticancer activities.

## INTRODUCTION

From early days till now people in search of remedy for their disease, looked for drugs in nature. An impressive number of modern drugs have been isolated or derived from natural source<sup>1,2,3</sup>. Traditionally, the crude extracts of different parts of medicinal plants were widely used for treating some human diseases<sup>4</sup> as they have therapeutically effective metabolites<sup>5,6</sup>. Emergence of drug resistant in bacteria have created several questions on effectiveness of existing antibacterial therapy<sup>7,8</sup>. Various developing countries have been known to use plant-derived medicine mostly crude preparation for treating infectious diseases<sup>9</sup>. UTI – Urinary tract infections commonly caused by *E. coli*, *Klebsiella pneumoniae*, *Proteus mirabilis* etc<sup>10</sup>. Improper use of antibiotics created drug resistance in these organisms and makes the disease untreatable<sup>11,12</sup> and paving way for higher morbidity and mortality<sup>5</sup>. Medicinal plants are good choice to treat this ailment<sup>13</sup>. *Syzygium aqueum*, a member of family Mysteraceae, seen in Asian countries like India, Indonesia and other tropical countries. This plant has been used to treat oxidative stress related ailments<sup>14,15</sup> and it is being stated that it can be used to treat UTI by the Central India tribals of Mahakoshal region. Thus, it could be a good choice for treating this infections<sup>16</sup> as it is rich of various phytochemicals including tannins, alkaloids etc. and they are responsible for various bioactivities<sup>17</sup>. Having understand about the drug resistance and its importance of finding a new drug to treat multidrug resistant UTI causing organisms, this work was done to exploit *Syzygium aqueum* for its antimicrobial activity against UTI causative agents.

## Materials And Method

### 1. Collection of samples

#### 1. Collection and extraction of *S.aqueum* leaves

Leaves of *Syzygium aqueum* was collected from Rajakkamangalam, Nagercoil, Tamil Nadu, India, After collection of *S.aqueum* leaves, it was washed with distilled water, shade dried and blended to powder. 10g of powdered *S.aqueum* leaves were soaked in 100 ml of chloroform for 3 days, centrifuged at 5000 rpm and supernatant was collected and left for evaporation. The remained extract in the container was dissolved with DMSO (dimethylsulfoxide) and used in the study.



ISBN : 978-93-90781-81-2

# **ICMR - 2021**

26<sup>th</sup> & 27<sup>th</sup> November, 2021  
Hotel Turyaa, Chennai

## **INTERNATIONAL CONFERENCE ON** **MULTIDISCIPLINARY RESEARCH (ICMR-2021)**



**Organized by**  
***ESN Publications***

16	<b>INDIAN IMMIGRANT EXPOSURE IN THE SELECT NOVELS OF JHUMPA LAHIRI</b> <i>Mrs.P.Kiruthika</i>	125-128
17	<b>Cultural Conflict in Arun Joshi's The Strange Case of Billy Biswas</b> <i>Mrs. P.PRASHANTHI</i>	129-134
18	<b>A COMPARATIVE STUDY ON LEVEL OF STRESS AMONG MOTHER HAVING CHILDREN WITH MODERATE AND SEVERE INTELLECTUAL DISABILITY</b> <i>Ghousia Farheen, Dr sarita Gupta</i>	135-146
19	<b>POST PANDEMIC SCENARIO OF HIGHER EDUCATION: AN ANALYSIS WITH REFERENCE TO TEACHERS OF ARTS AND SCIENCE COLLEGES IN KERALA</b> <i>Mrs.Archana K M</i>	147-162
20	<b>CASE STUDY ON CRYPTOCURRENCY</b> <i>Yogita Shinde</i>	163-174
21	<b>THE INCESSANT WAR FOR GENDER JUSTICE: AN APPRAISAL ON TRANS IN JULIA SERANO'S EXCLUDED</b> <i>MONISHA M.</i>	175-180
22	<b>The character Nina's Identity In Manju kapur's The Immigrant</b> <i>G.VIJAYALAKSHMI</i>	181-186
23	<b>TPACK into Practice: Merging Theory into Classroom practices - The Theory of Constructivism in Virtual Station Rotation Model</b> <i>Caroline Unnathamani K, Dr Sumanjari S</i>	187-196



## POST PANDEMIC SCENARIO OF HIGHER EDUCATION: AN ANALYSIS WITH REFERENCE TO TEACHERS OF ARTS AND SCIENCE COLLEGES IN KERALA

**Mrs. Archana K M,**

Assistant Professor, Department of Commerce, Sree Narayana College, Alathur,  
Palakkad Dist. Kerala, India.  
archanamohan898@gmail.com

### **Abstract**

The paper discusses the attitude of teachers in Higher Educational Institutions (HEIs) towards the remote digitalised classroom teaching-learning activities in the post pandemic scenario of our country. As the pandemic crisis has seriously affected almost all the sectors of our socio-economic system, higher education is a key sector which has far reaching implications for the development of our country. The traditional classroom teaching has shifted rapidly to remote online classes and has serious drawbacks and issues including the cultural and social development of students and hence it seeks more attention and discussion. The study is held among the teachers from the Arts and Science Colleges of Kerala spread mainly across the districts of Thrissur and Palakkad. Non-parametric tests of hypothesis are conducted to test the attributes under study. The study would help develop a better adaptive system of education to survive the contingency period.

### **Introduction**

Beginning from early 2020, we all witnessed how the COVID-19 (caused by the SARS-CoV-2 virus) pandemic shocked the world, almost bringing it to an abrupt stop. On 11 March 2020, the World Health Organization (WHO) declared the COVID-19 a pandemic. By 31 July 2020, COVID-19 had spread across 217+ countries and territories, with almost 17.1 million confirmed cases and 668,073 deaths. The threats and challenges put forth by this pandemic situation will affect and is continuing to affect all of our lives irrespective of our nationalities. (Aristovnik et al., 2020)

As far my study is concerned the focus is on Higher Education Sector and our education sector has been seriously impaired by the crisis set forth by the pandemic situation. As per the records of the Ministry of Human Resource Development, 14.04 lakhs teachers are engaged in 53,620 institutions in the field of higher education in India. Also, 3.74 Crore students were registered for higher education in India in 2018-19. Studies reveal that the number of employable students are steadily decreasing in proportion, it is still more adversely affecting our education sector as physical real-time classes are continuously being stopped due to Covid -19. Besides the drawbacks



Economics of  
Happiness and  
Welfare

ISBN: 978-93-5526-922

1

# DISQUISITIONS ON ECONOMICS OF HAPPINESS

PROCEEDINGS OF THE INTERNATIONAL CONFERENCE ON  
ECONOMICS OF HAPPINESS AND WELFARE

18<sup>th</sup> & 19<sup>th</sup> JUNE 2021

Volume 1

EDITORS

**Dr.Chacko Jose P**

**Dr.Shirley Jose K**

**Mr.Nijil Jacobi**



10.	A STUDY ON INCLUSIVE SOCIETIES AND WAY TO THE HAPPIEST SOCIETY	RESHMA M	76 - 80
11.	PSYCHOLOGICAL WELLBEING AS A KEY FACTOR TO GROSS NATIONAL HAPPINESS	SREELAKSHMI K DR VINEETH K M	81 - 87
12.	CULTURAL DIVERSITY AND RESILIENCE AS A KEY FACTOR TO GROSS NATIONAL HAPPINESS	SULFIYA K S DR VINEETH K M	88 - 94
13.	THE GREAT INDIAN HAPPINESS TRAGEDY; AN EGALITARIAN SOCIETY IS THE ONLY PANACEA	KRISHNAPRIYA R	95 - 103
14.	CONSTRUCTION OF HAPPINESS: AN ENQUIRY INTO ADVERTISEMENTS	SONIA KUMARI	104 - 115
15.	COMPARISON BETWEEN THE HAPPINESS OF WORKING WOMAN AND NON-WORKING WOMAN	ANJANA JOSEPH RAJY RAMAKRISHNAN	116 - 120
16.	SOCIAL ENTREPRENEURSHIP: AVENUE FOR SUSTAINABLE SOCIO-ECONOMIC DEVELOPMENT AND ENVIRONMENTAL PROTECTION	SANJANA	121 - 129
17.	UNPAID CARE WORK AND ECONOMY OF HAPPINESS	ARCHANA. A	130 - 134
18.	RAMIFICATIONS OF COVID 19 ON THE EDUCATIONAL SPHERE IN KERALA	JUBY THOMAS PREETHA THOMAS	135 - 146
19.	BIBLIOMETRIC ANALYSIS OF SUSTAINABLE INVESTING IN SCOPUS	SHABNA BABU DR VINEETH K M	147 - 154

