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Accredited by NAAC  
Tiruchengode – 637 205, Namakkal dt., Tamilnadu



## **DEPARTMENT OF MICROBIOLOGY**

### **Students Internship 2022-2023**

**Degree / Branch / Year / Semester:** M.Sc/Microbiology/II/III

Academic year: 2022-2023

S.NO	ROLL.NO	NAMER OF THE STUDENT	Name of the Laboratory
1	21M1101	DHIVYARAJ A	ABS Biokare Lab Puducherry
2	21M1102	DILIP S	AWE Care Analytical and Research laboratory, Erode
3	21M1103	DIVAKAR T	AWE Care Analytical and Research laboratory, Erode
4	21M1104	INDRAJITH P	ABS Biokare Lab Puducherry
5	21M1105	KESAVAMURTHY R	ABS Biokare Lab Puducherry
6	21M1106	MOHAMED ARESHATHALIM	ABS Biokare Lab Puducherry
7	21M1107	MOHANRAJ D	ABS Biokare Lab Puducherry
8	21M1108	PUGAZHENDHI S	ABS Biokare Lab Puducherry
9	21M1109	SELVAGANAPATHI K	AWE Care Analytical and Research laboratory, Erode
10	21M1110	SRITHAR A	AWE Care Analytical and Research laboratory, Erode
11	21M1111	SURESH S	AWE Care Analytical and Research laboratory, Erode
12	21M1112	SUZZENDRAN D	ABS Biokare Lab Puducherry
13	21M1113	LAVANYA S	AWE Care Analytical and Research laboratory, Erode
14	21M1115	SRISIKAA N	AWE Care Analytical and Research laboratory, Erode

*A.P. L. Selly*  
DEPARTMENT OF MICROBIOLOGY,  
SENGUNTHAR ARTS & SCIENCE COLLEGE,  
TIRUCHENGODE - 637 205, (TAMILNADU)



*S. S. S. S.*  
PRINCIPAL  
SENGUNTHAR ARTS AND SCIENCE COLLEGE  
TIRUCHENGODE - 637 205.

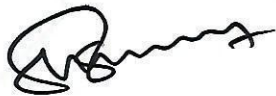
## CERTIFICATE

This is to certify that Mr. SURESH.S

DEPARTMENT OF MICROBIOLOGY

has learned and Successfully Completed by the Internship  
Course of '**Microbial Product Design and Development**'

Conducted by **Awe Care Private Limited**, Erode  
from 22.07.2022 to 09.08.2022.



**Dr. E.S. Karthy** M.Sc., Ph.D.,  
Research Director



22, Agri nagar, Near Geethanjali School,  
Thindal, Erode - 638 012. TamilNadu, India.  
Tel: 91 424 2244753 | Cell: 98429 65753  
E-mail: awecare@gmail.com  
Web: www.awecare.in





## CERTIFICATE

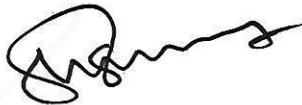
This is to certify that Mr. DILIP. S

DEPARTMENT OF MICROBIOLOGY

has learned and Successfully Completed by the Internship  
Course of '**Microbial Product Design and Development**'

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**Dr. E.S. Karthy** M.Sc., Ph.D.,  
Research Director



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**CERTIFICATE**

This is to certify that Mr. SRITHAR. A

DEPARTMENT OF MICROBIOLOGY

has learned and Successfully Completed by the Internship  
Course of '**Microbial Product Design and Development**'

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**Dr. E.S. Karthy** M.Sc., Ph.D.,  
Research Director



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## CERTIFICATE

This is to certify that Mr. DIVAKAR.T

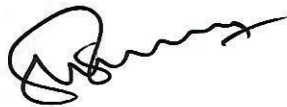
DEPARTMENT OF MICROBIOLOGY

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Research Director



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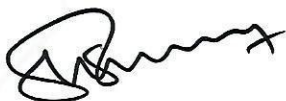


## CERTIFICATE

This is to certify that Ms. SRISIKAA.N

DEPARTMENT OF MICROBIOLOGY

has learned and Successfully Completed by the Internship  
Course of '**Microbial Product Design and Development**'  
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**Dr. E.S. Karthy** M.Sc., Ph.D.,  
Research Director



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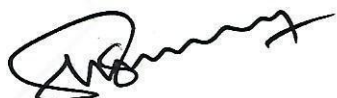
This is to certify that Ms. LAVANYA.S

DEPARTMENT OF MICROBIOLOGY

has learned and Successfully Completed by the Internship  
Course of **'Microbial Product Design and Development'**

Conducted by **Awe Care Private Limited, Erode**

from 22.07.2022 to 09.08.2022.



**Dr. E.S. Karthy** M.Sc., Ph.D.,  
Research Director



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**CERTIFICATE**

This is to certify that Mr. SELVAGANAPATHI.K

DEPARTMENT OF MICROBIOLOGY

has learned and Successfully Completed by the Internship

Course of '**Microbial Product Design and Development**'

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Dr. E.S. Karthy M.Sc., Ph.D.,  
Research Director



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## INTERNSHIP CERTIFICATE

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Mr. D.MOHANRAJ** (Reg.no: C21PG127MIB007), M.Sc., Microbiology student of Sengunthar Arts and Science College, Tiruchengode - 637205 has undergone internship training on “**Microbiological examination and identification of food borne bacteria**” in our organization from 25.07.2022 to 10.08.2022 as a partial fulfillment of his course study.

During the period of internship program with us he had been exposed to different Microbiological identification methods and was found prompt, diligent and inquisitive.

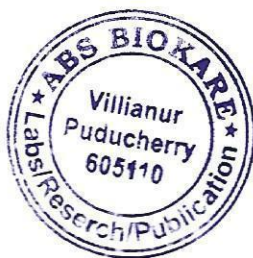
We wish him every success in his life and career.

Issued date: 10.08.2022

With best wishes



Dr. K. SUNDAR  
(Director)



## INTERNSHIP CERTIFICATE

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Mr. A.DHIVYARAJ** (Reg.no: C21PG127MIB001), M.Sc., Microbiology student of Sengunthar Arts and Science College, Tiruchengode - 637205 has undergone internship training on “**Microbiological examination and identification of food borne bacteria**” in our organization from 25.07.2022 to 10.08.2022 as a partial fulfillment of his course study.

During the period of internship program with us he had been exposed to different Microbiological identification methods and was found prompt, diligent and inquisitive.

We wish him every success in his life and career.

Issued date: 10.08.2022

With best wishes



Dr. K. SUNDAR  
(Director)







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## INTERNSHIP CERTIFICATE

TO WHOMSOEVER IT MAY CONCERN


This is to certify that **Mr. D.SUZZENDARAN** (Reg.no: C21PG127MIB012), M.Sc., Microbiology student of Sengunthar Arts and Science College, Tiruchengode - 637205 has undergone internship training on **"Microbiological examination and identification of food borne bacteria"** in our organization from 25.07.2022 to 10.08.2022 as a partial fulfillment of his course study.

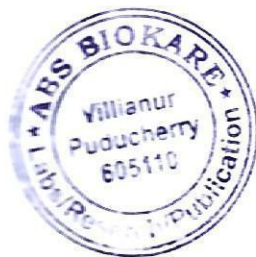
During the period of internship program with us he had been exposed to different Microbiological identification methods and was found prompt, diligent and inquisitive.

We wish him every success in his life and career.

Issued date: 10.08.2022

With best wishes

  
**Dr. K. SUNDAR**  
(Director)



## INTERNSHIP CERTIFICATE

TO WHOMSOEVER IT MAY CONCERN


This is to certify that **Mr. P. INDIRAJITH** (Reg.no: C21PG127MIB004), M.Sc., Microbiology student of Sengunthar Arts and Science College, Tiruchengode - 637205 has undergone internship training on "**Microbiological examination and identification of food borne bacteria**" in our organization from 25.07.2022 to 10.08.2022 as a partial fulfillment of his course study.

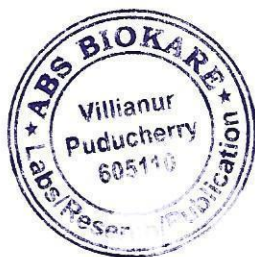
During the period of internship program with us he had been exposed to different Microbiological identification methods and was found prompt, diligent and inquisitive.

We wish him every success in his life and career.

Issued date: 10.08.2022

With best wishes

  
Dr. K. SUNDAR  
(Director)







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## INTERNSHIP CERTIFICATE

TO WHOMSOEVER IT MAY CONCERN


This is to certify that **Mr. S PUGAZHENDHI** (Reg.no: C21PG127MIB008), M.Sc., Microbiology student of Sengunthar Arts and Science College, Tiruchengode - 637205 has undergone internship training on "**Microbiological examination and identification of food borne bacteria**" in our organization from 25.07.2022 to 10.08.2022 as a partial fulfillment of his course study.

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We wish him every success in his life and career.

Issued date: 10.08.2022

With best wishes

  
Dr. K. SUNDAR  
(Director)





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TO WHOMSOEVER IT MAY CONCERN


This is to certify that **Mr. M. MOHAMED ARESHATHALI** (Reg.no: C21PG127MIB006), M.Sc., Microbiology student of Sengunthar Arts and Science College, Tiruchengode - 637205 has undergone internship training on “**Microbiological examination and identification of food borne bacteria**” in our organization from 25.07.2022 to 10.08.2022 as a partial fulfillment of his course study.

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We wish him every success in his life and career.

