

**Studies on formulation of Bacteriophage against pathogenic
bacteria isolated from hand swab of garbage laborers.**

Dissertation Submitted in partial fulfilment of

Masters of Science in Microbiology

(M.Sc. Microbiology)

Submitted by

Mr. Barve Sandesh Sundar

Mr. More Anmol Shashikant

(M.Sc. Microbiology)

Under the guidance of

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Professor

DEPARTMENT OF MICROBIOLOGY

Haribhai V. Desai College

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&

Mr. Omkar A. Sonne

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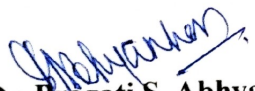
2023-2024



THE P. G. K. MANDAL'S
HARIBHAI V. DESAI COLLEGE
(Arts, Science and Commerce)
PUNE 411002

CERTIFICATE

This is to certify that **Mr. Sandesh Sundar Barve** and **Mr. Anmol Shashikant More** from the Department of Microbiology, Hari Bhai v. Desai college have successfully completed the Dissertation "**Studies on formulation of bacteriophage against pathogenic bacteria isolate from hand swab of garbage labourers**" for the particular fulfilment of Masters in Microbiology in academic year 2023-2024.


Dr. Pragati S. Abhyankar

Guide


Department of Microbiology




Ms. Sudha M. Adya

PG coordinator

Department Microbiology



Dr. Rajashree B. Patwardhan
Head Department of Microbiology
(vice Principal) science






Dr. Rajendra Gurao

Principal


Internal Examiner
21/05/2024


External Examiner
02/05/2024



Date 20/04/2024

CERTIFICATE

This is to certify that **Mr. Barve Sandesh Sundar** and **Mr. More Anmol Shashikant**, Student of M.Sc.-II Microbiology, Haribhai V. Desai, college of Arts, commerce and science, Pune, has successfully completed his Project Dissertation work from 28/01/2024 To 18/04/2024 at Abhidhiy laboratory. He has worked on a project titled **"Studies on formation of Bacteriophage against pathogenic bacteria isolated from hand swab of garbage laborers."** During Project Dissertation work his demonstrated good microbial handling, skill with a self-motivated attitude to learn new things. We wish his very best for all the future end ours.

Sonne
20/4/24

Mr. Omkar A. Sonne

Head of Department of Microbiology

Abhidhiy laboratory

Abstract

The present study aims to address the pressing issue of waste management in India, particularly focusing on the occupational health hazards faced by waste handlers due to exposure to pathogenic microorganisms. The research pinpoints *Escherichia coli* and *Salmonella spp* as significant threats to these workers, leading to an exploration of phage therapy as a potential solution. Phage therapy involves using lytic bacteriophages to target and destroy pathogenic bacteria. Isolated colonies are subculture onto various agar plates and returned to the incubator. The next day, growth is observed, with colony characteristics noted. Biochemical tests are conducted, identifying *Salmonella spp* on NA and *E. coli* on MA based on the results. The study results show that bacteriophage can be widely used as a treatment to eliminate bacteria. Our study isolated pathogenic *E. coli* and *Salmonella spp* from garbage labourer hand swabs. We developed effective bacteriophages targeting these pathogens, showing potential for use in hand sanitizers. This offers promise for improving hygiene among garbage labourers and addresses bacterial contamination concerns in occupational settings.

**Green Synthesis of Copper Oxide Nanoparticles from *Coriandrum sativum*
(Coriander) and Iron Oxide Nanoparticles from *Artocarpus heterophyllus*
(Jackfruit) and their Applications**

Dissertation submitted in partial fulfilment of

Masters of Science in Microbiology

M.Sc. Microbiology

Submitted by

Ms. Neha Kishor Dange

Ms. Pooja Ganpat Dimble

Under the guidance of

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Assistant Professor

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Pune 411002

2023-2024



THE POONA GUJURATHI KELVANI MANDAL'S
HARIBHAI V. DESAI COLLEGE of
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This is to certify that **Ms. Neha Kishor Dange and Ms. Pooja Ganpat Dimble** from Department of Microbiology; Haribhai V. Desai College of Arts Science and Commerce has successfully completed the dissertation, "**Green Synthesis of Copper Oxide Nanoparticles from *Coriandrum Sativum* (Coriander) and Iron Oxide Nanoparticles from *Artocarpus Hetrophyllus* (Jackfruit)**" for the partial fulfillment of Masters in Microbiology in the academic year 2023-2024.

Ms. Sudha M. Adya

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ABSTRACT

This study focuses on green synthesis of copper and iron oxide, based nanoparticles utilizing plant extract as reducing agents, and discusses the antimicrobial activity. Creating environmentally friendly, an essential aspect of nanotechnology and low- cost method for nanoparticle biosynthesis is the green production of copper oxide nanoparticles and iron oxide nanoparticles. Utilizing secondary metabolites from plant leaf extract has recently become an advanced technique for creating different nanoparticles. In the present study, *Coriandrum sativum* (Coriander) leaf extract was used to synthesize copper oxide nanoparticles and *Artocarpus heterophyllus* (Jackfruit) peel extract was used to synthesize iron oxide nanoparticles. Antimicrobial activity was performed by using *Pseudomonas aeruginosa*, *Staphylococcus aureus*, *Klebsiella*, *Candida*, *E. coli*, by Kirby Bauer disc diffusion method. The zones of inhibition were measured after 24 hrs incubation at 30°C to 35° C. Positive control streptomycin was used and negative control as sterile distilled water. The synthesized CuO NPs, FeO NPs did not show zone of inhibition against human pathogen bacteria studied. *E. coli*, *Staphylococcus aureus*, *Candida*, *Klebsiella*, *Pseudomonas aeruginosa*. The result of the antibacterial activity did not confirm that the activity was enhanced for synthesized CuO NPs and IO NPs. We studied potential of iron oxide nanoparticles in decolourisation of congo red dye. . We further characterized Copper oxide nanoparticles by using UV- visible spectroscopy. The resulted nanoparticles from Coriander leaves extract absorbance peak could not be determine properly and Iron oxide nanoparticles from jackfruit extract show absorption peak at the wavelength of 400nm.

This is an alternative to conventional physical and chemical methods of copper nanoparticles synthesis and would be suitable for developing a biological process for large scale production. The biologically synthesized copper nanoparticles can be of immense use in the medical field due to their efficient antimicrobial function which could be used to cure different infectious diseases.

**“CHARACTERIZATION OF CYANOBACTERIA ISOLATED FROM
MARINE HABITAT”**

DISSERTATION SUBMITTED IN PARTIAL FULFILLMENT OF
MASTER OF SCIENCE IN MICROBIOLOGY
(M.Sc. MICROBIOLOGY)

SUBMITTED BY

Ms. RASIKA NAGESH GAIKWAD

UNDER THE GUIDANCE OF

Dr. REEMA CHAUDHARY, SCIENTIST ‘B’

NATIONAL CENTRE FOR MICROBIAL RESOURCE (NCMR),

NATIONAL CENTRE FOR CELL SCIENCE (NCCS),

NCCS COMPLEX GANESHKHIND, SAVITRIBAI PHULE PUNE UNIVERSITY CAMPUS,

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&

Dr. MUKUND AMBAWADE

ASSISTANT PROFESSOR

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2023-2024





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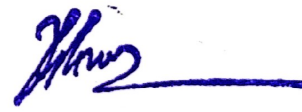
This is to certify that **Ms. Rasika Nagesh Gaikwad** from Department of Microbiology; Haribhai V. Desai College of Arts Science and Commerce has successfully completed the dissertation, “**Characterization of Cyanobacteria isolated from marine habitat**” for the partial fulfillment of Masters in Microbiology in the academic year 2023-2024.

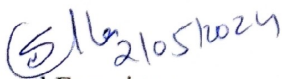

Dr. Mukund Ambawade
Guide
Department of Microbiology

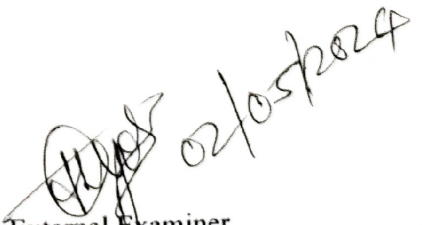

Ms. Sudha M. Adya
PG Coordinator
Department Microbiology


Dr. Rajashree Patwardhan
Head
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Vice- Principal, Science




Dr. Rajendra Gurao
Principal

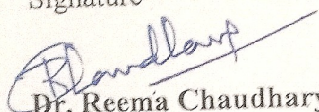

Internal Examiner


External Examiner

CERTIFICATE OF THE GUIDE

This is to certify that the work incorporated in the thesis "Characterization of cyanobacteria isolated from marine habitat" submitted by, Miss. Rasika Nagesh Gaikwad student of, Department of Microbiology, H. V. Desai College of Commerce, Arts and Science, Pune was carried out by the candidate under our supervision/ guidance. Any literature, method or work done by others and cited within this thesis due is acknowledged and listed in the reference section.