*PROCEEDINGS OF*  
*THE NATIONAL CONFERENCE ON*  
**LIFE IN THE 2020s:  
SOCIAL, CULTURAL AND  
ECONOMIC DIMENSIONS**

*25<sup>th</sup> May 2021*



*Editors*

*Dr. Chacko Jose P*

*Dr. Shirley Jose K*

*Mr. Nijil Jacobi*

*Mr. Omprakash Arun Sonone*

---

*The Department of Economics  
Sacred Heart College, Chalakudy, Kerala*

## INDEX

Sl. No.	Title of Research Paper/Article	Name/s of Author/s	Page No.
1	A STUDY ON THE IMPACT OF COVID-19 IN THE PRESENT BUSINESS MILIEU	Diya Akbar	1 - 9
2	PERCEIVED EASE OF USE OF SOCIAL MEDIA PLATFORMS ON MOBILE DURING LOCKDOWN	Sheena Mathew Dr. Vineeth K M	10 - 21
3	SOCIAL MEDIA USAGE OF HIGHER SECONDARY STUDENTS	Jijish Elias	22 - 28
4	BIBLIOMETRIC ANALYSIS OF BEHAVIOURAL FINANCE IN SCOPUS DURING 2018-2021	Krishna Nambiar Dr Vineeth K M	2 4/11
5	INTERNET USAGE AND ECONOMIC PERFORMANCE OF INDIA USING AN ADRL APPROACH	Dr. Jayant Kumar Chakraborty Sudeshna Sarkar	40 - 49
6	BIBLIOMETRIC ANALYSIS OF SOCIAL RESPONSIBLE INVESTING IN SCOPUS	Shabna Babu Dr. Vineeth K M	50 - 60
7	THE INSTANT GRATIFICATION OF CONSUMERS THROUGH E-COMMERCE- A STUDY AMIDST COVID 19	Seethu John Anish B Bhaskaran	61 - 67
8	BIBLIOMETRIC ANALYSIS OF EVENT TOURISM IN SCOPUS DURING 2018-2021	Neena Merina Dr. Vineeth K M	68 - 78
9	FINANCIAL WELLBEING- GOAL OF FINANCIAL LITERACY	Anusha Ragesh Beneeta Benny	79 - 87
10	INFLUENCE OF PERCEIVED USEFULNESS AND PERCEIVED EASE OF USE ON SWITCHING INTENTION REGARDING MOBILE APPS	Aleena P .Z Dr. Vineeth K M	88 - 93
11	ENVISAGING THE REPERCUSSION OF SELF-HELP GROUPS IN WOMEN ENTREPRENEURSHIP: -WITH SPECIAL REFERENCE TO KARUKACHAL PANCHAYAT	Preetha Thomas	94 - 102



*Multidisciplinary Research Thoughts*  
*Dr Vineeth KM*



*Multidisciplinary Research Thoughts*  
**[ISBN 978-93-5566-389-4]**  
*Dr Vineeth KM*  
Editor-in-Chief  
Assistant Professor of Commerce



<b>MDRC 078</b>	Dr Jency Treesa Remya Madhu Silfa C R	A Study on the Effect of the Financial Performance on the Stock Prices of the Top Constituent Banks of BANKNIFTY	472 – 480
<b>MDRC 079</b>	Seenamol KK	A Study on Drifts in Urban Poverty in India	481 – 487
<b>MDRC 080</b>	Bindu R Dr D Geetha	A Study on Factors Affecting Credit Management and Loan Performance of Microfinance Institutions	488 - 494
<b>MDRC 081</b>	Shabna Babu Dr Vineeth K M	Bibliometric Analysis of ESG Investing in Scopus	495 - 502
<b>MDRC 082</b>	Neena Merina Dr Vineeth K M	Bibliometric Analysis of Destination Image in Scopus	503 - 510
<b>MDRC 083</b>	Mary Sruthy Melbin Dr Vineeth K M	Bibliometric Analysis of Ecotourism in Scopus	511 – 517
<b>MDRC 084</b>	Sulfiya K S Dr Vineeth K M	Bibliometric Analysis of Emotional Intelligence in Scopus	518 - 524
<b>MDRC 085</b>	Shiju C R Dr Vineeth K M	Bibliometric Analysis of Total Quality Management in Scopus	525 - 532
<b>MDRC 086</b>	Sheena Mathew Dr Vineeth K M	Bibliometric Analysis of Destination Marketing in Scopus	533 - 540
<b>MDRC 087</b>	Anupama K A Dr Vineeth K M	Association between Composition of Fund Portfolios and Fund Returns of Value Funds	541 - 548
<b>MDRC 088</b>	Neha A S Dr Vineeth K M	Antecedents of Brand Equity	549 - 558
<b>MDRC 089</b>	Gopika Jayachandran Dr Vineeth K M	Influence of Emotional Brand Attachment and Brand Love on Brand Loyalty in Beauty Soaps	559 - 566
<b>MDRC 090</b>	Aleena P Z Dr Vineeth K M	Evaluating the Risk Ratios of Exchange Traded Funds	567 - 572
<b>MDRC 091</b>	Divya John Dr Vineeth KM	Bibliometric Analysis of Brand Love in Scopus	573 - 583
<b>MDRC 092</b>	Dr Mufliha S	Effectiveness Of Management And Individual Prevention Strategies Adopted By The Bank Employees To Get Rid Of Excessive Job Burnout	584 - 597

## Recent Multidisciplinary Research

### EDITORS

**Dr. Vineeth. K. M**  
Assistant Professor,  
PG Department of Commerce  
Government College Tripunithura.

**Dr. Ms. Renu A Rathi**  
Associate Professor,  
PG Department of Commerce,  
Jain Deemed to be University, Bangalore

**Dr. Priya R**  
Post Graduate Department of Commerce, Sanatana Dharma  
College, Kalarcode Alappuzha ,Kerala ,India

**ESN PUBLICATIONS  
INDIA**

© 2021, ESN Publications,  
First Edition: 2021



S.NO	CHAPTER TITLE	PAGE NO
10.	<b>Impact Of Covid-19 Pandemic On Mental Health Of Teenagers.</b> <i>Prasanna Mahantesh Pattan</i>	62-67
11.	<b>Impact Of Covid-19 On Cyber World</b> <i>Varsha Prashant Desai</i>	68-74
12.	<b>Measuring The Role Of Eco-Friendly Sustainability Of Green Supply Chain Management Practices On Corporate Image Of Top Branded Curry Powders In Kerala</b> <i>DrMufliha S</i>	75-85
13.	<b>An Overview Of Health Insurance Policies Covering Covid 19</b> <i>Krishna Nambiar</i>	86-90
14.	<b>A Bibliometric Analysis Of Covid19 In Pubmed</b> <i>Mary SruthyMelbin</i>	91-97
15.	<b>Emerging Home Entrepreneurs – A Wave Of Hope During Covid-19 Pandemic</b> <i>Nayana B S</i>	98-103
16.	<b>Kochi Muziris Biennale - Millennialperception To Special Events</b> <i>NeenaMerina</i>	104-113
17.	<b>Performance Evaluation Of Ethical Mutual Funds In India</b> <i>ShabnaBabu</i>	114-121