Issued date: 10.08.2022

With best wishes

  
Dr. K. SUNDAR  
(Director)



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No. 2, Madha koil st., Villianur, Pudocherry-605110  
[absbiokarepdy@gmail.com](mailto:absbiokarepdy@gmail.com)



## INTERNSHIP CERTIFICATE

TO WHOMSOEVER IT MAY CONCERN


This is to certify that **Mr. R. KESAVAMURTHY** (Reg.no: C21PG127MIB005), M.Sc., Microbiology student of Sengunthar Arts and Science College, Tiruchengode - 637205 has undergone internship training on “**Microbiological examination and identification of food borne bacteria**” in our organization from 25.07.2022 to 10.08.2022 as a partial fulfillment of his course study.

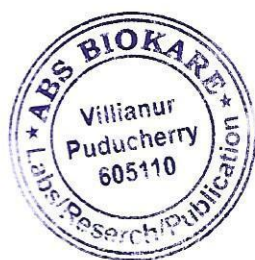
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Dr. K. SUNDAR  
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## **DEPARTMENT OF MICROBIOLOGY**

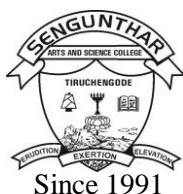
### **Students MiniProject - 2022-2023**

**Degree / Branch / Year / Semester: B.Sc Microbiology/III/V**

Academic year: 2022-2023

S.NO	ROLL.NO	NAMER OF THE STUDENT	Title of the Project
1	20UMB1309	BOOBALAN S	Degradation of Navy blue dye
2	20UMB1310	BOOPATHY S	Degradation of Navy blue dye
3	20UMB1311	DEEPAK M	Degradation of Navy blue dye
4	20UMB1312	DHANUSKUMAR S	Degradation of Navy blue dye
5	20UMB1313	DINESH KUMAR R	Microbial load in fermented rice
6	20UMB1314	HARIHARAN S	Microbial load in fermented rice
7	20UMB1315	KARTHICK RAJA S	Microbial load in fermented rice
8	20UMB1316	KARTHICK S	Microbial load in fermented rice
9	20UMB1317	MEIYARASAN P	Microbiological quality of Water
10	20UMB1318	MUKESH U G	Microbiological quality of Water
11	20UMB1320	RAJASEKAR B	Microbiological quality of Water
12	20UMB1321	SARATHI R	Microbiological quality of Water
13	20UMB1323	SATHISH KUMAR R	Microbiological quality of Water
14	20UMB1324	SATHISH KUMAR S	Parasitic contamination of fruits and vegetables
15	20UMB1326	SURYA A	Parasitic contamination of fruits and vegetables
16	20UMB1327	THIRUMOORTHY M	Parasitic contamination of fruits and vegetables
17	20UMB1328	VIGNESH P	Parasitic contamination of fruits and vegetables
18	20UMB1330	DEEPIKA M	Antibacterial activity of Guava
19	20UMB1332	GOWSALYA G	Antibacterial activity of Guava
20	20UMB1333	GOWSIKA V	Antibacterial activity of Guava
21	20UMB1334	HEMALATHA M	Antibacterial activity of Guava
22	20UMB1335	INTHUJA V	Antibacterial activity of Guava
23	20UMB1336	JEEVADHARSHINI S	Antimicrobial activity of garlic extract
24	20UMB1337	KATHIJA J	Antimicrobial activity of garlic extract
25	20UMB1338	MYTHILI S	Antimicrobial activity of garlic extract
26	20UMB1339	SABITHA K	Antimicrobial activity of garlic extract





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27	20UMB1340	SANDHIYA J	Antimicrobial activity of garlic extract
28	20UMB1341	SARANYA S	Antibacterial activity of Citrus fruits
29	20UMB1342	SHALINI S	Antibacterial activity of Citrus fruits
30	20UMB1343	SRINIDHI S R	Antibacterial activity of Citrus fruits
31	20UMB1344	SOWBARNAYA B	Antibacterial activity of Citrus fruits
32	20UMB1345	SUBHASRI M.T	Antibacterial activity of Citrus fruits
33	20UMB1346	SUGANESHWARI P	Antagonistic activity of soil
34	20UMB1347	SUNMATHI M	Antagonistic activity of soil microorganisms
35	20UMB1349	YOGALAKSHMI S	Antagonistic activity of soil microorganisms
36	18UMB1565	DEEPA M	Antagonistic activity of soil microorganisms
37	20UMB1348	TAMILSELVI M	Antagonistic activity of soil microorganisms

*A.P. [Signature]*  
DEPARTMENT OF MICROBIOLOGY,  
SENGUNTHAR ARTS & SCIENCE COLLEGE,  
TIRUCHENGODE - 637 205, (TAMILNADU)



*[Signature]*  
PRINCIPAL  
SENGUNTHAR ARTS AND SCIENCE COLLEGE  
TIRUCHENGODE - 637 205.





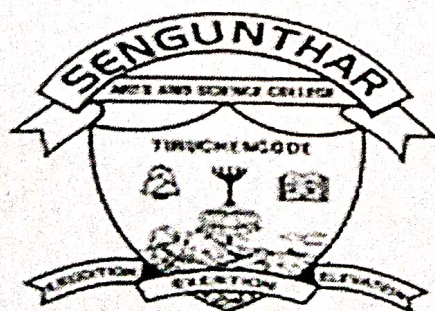
# **ANTIBACTERIAL ACTIVITY OF CITRUS FRUITS AGAINST SOME BACTERIAL PATHOGEN**

Mini project submitted in partial fulfillment  
of the requirement for the Degree of

**Bachelor of Science in Microbiology**

Submitted by

**Ms.S.SARANYA, Ms.S.SHALINI, Ms.S.R.SHRINIDHI, Ms.B.SOWBARNIYA &  
Ms.M.T.SUBHASRI**



**DEPARTMENT OF MICROBIOLOGY**


**SENGUNTHAR ARTS AND SCIENCE COLLEGE,  
TIRUCHENGODE  
NAMAKKAL-637205**

**NOVEMBER-2022**

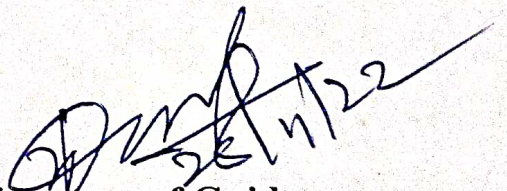


## CERTIFICATE

This is to certify that the entitled "ANTIBACTERIAL ACTIVITY OF CITRUS FRUITS AGAINST SOME BACTERIAL PATHOGENS" submitted in partial fulfillment of the requirement of the degree of BACHELOR OF SCIENCE IN MICROBIOLOGY to the PERIYAR UNIVERSITY, Salem is the record of bonafied research work carried out by Ms.S.SARANYA(Reg.no.20UMB1341), Ms.S.SHALINI(Reg.no.20UMB1342), Ms.SHRINIDHI(Reg.no.20UMB1343), Ms.B.SOWBARNIYA(Reg.no.20UMB1344), Ms.M.T.SUBHASRI(Reg.no.20UMB1345) under my supervision and guidance, that no part of the project has been submitted for the award of any degree, diploma, fellowship or other similar title or prizes and that the work has not been published in part or full in any scientific popular journals or magazines.


  
Signature of the Head

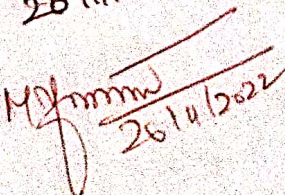
HEAD  
DEPARTMENT OF MICROBIOLOGY,  
SRIKANTHAR ARTS & SCIENCE COLLEGE  
TIRUCHENGODE - 637 205, (TN).

  
Signature of Guide

The Viva Voice Examination held on - 26.11.22

### External Examiners

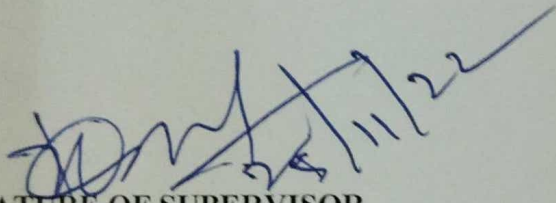
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26/11/22

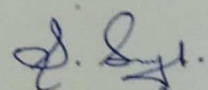
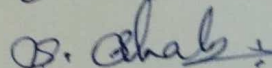
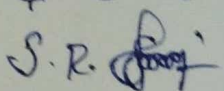
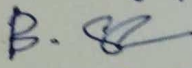
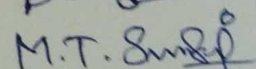
2.   
26/11/2022



## DECLARATION

I hereby declare the mini project entitled " **ANTIBACTERIAL ACTIVITY OF CITRUS FRUITS AGAINST SOME BACTERIAL PATHOGENS** " submitted to PERIYAR UNIVERSITY, Salem is partial fulfillment of the requirement to the award of the degree **BACHELOR OF MICROBIOLOGY**, is a record of original research work done by me under the guidance of **Dr. P.ASHOKKUMAR M.Sc., Ph.D.**, Assistant Professor, Department of Microbiology, Sengunthar Arts and Science College, Tiruchengode and it has not formed that basis for the award of any Degree/ Diploma/ Associate ship/ fellowship or other similar title to any candidate of this University.