Signature



Dr. Reema Chaudhary, PhD

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S.P. University, Ganeshkhind

Pune- 411007, Maharashtra

Place: Pune

Date: 17/04/2024

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एनसीसीएस भारत सरकार के जैवप्रौद्योगिकी विभाग का स्वायत्त संस्थान है.
NCCS is an Autonomous Institute of Department of Biotechnology, Govt. of India

ABSTRACT:

Cyanobacteria are prokaryotic, oxygenic photosynthetic, autotrophic and some of them can fix atmospheric nitrogen. Cyanobacteria is useful in aquaculture, wastewater treatment, food, and fertilizers. It plays an important role in performing oxygenic photosynthesis, fix nitrogen and produce extra cellular organic molecules, maintenance and build-up of soil fertility, which increases the growth of crops and functions as a natural bio fertilizer. In this study, we have taken samples from different Marine rich habitats for isolating and studying the diversity of cyanobacteria in these representative samples. We isolated and characterized 4 isolates using both microscopic and molecular taxonomic approaches. The isolates were grown in suitable conditions and further observed for microscopic examination primarily. Then the DNA from the corresponding isolates were extracted, purified, and amplified by PCR using universal cyanobacteria primers and were used subsequently for sequencing of 16S rRNA gene. The 16S rRNA sequences were analysed by various bioinformatics tools such as SeqMan, BLAST, EzBioCloud database and used for construction of phylogenetic trees using Mega7 software. We found strain RBS4-3 shows 97.7% of the genus *Leptolyngbya nodulosa* and RBS3-4 shows 94.9% of the genus *Westiellopsis welwitschii* found probable the novel species with morphological and phylogenetic analysis. These strains are interesting and it needs further study.

Keywords: Taxonomy; polyphasic approach; cyanobacteria; phylogeny; new genus

**Assessment of water purification capabilities of ash prepared by
using water hyacinth and agriculture waste.**

Dissertation submitted in partial fulfilment of

Master of Science in Microbiology

M.Sc. Microbiology

Submitted by

Ms. Susmeeta Bhaskar Mesta

Ms. Payal Tanaji Awasare

Under the guidance of

Dr. Mukund Ambawade

Assistant Professor

Department of Microbiology

Haribhai V. Desai College

Pune – 411002



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HARIBHAI V. DESAI COLLEGE of ARTS, SCIENCE AND COMMERCE
PUNE - 411002

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This is to certify that **Ms. Susmeeta Bhaskar Mesta and Payal Tanaji Awasare** from Department of Microbiology; Haribhai V. Desai College of Arts Science and Commerce has successfully completed the dissertation, "**Assessment of water purification capabilities of ash prepared by using water hyacinth and agriculture waste**" for the partial fulfilment of Masters in Microbiology in the academic year 2023-2024.

Dr. Mukund Ambawade

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Dr. Rajashree Patwardhan

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Internal Examiner

Ms. Sudha M. Adya

PG Coordinator

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Dr. Rajendra Gurao

Principal


02/05/2024

External Examiner

Abstract

This study investigates the quality of water from four different sources: Mula River, Mutha River, Ram River, and Pawna River. Seventeen tests were conducted on these water samples utilizing physical, chemical, and biological analysis methods. Physical analysis included Total Solids (TS), Total Dissolved Solids (TDS), Total Suspended Solids (TSS), turbidity, and conductivity measurements. Chemical analysis encompassed Biochemical Oxygen Demand (BOD), Chemical Oxygen Demand (COD), Dissolved Oxygen (DO), pH, Alkalinity, Total Hardness, chloride, iron, Nitrate, fluoride, and residual chlorine assessments. Biological analysis involved Standard Plate Count (SPC) and Most Probable Number (MPN) determinations. Subsequently, a filter comprising biochar derived from water hyacinth and agricultural waste was prepared and employed. After passing the water samples through the filter, a significant reduction in readings was observed, indicating the removal of contaminants. The results suggest the effectiveness of the biochar filter in reducing the levels of pollutants in the water samples.

**Effect of salt stress on nodule formation and growth
parameters of fenugreek (*Trigonella foenum-
graecum* L.)**

Dissertation submitted in partial fulfilment of
Master of Science in Microbiology
M.Sc. Microbiology

Submitted by
Miss. Sanvedna Kishor Shinde
Miss. Nruttika Ananda Thite

Under the guidance of
Dr. Mukund Ambawade
Mr. Pramod Shelar

Haribhai V. Desai College
(Arts, Science & Commerce)
Pune – 411002

2023-2024



THE P. G. K. MANDAL'S
HARIBHAI V. DESAI COLLEGE
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This is to certify that **Miss. Sanvedna Kishor Shinde** and **Miss. Nruttika Ananda Thite** and from the Department of Microbiology, Haribhai V. Desai college have successfully completed the Dissertation "**Effect of salt stress on nodule formation and growth parameters of fenugreek (*Trigonella foenum-graecum L.*)**" for the particular fulfilment of Masters in Microbiology in academic year 2023-2024.

Dr. Mukund Ambawade

Guide

Department of Microbiology

Mr. Promod Shelar

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Ms. Sudha Aditya

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Dr. Rajashree Patwardhan

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Department of microbiology
Vice – Principal (Science)

Dr. Rajendra Gurao

Principal

Date:

21/05/2024

Internal Examiner

02/05/2024

External Examiner

ABSTRACT

Salinity is a major problem affecting crop production all over the world: 20% of cultivated land in the world, and 33% of irrigated land, are salt-affected and degraded. This process can be accentuated by climate change, excessive use of groundwater (mainly if close to the sea), increasing use of low-quality water in irrigation, and massive introduction of irrigation associated with intensive farming. Excessive soil salinity reduces the productivity of many agricultural crops, including most vegetables, which are particularly sensitive throughout the ontogeny of the plant. The objective of this review is to discuss the effects of salinity on vegetable growth and how management practices add (irrigation, drainage, and fertilization) can prevent soil and water salinization and mitigate the adverse effects of salinity.

Keywords: vegetable crops, salinity threshold, crop salt tolerance, ion imbalance, irrigation, drainage, fertilization.

BIOPROSPECTING BIOACTIVE COMPOUNDS FROM TRICHODERMA SPECIES

Dissertation submitted to

Savitribai Phule Pune University towards the partial fulfilment of

The degree of M. Sc. (Microbiology)

By

BHAVANA MAHADEV HIRAVE

ANKITA UDAY GOSAVI

Under the Guidance of Ex

Dr. MANISHA SHINDE

Department of Biotechnology,

Sinhgad College of Engineering, Pune 411041

&

Dr. Suchitra Patil

Department of Microbiology,

Haribhai V. Desai college, Pune 411002

Year

2023-2024



THE POONA GUJRATHI KELVANI MANDAL'S

HARIBHAI V. DESAI COLLEGE

of ARTS, SCIENCE AND COMMERCE

PUNE - 411002

CERTIFICATE

This is to certify that **Miss. Bhavana Mahadev Hirave and Miss. Ankita U. Gosavi** from Department of Microbiology; Haribhai V. Desai College of Arts Science and Commerce has successfully completed the dissertation, "**Bioprospecting Bioactive Compounds from Trichoderma species**" for the partial fulfillment of Masters in Microbiology in the academic year 2023-2024.

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B.E. (Electronics), M.E., Ph.D.
PRINCIPAL

CERTIFICATE

This is to certify that the Project Report entitled

**"BIOPROSPECTING BIOACTIVE COMPOUNDS FROM
TRICHODERMA SPP."**

Submitted by

Ms. Bhavana Mahadev Hirave (Roll No.-5459)

&

Ms. Ankita Uday Gosavi (Roll No.-5409)

From

Haribhai V. Desai College of Arts Science and Commerce, Pune 411002

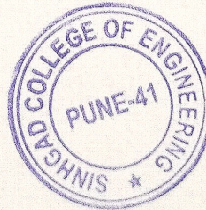
has successfully completed Project under the guidance of Dr. Manisha Shinde,
Department of Biotechnology, Sinhgad College of Engineering, Pune, Savitribai Phule
Pune University. This Project has done for the partial fulfillment of Masters in
Microbiology in the academic year 2023 – 2024.

Dr. Manisha Shinde.

Assistant Professor & External Guide

Department of Biotechnology

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ABSTRACT

In this study focused on large-scale production of *Trichoderma* biomass for extracting primary and secondary bioactive compounds. Solid-state and liquid-state fermentation methods were employed using various substrates such as PDA/PDB and sugarcane bagasse. Biomass obtained from solid-state fermentation was used directly for fertilizer or for extracting bioactive compounds. Liquid fermentation resulted in thick pellicle growth easily separated by filtration. *Trichoderma* spp. were isolated and identified using standard methods. Biofertilizer production from fermentation biomass was explored for plant pathogen control. Primary bioactive compounds like protein, carbohydrate, and phenol were estimated, along with enzyme activities like cellulase and protease. Secondary bioactive compounds were analyzed using TLC and gas chromatography. Previous studies highlighted *Trichoderma*'s significance in agriculture and pharmaceuticals, with numerous terpenoids identified. The study concluded that *Trichoderma* biomass from commercial biofertilizers contains essential bioactive compounds useful for pharmaceutical and agricultural applications.

**SCREENING AND OPTIMIZATION OF HYDROLYTIC ENZYMES OF FUNGI
ISOLATED FROM THE GUT OF BEETLE.**

M.SC. DISSERTATION REPORT

SUBMITTED TO

HARIBHAI V. DESAI COLLEGE OF ARTS, SCIENCE AND COMMERCE

PUNE 411030, MAHARASHTRA.