# TABLE OF CONTENTS

## *Social Science Stream*

Article Tracking ID	Title of Article	Author (s)	Page Numbers
MDRC 1	A Conceptual Review of e-Governance Initiatives of Grama Panchayats in Kerala	Raju Kurian M Dr. V. Ambilikumar Dr. Felice Joy	1 - 4
MDRC 2	A Study on Bell and Brass Metal Industries in Kerala with Reference to Mannar Panchayat	Aparna S Divya Unnikrishnan Reshma Pillasi S	5 - 12
MDRC 3	A Study on Customer Perception Towards Digital Marketing	Anjana S Arya Suresh	13 - 21
MDRC 4	A Study on Stress Among College Teachers of Thrissur District.	Haritha C R Dr. Rinu V Antony	22 - 27
MDRC 5	The Effectiveness of Instagram Marketing Techniques During Covid-19 with Special Reference to Beauty Products	Dhanasree S Rebecca Benoy	28 - 38
MDRC 6	An Analysis on Investment Behaviour Among Teachers Working in Unaided Institutions Towards Post Office Investment in Thrissur District	Sreedevi M A Anagha Nandakumaran Ann Maria T R Anna Rose	39 - 47
MDRC 7	Consumer Perception towards Organic Food Products with Special Reference to Changanacherry Taluk	Namitha Mohan Aparna Lekshmi S	48 - 49
MDRC 9	Consumers' Perception Towards Social Media Advertisements with Special Reference to Thrissur	Sreeshna S Liyatt Mary Joshy Merin Thomas Sanitha K S	50 - 57
MDRC 10	Different Types of Entrepreneurs in Kerala	Soorya Thankachan Dr Anitha M N	58 - 62
MDRC 11	Ethical Investing	Shabna Babu Dr Vineeth K M	63 - 66



EDITED BOOK

# ENTREPRENEURSHIP AND ECONOMIC DEVELOPMENT

ISBN - 978-93-5407-454-7

Editor & Publisher  
C. Thomas Sebastian  
Retd. Associate Professor in Commerce  
Deva Matha College, Kannevilangad  
Kottayam Dt., Kerala - 686633

*Entrepreneurship and Economic Development*  
ISBN Number : 978-93-5407-454-7

## CHAPTER - 23

Entrepreneurial Aptitude of Female Commerce Students in  
Nattika Panchayath (Thrissur District)

**Anila Bulhan**

Assistant Professor Dept. of Commerce

Deva Matha College, Kannevilangad, Kottayam Dt., Kerala



**International e-Conference on  
Bioengineering for Health &  
Environment  
(ICBHE - 2021)**



**Abstract Book**

**Jointly Organized by**

**Department of Biotechnology,  
School of Bio & Chemical Engineering,  
Centre for Academic Partnership and International Relations,  
Soeharto Institute of Science & Technology,  
India**

**School of Bioscience  
Faculty of Medicine, Bioscience and Nursing,  
MAHSA University  
Bandar Sunjana Putra, Jengatan, Selangor  
Malaysia**

# ABSTRACT BOOK

INTERNATIONAL  
CONFERENCE ON  
GREEN MATERIALS  
AND RENEWABLE  
ENERGY (ICGRME)

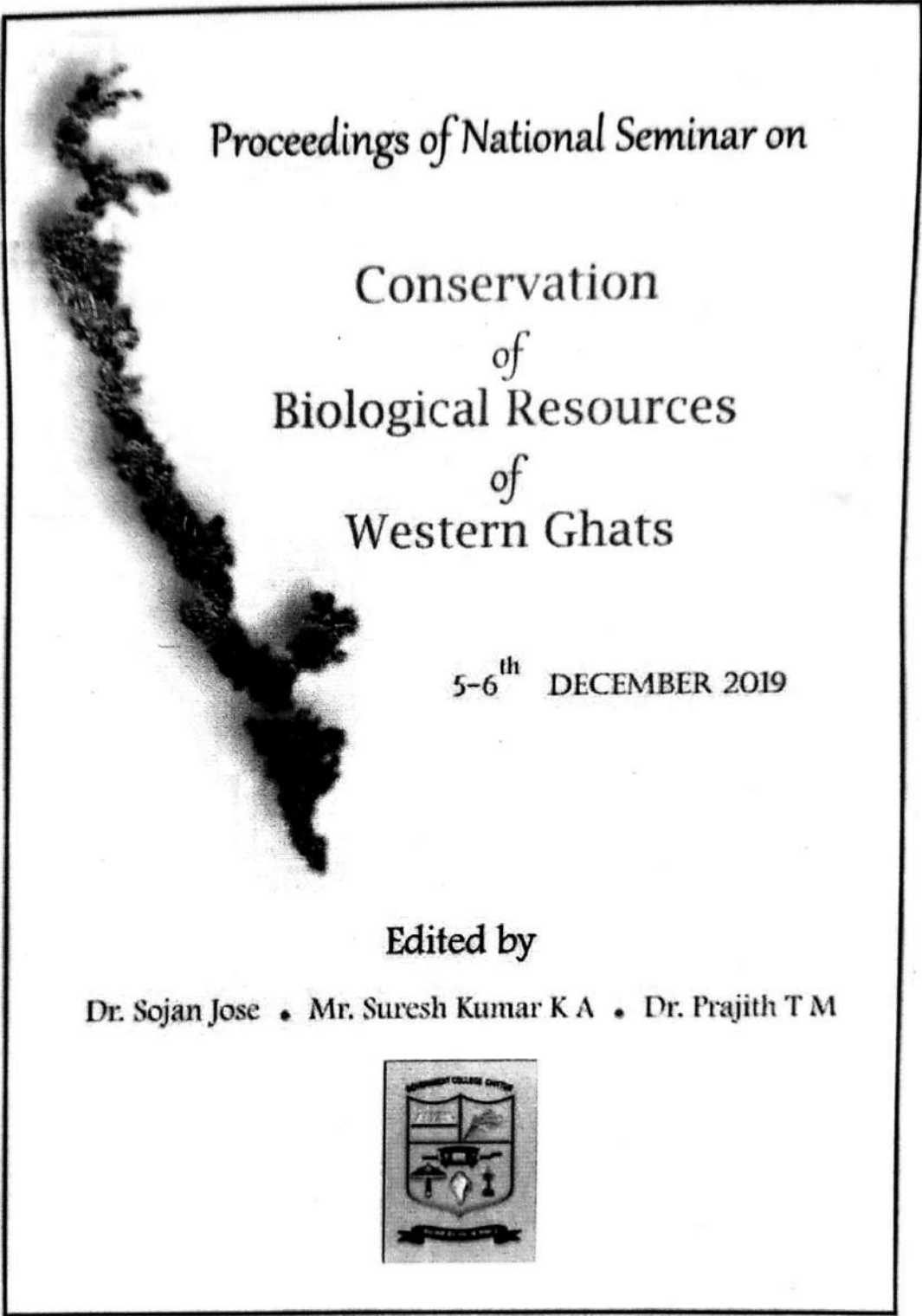
July 10-11, 2021  
(ONLINE)



Organized by  
Department of Applied Sciences  
in Association with  
Department of Chemical Engineering

Dr. Manoj Kumar Singh is Director  
of Applied Sciences Department, O.P.J.S. Group  
of Institutions, Lucknow - 226005, India.





*R. Birelu*

Principal  
Sree Narayana College, Alathur  
Palakkad- 678 682, Kerala



## Comparison of physiological features of viable and non-viable recalcitrant seeds with special reference to *Myristica malabarica* Lam. and *Myristica magnifica* Bedd.

K. A. Suresh Kumar <sup>1</sup>, C. Anilkumar <sup>2</sup>, K. G. Ajithkumar <sup>3</sup> and T. M. Prajith <sup>1</sup>

<sup>1</sup> Department of Botany, Government College Chittur, Palakkad,

<sup>2</sup> Conservation Biology Division, Jawaharlal Nehru Tropical Botanic Garden and Research Institute, Pacha-Palode, Thiruvananthapuram,

<sup>3</sup> Department of Botany, Government College for Women, Thiruvananthapuram

For correspondence (e-mail: sureshvmala74@gmail.com)

### ABSTRACT

Palakkad is well known for agro biodiversity and agriculture based traditional knowledge. This paper deals with scientific analysis of traditional knowledge related to sorting viable seeds which are prevailed in various rural farming communities in Palakkad district of Kerala state. The present study was undertaken with the objective of documentation of traditional knowledge of farmers related to sorting of viable seeds, viz. floating seeds will never sprout and shaky seeds will never sprout. Another important objective was to pave the way for value addition to such traditional knowledge by giving logical and scientific interpretation. The seeds of various *Myristica* species (*Myristicaceae*) were taken for the scientific validation of the documented traditional knowledge because the distribution of these endemic and endangered tropical forest trees are restricted to a unique but highly fragile and fragmented fresh water ecosystem called *Myristica* swamps. The value added and validated traditional knowledge will be documented and made available as knowledge repository to farming as well as academic community.