  
SIGNATURE OF SUPERVISOR  
(Dr.P.ASHOKKUMAR)

  
  
  
  
  
SIGNATURE OF CANDIDATE  
(S.SARANYA)  
(S.SHALINI)  
(S.R.SRINIDHI)  
(B.SOWBARNIYA)  
(M.T.SUBHASRI)



## ACKNOWLEDGEMENT

First and foremost, I would like to extend my greatest and deepest gratitude to my Supervisor, **Dr. P.ASHOKKUMAR M.Sc., PhD.**, Assistant Professor, Department of Microbiology, for his constant encouragement, invaluable guidance, untailmg co-operation and keen interest evinced in my work helped to complete the thesis.

My profound thanks to **Dr. A.P.VENKATACHALAM, M.Sc., M.Phil, PhD**, Head of the Department, Department of Microbiology, Sengunthar Arts and Science College, Tiruchengode, for providing facilities to undertake the course of study.

I express my heart full thanks to our Principal **Dr. P.RAVIKUMAR., M.Sc., M.Phil, Ph.D.**, and the Management of Sengunthar Arts and Science College, Tiruchengode, for the encouragement during the entire course of study.

T also wish to express my thanks to staff memberS of Sengunthar Arts and Science College, Tiruchengode. **Ms.T.NIVEDHARSINI., M.Sc.**, and **Mr.PRAKASH.,M.Sc M.Phil**, for their encouragement during the entire course of study.

I express my thanks to **Mr. K.P. GOPAL** and **Ms. D.SHANTHAKUMARI**, Technical staff for their timely help during my project work.

## ANTIBACTERIAL ACTIVITY OF CITRUS FRUITS AGAINST SOME BACTERIAL PATHOGENS

### INTRODUCTION:

Natural products such as plants have been integral part traditional medicine system in ancient such as Chinese, Ayurvedic and Egyptian [1]. Several published reports had described the antimicrobial activity of various crude extracts of plants either in single or in combination [2]. It has been estimated that about 2.5 million species of higher plants and their therapeutic values are yet to be determined. However, herbal extracts are becoming popular as natural medicine; preservatives and additives [3]. According to World Health Organization [4] medicinal plants contain substances in one of its organs such as stem, root, leaves, rhizomes, fruits, flower and seeds that can be used for therapeutic purposes or which are precursor for chemo-pharmaceutical semi-synthesis [4]. The medicinal plants are employed in the treatment or control of disease condition due to the presence of biochemical components called phytochemical [5]. Phytochemicals are considered as bioactive substances of plant origin and are of medical importance. They are otherwise known as secondary metabolites as they are of little important to the plant who manufactured them. These secondary metabolites synthesized naturally in various organs of plants such as leaves, stem, root, flower and seed [6]. Most of the modern drugs used today were originally obtained from plants [7]. Many researches confirmed the herbal extract boost immune system by stimulating the production of white blood cell which fight diseases [8]. *Citrus aurantifolia* belongs to Rutaceae, it is a polyembryonic plant cultivated in several part of the world especially hot subtropical or tropical region such as India, USA, Nigeria, Mexico West Indies and Egypt [9]. The plant is shrub in nature and height of about 2 meter tall, evergreen with dense and irregular branches which possess short and stiff spines. The *Citrus aurantifolia* fruits are ovoid berry of about 3-6cm in diameter and sometimes possess apical papilla. When ripe, the fruits turn yellow from initial blue [10]. The plant is used in traditional medicine for treatment of several diseases such as cold and stomach ailment. It can also be used as an antiseptic, mosquito repellent, antifungal, antibacterial and antiviral agent. The health benefits of *Citrus aurantifolia* plant are highly associated with the high amount of bioactive constituents it contained such as phenols, flavonoids, carotenoid, vitamins and minerals [11]. Limes contain unique flavonoid compounds that have antioxidant and anti-cancer properties. The flavonoids help to inhibit cell division in many cancer cell lines in addition to its antimicrobial efficacy [12]. The plant also demonstrated bioactive activities for cold, fever, sinusitis, sore throats, asthma and bronchitis [13]. Antibacterial assessment of *Citrus aurantifolia* aqueous ethanol, acetone, chloroform, ethanol and petroleum ether leaves extract



conducted by Pathan R et al. [14] against various pathogen showed significant activity against *Staphylococcus aureus*, *Pseudomonas* spp, *Klebsiella pneumonia* along with antifungal activity against *Mucor* spp., *Aspergillus fumigates* and *Aspergillus niger*. Kandpal et al. [15] isolated actinomycetes from *C. aurantifolia* and tested its antibacterial efficacy against different pathogen. In this study, five actinomycetes isolated from the plant exhibited antibacterial activity against various pathogens including *S. aureus*, *E. coli*, *K. Pneumonia* and *S. typhi*.

Medicinal plants are a rich source of lead compounds for traditional and modern medicines (16). Currently, clinical effectiveness of many antibiotics is compromised by the emergence of resistant pathogens. Therefore, there is a continuing and urgent need for the discovery of new antimicrobial sources. Herbal drugs are widely used in ethnomedicine due to their unknown bioactive compounds, low side effects, and relatively low costs (17). Accordingly, several studies have focused on medicinal plants to find more effective drugs against microbial infections (18,19). *Citrus medica* L. is a valuable medicinal plant used in Iranian ethnomedicine. It is a small plant, having short thorns and large and rectangular leaves with elliptical fruits. It is reported that *C. medica* extract plays a role in the treatment of diabetes and Alzheimer disease (20). The root extract of *C. medica* is used for its anthelmintic and antilithic properties in the treatment of urinary calculi in India (21).

It is known that plant oriented compounds such as carotenoids, phenolics, flavonoids, and ascorbic acid eliminate free radicals and have antioxidant and anti-mutagenic properties (22). Antimicrobial activity of saponin and tannins (23), alkaloids (24), and flavonoids have been reported (10). Therefore, differences in the sensitivity of bacteria to plant extracts could be either due to the intrinsic sensitivity of microorganisms, or the nature of compounds with antimicrobial properties such as alkaloids, tannins, saponins, phenols, glycosides, and flavonoids (25). Moreover, several parameters affecting the plant extract efficacy are extraction method, plant genotypes (26), the moisture content of the plant, and the temperature of the extraction time (27). As a result, the extraction method, extraction time, solvent and tissue type, as well as the plant species affect the presence and the amount of desired compounds in the extracts (28).

Citrus species are known for an abundance of bioactive components, nutraceuticals, and functional compounds in the flavedo and albedo of the peels. In Citrus fruits, flavonoids are present as flavanones (neohesperidosides, rutinoides), flavanol glycosides, flavones (polymethoxyflavones, hydroxylated polymethoxyflavones) with predominant bioactive compounds like naringin and hesperidin (2). Phenolic compounds like flavonoids are known to exhibit antioxidant, antiatherogenic, anti-inflammatory, anti-carcinogenic, antiviral, antimicrobial and antiallergenic activities (6)

actinomycetes isolated from the plant exhibited antibacterial activity against various pathogens including *S. aureus*, *E. coli*, *K. Pneumonia* and *S. typhi*. Minimum inhibitory concentration of aqueous and ethanol extracts of *Citrus aurantifolia* leaves showed dilutions of various concentrations of aqueous and ethanol of the extracts can inhibit and/or kill the isolates.

## Conclusion

Phytochemical screening of leaves extracts of *Citrus aurantifolia* indicated the presence of alkaloid, flavonoid, glycoside, saponin, steroid, phenols, terpenoid and tannin in both aqueous and ethanol extracts. The antibacterial efficacy of the extracts against the test isolates showed that the leaves extracts demonstrated an antimicrobial effect against the isolates. The Minimum inhibitory Concentration (MIC) of aqueous and ethanol extract showed dilutions of various concentrations of the extracts can inhibit and/or kill the isolates. The finding of this study supported the use of *Citrus aurantifolia* leaves extracts for medicinal purpose.



# **PARASITIC CONTAMINATION OF FRUITS AND VEGETABLES COLLECTED FROM SELECTED LOCAL MARKETS OF TIRUCHENGODE**

Mini project submitted in partial fulfillment  
of the requirement for the Degree of

**BACHELOR OF SCIENCE IN MICROBIOLOGY**

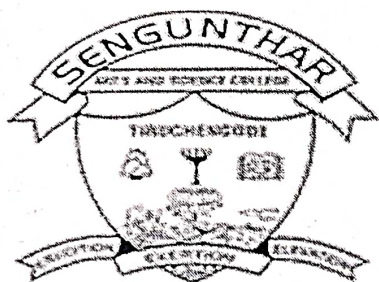
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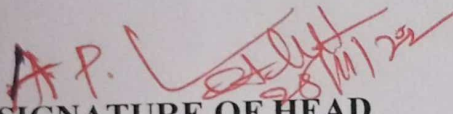
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GETABLES COLLECTED FROM SELECTED LOCAL MARKETS OF  
TIRUCHENGODE" Submitted in partial fulfillment of the requirement of the degree of  
Bachelor of Science in Microbiology to the Periyar University, Salem is the record of bonafied  
research work carried out by (S.SATHISH KUMAR,A.SURYA,M.THIRU  
MORTHIL,P.VIGNESH) under my supervision and guidance, that no part of the project has  
been submitted for the award of any degree, diploma, fellowship or other similar titles or prizes  
and that the work has not been published in part or full in any scientific popular journals or  
magazines


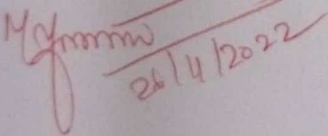
  
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SIGNATURE OF GUIDE

Submitted for viva voce examination held on 26.11.2022

Internal Examiners

  
26/11/22  
  
26/11/2022



### DECLARATION

I hereby declare the mini project entitled “**PARASITIC CONTAMINATION OF FRUITS AND VEGETABLES COLLECTED FROM SELECTED LOCAL MARKETS OF TIRUCHENGODE** ” Submitted to Periyar University, Salem is partial fulfillment of the requirement to the award of the degree Bachelor of Science in Microbiology, is a record of original research work done by me under the guidance of **Dr.P.VENKATACHALAM M.Sc., M.Phil., Ph.D.**, Assistant Professor, Department of Microbiology, Sengunthar Arts and Science College, Tiruchengode and it has not formed that basic for the award of any Degree/Diploma/Associate ship/Fellowship or other similar title to any candidate of this university.