IN PARTIAL FULFILMENT FOR THE AWARD OF THE DEGREE OF

M.Sc. MICROBIOLOGY

BY

MS. SONAM YASHVANT HULAWALE

UNDER THE GUIDANCE OF

Dr. RAMESHWAR AVCHAR, (External guide)

SCIENTIST 'B'

And

Dr. MUKUND S. AMBAWADE, (Internal guide)

(Department of Microbiology, Haribhai V. Desai Collage, Pune)

AT

NATIONAL CENTRE FOR MICROBIAL RESOURCE (NCMR),

NATIONAL CENTRE FOR CELL SCIENCE (NCCS),

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PUNE- 411 007, MAHARASHTRA, INDIA (2022-2023).





THE POONA GUJRATHI KELVANI MANDAL'S
HARIBHAI V. DESAI COLLEGE of
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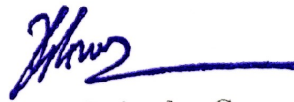
This is to certify that **Ms. Sonam Yashavant Hulawale** from Department of Microbiology; Haribhai V. Desai College of Arts Science and Commerce has successfully completed the dissertation, "**Screening and Optimization of Hydrolytic Enzymes of Fungi Isolated from the Gut of Beetle.**" for the partial fulfillment of Masters in Microbiology in the academic year 2023-2024.



Dr. Mukund S. Ambawade
Internal guide

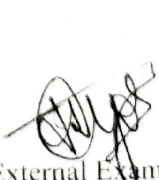

Ms. Sudha M. Adya
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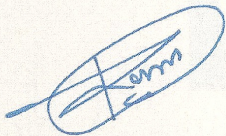
Abstract

In this study, 60 of 50 cultures were revived to Screen 4 different enzymes from the culture. To study enzyme production and the influence of various parameters on enzyme production. Our studies also highlight enzyme activity under certain conditions. In the initial screening. We obtained 12 positive isolates out of 60 for cellulase enzyme production. Total nine positive isolates for amylase enzyme. Eight positive isolates for lactase enzyme. Almost nine positive isolates for xylanase enzyme. Our study continued in the selected two to investigate the secondary screening of all enzymes. We further investigated the effect of parameter temperature on enzyme production under optimal conditions. In this study, the optimum range of cellulases for strains (B46) temperature of 40°C 3 days. The optimal temperature for Amylase of strain showed higher activity at 40°C on 4th day. A laccase enzyme has a higher activity at the temperature was 30° C on 3rd day Xylanase rains (B46) showed higher activity at 30°C 4th days.

CERTIFICATE OF THE GUIDE

This is to certify that the work incorporated in the thesis “**Screening and Optimization of Hydrolytic Enzymes of Fungi Isolated from the Gut of Beetle**”, submitted by Miss. Sonam Yashvant Hulawale, the student of the **Department of Microbiology, Haribhai V. Desai Collage of Commerce, Arts and Science College in Pune** was carried out by the candidate under our supervision/ guidance. Any literature, method, or work done by others and cited within this thesis due acknowledgement and listed in the reference section.

Signature

**Dr. Rameshwar Avchar, PhD**

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Pune- 411 007, Maharashtra

Place: Pune

Date: 18/04/2024

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एनसीएमआर भारत सरकार के जैवप्रौद्योगिकी विभाग का स्वायत्त संस्थान है।

Studies on Plant Growth Promoting traits of Actinobacteria.

Dissertation submitted in partial fulfilment of

Master of Science in Microbiology

M.Sc. Microbiology

Submitted by

Ms. Konica Shankar Karosiya

Ms. Kshitija Moreshwar Khatavkar

Under the guidance of

Mrs. Richa Raut

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2023-2024



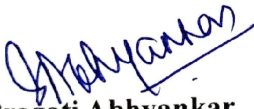
THE POONA GUJURATHI KELVANI MANDAL'S


HARIBHAI V. DESAI


COLLEGE of ARTS,
SCIENCE AND COMMERCE
PUNE - 411002

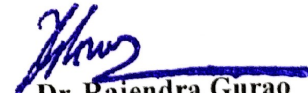
CERTIFICATE

This is to certify that **Ms. Konica Shankar Karosiya** and **Ms. Kshitija Moreshwar Khatavkar** from Department of Microbiology; Haribhai V. Desai College of Arts Science and Commerce has successfully completed the dissertation, "**Studies on Plant Growth Promoting traits of Actinobacteria**" for the partial fulfillment of Masters in Microbiology in the academic year 2023-2024.

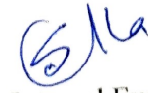

Dr. Pragati Abhyankar
Guide



Ms. Sudha M. Adya
PG Coordinator
Department of Microbiology


Dr. Rajashree Patwardhan
Head
Department of Microbiology
Vice- Principal, Science


Dr. Rajendra Gurao
Principal

Date:


4/05/2024
Internal Examiner


04/05/2023
External Examiner

Abstract

Globally, agriculture serves as the primary provider of sustainable raw materials for diverse industries, necessitating extensive annual crop production. Chemical fertilizers, commonly employed to augment plant growth, pose significant environmental and health risks to both humans and animals due to their toxic nature. In contrast, actinobacteria can be used to supplement biological fertilizers and pesticides to offer a non-toxic, environmentally friendly alternative, showcasing potential superiority over their chemical counterparts. We had 25 actinobacterial isolates tested for their Plant growth promoting properties. They were screened for IAA production, phosphate solubilization, siderophore production, gibberellic acid production test, hydrogen cyanide activity, ammonia production test and also for the phosphate solubilization test. High amount of IAA was produced by I4 i.e., 7.2479 ug/ml. All the 25 isolates failed to degrade chitin as well as were not able to produce hydrogen cyanide. Whereas, all the isolates were efficient in the production of ammonia. Gibberellic acid production was not determined due to some challenges. E3.3, L1b, I8, I4, I7 respectively indicated presence of siderophore. For the phosphate solubilization test E4. 1, L1d, H1Ra, H1Rb, H1Rc, I4, I7 and I9 tested positive. These isolates can be used for promoting the plant growth and improving the crop yield.

**Antifungal activity of non-antifungal drugs alone and their combination with
fluconazole against planktonic growth of *Candida albicans***

Dissertation submitted in partial fulfilment of

Master of Science in Microbiology

M.Sc. Microbiology

Submitted by

Ms. Avantika Kondhare

Mr. Ramesh Mahut

Under the guidance of

Dr. Santosh Kathwate

Assistant Professor

Department of Biotechnology

Savitribai Phule Pune University

&

Dr. Suchitra P. Patil

Assistant Professor

Department of Microbiology

Haribhai V. Desai College

Of Arts, Science & Commerce

Pune-411002

2023-2024





THE POONA GUJRATHI KELVANI MANDAL'S
HARIBHAI V. DESAI COLLEGE
Of Arts, Science and Commerce

Pune-411002


CERTIFICATE


This is to certify that Miss. Avantika Dattatray Kondhare and Mr. Ramesh Vilas Mahut from Department of Microbiology Haribhai V. Desai College has successfully completed the dissertation "**Antifungal activity of non-antifungal drugs alone and their combination with fluconazole against planktonic growth of *Candida albicans***" for the fulfillment of Masters in Microbiology in the academic year 2023-2024.



Dr. Suchitra Patil
Internal Guide

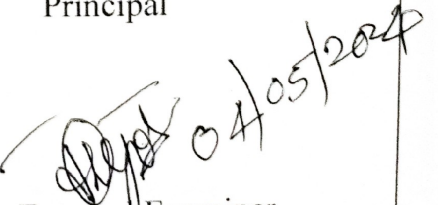

Dr. Rajashree Patwardhan
Head
Department of Microbiology
Vice Principal (Science)

Date:


Internal Examiner


Ms. Sudha Adya
PG Coordinator
Department of Microbiology


Dr. Rajendra Gurao
Principal


External Examiner

Savitribai Phule Pune University



DEPARTMENT OF BIOTECHNOLOGY
Ganeshkhind,
Pune-411007 (INDIA).

Date: 19/04/2024

Ref. No. Biotech

Certificate

It is certified that the work contained in this thesis entitled '**Antifungal activity of non-antifungal drugs alone and their combination with fluconazole against planktonic growth of *Candida albicans***' submitted by Miss **Avantika Kondhare** (Seat No: **5462**) and Mr. **Ramesh Mahut** (Seat No: **5469**) from Haribhai V. Desai College of Arts, Science and Commerce Pune 411002 for the award of Fourth Semester (Master of Science in Microbiology) is absolutely based on their own work carried out under my supervision and that this work/thesis has not been submitted elsewhere for any degree/diploma.

Dr. Santosh Kathwate
Assistant Professor,
Department of biotechnology,
Savitribai Phule Pune University

Date: 19/04/2024

Place: Pune

Abstract

Candida albicans, an opportunistic fungus within the Candidaceae family, poses a significant public health threat due to its ability to cause a spectrum of diseases and its increasing prevalence, particularly among immunocompromised individuals.

Candida yeast exist in two primary growth states, planktonic (free-floating) and biofilm (surface-attached). Biofilm formation is initiated by the adherence of planktonic Cells to a surface, followed by their proliferation and production of a protective extracellular matrix (ECM) composed mainly of exopolysaccharides (EPS). By understanding the transition from planktonic to biofilm growth, we can gain valuable insights into how *Candida* adapts to their environment and develop resistance to various threats.