**Key Words:** Desiccation, *Myristica* sps, *Myristica* swamps, Traditional Knowledge, Viability.



130

Principal  
Sree Narayana College, Alathur  
Palakkad - 678 682, Kerala

Proceedings of National Seminar on  
Conservation of Biological Resources of  
Western Ghats

3<sup>rd</sup> December 2019



## Effect of Pre Sowing Cold Treatment on Seedling Vigor Index of Paddy

K.A. Suresh Kumar, S. J. Swathy and T. M. Prajith

Department of Botany, Government College Chittur, Palakkad, 678 104 - Kerala, India.

For correspondence (e-mail : sureshvmala74@gmail.com)

### ABSTRACT

Traditional seed treatments that have been practiced with ease and effectiveness is a key for sustainable development of agriculture. The traditional practice of subjecting paddy seeds to pre-chilling treatment has shown an increased performance of the crop. This long-established practice was tested under the artificial cold treatment and the outcomes were compared with the seeds treated in natural cold condition as per the traditional practice. *Oryza sativa* var. CO-52, *Oryza sativa* var. jyothi, *Oryza sativa* var. mahamaya, and *Oryza sativa* var. uma were the seed varieties selected for this. The seedling vigor index of the treated seeds showed a considerable increase in comparison with non-treated seeds. The seeds treated in artificial conditions and natural condition showed similar trend in results.

### INTRODUCTION

Rice is a versatile crop; it can grow at an elevation of more than 3000m in the Himalayas and at sea level in the deltas of great rivers of Asia. It is one of the most important crop which is the major contributor to human food supply. Due to its origin in tropical and subtropical regions, rice is more suitable at a temperature between 20°C and 35°C. Palakkad, the granary of Kerala, has about 83,000 ha. under paddy cultivation, accounting for 40% of state's total paddy area. Traditional knowledge of farmers and local communities in paddy cultivation is paving to more production of rice. So this accumulated knowledge, skills and technology of local people, derived from direct interaction of human beings and their environment over centuries which has adapted to the local culture and environment should be documented and preserved.

105



R. Binu

Principal

Sree Narayana College, Palakkad - 678 104, Kerala



# Women Entrepreneurship An Overview



**Editors**  
**Dr. Liji K.T. • Ms. Deepa N.**



*[Signature]*  
Principal  
Sree Narayana College, Alathur  
Palakkad-678 682, Kerala

## Women Entrepreneurship An Overview

Before the 20th century, women were operating businesses as a way of supplementing income. In many cases, they were trying to avoid poverty or making up for the loss of a spouse. The ventures that these women undertook were not known as entrepreneurial at the time; many of them usually had to bow to their domestic responsibilities. Women became more involved in the business world only when the idea of women in business became palatable to the general public. However, this does not mean that there were no female entrepreneurs until that time. During the 18th and 19th centuries, more women came out from under the oppression of society's limits and began to emerge into the public eye. Despite the frowns of society, women flourished. In the 1900s, due to a more progressive way of thinking and the rise of feminism, female entrepreneurs began to be a widely accepted term and although these women entrepreneurs serviced mostly women consumers, they were making great strides. As each change in society happened, female entrepreneurs were there, becoming more influential. Despite all these advances, the female entrepreneurs still fell behind when compared to their male counterparts. Therefore an attempt has been made to understand the pros and cons of women entrepreneurship in Kerala. We hope that the readers will find this volume useful for further research, teaching policy, formulation and programme implementation.



**Dr. Liji K.T.** has completed M.A from Christ College, Irinjalakuda, M.Phil from Avinashilingam University for Women Coimbatore and Ph. D from M.G. University, Kottayam. Presently working as Head & Asst. Prof. in the Dept. of Economics, Mercy College, Palakkad, Kerala. She has an excellent academic background with 6 years of research experience and was a co-investigator and Principal investigator in the UGC funded minor projects. Also possess associateship with IUCAE, University of Kerala, TVM and had presented more than 20 papers in various national and international seminars. In addition, served as a resource person for a number of national and state level seminars.



**Deepa N.** is working as Assistant Professor of Sociology in Mercy College, Palakkad, Kerala. She took her M.A. degree from University of Calicut and is pursuing her Ph.D. from Bharathiyar University, Coimbatore. Her area of specialization is Women Studies. She has 4 years of teaching experience. She has completed a UGC - Minor Research Project in 2016. She is the author of three books in Sociology published by the University of Calicut which are course materials for Degree Students. She has presented research papers in international and national seminars, published research articles in national and international reputed peer reviewed journals and also in edited books.



### ABHIJEET PUBLICATIONS

4658-A, Ambika Bhawan, First Floor  
21, Ansari Road, Darya Ganj, New Delhi-110002  
Tel. 011-23259444, 65698474  
e-mail: [info@abhijeetpublications.com](mailto:info@abhijeetpublications.com)  
[www.abhijeetpublications.com](http://www.abhijeetpublications.com)

₹ 1450/-

ISBN: 978-93-5074-268-6



9 789350 742686



*R. Bineth*  
Principal

Sree Narayana College, Alathur  
Palakkad- 678 682, Kerala

PROCEEDINGS OF THE NATIONAL SEMINAR  
**EMERGING TRENDS IN  
BANKING AND FINANCE**



EDITORS  
Dr. P. VASANTHAKUMARI  
JESITHA J.  
REKHA MENON



PG DEPARTMENT OF COMMERCE  
**N.S.S. COLLEGE**  
OTTAPALAM



*P. Bireesh*  
Principal  
Sree Narayana College, Alathur  
Palakkad- 678 682, Kerala

# CONTENTS

	1-5
1. Role of Tourism in Indian Economy Dr. Nisamudheen T.	6-10
2. Ecotourism - Issues and Challenges Binija George	11-16
3. An Empirical Study of Service Quality Factors Impacting Tourists Satisfaction in Nilambur Ecotourism Destinations Munivar Favarus M.A. & Asooru K.	17-21
4. Role of Kerala Tourism Development Corporation (K.T.D.C.) in the Tourism Development of Kerala Muhammed Faisal T. & Aboobacker Siddique Kakkattuchali	22-30
5. A Study on Accessible Tourism - with special reference to Kerala Gayathri V. & Deepthi I.	31-36
6. Importance of Tourism Sector in Poverty Alleviation and Employment Generation - special reference to Wayanad District of Kerala Muhammed Raff N.	37-41
7. Impact of Tourism on Economic Development of India Gopika S.S.	42-44
8. Tourism and Regional Development in India Svapna V.P.	45-50
9. Lean Concept in Health Care Tourism Mahda T. and Shyni P. & Dr. R. Priya	51-55
10. The Role of Cruise Tourism in Sustainable Development of Tourism Industry with special reference to Kerala Brilla Varghese, Maya K. & Gaugasree T.	56-61
11. Perception Level of Tourists towards Tourist Attractions in Nilambur Mujeebu Rahiman P.	62-67
12. MICE Tourism in India: A Promising Proposition to Economic Growth Shameema V. & Sreekala T.	68-72
13. Adventure Tourism in Kerala Shana Shimin P. & Fousiya M.P.	73-78
14. Socio Economic Impact of Pilgrimage Tourism with special reference to Bharananganam Joicey Jose, Deepa Tes George & Sany Emmanuel	79-84
15. Visitors Satisfaction towards Athirappilly Waterfall Tourism Tony V.M. & Siby Linson	85-89
16. Indigenous Tourism: Best Practices for Eco-Friendly and Livable Society Balamurthy S.S. & Dr. R. Vasanthagopal	90-98
17. Health Tourism: Potentials of Kerala Thahani K.T.	99-105
18. Role of Alternative Tourism in the Economic Development of Villages in Kerala Dhanya Babu V. & Nawal Mohammed	106-109
19. Ecotourism: A Tool for Development of Society Rajani P. & Dr. Vasanthakumari P.	110-115
20. Problems and Prospects of Health Tourism in India Binisha M.A. & Rincy James	116-121
21. Effect of GST on Tourism and Hospitality Sector Jariya V.V. & Sahla Aseena O.	122-129
22. An Analysis of E-Tourist Visa (E-TV) Scheme with special reference to Latest Statistics Shameema Raihan P. & Farisa AbdulAzeez	130-134
23. A Study on the Marketing Strategies of Tourist Bus Operators - Kerala Context Arun Balakrishnan & Diana John	