*A.P. Venkatchalam*  
Guide and Supervisor *28/11/22*

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## ACKNOWLEDGEMENT

First and foremost, I would like to extend my greatest and deepest to my supervisor, **Dr. P.VENKATACHALAM M.Sc., M.Phil., Ph.D.**, Assistant Professor, Department of Microbiology, for his constant encouragement, invaluable guidance, unfailing co-operation and keen interest evinced in my work helped to complete the thesis

My profound to **Dr. P.ASHOK KUMAR M.Sc., Ph.D.**, Assistant Professor Department of Microbiology, Sengunthar Arts and Science College, Tiruchengode, for the encouragement during the entire course of study.

I also wish to express my thanks to staff members of Sengunthar Arts and Science College, Tiruchengode. **Ms. T.NIVEDHARSINI M.Sc., M.Phil. and Mr.T.R.PRAKASH M.Sc., M.Phil.**, For their encouragement during the entire course of study.

I express my thanks to **Mr. K.P. GOPAL** and **Mrs. D.SHANTHAKUMARI**, Technical staff for their timely help during my project

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# PARASITIC CONTAMINATION OF FRUITS AND VEGETABLES COLLECTED FROM SELECTED LOCAL MARKETS OF TIRUCHENGODE

## Introduction

Intestinal parasitic infections are widely distributed throughout the world causing substantial intimidation to the public health, economy, and physical and cognitive development particularly among children in developing countries like Ethiopia. The poor personal hygiene, poor environmental hygiene, and poor health system commonly observed in developing countries make the prevalence to be highest among these populations [1, 2].

The consumption of fruits and vegetables helps in protecting human body from a number of diseases by providing nutrients, vitamins, minerals, protein, and fibers. It could also have a positive impact on body-weight regulation and related conditions, including diabetes and hypertension. However, fruits and vegetables, especially, those that are consumed raw and or not properly washed, have been the major way for the transmission of human pathogens [3–5].

Intestinal parasitic infection may be acquired in different ways like by consumption of contaminated fruits, vegetables, other food stuff, and water [6]. Eating unclean, raw, or undercooked fruits and vegetables is one of the means by which the transmission of intestinal parasitic infections is propagated [7]. Fruits and vegetables act as vehicles for the transmission of parasitic infections when contaminated as a result of various associated factors related to planting, such as while they are still on the field, harvesting, transportation, storage, market chain, and even at home [5, 8].

Despite the fact that intestinal parasitosis is common in namakkal [9, 10], there are no studies conducted to assess the level of contamination of fruits and vegetables with parasites of medical and zoonotic importance. If our target is to control the intestinal parasitic diseases, it is not enough to depend merely on the chemotherapeutic intervention of identified cases, but need the concerted effort to reduce and eliminate the potential sources of infection. To our knowledge there is no published document to attest the level of parasitological contamination of fruits and vegetables in namakkal.. Therefore, this study was designed to determine the level of parasitic contamination of selected fruits and vegetables and associated factors in namakkal.

## Conclusion

In conclusion, this study highlighted the importance of raw fruits and vegetables as the potential source of transmission for intestinal parasites to humans. The fruits and vegetables contamination with the pathogenic parasites poses health risk to the consumers if consumed without proper cleaning and or cooking. Prevention of contamination remains the most effective way of reducing food borne parasitic infection. A comprehensive health education should be given to vendors and farmers of fruits and vegetables and to the general population on the health risks associated with consumption of contaminated fruits and vegetables. The consumers should always observe the basic principle of food and personal hygiene, that is, thorough washing of the fruits and vegetables before eating and washing hands before meal. The vendors of fruits and vegetables should avoid the contact of the produces with soil while display for selling. Further studies should be conducted on the viability of parasitic contaminants of fruits and vegetables. Also, other researches must be done to evaluate the level of parasitic contamination of farm produces, water, and soil in which fruits and vegetables are cultivated. These studies should also be conducted in different regions of the country.



# **DEGRADATION OF NAVY BLUE DYE BY BACTERIA ISOLATED FROM TEXTILE DYE EFFLUENT**

Mini project submitted in partial fulfillment  
of the requirement for the Degree of

**Bachelor of Science in Microbiology**

Submitted by

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S. BOOPATHI (Reg.No:20UMB1310)

M. DEEPAK (Reg.No:20UMB1311)

S. DANUSHKUMAR (Reg.No:20UMB1312)




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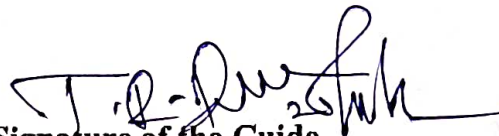
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**NOVEMBER-2022**

## CERTIFICATE

This is to certify that the entitled "DEGRADATION OF NAVY BLUE DYE BY BACTERIA ISOLATED FROM TEXTILE DYE EFFLUENT" submitted in partial fulfillment of the requirement of the degree of BACHELOR OF SCIENCE IN MICROBIOLOGY to the PERIYAR UNIVERSITY, salem is the record of bonafied research work carried out by Mr.B.BOOBALAN(20UMB1309), Mr.S.BOOPATHI(20UMB1310) Mr.M.DEEPAK(20UMB1311) Mr.S.DANUSHKUMAR(20UMB1312) under my supervision and guidance, that no part of the project has been submitted for the award of any degree, diploma, fellowship or other similar title or prizes and that the work has not been published in part or full in any scientific popular journals or magazines.

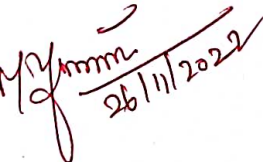
  
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Submitted for viva voce examination held on 26.11.2022

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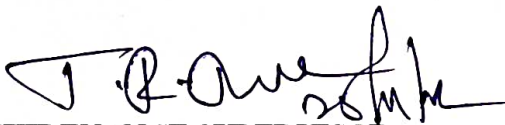
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26/11/2022



# DECLARATION

I here by declare the mini project entitled “ **DEGRADATION OF NAVY BLUE DYE BY BACTERIA ISOLATED FROM TEXTILE DYE EFFLUENT**” submitted to PERIYAR UNIVERSITY,Salem is partial fulfillment of the requirement to the award of the degree **BACHELOR OF MICROBIOLOGY**, is a record f original research work done by me under the guidance of **Mr.T.R.PRAKASH M.Sc.Mphil.**, department of microbiology,sengunthar arts and science college,tiruchengode and it has not formed that basic for the award of any Degree/ Diploma/ Associate ship/ fellowship or other similar title to any candidate of this University.



**GUIDENANCE SUPERVISOR**

**[Mr.T.Prakash]**

**SIGNATURE OF CANDIDATE**

**B.Boobalan**

**S.Boopathi**

**M.Deepak**

**S.Danushkumar**

## ACKNOWLEDGEMENT

First and foremost, I would like to extend my greatest and deepest gratitude to my Supervisor, **Mr.T.R.PRAKASH M.Sc.,Mphil.,** Department of microbiology, for his constant encouragement, invaluable guidance, unfailing co-operation and keen interest evinced in my work helped to complete the thesis.

My profound thanks to **Dr. A.P.VENKATACHALAM, M.Sc., M.Phil, PhD,** Head of the Department, Department of Microbiology, Sengunthar Arts and Science College, Tirucengode for providing facilities to undertake the course of study.

I express my heart full thanks to our Principal **Dr.P.RAVIKUMAR M.Sc., M.Phil.,Ph.D.,** and the Management of Sengunthar Arts and Science College, Tirucengode for the encouragement during the entire course of study.

I also wish to express my thanks to staff members of Sengunthar Arts and Science College, Tiruchengode **Dr.P.ASHOKKUMAR M.Sc.,PhD.,** Assistant Proffessor of Microbiology and **Mrs.M.NIVEDHARSINI.,MSc.,M.Phil,** encouragement during the entire course of study.

I express my thanks to **Mr.K.P.GOPAL** and **Mrs.D.SHANTHAKUMARI,** Technical staff for their timely help during my project work.



## 1.INTRODUCTION

The textile industry is one of the industries that generate a high volume of waste water strong color of the textile waste water is the most serious problem of the textile waste effluent. The disposal of these waste into receiving causes damage to the environment dyes may significant affect photosynthetic activity aquatic habitat because of reduce light penetration may also be toxic to some aquatic life due to the presence of aromatics metals chlorides and other toxic compounds (Husseiny, 2008).

The removal of dyes from effluent is important due to their mutagenicity and carcinogenicity together with their intense coloration. Both physiochemical and biological methods for the removal of dyes have been investigated widely. The present study was focused on decolourization and biodegradation of textile effluent by using bacteria isolated from textile dye effluent.

### 1.1 DYE

Dye can be said to be colored, ionizing and aromatic organic compounds which shows an affinity towards the substrate to which it is being applied. It is generally applied in a solution that is aqueous. Dyes may also require a mordant to better the fastness of the dye on the material on which it is applied.