Fluconazole is a popular antifungal medication for treating *Candida albicans* infections due to its favorable properties. However, it only inhibits the growth of *C. albicans* (fungistatic activity) and doesn't necessarily kill them. This fungistatic effect allows *C. albicans* to develop resistance to fluconazole, particularly during long-term treatment. To improve fluconazole's effectiveness, identifying new drug targets that can boost its antifungal activity or convert it into a fungicidal agent is a promising strategy.

In this study four non-antifungal drugs, MET, ENA, TRH, and PCP and one antifungal drug, FLC were investigated for their antifungal effect against the planktonic growth of *C. albicans*. The antifungal efficacy of TRH and PCP was evaluated as monotherapy, while the combination of MET, ENA, TRH, and PCP with the antifungal agent FLC against *C. albicans* planktonic growth was also tested. The minimum inhibitory concentration (MIC) of the non-antifungal drugs against *C. albicans* planktonic growth was determined using the broth microdilution method. ENA

**The study of viability and stability of free and encapsulated probiotic
bacteria against gastrointestinal and thermal condition.**

Dissertation submitted in partial fulfilment of
Master of Science in Microbiology
(MSc Microbiology)

Submitted by
Ms. Shruti S. Chordiya
And
Ms. Namrata T. Bibave

Under the guidance of
Dr. Rajashree Patwardhan
Head
Department of Microbiology
Vice Principal Science Faculty

Department of Microbiology
Haribhai V. Desai College
Pune-411002
2023-2024



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ARTS, SCIENCE AND COMMERCE
PUNE -411002


CERTIFICATE

This is to certify that **Ms. Shruti S. Chordiya** and **Ms. Namrata T. Bibave** from Department of Microbiology; Haribhai V. Desai College of Arts Science and Commerce has successfully completed the dissertation, "**The Study of Viability and Stability of Free and Encapsulated Probiotic Bacteria against Gastrointestinal and Thermal conditions.**" For the partial fulfilment of masters in Microbiology in academic year 2023-2024.


Prof. Dr. Rajashree Patwardhan

Guide

Department of Microbiology


Ms. Sudha M. Adya

PG Coordinator

Department of Microbiology


Prof. Dr. Rajashree Patwardhan

Head

Department of Microbiology

Vice Principal (Science)


Dr. Rajendra Gurao

Principal


Internal Examiner


External Examiner

04/05/2024

ABSTRACT

The current study was conducted to elucidate the impact of encapsulation on the stability and viability of probiotic bacteria (*Enterococcus spp.*) in vitro gastrointestinal conditions and thermal conditions. Purposely, probiotics were encapsulated in two hydrogel materials (kappa carrageenan and sodium alginate). Encapsulation exhibited a significant effect on the survival and stability of probiotics. A rapid log reduction was observed when free probiotic cells were exposed to the thermal conditions compared to encapsulated probiotic bacteria. Whereas, in gastric conditions viability in case of 2%(w/v) of beads increases to 3.92 log cfu/g, while in case of 4% (w/v) of beads it increases to 4.15 cfu/g. Similarly, viability of free cells decreases to 2.15 log cfu/g. Whereas in the stimulated intestinal conditions viability in case of 2%(w/v) of beads and 4% (w/v) of beads was decreased to 1.74 log cfu/g and 1.84 log cfu/g respectively. While in case of free cells it decreased to 1.70 log cfu/g. In short encapsulation of sodium alginate and carrageenan provided better protection in thermal as well as under stimulated gastro intestinal condition.

Evaluation of antibacterial activity of hibiscus (*Rosa-sinensis*) against some human pathogens

Dissertation submitted in partial fulfilment of Master of Science in
Microbiology

Submitted by

Miss. Sakshi Shrikant Chavan

Under guidance of

Ms. Sudha Adya

Assistant Professor

Department of Microbiology

Haribhai V Desai College

(Of Arts, Science and Commerce)

Pune 411002

2023-2024

Abstract

Hibiscus rosa sinensis, a member of the Malvaceae family, is widely cultivated in the tropics as an ornamental plant. In this study the antibacterial activity of *Hibiscus rosa-sinensis* plant parts on skin infection causing microorganisms like *Escherichia coli* and *Pseudomonas aeruginosa* was studied. Also antibacterial activity of hibiscus flower and leaves on urinary infection causing microorganisms *Klebsiella* and *Proteus* was studied. The aqueous and solvent (Methanol and ethanol) extracts of the leaves and flowers were screened for antibacterial activity by using Agar disc diffusion method and Agar well diffusion method. Based on the previous study, phytochemical investigation of *Hibiscus rosa-sinensis* extracts revealed that there was the presence of compounds such as tannins, saponins, glycosides, anthocyanins, flavonoids, and several other compounds in different parts of the plant. The leaves part of the plant consists of important constituents such as tannins, saponins, glycosides, flavonoids and terpenoids. Thin layer chromatography technique is used to show the separation of various components present in plant extract of hibiscus, Curry leaves, Pudina and Tulsi was studied. The Phytochemical analysis for Curry leaves, Pudina and Tulsi was studied.

**ISOLATION, CHARACTERIZATION OF PIGMENT PRODUCING
BACTERIA WITH THEIR APPLICATIONS**

Dissertation Submitted in partial fulfillment of

Masters of Science in Microbiology

Msc. Microbiology

Submitted by

Ms. Poonam Jasaram Choudhary

Ms. Deepika Kishansingh Chowhan

Under the guidance of

Dr. Pragati Abhyankar

Department of Microbiology

Haribhai V. Desai College

Pune 411002

2023-2024



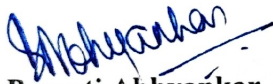
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HARIBHAI V. DESAI COLLEGE Of ARTS, SCIENCE AND COMMERCE


PUNE – 411002


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This is to certify that **Ms. Poonam Choudhary** and **Ms. Deepika Chowhan** from Department of Microbiology, Haribhai V. Desai College of Arts Science and Commerce has successfully completed the dissertation, **“ISOLATION, CHARACTERIZATION OF PIGMENT PRODUCING BACTERIA WITH THEIR APPLICATIONS”** for the partial fulfillment of Masters in Microbiology in the academic year 2023-2024.


Dr. Pragati Abhyankar
Guide

Department of Microbiology

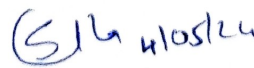

Ms. Sudha M Adya
PG Coordinator
Department of Microbiology

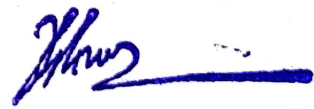

Dr. Rajashree B. Patwardhan
Head of

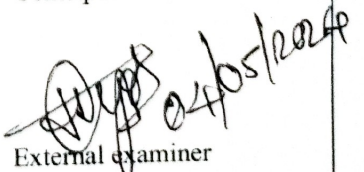
Department of Microbiology

Vice Principal (Science)

Date:


Internal examiner


Dr. Rajendra Gurao
Principal


External examiner

ABSTRACT

Natural products that are either synthesized or secreted by organisms represent a critical source of potential applications. In this study we isolated pigment-producing organisms from different environmental sources. Four pigment producing isolates were selected and characterized using Bergey's Manual of Determinative Biology. The isolated strains produced yellow, orange, reddish orange and florescent orange pigments. The pigments were extracted from the yellow, fluorescent pigment-producing isolate *Janthinobacterium* (strain MCC 4783), and their antimicrobial activity against human pathogens was noted. For maximum pigment production, different concentrations of glycerol were used in the broth at different temperatures for incubation. In the present study, we concentrated on *Janthinobacterium* (strain MCC 4783), and the optimum temperature required for production of *Janthinobacterium* (strain MCC 4783) was found to be 20°C. FTIR and Spectrophotometric analysis were studied for *Janthinobacterium* strain (MCC 4783).

**STANDARDIZATION OF HERBAL MEDICINE WITH RESPECT TO MICROBIAL
CONTAMINATION AND PHARMACOGNOSTIC CHARACTERS**

Dissertation Submitted in partial fulfilment of

Masters of Science in Microbiology

(M.Sc. Microbiology)

Submitted by

Ms. Deshpande Amarja Dnyaneshwar

Ms. Deshmukh Shruti Shripad

(M.Sc. Microbiology)

Under the guidance of

Dr. Suchitra Patil

Professor

DEPARTMENT OF MICROBIOLOGY

HARIBHAI V. DESAI COLLEGE

PUNE 411002

&

Dr. Sham U. Deshmukh

Head of Department of Pharmacology and Microbiology

INDIAN DRUG RESEARCH ASSOCIATION AND LABORATORY

SHIVAJINAGAR , PUNE 411005

2023-2024



THE P. G. K. MANDAL'S
HARIBHAI V. DESAI COLLEGE
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PUNE 411002

CERTIFICATE

This is to certify that **Ms. Deshpande Amarja Dnyaneshwar** and **Ms. Deshmukh Shruti Shripad** from the Department of Microbiology, Haribhai V. Desai College of Arts, Commerce & Science have successfully completed the Dissertation "**Standardization Of Herbal Medicine With Respect To Microbial Contamination and Pharmacognostic Characters**" for the partial fulfilment of Masters in Microbiology in academic year 2023-2024.