R. Binil

- 9. **Rising Tide of Dame Entrepreneurship: Analysing the Role of Women Entrepreneurs in Kerala**  
*Rasmi R.*
- 10. **Challenges Faced by Women Entrepreneurs in Kerala**  
*Rajesh P.*
- 11. **Study on Rural Women Entrepreneurship in India**  
*Mukesh V.M.*
- 12. **Muslim Women Entrepreneurs in Kerala: Socialist Feminist Insights to Overcome the Hurdles**  
*Nabilah Haniffa*
- 13. **Micro Finance—A Panacea for Empowering Women**  
*Manju P. P. and P R Bose*
- 14. **Development of Women Entrepreneurship in Kerala**  
*Dr. Liji K.T.*
- 15. **Issues and Challenges among Women Entrepreneur**  
*Kroiltha C.*
- 16. **Business Education for Women Entrepreneurs: Need of the Hour**  
*M. Dhiliphan Kumar and P.L. Maheswari*
- 17. **A Case Study on Women Empowerment through Self Help Groups with Special Reference to Virudhunagar District, Tamil Nadu**  
*R. Krishna Priya and R. Ragugokulavaishnavi*
- 18. **Kudumbashree as a Women Entrepreneurship**  
*Remya S and Sunitha M*
- 19. **Women Entrepreneurs in India—Problems and Prospects**  
*B. Santhos Sivan and U. Shruthi*
- 20. **Women Entrepreneurship—A Big 5 Trait Approach**  
*M. Dhiliphan Kumar and R. Manoj Prakash*
- 21. **Mainstreaming Entrepreneurship among Women in Eberly Sandberg's *Lean in: Women, Work and the Will to Lead***  
*Pooja K*
- 22. **Empowerment of Women through Kudumbhasree: With Reference to Pattencherry Panchayat in Palakkad District**  
*Smt. Ambilli S.*
- 23. **Beauty Parlor: A Vehicle for Women Entrepreneurship—A Case Study**  
*Arshad N.G. & Praseetha V.P.*
- 24. **Women Allied Product**  
*An*
- 25. **Sector Entry**
- 26. **Debit in Ma**
- 27. **Wom Era**
- 28. **Supp Won**
- 29. **Wor Wor**
- 30. **Stu Err Di**
- 31. **In**
- 32. **Ri W**
- 33. **E a I**
- 35.



D B : n

## List of Contributors

1. **Vijayalakshmi, K.K.**, Asst. Prof., S.V.T.B College, Mannampatta.
2. **Dr. S. Suganya**, Associate Professor, KV Institute of Management and Information Studies.
3. **Suchitra. V**, Asst. Prof., Sree Krishna College, Guruvayur
4. **Sree Latha. C**, Assistant Professor, Dept. of Economics, S.N College, Nattika.
5. **Shiny L**, Asst. Prof. on Contract, Mercy College, Palakkad.
6. **S. Shiny and S. Vimala**, Assistant Professor, KV Institute of Management and Information Studies, Kurumbapalayam, Coimbatore.
7. **Sathyavathi. M**, Assistant Professor, S.V.T.B College, Mannampatta.
8. **Rosini K.**, Assistant Professor, S.N.Collge, Alathur.
9. **Resmi R**, Mercy College, Palakkad.
10. **Rajani. P.**, Assistant Professor, S.N.Collge, Alathur.
11. **Mukesh V.M**, Assistant Professor, Mar Osthatheos College.
12. **Nabilah Haniph**, Assistant Professors, Department of Economics, M.E.S Kalladi College, Mannarkkad.
13. **Manju P. P. and P R Bose**, Asst Prof on Contract & Associate Professor, Christ College(autonomous), Irinjalakuda.
14. **Dr. Liji K.T.**, Assistant Professor, Mercy College, Palakkad.
15. **Kavitha C.**, Asst Prof on Contract, Mercy College, Palakkad.

# EMERGING TRENDS IN BANKING AND FINANCE

EDITORS  
Dr. P. VASANTHAKUMARI  
JESITHA J.  
REKHA MENON



PG DEPARTMENT OF COMMERCE

**N.S.S. COLLEGE**  
**OTTAPALAM**

Distribution



ISBN 978-93-85105-75-3



*[Signature]*  
Principal  
Sree Narayana College, Alathur  
Palakkad - 678 682, Kerala





**EMERGING TRENDS IN BANKING AND FINANCE**  
(Studies)

Editor : **Dr.P. Vasanthakumari**

© The Principal

First Published : August 2017  
Cover Design : Jyothis Narayanankutty  
Layout : Amrutha Syam  
Printing : Book Media

**PUBLISHED BY**

P.G. Department of Commerce  
N.S.S. College  
Ottapalam

**DISTRIBUTION**

**BOOK MEDIA**

Kottaramattom, Pala - 686 575  
Kottayam, Kerala, India.  
Mob: +91 94462 88878  
ISBN: 978-93-85105-75-3



Research Papers Presented in the  
International Seminar on  
**Strategies for Tourism Promotion &  
Marketing in Global Perspective -ISTPM 2K17**  
on 13 & 14 November 2017



**Postgraduate Department of  
Commerce and Management Studies**  
**M.E.S. Mampad College**  
(AUTONOMOUS) Accredited by NAAC with A grade



*R. Durbin*



**Special  
Issue**

# MIRROR

ISSN 2456-8007

**Peer Refereed International Research  
Journal of Commerce, Management & Social Science**

**UGC Approved Journal (No. 64272)**



Scholars Association of Kerala  
Ruby Villa, Kozha P.O.  
Kottayam Dist. Kerala-686640



*J. K. Prasad*

Principal  
Sree Narayana College, Alathur  
Palakkad-678 888, Kerala

Sl No	Title Of Paper	Author/s	Page No
1	DEVELOPMENT OF INDIAN INSURANCE SECTOR: AN OVERVIEW	Dr. Vasanth Kumar P	2
2	INVESTORS' ATTITUDE TOWARDS MUTUAL FUNDS - A STUDY WITH SPECIAL REFERENCE TO THRISSUR CORPORATION	Archana K M	6
3	A STUDY ON CONSUMER'S ATTITUDE TOWARDS HEALTH INSURANCE IN KERALA, WITH SPECIAL REFERENCE TO THRISSUR DISTRICT	Chouthiyil U	10
4	A STUDY ON EFFECTIVENESS OF GREEN BANKING ON STATE BANK OF INDIA WITH SPECIAL REFERENCE TO PALAKKAD DISTRICT	Rajal P Dr. Vasanth Kumar P	28
5	TOURISM - AS AN INSTRUMENT TO ACCELERATE THE ECONOMIC DEVELOPMENT OF KERALA.	Siji V Dr. Vasanth Kumar P	35
6	EFFECTS OF DEMONETISATION IN INVESTOR BEHAVIOUR WITH SPECIAL REFERENCE TO MALAPPURAM DISTRICT	Fathima Dr. Vasanth Kumar P	44
7	A STUDY ON CUSTOMER AWARENESS AND SATISFACTION ON BANCASSURANCE: WITH SPECIAL REFERENCE TO PALAKKAD	Femi Thab	53
8	CORPORATE SOCIAL RESPONSIBILITY PRACTICES OF PUBLIC AND PRIVATE SECTOR BANKS WITH PARTICULAR REFERENCE TO SBI AND FEDERAL BANK	Dee	60
9	A STUDY ON THE AWARENESS OF MOBILE BANKING SERVICES IN SREEKRISHNAPURAM	Nilufar Suchit Dr. R. S.	64
10	A STUDY ON CUSTOMER AWARENESS TOWARDS INNOVATIVE BANKING SERVICES WITH SPECIAL REFERENCE TO SHORANUR AND CHELAKARA BRANCHES OF STATE BANK OF INDIA	Renu Reji Elwin P	70
11	PERCEPTION TOWARDS GST AMONG EMERGING CHARTERED ACCOUNTANTS	Sho Rat	81



medicinal value and are the natural source of various drug molecules as they contain active compounds and these endophytes isolated from them contributes to microbial biodiversity.