Dyes are applied to numerous substrates for examples of the textiles leather, plastic paper etc., in liquid form. One characteristic of dye is that the dyes must get completely or atleast partially soluble in which it is being put to the rule that we apply to other chemicals is similarly applicaple to dye also.

## 7. SUMMARY AND CONCLUSION

Increasing industrialization and urbanization leads to environmental pollution. The discharge of toxic effluents from various industries adversely affect water resources, soil fertility, aquatic organisms and ecosystem integrity. Among various industries, the textile dyeing industries discharge large volume of waste water after the dying process. Wastewater from textile industry is a complex mixture of many polluting substances ranging from organochloride based waste pesticides to heavy metals associated with dyes and dyeing process.

Textile effluent samples were collected from different dying unites near Erode and Salem. Two isolates were isolated. Using plate assay method the decolourization activity of bacteria was detected. Among the eight isolates two organisms showed the decolourizing activity and they are *Pseudomonas sp* ,*Bacillus sp*.

These organisms were identified using various tests and compared with Bergey's manual. For the degradation study, the isolated organisms were inoculated on Mineral Salt Medium containing the dye Navy Blue Dye Under stationary conditions, the decolorization was studied.

The maximum decolourisation was obtained stationary condition. The present study confirms the ability of *Pseudomonas sp* to decolorize the Direct Navy Blue GL with decolourization efficiency of 85% under stationary condition. Followed by this *Pseudomonas sp*



# ANTIMICROBIAL PROPERTIES OF GARLIC EXTRACT

Mini project submitted in partial fulfillment  
of the requirement for the Degree of

**Bachelor of Science in Microbiology**

Submitted by

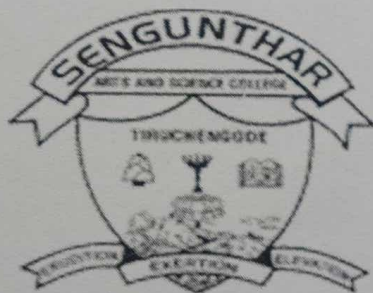
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partial fulfillment of the requirement of the degree of Bachelor of Science in Microbiology  
the Periyar University, Salem is the record of bonafied research work carried out by  
Ms. S. JEEVADHARSHINI, J.KATHIJA, S. MYTHILI, K. SABITHA, J. SANTHIYA under my  
supervision and guidance, that no part of the project has been submitted for the award of any  
degree, diploma, fellowship or other similar titles or prizes and that the work has not been  
published in part or full in any scientific popular journals or magazines

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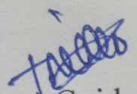
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## DECLARATION

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## ACKNOWLEDGEMENT

First and foremost, I would like to extend my greatest and deepest to my supervisor, **Ms.T.Nivedharshini M.Sc., M.Phil.**, Department of Microbiology, for his constant encouragement, invaluable guidance, unfailing co-operation and keen interest evinced in my work helped to complete the thesis.

My profound to **Dr. P. Venkatachalam M.Sc., M.Phil., Ph.D**, Assistant Professor & Head , Department of Microbiology, Sengunthar Arts and Science College, Tiruchengode, for the encouragement during the entire course of study.

I also wish to express my thanks to staff members of Sengunthar Arts and Science College, Tiruchengode. **Dr.P.Ashokkumar MSc., Ph.D., Mr.T.R.Prakash M.Sc., M.Phil.** for their encouragement during the entire course of study.

I express my thanks to **Mr. K.P. Gopal** and **Mrs. D.Santhakumari**, Technical staff for their timely help during my project.

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# ANTIMICROBIAL PROPERTIES OF GARLIC EXTRACT

## 1.INTRODUCTION

*Allium sativum* (Garlic) has been grown on a massive scale on all continents for thousands of years. The species is one of the oldest vegetables cultivated by man not only for its specific taste and smell but for its therapeutic properties. The presence of many biologically active substances in garlic, especially in its underground bulb, makes the plant suitable for use in alternative medicine. Additionally, due to the new challenges facing contemporary medicine, the therapeutic activity of the species is being studied and the plant is increasingly being applied in treatment (Bongiorno et al.2008; Block 2010).

The properties of Garlic are associated with its extremely rich composition. It contains approximately 33 sulfur compounds, 17 amino acids, enzymes, mineral salt (e.g. germanium, selenium, phosphates, calcium and iron salt), vitamins (e.g. ascorbic acid, riboflavin, niacin, thiamine, folic acid), and valuable essential oils (Block 1985,2010; Josling 2005; Ariga and Seki 2006; Najda et al. 2016; Tch Orzewska et al.2017). Garlic is estimated to contain over two hundred chemical substances that can protect the human organism against various diseases (Gebreyohannes and Gebreyohannes 2013).

To date, Garlic extract has been shown to exert potent therapeutic effects in the treatment of cardiovascular diseases, e.g. hypertension and high serum cholesterol levels (McMahon and Vargas 1993; Silagy and Neil 1994; Yeh et al. 2006; Capraz et al.2006). Moreover, studies conducted in a rabbit model have demonstrated that long-term administration of Garlic extract reduces atherosclerotic plaque (Bordia 1981). Additionally, garlic components have been reported to lower the level of fibrin in blood can thus prevent myocardial infarction (Ernst 1994; Fukao et al 2007).

Investigations of the antiviral properties of the plant indicate that the garlic extract is effective in the treatment of e.g. herpes simplex virus types 1 and 2, coxsackie virus species, influenza B, para-influenza virus type 3, vaccinia virus, vesicular stomatitis virus, human

## 5.CONCLUSION

Based on antimicrobial activity that *Staphylococcus aureus* and *E.coli* inhibiting that activity at that concentration of 150µl, so concluded that above result that Garlic extract was having antimicrobial activity on that *Staphylococcus aureus* and *E.coli* and then further study to identify the minimal inhibiting concentration and concentration level of inhibitory action.



# **MICROBIOLOGICAL QUALITY AND CONTAMINATION LEVEL OF WATER SOURCES IN PARAMATHI REGION, NAMAKKAL DISTRICT**

Mini project submitted in partial fulfillment  
of the requirement for the Degree of

**Bachelor of Science in Microbiology**

**Submitted**

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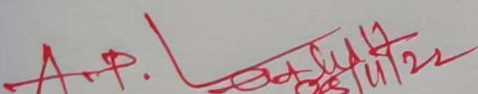
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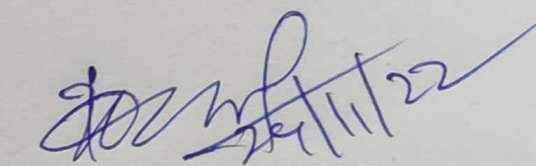
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## CERTIFICATE

This is to certify that the entitle “**MICROBIOLOGICAL QUALITY AND CONTAMINATION LEVEL OF WATER SOURCES IN PARAMATHI REGION, NAMAKKAL DISTRICT**” Submitted in partial fulfillment of the requirement of the degree of Bachelor of Science in Microbiology to the Periyar University, Salem is the record of bonafied research work carried out by **Mr. MEIYARASAN. Mr.C.MUKESH. Mr. R. SARATHI Mr. B.RAJASEKAR. Mr. R.SATHISH KUMAR** under my supervision and guidance, that no part of the project has been submitted for the award of any degree, diploma, fellowship or other similar titles or prizes and that the work has not been published in part of full in any scientific popular journals or magazines

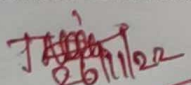
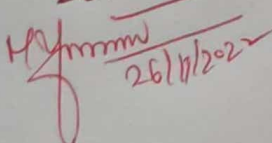
  
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Submitted for viva voce examination held on 26.11.22.

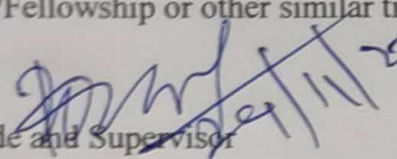
### External Examiners

- 1   
26/11/22
- 2   
26/11/22



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Guide and Supervisor

(Dr. P.ASHOKKUMAR)

Signature of candidate

Mr. P.MEIVARASAN

Mr.C. MUKESH

Mr. R . SARATHI

Mr. B. RAJAKAR

Mr. R. SATHISH KUMAR

## MICROBIOLOGICAL QUALITY AND CONTAMINATION LEVEL OF WATER SOURCES IN PARAMATHI REGION, NAMAKKAL DISTRICT

### INTRODUCTION

Water is an important component of every life [1–4]. Water supply and accessibility is goal 6 of the sustainable development goals (SDGs) and aims at ensuring environmental sustainability [3, 4]. Historically, efforts to ensure access to safe drinking and food processing water have been focused on the community based water sources [5, 6]. Most regions of the developing nations are experiencing shortage of potable water supply as improved water sources are only limited to urban areas [7]. Water sources that include both surface and ground water sources [8, 9]. In a bid to promote healthy living among inhabitants of the county, a reliable potable water access is essential for sustainable development, health, food production, and poverty alleviation [4, 10]. Water shortage and pollution of the readily accessible water sources are evident in many regions of the developing nations [3, 6, 11]. This is largely attributed to low level of personal hygiene and inadequate treatment facilities for water and wastes that are consequent pollutants [12]. Increase in population has exerted more pressure on the available water sources. Consequently, more than 1.2 billion people worldwide do not have access to safe water [13–15]. Millions of people die yearly from diarrheal disease and a larger proportion are children aged below 5 years [16]. Besides causing death, water-related diseases also prevent people from working and living active lives [17].