Dr. Suchitra Patil

Guide

Department of Microbiology

Dr. Rajashree B. Patwardhan

Head

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Vice -Principal ,Science.

Internal Examiner

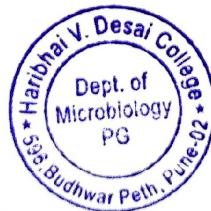
Ms. Sudha M. Adya

PG Coordinator

Department of Microbiology

Dr. Rajendra Gurao

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Indian Drugs Research Association & Laboratory



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9-2024

Date: _____

24-04-2024

CERTIFICATE

This is to certify that **Ms .Deshpande Amarja Dnyaneshwar** and **Ms. Deshmukh Shruti Shripad**, students of MSC-II Microbiology, Haribhai.V. Desai College of Arts, Commerce & Science, Pune, has successfully completed their internship programme from 17/01/2024 To 10/04/2024 at Indian Drugs Research Association & Laboratory. They have worked on a project Titled "**Standardization of herbal medicine with respect to microbial contamination and pharmacognostic character**".

During the internship they demonstrated good microbial handling and phytochemical analytical skill with a self motivated attitude to learn new things. Their performance exceeded and was able to complete project in time.

(Dr. S.U. Deshmukh)
H.O.D .of Microbiology & Pharmacognosy,

ABSTRACT

Standardization of herbal medicine is essential to ensure safety, efficacy, and quality in therapeutic interventions. This study focuses on the standardization of three widely used medicinal herbs, namely Ashwagandha (*Withania somnifera*), Gulvel (*Tinospora cordifolia*), and Tulasi (*Ocimum sanctum*), with respect to microbial contamination and pharmacognostic character. The objectives include establishing stringent protocols for cultivation, processing, and storage to minimize microbial contamination risks, as well as developing methods for pharmacognostic characterization to identify and quantify the active constituents.

The significance of this standardization lies in its potential to enhance safety, efficacy, and reproducibility of herbal medicines, thereby fostering their integration into mainstream healthcare systems. Key findings reveal that standardized practices ensure safety by minimizing microbial contamination, while pharmacognostic characterization enables the consistent identification and quantification of active compounds, ensuring potency and efficacy. Overall, this study underscores the importance of standardization in optimizing the therapeutic benefits and acceptance of herbal medicines in contemporary healthcare practices.

**Nutritional Assessment of Beetroot Probiotic Elixirs:
From Isolation to Sensory Analysis in Functional Beverages**

Dissertation submitted in partial fulfillment of

Master of Science in Microbiology

M.Sc. Microbiology

Submitted by

Ms. Rutuja Naresh Shripati

&

Ms. Prajakta Shankar Madchetti

Under the guidance of

Dr. Manisha Shinde

Assistant Professor
Department of Biotechnology
Sinhgad College of Engineering
Pune-411041

&

Ms. Sudha M. Adya

Assistant Professor
Department of Microbiology
Haribhai V. Desai College
Of Arts, Science and Commerce

2023-2024



THE POONA GUJURATHI KELVANI MANDAL'S
HARIBHAI V. DESAI COLLEGE
of ARTS, SCIENCE AND COMMERCE
PUNE - 411002

CERTIFICATE

This is to certify that **Ms. Rutuja Naresh Shripati & Ms. Prajakta Shankar Madchetti** from Department of Microbiology; Haribhai V. Desai College of Arts Science and Commerce has successfully completed the dissertation, "**Nutritional Assessment of Beetroot Probiotic Elixirs: From Isolation to Sensory Analysis in Functional Beverages**" for the partial fulfillment of Masters in Microbiology in the academic year 2023-2024.

Ms. Sudha M. Adya
Guide

Ms. Sudha M. Adya
PG Coordinator
Department of Microbiology

Dr. Rajashree Patwardhan
Head
Department of Microbiology
Vice- Principal, Science



Dr. Rajendra Gurao
Principal

Internal Examiner

04/05/2023
External Examiner



SINHGAD TECHNICAL EDUCATION SOCIETY'S
SINHGAD COLLEGE OF ENGINEERING

Accredited by NAAC with 'A+' Grade

(Approved by AICTE, Recognized by Government of Maharashtra, Affiliated to Savitribai Phule Pune University)

Prof. M. N. Navale
M.E. (Engg.), M.B.A.
FOUNDER PRESIDENT

Dr. (Mrs.) Sunanda M. Navale
B.A., M.P.M., Ph.D.
FOUNDER SECRETARY

Dr. S. D. Lokhande
B.E. (Electronics), M.S., Ph.D.
PRINCIPAL

CERTIFICATE

This is to certify that the Project Report entitled

**"Nutritional Assessment of Beetroot Probiotic Elixirs:
From Isolation to Sensory Analysis in Functional Beverages"**

Submitted by

Ms. Rutuja Naresh Shripati (Roll No.-5467)

&

Ms. Prajakta Shankar Madchetti (Roll No.-5463)

From

Haribhai V. Desai College of Arts Science and Commerce Pune 411002

has successfully completed Project under the guidance of Dr. Manisha Shinde, Sinhgad College of Engineering – Department Of Biotechnology of Savitribai Phule Pune University. This Project has done for the partial fulfillment of Masters in Microbiology in the academic year 2023 – 2024.

Dr. Manisha Shinde,

Assistant Professor & External Guide

Department of Biotechnology

Sinhgad College of Engineering, Pune 41



ABSTRACT

Beetroot Kanji is traditional fermented beverages used by many people worldwide. As the lifespan of fermented products is short, plant based probiotic beverages are not predominant in market, hence this study focuses on assessing nutritional values as well as sensory acceptance of Beetroot Kanji as Beetroot Elixir.

The study was planned to prepare non- dairy probiotic drink using beetroot juice. This study focuses on preparing Kanji from natural recipes containing beetroots and ginger fermenting in brine.

The Probiotic culture which is not inoculated (Uninoculated) in Beetroot juice was named as 'Kanji' and Probiotic culture inoculated in Beetroot juice (Kanji) is named as Beetroot Elixir".

In our study the pH of our probiotic elixir drink was observed to be in the range of 3-4. Change in pH due to acid production and sugar utilization was observed after fermentation. Brine has pH value in neutral range and final probiotic beverage pH was in range if 3-4. During fermentation acidity was increased as pH was decreased. Lower the pH more sour taste of probiotic drink was observed. Lactic acid fermentation of beetroot at 30°C in 3-5 days gives final Kanji preparation.

Microbiological Analysis was performed by growing the culture on general purpose media and selective media and on performing Gram Staining it showed the presence of *Lactobacillus* and *Saccharomyces*.

The prepared Beetroot Elixir and Kanji were tested for its nutritional content such as total sugar, total protein, total phenols and detection of flavonoids and nitrate content qualitatively.

In our study, naturally fermented kanji drink (Uninoculated) were formulated and their nutritional content were estimated as follows:it contains total protein = 3.58 mg/ml, total carbohydrates-Kanji=54.71 mg/ml, total phenol =377.2 ppm, flavonoid and nitrate content was checked qualitatively and both test were positive indicating presence of nitrate and flavonoids in kanji.

Beetroot Elixir (inoculated) were formulated and their nutritional content were estimated as follows:it contains total protein- Fresh Beetroot=3.25mg/ml, Inoculated = 3.51 mg/ml; total

A Dissertation Report

On

**“POLYPHASIC CHARACTERIZATION OF BACTRIAL STRAIN BSM 11
(MCC 2433) AND OF CLOSELY RELATED TYPE STRAINS”**

Submitted

Towards the Partial Fulfilment of Master of Science

To Haribhai V. Desai College

By

Ms. Shraddha Parmar

Ms. Divya Padghan

Under the Guidance of

Dr. Neetha Joseph

Scientist “C”

National Centre for Microbial Resources

NCMR-NCCS, Pune.

And

Dr. Suchitra Patil

Assistant Professor

Department of Microbiology

Haribhai V. Desai College of Arts, Science and Commerce

Pune- 411002

2023-2024



THE POONA GUJRATHI KELVANI MANDAL'S
HARIBHAI V. DESAI COLLEGE
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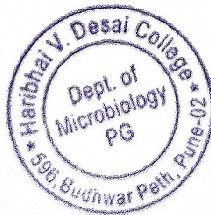
CERTIFICATE

This is to certify that Ms. Shraddha Ashok Parmar and Ms. Divya Ankush Padghan from Department of Microbiology; Haribhai V. Desai College of Arts, Science and Commerce has successfully completed the dissertation, "Polyphasic characterization of bacterial strain BSM 11 (MCC 2433) and of closely related type strains" for the partial fulfilment of Masters in Microbiology in the academic year 2023-2024.

Dr. Suchitra Patil
Internal Guide

Ms. Sudha M. Adya
PG Coordinator
Department of Microbiology

Dr. Rajashree Patwardhan
Head
Department of Microbiology
Vice- Principal, Science



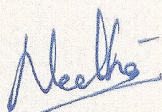
Dr. Rajendra Gurao
Principal

Date:

410524
Internal Examiner
04/05/2023
External Examiner

CERTIFICATE

This is to certify that the work described in this thesis entitled “**Polyphasic characterization of bacterial strain BSM 11 (MCC 2433) And of closely related type strains**” for the fulfillment of Degree of Master of Science in Microbiology has been carried out by **Ms. Shraddha Ashok Parmar** and **Ms. Divya Ankush Padghan** under my supervision and guidance at National Centre for Microbial Resource (NCMR), National Centre for Cell Science, Pune during the period January to April 2024. I certify that this is their bonafide work. The work described is original and has not been submitted for any degree to this or any other University.