The selected fungal extract showed the presence of different phytochemicals like glycosides, tannins and terpenes. Tannins exhibit antibacterial, antifungal and mitoproliferative activity and anticancer activity. For separation and identification of the secondary metabolites TLC, FT-IR, GC-MS analysis were carry out. 11 compounds were identified from the GC-MS analysis of the chloroform extract and revealed the name and mass of them. FT-IR revealed the presence of carboxylic group, ketogroup, ester and alkane and also supported the structure of the compound. The identified compounds were reported to exhibit antibacterial, antifungal and pharmaceutical properties. Out of the 11 compounds 2,4-Di-*t*-butylphenol, 1-Hexadecene, 1-Octadecene, Tetracosane, Octacosane were reported to possess antibacterial and antifungal properties and pharmaceutical importance (Eyob *et al.*, 2018) (Devanushi *et al.*, 2014). Hence the compounds extracted from the isolated endophytic fungus *A. flavus* that exhibit antifungal activity against rice pathogen *F. oxysporum* can be used in the preparation of biocontrol formulations that has no side effect when compared to chemical pesticides.

## REFERENCES

- Bhardwaj, A., Agarwal, P. (2014) A review fungal endophytes as a store house bioactive compound. *World J Pharm. Sci.* 3: 228-237.  
 Devanushi, D., Keshab, C. P., Robin, G., Pranab, D. (2014). *Braz arch. biol. technol.* 57: 621-629.  
 Eyob, C., Chutulo, Raju, K. (2018). Endophytic Mycoflora and their bioactive compounds from *Azadirachta indica*. A comprehensive review. *J Fungi.* 4: 42-54.

**Key words:** Endophyte, Biocontrol, *Aspergillus flavus*, *Fusarium oxysporum*

## AMC 8

### IN VITRO CULTURE OF MOSSES: BRACHYTHECIUM BUCHANANII (HOOK.) A. JAEGER AND THUIDIUM TAMARISCELLUM (C. MUELL.) BOSCH. & SANDE-LAC AND ISOLATION OF TERPENOIDS

Greeshma G M<sup>1\*</sup>, Murugan K<sup>2</sup> and Manoj G S<sup>3</sup>

<sup>1</sup>Dept of Botany University College

<sup>2</sup>Dept of Higher education Govt of Kerala

<sup>3</sup>Dept of Botany NSS College Nilamel, Thiruvananthapuram, Kerala, India

Email: greeshmagm1990@gmail.com

## INTRODUCTION

Bryophytes are the oldest known land plants comprising of more than 22,000 species. Approximately, 3000 members were reported to possess medicinal properties. Several biologically active compounds were isolated from these plants such as phenolic acids.

Theme 4: Advances in Microbes and...



R. Birendra

Principal  
 Sree Narayana College, Alathur  
 Palakkad- 678 682, Kerala



negative effects it is necessary to find an environmental friendly and easily obtainable substitute for chemical pesticides. Hence the aim of the present study was to extract and identify the secondary metabolites from the endophytic fungi isolated from the medicinal plant *Lawsonia inermis* L. which show an antifungal activity against the rice pathogen *Fusarium oxysporum* (ITCC 7739).

## METHODOLOGY

**Isolation of endophytic fungi :** The healthy fresh leaves of the medicinal plant *Lawsonia inermis* L. were randomly selected and was collected from Sukhodhaya Hospital and Medicinal Garden in Kottayam district, Kerala. The leaves were washed under running tap water. Treated with 5% Tween 20 for 3 min and then with distilled water. Leaves were cut into small pieces and treated with 70% ethanol for 30 sec and then with surface sterilizing agent 4% NaOCl for 5 min. Rinsed 3 times with sterile distilled water and blotted on sterile blotting paper. The last distilled water wash were cultured on Potato Dextrose Agar and incubated as control. For the isolation of endophytic fungi the surface sterilized samples were placed on PDA supplemented with chloramphenicol. Plates were incubated at room temperature for 5-7 days and observed for growth and emerged fungal colonies were transferred to fresh PDA plates. Colonization frequency was calculated.

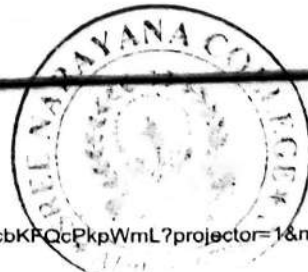
**In vitro antagonistic activity of the isolate against phytopathogen *F. oxysporum*:** PDA plates were simultaneously inoculated with the discs of the pathogen as well as the test organism near the periphery at diametrically opposite ends and incubated at room temperature for 5-7 days and observed at regular intervals on the linear growth (cm) of the antagonist colonizing the pathogen's growth. The percentage of inhibition was calculated.

**Extraction of secondary metabolites from endophytic fungus LIF1:** Liquid state fermentation process was done for secondary metabolite production. 7 days old fresh mycelia of the fungus were inoculated into 100 ml of PDB. Incubated at 28°C for 21-30 days with continuous shaking at 150 rpm in a shaking incubator. Homogenized by adding 10% methanol and filtered. The metabolite was extracted 3 times with equal volume of chloroform. Lower layer of the solvent containing the extracted compound were separated using separating funnel and evaporated in a rotary evaporator (at vacuum for a vapour temperature at 40°C for 474 pressures) (Bhardwaj and Agarwal, 2014). The crude extract was then dissolved in Dimethyl sulphoxide (DMSO) at 1mg/ml of concentration and kept at 4°C.

**Antifungal activity of chloroform extract of LIF1:** For determining antifungal activity of the LIF1, PDA plates supplemented with streptomycin was spotted with test pathogen *F. oxysporum*. Wells of 8 mm diameter were made on the left and right side of the spot. 100 µl of the fungal extract (5 mg/ml) dissolved in DMSO and DMSO (-ve control) were loaded in each. Incubated at 27°C for 3-5 days.

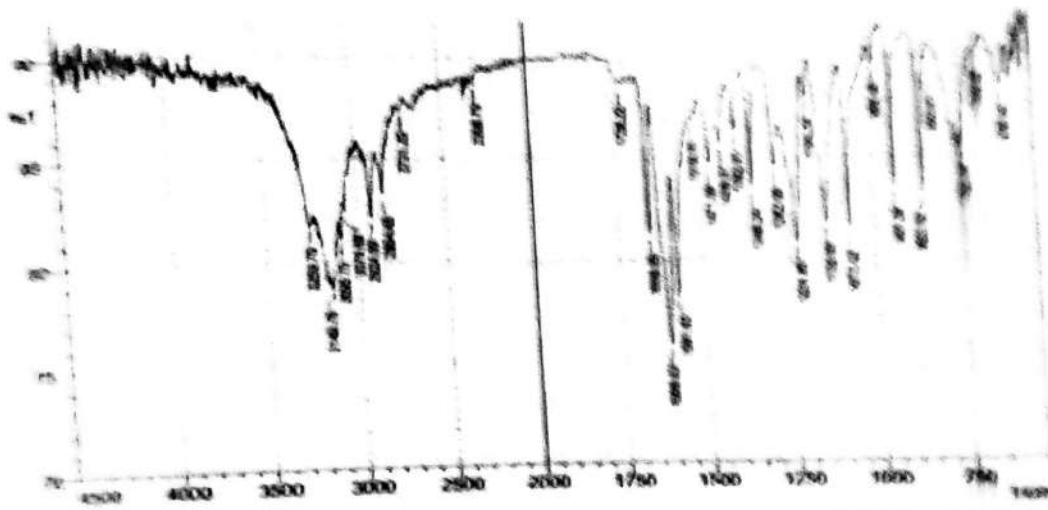
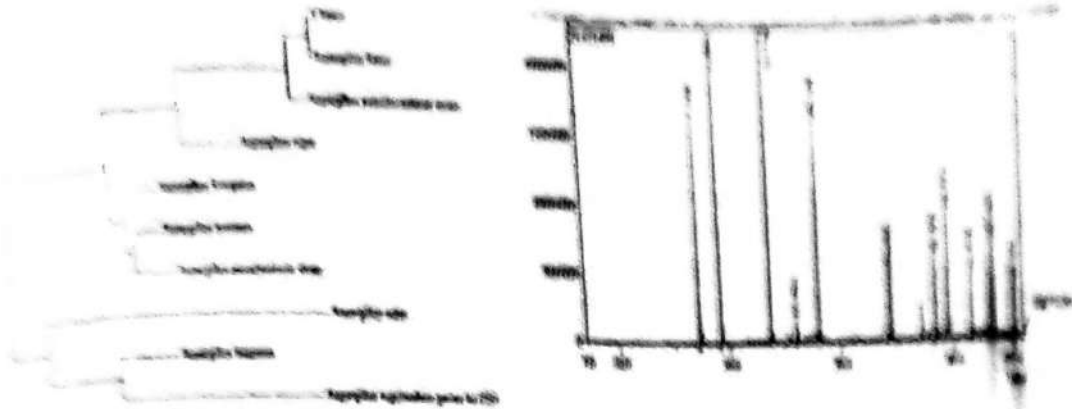
**Identification of LIF1:** LIF1 were identified according to macroscopic features as well as microscopic features by Lactophenol cotton blue staining. Molecular level identification were done by using D1/D2 region of LSU 28S rDNA based molecular techniques at UniBiosys Biotech Research Labs, Cochin.