Water is susceptible to contamination with microorganisms and organic matter among other pollutants regardless of the source [3, 11, 18]. Significantly, microbial contaminants such as coliforms, *E. coli*, *Cryptosporidium parvum*, and *Giardia lamblia* compromise the safety of the water [19]. Presence of *Escherichia coli*, *Klebsiella*, and *Enterobacter* species in water is a likely indicator of the presence of pathogenic organisms such as *Clostridium pafringens*, *Salmonella*, and Protozoa [18]. These pathogens cause diarrhea, giardiasis, dysentery, and gastroenteritis, which is common among the rural dwellers of developing nations [2, 3, 8, 20–22].

Ground water is dominant over surface water and is less susceptible to bacterial pollution.



## CONCLUSION

Water security and safety is of vital concern in arid and semiarid regions of Tamilnadu. Potable water accessibility and supply is limited due to fluctuating climatic conditions and environmental pollution that lower the wholesomeness of most water sources. The aim of this study was to establish the suitability of these water sources for drinking and use in industrial food processing by the small and medium enterprises (SME's). The aim of this study was to establish suitability of these water sources for drinking and use in industrial food processing by the small and medium enterprises (SME's). Enumeration of *E.coli*, *Staphylococcus aureus*, *Clostridium pafringens*, Coliforms, and cysts. Surface, ground, and chlorinated urban water sources in Isiolo were contaminated with bacteria and cysts to levels regarded as unsafe as per the standards for potable water. This makes the water sources unsafe for direct drinking and use in food processing. Acceptability of solar use in powering boreholes pumps and solar drying of agricultural produce has increased recently and solar water disinfection technologies might not be an exception. This would minimize health risk associated with other chemical disinfection methods and save on biofuel consumption in the form of firewood for boiling water as well.

**ANTIBACTERIAL ACTIVITY OF PSIDIUM GUAJAVA PLANT  
EXTRACT AGAINST CITRUS BACTERIAL CANKER CAUSED BY  
*XANTHOMONAS SPECIES***

Mini project submitted in partial fulfillment  
of the requirement for the Degree of

**Bachelor of Science in Microbiology**

Submitted by

M s.M.DEEPIKA	(Reg No : 20UMB1330)
G.GOWSALYA	(Reg No : 20UMB1332)
V.GOWSIKA	(Reg No : 20UMB1333)
M.HEMALATHA	(Reg No : 20UMB1334)
M s.V.INDHUJA	(Reg No : 20UMB1335)



**DEPARTMENT OF MICROBIOLOGY**

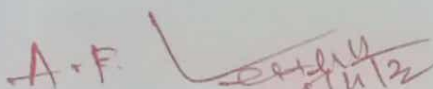
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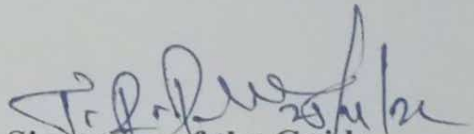
**NOVEMBER-2022**



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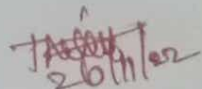
  
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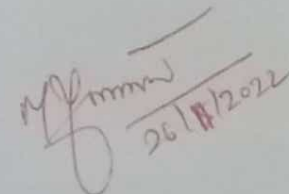
  
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The viva voice Examination held on - 26.11.2022

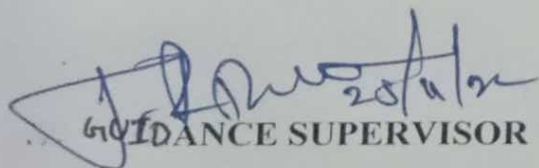
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GUIDANCE SUPERVISOR

M. Deepika .  
Gt. G. G. G. G. G.  
V. G. G.  
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SIGNATURE OF CANDIDATE



## ACKNOWLEDGEMENT

First and foremost, I would like to extend my greatest and deepest gratitude to my Supervisor, **Mr.T.R.PRAKASH M.Sc.,Mphil,** Department of microbiology, for his constant encouragement, invaluable guidance, unfailing co-operation and keen interest evinced in my work helped to complete the thesis.

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I also wish to express my thanks to staff members of Sengunthar Arts and Science College, Tiruchengode **Dr.P.ASHOKKUMAR M.Sc.,PhD.,** Assistant Proffessor of Microbiology and **M s.M.NIVEDHARSINI.,MSc.,M.Phil,** encouragement during the entire course of study.

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## 1. INTRODUCTION

### 1.1. CITRUS CANKER

Citrus bacterial canker (CBC) caused by *Xanthomonas citri* pv *citri* (Hassles) (Xac) is a wide spread disease in citrus producing area of the tropic and subtropics. It is a serious disease of most commercial citrus cultivars and species (Civerola, 1984). The disease is present in Asia, Africa, North America, South America and Oceania (EPPO/CABI, 1997). Bacterial canker of citrus caused by *Xanthomonas axonopodis* pv *citri* is one of the most serious in citrus crops. It causes necrotic lesions on fruits, leaves and twigs. The symptoms are appearing on young leaves, twigs and fruits. The lesions at first are small slightly raised, round and light green spots later they become grayish, white rupture and appear corky with brown sunken centers. The margin of the leaves is often surrounded by a yellow halo ( Sasitorn vudhivanchi, 2003).

Citrus canker caused by *Xanthomonas axonopodis* pv *citri* (Xc) (synonym *Xanthomonas campestris* pv *citri* ) is a serious disease reducing the external quality of citrus fruits. It affects all types of citrus and severely infects on citrus aurantifolia (lime). Typical symptoms on leaves is a raised necrotic lesions surrounding with yellow halo but on fruit and steam halo seldom occurs (Chhalia Leksomboon *et al.*, 2001). Citrus canker caused by *Xanthomonas campestris* pv. *citri* is a common and endemic disease in many citrus growing countries through out the world (Hartung and Civesole, 1989) . The disease was originated from India, Indonesia and other countries in Asia ( Semangun, 1994). In Indonesia and Malaysia citrus canker is one of the most important disease (Singh, 1980, Tri Joko, *et al.*, 2000).

Natural infections are known to occur on citrus hybrids, and on *Poncirus tripoliata*, *Fortunalla japonica*, *Fortunalla migarita*, *Severia bufolia* and *Swinglea glustinesa*. Two groups of strains with restricted host range have recently identified with pathotype A (Verniere *et al.*, 1998; sun *et al.*, 2000) and designated as A\* and Aw. These are closely related to type A strain (Cubero and Graham 2002). The proposal has been *Xanthomones axonopodis citri* to pathotype A and to use *Xanthomonas axonopodis* pv.*aulrantifolil* for pathotype B and C (Vauterin *et al*, 1995). Despite the fact that these distinct names have been extensively and commonly used, the proposal has not been validated by the committee on taxonomy of plant pathogenic bacteria . so all strains considered as *Xanthomonas campestris* pv.*citri*. Another disease, citrus bacterial spot is



## 7. SUMMARY

- Samples were collected from infected citrus plant's part like leaves fruits and stem.
- Plant pathogens were isolated by spread plate method.
- Plant pathogens were identified by microscopic examination, cultural character and biochemical test.
- Antibacterial activity of medicinal plant ( *Psidium guajava*,) extract was prepared by using chloroform, hexane, ethanol, diethyl ether.
- Antibacterial activity of medicinal plant was detected by zone of inhibition on *Xanthomonas campestris pv.citri*.
- In this *Psidium guajava* leaf extract prepared by chloroform ethanol hexane and diethyl ether solvents showed good results.
- Minimum inhibitory concentration of the plant extract against isolates was determined.
- Statistical analysis were performed for the medicinal plant treatment which showed that the treatment of citrus canker with the plant extract were significant.

## 8. CONCLUSION

In this study, we can conclude that, the chloroform, ethanol, hexane and diethyl ether extraction of *Psidium guajava* leaf powder at the concentration of 150 $\mu$ l can be recommended for the citrus canker disease. Further work on isolation and characterization of active compounds from *Psidium guajava* leaf would be highly beneficial for the treatment of citrus canker caused by *Xanthomonas campestris* pv.citri. The application of medicinal plants in the treatment of plant disease can minimize the environmental pollution by the chemicals and antibiotics.



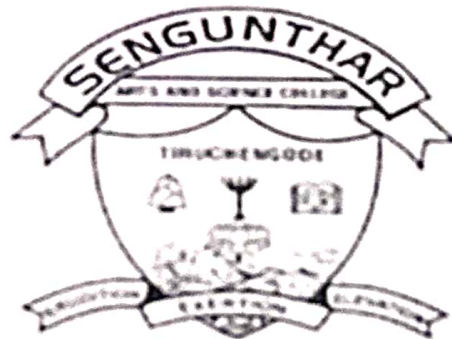
# **ISOLATION,IDENTIFICATION AND CHARACTERIZATION OF ANTAGONATIC ACTIVITY PRODUCING BACTERIA FROM AGRICULTURAL SOIL**

Mini project submitted in partial fulfillment  
of the requirement for the Degree of

**Bachelor of Science in Microbiology**

Submitted by

M. SUNMATHI	(20UMB1347)
M.TAMILSELVI	(20UMB1348)
M.DEEPA	(18UMB1565)
S.YOGALAKSHMI	(20UMB1349)
P.SUGANESHWARI	(20UMB1346)



**DEPARTMENT OF MICROBIOLOGY**

**SENGUNTHAR ARTS AND SCIENCE COLLEGE,  
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**NOVEMBER-2022**

Miss. T.Nivedharshini M.Sc., M.Phil.,

Assistant Professor Dept of Microbiology  
Sengunthar arts and Science College  
Tiruchengode - 637205

## CERTIFICATE

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DEPARTMENT OF MICROBIOLOGY,  
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TIRUCHENGODE - 637 205, (TN).