Date: - 18/04/2024**Place: - Pune, India****Dr Neetha Joseph**

Scientist “C”,

National Centre for Microbial Resource (NCMR),

National centre for cell science (NCCS),

Savitribai Phule Pune University Campus,

Ganeshkhind, Pune – 411007

Maharashtra, INDIA

Pune

साई ट्रिनिटी कॉम्प्लेक्स, सुस रोड, पाषाण, पुणे-४११ ०२१. महाराष्ट्र, भारत.

Sai Trinity Complex, Sus Road, Pashan, Pune- 411 021. Maharashtra, INDIA

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ई-मेल / e-mail: mcc@nccs.res.in | वेब / Web: www.nccs.res.in

एनसीसीएस भारत सरकार के जैवप्रौद्योगिकी विभाग का स्वायत्त संस्थान है.

NCCS is an Autonomous Institute of Department of Biotechnology, Govt. of India

ABSTRACT

The strain BSM 11 (MCC 2433) is Gram-variable, aerobic or facultatively anaerobic, motile, rod-shaped bacteria that produce endospore and was originally isolated from coastal ecosystem. BSM 11 (MCC 2433) is cream colonies with 2-4mm in diameter can grow on nutrient agar at pH range of 6.0-13.0 (optimum: - 8.0-9.0), at temperature between 15°C - 50°C (optimum: - 28-30°C) and at 0%-8% w/v NaCl concentrations (optimum: - 0%). The cell wall peptidoglycan contained *meso*-diaminopimelic acid. Phylogenetic analysis based on 16S rRNA gene sequence revealed that our strain BSM 11 shows highest similarity with closely related type strains *Niallia taxi* (JCM 33117, MCC 5264) **99.12%**, *N. nealsonii* (DSM 15077, MCC 3837) **99.05%** and *N. circulans* (DSM 11, MCC 2040) **98.09%**. The isolate shows positive for catalase and negative for oxidase. Hydrolysis of starch, tween 20, 40, 60, 80 and casein were performed. Results obtained were negative for starch, tween 40, 60, 80 and positive for tween 20 and casein hydrolysis. API test for BSM 11 and closely related type strains were carried out.

STUDY OF DIFFERENT ASPECTS OF ETHNOMEDICINAL PLANT *CASSIA FISTULA*

Dissertation submitted in partial fulfillment of
Master of Science in Microbiology
(M.Sc. Microbiology)

Submitted by
Ms. Anushree Mahesh Pednekar
Ms. Rutuja Dattatray Zurange

Under the guidance of
Mr. Sham U. Deshmukh
External Guide
Indian Drug Research Association and Laboratory, Shivaji nagar
Pune- 411005

Dr. Suchitra Patil
Internal Guide
Department of Microbiology
Haribhai V. Desai College
Pune- 411002
2023-2024



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HARIBHAI V. DESAI COLLEGE of
ARTS, SCIENCE AND COMMERCE
PUNE - 411002

CERTIFICATE

This is to certify that **Ms. Anushree Mahesh Pednekar & Ms. Rutuja Dattatray Zurange** from Department of Microbiology; Haribhai V. Desai College of Arts Science and Commerce has successfully completed the dissertation, “**Study of different aspects of Ethnomedicinal Plant *Cassia fistula***” for the partial fulfillment of Masters in Microbiology in the academic year 2023-2024.

Dr. Suchitra Patil

Guide

Ms. Sudha M. Adya

PG Coordinator

Department of Microbiology

Dr. Rajashree Patwardhan

Head

Department of Microbiology

Vice- Principal, Science

Internal Examiner



Dr. Rajendra Gurao

Principal

03/05/2024
External Examiner



AN ISO 9001: 2015 CERTIFIED LAB

Indian Drugs Research Association & Laboratory



561-B, Shivajinagar, Behind Congress Bhavan Lane, Pune - 411 005. ☎: (020) 25534018
Mob.: 9623354018 E-mail : idralpune@gmail.com

Ref. No. _____

Date _____

12-2024

24-04-2024

CERTIFICATE

This is to certify that Ms Rutuja Dattatray Zurange, student of Msc-II, Microbiology, Haribhai V. Desai, College of Arts, Commerce & Science, Pune, has successfully completed her internship programme from 23/01/2024 To 28/03/2024 at Indian Drugs Research Association & Laboratory. She has worked on a project Titled "**Study of different aspects of ethno medicinal plant *Cassia fistula*.**"

During the internship she demonstrated good microbial handling and phytochemical analytical skill with a self motivated attitude to learn new things. Her performance exceeded and was able to complete project in time.

(Mr S.U. Deshmukh)
H.O.D. of Microbiology & Pharmacognosy.

ABSTRACT

This study was carried out with an objective to investigate the antibacterial and antifungal potentials of leaves of *Cassia fistula* Linn. The aim of the study is to assess the antimicrobial activity and to determine the zone of inhibition of extracts on some bacterial and fungal strains. In the present study, the microbial activity of hydroalcohol extracts of leaves of *Cassia fistula* Linn. (an ethnomedicinal plant) was evaluated for potential antimicrobial activity against medically important bacterial and fungal strains. The antimicrobial activity was determined in the extracts using agar well diffusion method. The antibacterial and antifungal activities of extracts of *Cassia fistula* were tested against two bacterial strain—*Staphylococcus aureus*, *Escherichia coli* and two fungal strains—*Aspergillus niger*, *Candida albicans*. Zone of inhibition of extracts were compared with that of different standards like chloramphenicol for antibacterial activity and fluconazole for antifungal activity. Zone of inhibition is shown against *E.coli*, *S.aureus* and *Candida* but no zone of inhibition seen against *Aspergillus*.

The phytochemical analyses of the plants were carried out. The microbial activity of the *Cassia fistula* was due to the presence of various secondary metabolites. Hence, these plants can be used to discover bioactive natural products that may serve as leads in the development of new pharmaceuticals research activities.

Thin layer chromatography is performed for the fruit pulp of *Cassia fistula* to check the rhein content in present in the plant which is anti-inflammatory, anti-oxidant, anti-diabetic, anti-cancer and anti-allergic.

Also extracted the oil from seeds which further performed the different tests for oil like acid value, rancidity, iodine value, refractive index and specific gravity which showed the efficiency of oil.

**“Polyphasic Characterization of an Alkaliphilic Bacterial strain LL-1
Isolated from Lonar lake”**

Dissertation submitted in partial fulfilment of
Masters of Science in Microbiology
(M.Sc. Microbiology)

Submitted By

Miss. Arpita Govind Thombare
Miss. Vaishnavi Bapu Sonar

Under the guidance of

Dr. Amaraja Joshi
Scientist ‘C’
NCMR, NCCS, Pune

&

Dr. Sonia Ambade
Associate Professor
Department of Microbiology
Haribhai V. Desai College
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Pune- 411002

2023-2024



THE POONA GUJURATHI KELVANI MANDAL'S
HARIBHAI V. DESAI COLLEGE of
ARTS, SCIENCE AND COMMERCE
PUNE - 411002

CERTIFICATE

This is to certify that **Miss. Arpita Govind Thombare** and **Miss. Vaishnavi Bapu Sonar** from Department of Microbiology; Haribhai V. Desai College of Arts Science and Commerce have successfully completed the dissertation, "**Polyphasic Characterization of an Alkaliphilic Bacterial Strain LL-1 Isolated from Lonar lake**" for the partial fulfillment of Masters in Microbiology in the academic year 2023-2024.

Dr. Sonia Ambade
Guide

Ms. Sudha M. Adya
PG Coordinator
Department of Microbiology

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Head
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Vice- Principal, Science

Dr. Rajendra Gurao
Principal

Internal Examiner


04/05/2024

External Examiner

CERTIFICATE

It is to certify that the Dissertation Report entitled "Polyphasic characterization of an alkaliphilic bacterial strain LL-1 isolated from Lonar lake, India" which is being submitted by **Miss. Arpita Govind Thombare** and **Miss. Vaishnavi Bapu Sonar** in partial fulfilment of the requirements for the award of degree in Masters in Microbiology of Haribhai V. Desai college, Pune is a record of candidates' own work carried out by them under my supervision and guidance from 09.01.2024 to 15.04.2024. The matter embodied in this report has not been submitted for award of any other degree.