## Phytochemical screening of fungal extracts





In GC-MS analysis the TLC fraction of *Aspergillus flavus* showed variety of compounds and were identified by comparing the retention time of the compound with known databases of the instruments. In the present study, the selected endophytic fungal extract showed the presence of different phytochemicals like Glycosides, Tannins and Terpenes.



Frequency cm <sup>-1</sup>	Bond	Functional group
2854-3260	O-H stretch	Carboxylic acid
1728	C=O	Keto
1072-1471	C-O	Ester
638.44-1072.42	C-H stretch	Alkane

Discovering novel and effective microbial strains for increasing plant productivity is very important in the agriculture field. Endophytes have the ability to enhance host plant growth, protection diseases and producing commercially valued secondary metabolites.

In the present study, 5 different endophytic fungi were isolated from the medicinal plant *Lawsonia inermis* L. and a novel potential endophytic fungus appear to be producing certain bioactive compounds that exhibited antifungal activity against the phytopathogen *F. oxysporum* (ITCC 7739), an important rice pathogen causing Basal Node Rot in rice. The chloroform extract also showed significant antifungal activity against *F. oxysporum*. Medicinal plants gaining global attention because of their



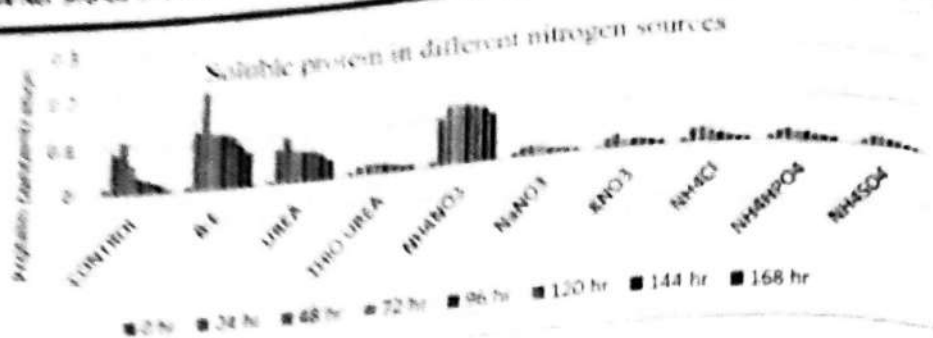


Fig. 5. Soluble protein in different nitrogen sources

## REFERENCES

- Haq, N. B., Samia, R., Noosheen, A. (2013). Production and characterization of a novel  $\beta$ -glucosidase from *Fusarium solani*. *Int. J. Agric Biol.* 15(1): 140-144.
- Lowry, O. H., Rosebrough, N. J., Farr, A. L., Randall, R. J. (1951). Protein measurement with the Folin-Phenol reagent. *J. Biol. Chem.* 193:265-275.
- Pavana Jyotsna, K., Ramakrishna Rao, A., Devaki, K. (2015). Effect of nutritional factors on cellulase production by *Lyccinibacillusphaericus* from the gut of earthworm, *Eiseniafoetida*. *Curr. Biot.* 9(2):145-152.
- Sorensen, A., Ahring, B. K., Lubeck, M., Ubhayasekera, W., Bruno, K. S., Culley, D., E. Lubeck, P. S. (2012). Identifying and characterizing the most significant  $\beta$ -glucosidase of the novel species *Aspergillus saccharolyticus*. *Can. J. Microb.* 58: 1035-1046.

## AMC 7

### BIOACTIVE POTENTIAL OF THE ENDOPHYTIC FUNGUS *ASPERGILLUS FLAVUS* ISOLATED FROM THE LEAF OF THE MEDICINAL PLANT *LAWSONIA INERMIS* L.

Bioactive potential of the endophytic fungus *Aspergillus flavus* isolated from the leaf of the medicinal plant *Lawsonia inermis* L.

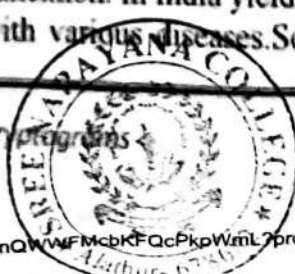
Divya R<sup>1</sup>, Sunitha G<sup>2</sup>, Jisha MS<sup>3</sup>

<sup>1</sup> Department of Microbiology, SN College, Alathur, Palakkad University of Calicut

<sup>2,3</sup> School of Biosciences, Mahatma Gandhi University Campus, Kottayam- 686560, Kerala Mahatma Gandhi University

## INTRODUCTION

Microbes that are present within the plant tissues that spend the whole or part of their life cycle and do not cause infection were called endophytes. Distribution of endophytic microorganisms differs within host plants. They are considered as the significant component of biodiversity. Medicinal plants are reported to harbour endophytes and are gaining global attention. In India yield of rice (*Oryza sativa* L.) is at serious risk when threatened with various diseases. So in order to reduce these





**Proceedings of the International Conference  
Biocommercium '19**

**BIOACTIVE AND BIO CONTROL POTENTIAL OF ENDOPHYTIC FUNGI ASSOCIATED  
WITH LAWSONIA INERMIS L.**

Divya R<sup>1</sup>, Sunitha G<sup>2</sup>, Jisha MS<sup>2</sup>

<sup>1</sup>SN College, Alathur, Palakkad, Kerala, India

<sup>2</sup>School of Biosciences, M G University, Kottayam, Kerala, India

[divvijay@yahoo.com](mailto:divvijay@yahoo.com)

**Abstract**

Endophytes are microorganisms which are present inside the tissues of plants without causing harmful effects to the host. Fungal endophytes are the highly diverse group. The bioactive compounds produced by endophytic microorganisms have antibacterial, antifungal, antiviral activity. They are considered as the significant component of biodiversity. Medicinal plants are reported to harbour endophytes and are gaining global attention. In India yield of rice (*Oryza sativa* L.) is at serious risk when threatened with various diseases. So in order to reduce these negative effects it is necessary to find an environmental friendly and easily obtainable substitute for chemical agents. Hence the aim of the present study was to extract and identify the secondary metabolites from the endophytic fungi isolated from the medicinal plant *Lawsonia inermis* L. which show an antifungal activity against the rice pathogen *Fusarium oxysporum* (ITCC 7739). The solvent extraction process showed the presence of secondary metabolites. The crude extract was screened for determining the antibacterial and antifungal activity against various tested pathogens. The MIC of the extract was determined for finding the least concentration of the extract that inhibits the growth of pathogens. The MIC were found to be 16-63 µg/ml. For separation and identification of the secondary metabolites TLC, FT-IR, GC-MS analysis were carry out. 11 compounds were identified from the chloroform extract. GC-MS analysis revealed their name and mass. FT-IR reveals the presence of carboxylic, keto groups, esters and alkanes. The identified compounds were reported to exhibit antibacterial, antifungal and pharmaceutical properties. Hence the compounds extracted from the endophytic fungus *A. flavus* that exhibited antifungal activity against *F. oxysporum* (rice pathogen causing root rot and basal node rot disease) can be used in the preparation of bioformulation.