  
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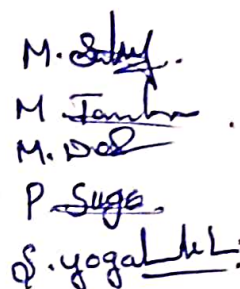
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Guide

(Ms. T.NIVEDHARSHINI)



Signature of candidate

M.SUNMATHI

M.TAMILSELVI

M.DEEPA

P.SUGANSHWARI

S.YOGALAKSHMI

## **ACKNOWLEDGEMENT**

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**P.SUGANESHWARI**

**M.SUNMATHI**

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**S.YOGALAKSHMI**

**M.DEEPA**



# ISOLATION, IDENTIFICATION AND CHARACTERIZATION OF ANTAGONISTIC ACTIVITY PRODUCING BACTERIA FROM AGRICULTURAL SOIL

## 1. INTRODUCTION

The antibiotics are broadly distributed in the nature, where they play a main role in managing the microbial population of soil, water, compost, and sewage. Antibiotics are low molecular weight molecules that produced secondary metabolites, mainly by microorganism that found in the soil. Microbes which produce antibiotics in large amount that can survive for longer time than the other microbes which produced antibiotics in less amount. These antibiotics which produce by the microbes have been very beneficial and helpful for the treatment of many human and animal diseases caused by microbes like bacteria, fungi and protozoa. The bacteria present in soil can be rods, (bacilli), cocci (spherical), and spirilla (spirals) of which, bacillus are more in numbers than others bacteria. They are one of the major groups of soil bacteria and are widely distributed. *E. coli* is a gram negative straight rod shaped (*bacilli*) bacterium arranged singly or in pairs that is commonly found in the lower intestine of worm blooded organisms. These are the some important examples of antibiotics used in medical treatments are bacitracin, gramicidin, polymyxin, and tyrotricin produced by different bacillus species. Microbes have antimicrobial properties that characterization of various antimicrobial substances as organic acid (lactic acid and formic acid), diacetyl, and hydrogen peroxide alone or in combination. And other antimicrobial substances with antagonistic properties include biocides, probiotics, and sterilants. Plant disease critically endangered agricultural resources. In particular soil borne pathogens cause dramatic yield and economic losses, with fungi being the most aggressive pathogens. In the past few decades, chemical fungicides have had a critical role in controlling plant disease and increasing crop yield. Until now, suppression of soil borne pathogens mainly relied on chemical pesticides. However, recently, scientists have reported that long time use of chemical agents can cause adverse effects, including environmental contamination, resistant plant pathogen outbreak, progressively greater production costs owing to the over expenditure on these chemicals, and even toxicity in human.

*niger*. *Aspergillus niger* is one of pathogenic fungi present in the environment, it is present in agricultural soil of plant and cause substantial ailments for plant that lead to huge crops yield loss. In this study, the antagonistic activity of *Klebsiella spp.*, *Escherichia coli*, *Bacillus spp.* and *Staphylococcus spp.* Bacteria was examined against *Aspergillus niger* pathogenic fungi isolated from agricultural soil by using disk diffusion agar technique. Bacterial cells were cultured and grown on Sabouraud dextrose agar media. After that, bacterial and fungal colonies were purified to one type of each one. Subsequently, bacterial type was identified by gram staining kit and some biochemical tests such as lysine, urease, triple sugar iron and motility tests, while fungal type was identified by observing it under the microscope. Finally, the bacteria against fungi was examined by putting the cells of *Klebsiella spp.*, *Escherichia coli*, *Bacillus spp.*, *Staphylococcus spp.* As antibiotic disk on streaked *Aspergillus niger* on Sabouraud Dextrose Agar plates and streaking bacterial cells and fungal cells half in half on Sabouraud Dextrose Agar. The results of this study proved that *Aspergillus niger* grew normally in the presence of *Klebsiella* while grew in presence of *Escherichia coli*, *Bacillus spp.* And *Staphylococcus spp.* *Klebsiella* might not produce any enzymes have the ability to dissolve the *Aspergillus niger* cell wall as chitinase enzyme while the different antagonistic activities of *Escherichia coli*, *Bacillus spp.*, *Staphylococcus sp* Despite the increasing number of scientific papers dealing with biological control, an insufficient number of products are available in the market. It is known that the efficiency of mycelial growth inhibition in vitro does not always correlated with bio control efficiency under natural condition. Further more, the production of antifungal metabolites may not be equally expressed under in vitro and natural soil condition. Hence, understanding the mechanisms of disease control may help to control soil borne disease efficiently.

It is known that some microorganisms of soil such as some bacterial and fungal species have efficient roles in plant as antagonists against pathogenic microorganisms. For example; *Escherichia coli* has antagonistic activity against *Aspergillus p.* were because they might produce chitinase enzyme at different rates. In conclusion, not all bacterial species of soil have antagonistic activity against pathogenic microorganisms in which *Klebsiella* had not antagonistic or activity was not able to be antifungal agent *Aspergillus niger*. where as *Escherichia coli*, *Bacillus spp.*, *Staphylococcus spp.* Had varies effects as antifungal growth agents according to the difference in the production of pathogenic fungal cell wall lytic enzymes. key words:



#### 4.DISCUSSION

Antibiotic production is a quality of several types of soil microbes and may represent a survival mechanism where organisms can eliminate competition and colonize a niche. According to Shinde, the *E.coli* ATCC8739 with 49.77% antagonistic activity shows against ten fungal pathogens. Some of the soil bacteria showed antifungal properties because they produce chitinases which may be a part of a lytic system that is capable of bacteria for living on hyphae as a real growth substrate. *E.coli* was produced chitinase enzyme because of this chitinase *E.coli* dissolves the cell wall of the pathogenic fungus *F.oxysporum* which causes the wilt disease in cucumber. Along with the three strains of the bacteria, *E.coli* was found to be more effective as remaining two bacterial strains. It was observed that besides antagonistic properties of strain-1 also exhibited the capabilities to suppress the growth of test fungal species (*Penicillium notatum*, *P.chrysogenum*, *Aspergillus niger* and *F.flavus*) used in this study. This showed that strain-1 might have great ability to become an effective anti-fungal agent which is clearly shown in figure 4, so the strain-1 is an antibacterial as well as anti-fungal agent. Strain-1 could be applied in agricultural industries, husbandry and medical fields. Even, more species of test fungi were needed in this testing in order to show the antifungal properties exhibited by strain-1.

# **MICROBIAL LOAD IN PERMENTED WHITE RICE**

Mini project submitted in partial fulfillment  
of the requirement for the Degree of

**Bachelor of Science in Microbiology**

Submitted by

**Mr.R.DINESHKUMAR (REG.NO:20UMB1313)**

**Mr.S.HARIHARAN (REG.NO:20UMB1314)**

**Mr.S.KARTHICKRAJA (REG.NO:20UMB1315)**

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Assistant Professor & Head of the Dept of  
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Tiruchengode-637205

## CERTIFICATE

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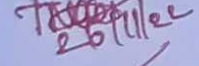
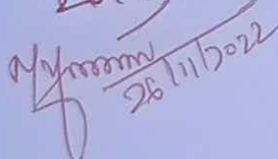
  
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Guide and Supervisor

(Dr. P.VENKATACHALAM)

Signature of candidate

R.DINESHKUMAR

S.HARIHARAN

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First and foremost, I would like to extend my greatest and deepest to my supervisor, **Dr. P. VENKATACHALAM M.Sc.,M.Phill.,Ph.D.**, Assistant Professor, & Head of the Department of Microbiology, for his constant encouragement, invaluable guidance, unfailing co-operation and keen interest evinced in my work helped to complete the thesis

My profound to **Dr. P. ASHOKKUMAR M.Sc.,Ph.D.**, Assistant Professor Department of Microbiology, Sengunthar Arts and Science College, Tiruchengode, for the encouragement during the entire course of study.

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**S.HARIHARAN**

**S.KARTHICKRAJA**

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# MICROBIAL LOAD IN FERMENTED WHITE RICE

## 1. INTRODUCTION

Probiotics are live microorganisms used as food supplements, which provide health benefits when consumed, through improving the intestinal microbial balance of the host (Fuller, 1989). They are live microorganisms which when administered in adequate amounts confer health benefits on the host (FAO-WHO, 2001). Microorganisms commonly used as probiotics include *Bifidobacteria*, *Lactobacilli* and certain yeasts. Research has shown that addition of probiotics to food provides many a health benefit. They are able to increase the frequency of bowel movements (Bekkali *et al.*, 2007) and stimulate cell-mediated immunity (Wold, 2001). Moreover, *Lactobacillus acidophilus* L1 has shown the ability to reduce serum cholesterol level indicating the potential of reducing the risk for coronary heart disease by 6% to 10% in hypercholesterolemic human (Anderson *et al.*, 1999). *L. Rhamnosus* GG has shown anti-carcinogenic effects through decreasing the activity of  $\beta$ -glucuronidase (Nicole and Martijn, 2000). Fermentation is one of the primary methods of adding value to food including improving palatability, safety, shelf life and nutritional value. This process could also be applied in the production of functional foods such as probiotic food (Salovaara and Simson, 2004).