Arpita
29/04/2024

Dr. Amaraja Joshi

Scientist 'C'

National Center for Microbial Resource (NCMR)

National Center for Cell Science (NCCS), Pune

साई ट्रिनिटी कॉम्प्लेक्स, सुस रोड, पाषाण, पुणे-४११ ०२१, महाराष्ट्र, भारत.
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एनसीसीएस भारत सरकार के जैवप्रौद्योगिकी विभाग का स्वायत्त संस्थान है।

NCCS is an Autonomous Institute of Department of Biotechnology, Govt. of India

ABSTRACT

An alkaliphilic bacterial strain was isolated from water sample collected from Lonar lake, Maharashtra, India. This strain was designated as LL-1. 16S rRNA gene sequencing revealed that the strain belonged to the genus *Vibrio* and showed 99.50 % sequence similarity with *Vibrio injenensis* KCTC 32233^T followed by *Vibrio metschnikovii* MCC 3749^T with sequence similarity of 98.37% which was further confirmed by phylogenetic analysis. The strain is Gram negative, rod-shaped, catalase positive and oxidase negative. It grows optimally at 37° C, at pH 10 and with a salt concentration of around 3%. The strain is fast growing and shows visible growth within 3 h on BHI pH-10 plates. The strain produced important alkaline enzymes such as amylase, chitinase, cellulase, lipase and caseinase. Phenotypic, Chemotaxonomic, physiological, biochemical and molecular characterization showed that the strain LL-1 is unique and have differentiating characteristics from its type strain MCC 3749^T. Novelty of the strain will be further confirmed by genome-based studies such as whole genome sequencing.

**COMMON HUMAN PATHOGENS ISOLATED FROM URINE SAMPLES
AND THEIR ANTIBIOTIC SENSITIVITY PROFILE**

Dissertation submitted in partial fulfillment of

Master of Science in Microbiology

(M.Sc. Microbiology)

Submitted by

Ms. Radhika Gaikwad

Under the guidance of

Dr. Manoj Samant

MD Microbiologist

OM diagnostics, Pune

Ms. Sudha Adya

Assistant professor of

Haribhai V.Desai College Pune.

Department of Microbiology

Haribhai V. Desai College

Pune -41002.



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This is to certify that **Ms. Radhika Anant Gaikwad** from Department of Microbiology, Haribhai V. Desai College of Arts Science and Commerce has successfully completed the dissertation, "**Common Human Pathogens Isolated from Urine Samples and Their Antibiotic Sensitivity Profile**" for the partial fulfillment of Masters in Microbiology in the academic year 2023-2024.

Ms. Sudha M. Adya

Guide

Department of Microbiology

Ms. Sudha M. Adya

PG Coordinator

Department of Microbiology

Dr. Rajashree B. Patwardhan

Head

Department of Microbiology

Vice Principal (Science)

Dr. Rajendra Gurao

Principal

Date:

Internal examiner


External examiner



Date: 27/04/2024

CERTIFICATE

This is to certify that Ms. Radhika Anant Gaikwad from Department of Microbiology, Haribhai V. Desai College of Arts Science and Commerce, Pune has successfully completed the dissertation, "Common Human Pathogens Isolated From Urine Samples And Their Antibiotic Sensitivity Profile" for the partial fulfillment of Masters in Microbiology in the academic year 2023-2024 under my supervision and that this work/thesis has not been submitted elsewhere for any degree/diploma.


27/4/24

Dr. Manoj Samant

MD Microbiologist

OM Diagnostics, Pune

Abstract

Urinary tract infections (UTIs) are the most common community-acquired bacterial infection affecting people of all age groups and both sexes.

This study was performed to isolate bacterial pathogens usually cause community-acquired uncomplicated UTIs and to evaluate their sensitivity against 20 different antibiotics such as Ampicillin , Amoxycillin + Clavulanic acid , Piperacillin + Tazobactam , Ceftriaxone , Imipenem , Amikacin , Trimethoprim-sulfamethoxazole , Ciprofloxacin , Gentamicin , Fosfomycin , Cefepime , Cefixime , cefpodoxime , Nitrofurantoin , Cefoxitin , Ofloxacin , Norfloxacin , Vancomycin , Levofloxacin , Tetracycline . This study was conducted in OM diagnostics Pune.

One hundred and fifty seven urine samples were collected from patients who were suspected of having UTIs. Pathogenic bacteria were isolated and identified using conventional Cultural and biochemical methods. Kirby-Bauer disc diffusion method on Mueller Hinton agar media was used for the determination of sensitivity of the positive isolates to commonly prescribed Antibiotics.

Our study showed that *Escherichia coli* was the most common causative agent of UTI (31.21%), followed by *Klebsiella* species (11.46%) , *Proteus* species (1.27%), *Enterococcus Faecalis* (3.82%) , *Enterobacter Cloacae* (0.63%) and *Citrobacter Koseri* (4.45%). The Number of Gram-negative bacteria (49.04%) was higher than the Gram-positive bacteria (3.82%).

Antimicrobial susceptibility results for gram negative bacteria are as follows: Nitrofurantoin (79.22%), Imipenem (67.53%), Fosfomycin (64.93%) and for Gram positive bacteria Vancomycin (100%), Fosfomycin (100%), Piperacillin +Tazobactam (66.66%).

Among the uropathogens, *E. coli* (31.21%) was the most predominant bacteria in both gender and different age groups. Nitrofurantoin (87.75%) Fosfomycin (71.42) , Amikacin (48.97%). were the most effective drugs for Gram negative bacteria is Nitrofurantoin and Gram positive bacteria is Vancomycin for treatment of urinary tract infections.

**QUANTITATIVE ANALYSIS OF WATER SAMPLES FROM VARIOUS
SOURCES LIKE STP(SEWAGE TREATMENT PLANT), WTP(WATER
TREATMENT PLANT), ETP(EFFLUENT TREATMENT PLANT), RO
AND BOREWELL.**

Dissertation Submitted To

For the Degree of

M.sc Microbiology

By

Ms. Sonali Shahaji Memane

Under the guidance of

Ms. Sudha M. Adya

Assistant professor

Department of Microbiology

Haribhai V. Desai college

Pune-411002

And

Mrs. Sonal Nilesh Dagade

Managing director

Nirvieco solutions Pvt. Ltd

2023-2024



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This is to certify that **Ms. Sonali Shahaji Memane** from Department of Microbiology; Haribhai V. Desai College of Arts Science and Commerce has successfully completed the dissertation, "**Quantitative Analysis of water samples from various sources like STP, WTP , ETP, RO And Borewell**" for the partial fulfilment of Masters in Microbiology in the academic year 2023-2024.

Ms. Sudha M. Adya
Guide

Ms. Sudha M. Adya
PG Coordinator
Department of Microbiology

Dr. Rajashree Patwardhan
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Dr. Rajendra Gurao
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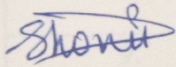
4/05/2024

Internal Examiner

04/05/2024
External Examiner

CERTIFICATE

This is to certify that **Ms. Sonali Shahaji Memane** from Department of Microbiology, Haribhai V. Desai College of Arts Science and Commerce, Pune has successfully completed the dissertation, "**Quantitative Analysis of Water Samples from various sources like WTP, STP, ETP, RO and Borewell**" for the partial fulfillment of Masters in Microbiology in the academic year 2023-2024 under my supervision and that this work/thesis has not been submitted elsewhere for any degree/diploma.



Mrs. Sonal Nilesh Dagade

Managing Director ,

Nirvieco Solutions Pvt. Ltd.

NABL Accrediated Environmental Laboratory,

Manjari Pune,

ABSTRACT

Sustainable access to safe drinking water remains a global problem as more people in the world still consume water from unimproved sources. The study is carried out to evaluate different qualities of water obtained from various sources. It is doubted that the water resources in many of our locations might be polluted due to the impact of industrial effluents located in the regions which cause stinky environment so there is a necessity to test ground and surface water pollutants. The samples collected from various sources are analyzed on the basis of various physio chemical parameters. These parameters are helping to indicate the level of quality of ground and surface water for drinking. and other domestic purposes. The parameters then are checked by the World Health Organization standard. Water quality index is a instrument applied to transform large quality of water quality data into a single number which indicates water quality level. The present study is intended to evaluate the suitability of ground water. The index map provides comprehensive information and picture which is easily interpretable for the decision makers for planning and management of water resources. Also, sources of water must be monitored regularly whether they are in sound health or not . Poor conditions of water are not only hazardous to environmental degradation but also to human health. After years of research water quality analysis is used as a standard protocol. There are guidelines for sampling preservation and analysis of samples.

Identification, Antifungal Susceptibility Testing and Biofilm Formation in Clinical *Candida* Species Isolated From Vulvovaginal Infections

Dissertation submitted in partial fulfillment of
Masters of Science in Microbiology
M.Sc. Microbiology

Submitted By
Mr. Sahil Sanjay Jangam
Miss. Triveni Shivanand Ganagi

Under the guidance of

Dr Santosh Kathwate
Assistant Professor
Department of Biotechnology
Savitribai Phule Pune University

And

Dr Sonia Ambade
Associate Professor
Department of Microbiology
Haribhai V Desai College
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Pune-411002

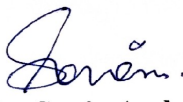
2023-2024





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This is certify that Mr. Sahil Sanjay Jangam and Miss. Triveni Shivanand Ganagi from Department of Microbiology Haribhai V. Desai College of Arts Science and Commerce has successfully complete the dissertation "**Identification, Antifungal Susceptibility Testing and Biofilm Formation in Clinical *Candida* Species Isolated From Vulvovaginal Infections**" for the fulfillment of Masters in Microbiology in the academic year 2023-2024.