**Key words:** Bio control, *Fusarium oxysporum*, Root Rot, Basal Node Rot

**ISBN: 978-93-5406-944-4**



*R. Binchi*  
Principal  
Sree Narayana College, Alathur  
Palakkad - 678 682, Kerala

BVG Trust  
S. Dhiva<sup>1</sup> and P.K. Soju<sup>2</sup>

J. Sci. Trans. Environ. Technol. 2017, 10(4): 203-212

Scientific Transactions in  
Environment and  
Technovation

<sup>1</sup>Department of Microbiology, Sree Narayana College, Alathur, Palakkad District - 678 682, Kerala, India  
<sup>2</sup>National Manager Sales, Hordis Medical, Hordis India Pvt. Ltd., New Delhi, India

**Abstract**

Salting is traditional way of preserving fish and prawns all over the world. The present investigation was aimed to analyze the presence of osmotolerant microbes in the dry fishes and the safety of the product. Samples of dry fish Kerala, including Kollam, Talechery and Calicut in three different seasons. The bacterial pathogens such as *E. coli* (35%), *Raillia cresus* (25%), *Klebsella* spp (15%), *Micromorus* spp (10%), *Enterobacter* spp (10%) and *Staphylococcus aureus* (5%) were found in almost all the dry fishes. In the case of dry prawns collected from Kollam and Calicut markets *Escherichia coli* (35%), *Raillia cresus* spp (20%), *Vibrio cholerae* (15%), *Vibrio parahaemolyticus* (10%), *Shigella* spp (5%) and *Staphylococcus aureus* (5%) were observed. The predominant fungi including *Aspergillus niger*, *Aspergillus flavus*, *Penicillium* spp, *Aspergillus fumigatus* and *Mucor* sp. were isolated from all the four samples whereas Ayila carried only *Aspergillus fumigatus*. No fungal contamination was seen in shrimps. The MPN readings for fecal indicators varied with the seasons. The fungal species *A. fumigatus* and *A. flavus* were dominant in the dried sea foods of all the seasons. The presence of microorganisms in these salted fishes indicates the osmotolerance potential of microorganism. It finally leads to reduction in the quality of the dried fishes. The contamination may be due to improper drying, poor hygienic processing, inadequate salting and improper packaging and transportation of the dried fishes.

**Keywords:** Sun dried seafood's, Microbiological Analysis, Safety, Poor hygiene, fecal indicators

Received : September 2016

Revised and Accepted : January 2017

**INTRODUCTION**

Fish and fish products are considered as preferable source of high nutritional values and highly desirable food due to their high quality animal protein content as their exceptional richness in calcium and phosphorus and their generous supply of B-complex vitamins (El Ahl, 2010). Fish and fish products constitute more than 60% of the total protein intake in adults (Adeleye, 1992). Fish flesh is one of the best sources of protein. Its flesh is tender due to bundles of muscle fibers, which are held together by fibrous material when heated it is better digested than beef or other types of protein (Fagade, 1992).

Fresh fish rapidly gets deteriorated unless it is preserved properly. Drying is a method of food preservation that works by removing water from the food, which inhibits the growth of microorganisms. Open air drying using sun and wind has been practiced since ancient times to preserve fish (Adebayo-Tayo et al., (2008). Water is usually removed by evaporation (air drying, sun drying, smoking or wind drying). Salting and drying are the ancient and

simple methods used to preserve fish, and in India about 17% of the total catch is being used for salting and drying (Anon, 2001). Salting of fish followed by drying is a simple processing technique and it yields a product with relatively long shelf life (Chakrabarti and Varma, 2004).

Curing is a traditional method for preservation of fish especially in rural areas (Chakrabarti and Varma, 1999). The quality of salted and sun dried fishes are adversely affected by the occurrence of microorganisms. Determination of microbiological quality of such processed fishes from the market is very important for guarding consumer's health and hygiene (Lilabati et al., 1999). In India, cured fishes are popular in the local markets and some commercially important species are exported to other countries. But in recent years, the export of cured fish products has declined due to their poor quality (Sugumar et al., 1995). Microbial contamination of fish is considered as the main cause of signs of spoilage off flavour and unpalatable taste and it may constitute a public health hazard as well as many of economic losses (Hassan et al., 2007).

**MATERIALS AND METHODS**

Samples of dry fishes such as 'Mandhal', 'Ayila', 'Chemmeen', 'Sravu' and 'Khozhuva' were collected and

209

www.bvgtjournal.com

Scientific Transactions in Environment and Technovation

Corresponding Author :  
em.ail: dhiva:soju@gmail.com

Phone: 0973 - 9157  
ISSN: 2193 - 9749

April to June 2017



Sree Narayana College, Alathur,  
Palakkad - 678 682, Kerala

Principal

## Fold thickness of graphs

T. Reji<sup>1</sup> and S. Vaishnavi<sup>2</sup>

<sup>1</sup>Government College, Chittur, Palakkad, Kerala 678 104, India  
e-mail: rejiaran@gmail.com

<sup>2</sup>Sree Narayana College, Alathur, Palakkad, Kerala 678 682, India  
e-mail: vaishnavisvaishu@gmail.com

**Abstract.** The graph  $G'$  obtained from a graph  $G$  by identifying two nonadjacent vertices in  $G$  having at least one common neighbor and reducing the resulting multiple edges to simple edges is called a 1-fold of  $G$ . A uniform  $k$ -folding of a graph  $G$  is a sequence of graphs  $G = G_0, G_1, G_2, \dots, G_k$ , where  $G_{i+1}$  is a 1-fold of  $G_i$  for  $i = 0, 1, 2, \dots, k-1$  such that all graphs in the sequence are singular or all of them are nonsingular. The largest  $k$  for which there exists a uniform  $k$ -folding of  $G$  is called fold thickness of  $G$  and this concept was first introduced in [1]. In this paper, we determine fold thickness of lollipop graph, web graph, helm graph and rooted product of complete graphs and paths.

2020 AMS Subject Classification: 05C50, 05C76.

### 1. Introduction

The motivation for graph folding as defined by Gervacio *et al.* [5] is from the situation of folding a meter stick. Let a finite number of unit bars be joined together at ends in such a way that they are free to turn. There are some meter sticks with this structure as in Figure 1. This meter stick is a physical model of the path  $P_n$  on  $n$  vertices and can be folded to become a physical model of the complete graph  $K_n$ .

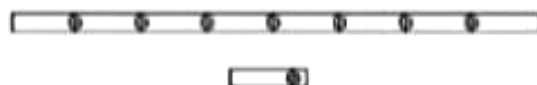


Figure 1. Meter stick - Folded and unfolded

Let  $G$  be a graph that is not isomorphic to a complete graph. If  $x$  and  $y$  are nonadjacent vertices of  $G$  that have at least one common neighbor, then identify  $x$  and  $y$  and reduce any resulting multiple edges to simple edges to form a new graph,  $G'$ . We call  $G'$ , a 1-fold of  $G$ . Consider a sequence of graphs  $G = G_0, G_1, G_2, \dots, G_k$  where  $G_{i+1}$  is a 1-fold of  $G_i$  for  $i = 0, 1, 2, \dots, k-1$ . This sequence is called a  $k$ -folding of  $G = G_0$ . Let  $\mathcal{A}(G_i)$  be the adjacency matrix of the graph  $G_i$ . A graph  $G_i$  is singular if  $\mathcal{A}(G_i)$  is singular and nonsingular if  $\mathcal{A}(G_i)$  is nonsingular. A graph  $G$  is said to have a uniform  $k$ -folding if there is a  $k$ -folding in which all graphs in the sequence are singular or all of them are nonsingular. The largest integer  $k$  for which there exists a uniform  $k$ -folding of  $G$  is called *fold thickness* of  $G$ , and is denoted by  $\text{fold}(G)$ . If  $G = G_0, G_1, G_2, \dots, G_k$  is a  $k$ -folding of  $G$ , the graph  $G_k$  is referred as a  $k$ -fold of  $G$ . The *fold thickness* of a graph was first defined by F. J. H. Campeña and S.V. Gervacio in [1] and evaluated fold thickness of some special classes of graphs such as wheel graph, cycle graph, bipartite graphs etc.

### 2. Preliminaries

In this paper  $P_n$ ,  $C_n$  and  $K_n$  denotes the path, cycle and complete graph on  $n$  vertices respectively. For vertex disjoint graphs  $G$  and  $H$ , the graph join,  $G + H$  is the graph with vertex set  $V(G + H) = V(G) \cup V(H)$  and edge set