The fermentation process is widely used for preservation of food, particularly in developing countries (Lei, 2006). Yoghurt rice, “dosa”, “idli” and hoppers are some examples of fermented rice products that constitute traditional Indian and Sri Lankan food (Wickramanayake, 2002). In the past, a vast majority of the farming community in Asian regions used to consume fermented rice for breakfast. This type of diet was known to provide adequate nutrition. The soothing effects of such meals were also well known. Fermented rice-milk beverage products show unique flavour, good taste and milky colour where *L. acidophilus* and *Streptococcus thermophilus* are used as starter cultures with rice steep liquor-milk (Yong-Jin *et al.*, 2010). Production of primary metabolite, lactic acid and resultant decrease in pH is identified as the main preserving factor in fermentation of food (Jagadeeswari *et al.*, 2010).

Cereal constituents such as wheat bran-based ingredients fermented with



probiotic, enhance the consumer health with the benefits of probiotics, bran fibre, and healthful bioactive components (Lamsal and Faubion, 2009). Poor eating habits, consumption of chlorinated drinking water, stress and certain disease conditions, consumption of alcohol and the use of antibiotics are known to alter the composition and activities of gut flora. These effects are akin to what occurs following systemic antimicrobial treatment on such occasions, the tilt of balance of the bacterial population dynamics results in overgrowth of opportunistic and undesirable bacteria in the gut. The reduction in the proportion of beneficial bacteria leads to development of excessive gas, bloating, constipation, intestinal toxicity and poor absorption of nutrients. Hence, it is essential to enrich the human gut with probiotics in order to maintain the probiotic balance through regular intake of probiotic foods. Many lactobacilli species possess probiotic determinants including resistance to low pH, bile tolerance, adhesive properties, antibacterial activity, and antibiotic susceptibility. There is evidence to suggest that organisms from different origins vary in their probiotic properties (Sandholm *et al.*, 2002).

The possibilities of horizontal gene transfer and recombination to create harmful pathogens in genetically modified (GM) probiotics (Cummins and Wan Ho, 2006) limit the production and application of the GM probiotics. Therefore, many researchers explore novel strains from different sources with improved probiotic potential.

Fermented rice is one of the neglected foods in countries where rice is a staple. Furthermore, despite the numerous strains of probiotic bacteria isolated from different sources including traditional fermented food, there is a paucity of information on fermented rice and their constituent probiotic bacteria. In this backdrop, the objective of the current study was to isolate and identify potentially probiotic microorganisms from fermented rice

#### 4.CONCLUSIONS

Traditional fermented food products such as fermented rice are known to possess probiotic potential. Probiotics are live microorganisms that provide a myriad of health benefits. Despite the associated health benefits, fermented rice has not received due attention in the countries where rice is the staple diet. Many strains of probiotic bacteria have been isolated from different sources, however, not much work has been carried out on isolation of probiotic strains from fermented rice. In this backdrop, the present study was carried out to isolate and identify potentially probiotic microorganisms from fermented rice. Cooked and uncooked white and red rice were separately fermented and subsequently used to isolate potentially probiotic strains. The Man Rogosa Sharpe (MRS), MRS sorbitol (0.2%) and MRS L-cysteine (0.5%) culture media were used for the isolation of potentially probiotic bacteria. The samples of fermented rice were serially diluted, plated and incubated at 37 °C for 2-3 days under anaerobic conditions. The resulting colonies were purified and tested for catalase production and Gram-staining. Distinct cluster like cocci, diplo cocci and rods were observed with gram-positive and catalase-negative reactions. Most of the isolated cluster like cocci morphologically resembled *Aerococcus* or *Peptococcus* species. The rods were selected for motility and endospore test and sugar fermentation was studied using API 50CH kits. The biochemical characteristics (gram positivity and catalase-negativity) non-motile and non-endospore forming and colony and cell morphology of seven rod shaped bacteria resembled the genus *Lactobacillus* and were identified to species level by API 50CH kits. The subsequent physiological and molecular methods for species identification and probiotic characterization of these seven *Lactobacillus* spp will further confirm the application of them as potential probiotic starter cultures in the food industry.



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Department of Biotechnology

Degree/Branch/Semester: II M.Sc., Biotechnology

Total Number of Students: 15

Academic Year: 2022--2023

S.NO	REG.NO	STUDENT NAME	PROJECT TITLE	GUIDE NAME
1	C21PG127BIT001	M.AJITH	GREEN SYNTHESIS OF CuO NANOPARTICLES BY OCIMUM AMERICANUM LEAF EXTRACT AND ITS APPLICATION ANTIBACTERIAL ACTIVITY AGAINST THE HUMAN PATHOGENS	DR.A.JEEVA
2	C21PG127BIT002	S.ANNAMALAI	PHYTOCHEMICAL SCREENING GC-MS ANALYSIS AND ANTIBACTERIAL ACTIVITY OF ARISTOLOCHIA BRACTEOLATE LEAF EXTRACT	MS.M.LAVANYA
3	C21PG127BIT003	A.CHRISTOPHER	PHYTOCHEMICAL AND PHARMACOLOGICAL ACTIVITY OF ETHYL ACETATE LEAF EXTRACT OF EHERTIA LEAVIS	MR.K.VIVEK
4	C21PG127BIT004	S.GODSONPRABHU	PHYTOCHEMICAL AND ANTIFUNGAL SCREENING IN LEAF EXTRACTS OF BUTEA MONOSPERMA(LAM) TAUB.	MS.R.RAJARAJESHWARI





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10	C21PG127BIT011	M.GOKULAPRIYA	A COMPARATIVE STUDY ON NATURAL MATERIALS AND Fe NANOPARTICLES ON TREATMENT OF CONTAMINATED INDUSTRIAL EFFLUENTS-A BIOTECHNOLOGICAL APPROACH	DR.S.SUDHAKAR
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13	C22PG127BIT016	L.SUBHASHINI	PHYTOCHEMICAL AND PHARMACOLOGICAL ACTIVITY OF CHLOROFORM LEAF EXTRACT OF EHERTLA LEAVIS	MR.K.VIVEK
14	C22PG127BIT017	M.VISWASREE	A NOVEL APPROACH FOR WATER PURIFICATION STRYCHNOS POTATORUM SEED POWDER AS POTENTIAL WATER PURIFIER	MRS.K.VISHNUKUMARI
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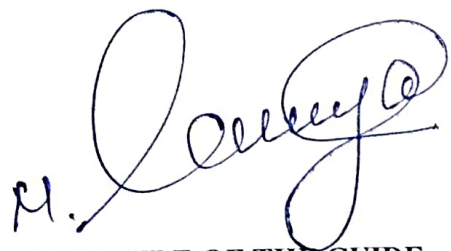


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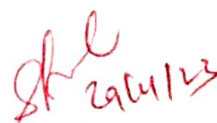
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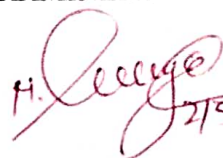
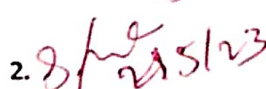
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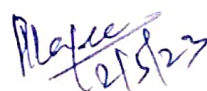
  
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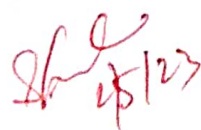
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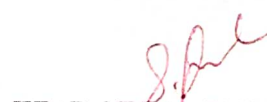
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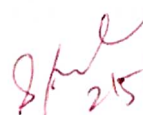


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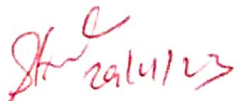
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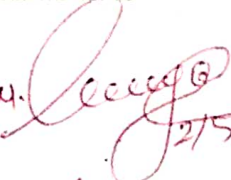
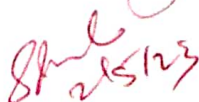
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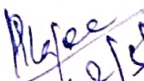
## **CERTIFICATE**


This is to certify that the dissertation entitled "**STUDIES ON PLANT GROWTH PROMOTING ACTIVITIES USING *AZOTOBACTER* AS BIO FERTILIZER**" submitted in partial fulfillment of the requirement of the degree of **MASTER OF SCIENCE IN BIOTECHNOLOGY** to the Periyar University, Salem is a record of bonafide research work carried out by **S.SAKTHEESWARI (RegisterNo.C21PG127BIT015)** under my supervision and guidance and that no part of the dissertation has been submitted for the award of any degree, diploma, fellowship or other similar titles or prizes and that the work has not been published in part or full in any scientific or popular journals or magazines.

  
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### **EXAMINERS**

1.   
2/5/23

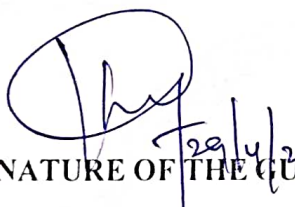
2.   
2/5/23


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Examiner 1 .....  


Examiner 2 .....  




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### **EXAMINERS**

1.   
21/5/22?

2.   
21/5/23

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This is to certify that the dissertation entitled *INVITRO ANTIBACTERIAL, ANTIOXIDANT, ANTICANCER AND ANTIFUNGAL EFFECT OF GANODERMA LUCIDUM FROM WOOD* submitted in partial fulfillment of the requirement of the degree of **MASTER OF SCIENCE IN BIOTECHNOLOGY** to the Periyar University, Salem is a record of bonafide research work carried out by A.YAMINI (Register No.C21PG127BIT018) under my supervision and guidance and that no part of the dissertation has been submitted for the award of any degree, diploma, fellowship or other similar titles or prizes and that the work has not been published in part or full in any scientific or popular journals or magazines.

  
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