Dr. Sonia Ambade
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Ms. Sudha Adya
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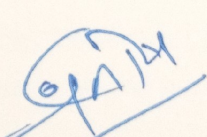
DEPARTMENT OF BIOTECHNOLOGY
Ganeshkhind,
Pune-411007 (INDIA).

Date: 19/04/2024

Ref. No. Biotech

Certificate

It is certified that the work contained in this thesis entitled '**Identification, antifungal susceptibility testing and biofilm formation in clinical *Candida* species isolated from vulvovaginal infections**' submitted by Miss **Triveni Shivanand Ganagi (Seat No: 5458)** and **Mr. Sahil Sanjay Jangam (Seat No: 5460)** from Haribhai V. Desai College of Arts, Science and Commerce Pune 411002 for the award of Fourth Semester (Master of Science in Microbiology) is absolutely based on their own work carried out under my supervision and that this work/thesis has not been submitted elsewhere for any degree/diploma.


Dr. Santosh Kathwate
Assistant Professor,
Department of biotechnology,
Savitribai Phule Pune University

Date: 19/04/2024
Place: Pune

ABSTRACT

Human fungal infections frequently arise from *Candida* species, which exist as part of the normal flora on mucous membranes, skin, and within the gastrointestinal tract. These fungi become opportunistic pathogens when a host's immune system weakens, triggering candidiasis. Vulvovaginal Candidiasis (VVC), caused by *Candida* spp., is a highly prevalent fungal infection affecting women during their reproductive years. While *Candida* is naturally present in the body, various factors can trigger an overgrowth and lead to infection. Diagnosing these infections relies on identifying the specific *Candida* species and determining their susceptibility to antifungal drugs.

Several tests are used to identify *Candida* species from clinical samples. These include Germ Tube Test, HiCrome agar, cornmeal agar, and Muller Hinton agar. Microbroth dilution tests fluconazole susceptibility. Biofilm formation and adherence to host tissues and biomaterials by *Candida albicans* are recognized as crucial factors in its pathogenic potential for VVC.

The germ tube test is a rapid and presumptive test specific for *Candida albicans*. It checks if the isolate can produce germ tubes, which are elongated tubular structures indicating the fungus is transitioning to its filamentous form, a more invasive form. A positive germ tube test suggests *C. albicans*, but a negative result doesn't rule it out entirely. The chlamydospore test checks if the isolate can produce chlamydospores, which are thick-walled resting spores. While positive for some *Candida* species, a negative test doesn't definitively rule out *Candida albicans*.

This fungus is a champion biofilm former, especially in immunocompromised patients. Biofilm formation is a major factor in the severity of candidiasis infections. The biofilm acts as a fortress, protecting the fungus from the immune system and antifungal drugs. This makes treating biofilm-related infections quite challenging. *C. albicans* biofilms create a significant hurdle in treating candidiasis.

**SYNTHESIS, CHARACTERISATION AND ANTIMICROBIAL
ACTIVITY OF ZINC OXIDE NANOPARTICLES BETA
CYCLODEXTRIN AND VANCOMYCIN CONJUGATE ON
*STAPHYLOCOCCUS AUREUS***

Dissertation Submitted to
Masters of Science in Microbiology
(M.Sc. Microbiology)

Submitted By

Miss. Sakshi Sukhalal Pandit

Miss. Manali Bhimrao Patil

Under the guidance of

Dr. Rajashree B Patwardhan

Head

Department of Microbiology

Vice Principle, Science

Haribhai V. Desai College

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&

Dr. Maya Khater

Assistant Professor

Department of Biotechnology

Abasaheb Garware College

Pune-411002


2023-2024





THE POONA GUJRATHI KELVANI MANDAL'S
HARIBHAI V. DESAI COLLEGE of
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PUNE - 411002

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This is to certify that **Miss. Sakshi Sukhalal Pandit** and **Miss. Manali Bhimrao Patil** from Department of Microbiology; Haribhai V. Desai College of Arts Science and Commerce have successfully completed the dissertation, "**Synthesis, characterization and antimicrobial activity of zinc oxide nanoparticles – Beta cyclodextrin and Vancomycin conjugate against *Staphylococcus aureus***" for the partial fulfillment of Masters in Microbiology in the academic year 2023-2024.

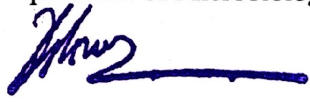

Prof. Dr. Rajashree Patwardhan
Guide
Department of Microbiology



Prof. Dr. Rajashree Patwardhan
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Ms. Sudha M. Adya
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04/05/2024

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Karve Road, Pune – 411004.

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DEPARTMENT OF BIOTECHNOLOGY

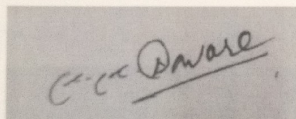
DEPARTMENT OF BIOTECHNOLOGY

CERTIFICATE

CERTIFICATE

This is to certify that Mr. / Ms. Sakshi Pandit has completed the Project titled
“**Synthesis, characterization, and antimicrobial activity of Zinc oxide
nanoparticle- Beta cyclodextrin-Vancomycin complex on Staphylococcus
aureus**” as part of M.Sc. in microbiology curriculum by the Savitribai Phule
Pune University of Pune during Semester IV (2023-2024).

Pune University of Pune during Semester IV (2023-2024).



Dr. Maya S. Khater

Assistant professor

Department of Biotechnology

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Acknowledgement

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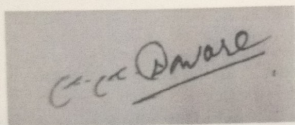
Abasaheb Garware College

Karve Road, Pune – 411004.

DEPARTMENT OF BIOTECHNOLOGY

CERTIFICATE

This is to certify that Mr. / Ms. Manali Patil has completed the Project titled **“Synthesis, characterization, and antimicrobial activity of Zinc oxide nanoparticle- Beta cyclodextrin-Vancomycin complex on Staphylococcus aureus”** as part of M.Sc. in microbiology curriculum by the Savitribai Phule Pune University of Pune during Semester IV (2023-2024).



Dr. Maya S. Khater

Assistant professor

Department of Biotechnology

MES Abasaheb Garware College

Pune 41104

Abstract

Zinc Oxide (ZnO) Nanoparticles were chemically synthesized by the Sol-Gel Method prepared by making Zinc Acetate solution by adding Zinc Acetate in Distilled water and adding 1N NaOH for adjusting pH at 9. ZnO Nanoparticles were characterised by U V Spectrophotometry, Fourier Transform Infrared Spectroscopy (FTIR), X-Ray Diffraction (XRD). Zinc Oxide Nanoparticles were then capped with Beta Cyclodextrin by mixing the Zinc Oxide Nanoparticles solution and Beta Cyclodextrin solution using Magnetic Stirrer. Zinc Oxide nanoparticles capped with Beta Cyclodextrin were characterised with the same techniques. The capped Zinc Oxide Nanoparticles were coated with Vancomycin by mixing using Magnetic Stirrer. The Antibiotic sensitivity of Vancomycin coated ZnO Nanoparticles at different concentrations was performed by Agar diffusion method by Streptomycin as a positive control and PBS as a negative control.

Keywords: - Zinc oxide nanoparticles, Vancomycin, UV Spectrometry, FTIR, X-Ray Diffraction.

**UNLOCKING THE POTENTIAL: SUSTAINABLE ETHANOL
PRODUCTION FROM WATER HYACINTH PLANTS
(EICHHORNIA CRASSIPE)**

Dissertation Submitted in partial fulfilment of
Masters of Science in Microbiology
(M.Sc. Microbiology)

Submitted by
Miss. Roshni Rafikul Khan
Miss. Tejaswini Rajesh Ashtekar
(M.Sc. Microbiology)

Under the guidance of
Mrs. Richa Raut
Dr. Mukund S. Ambawade
Assistant Professor
Department of Microbiology
Haribhai V. Desai College
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2023-2024



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HARIBHAI V. DESAI COLLEGE
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PUNE 411002

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This is to certify that **Miss. Roshni Rafikul Khan** and **Miss. Tejaswini Rajesh Ashtekar** from the Department of Microbiology, Haribhai V. Desai College have successfully completed the dissertation, "**Unlocking the potential: sustainable ethanol production from water hyacinth plants (*Eichhornia crassipe*)**" for the partial fulfilment of Masters in Microbiology in academic year 2023-2024.

Dr. Mukund S. Ambawade
Guide
Department of Microbiology

Ms. Sudha M. Adya
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Department of Microbiology

Dr. Rajashree B. Patwardhan
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Dr. Rajendra Gurao
Principal

Internal Examiner

Date:

04/05/2024
External Examiner

ABSTARCT

Ethanol production from *Eichhornia crassipes* (Water hyacinth), an aquatic weed, has gained significant attention as a sustainable biofuel source. *Eichhornia crassipes* is an invasive plant that causes environmental issues in aquatic environments, and its utilization for ethanol production can help reduce its negative impact while providing a renewable energy source.

The production of ethanol from water hyacinth involves several steps, including the isolation of cellulose-producing microbial strains *Saccharomyces cerevisiae*, cellulose digestion, and fermentation using yeast. The main objective is to reduce the production cost of ethanol by using water hyacinth as a raw material.

The optimal conditions for ethanol production from water hyacinth include a pH range of 3.5 to 5.0, with the highest alcohol yield at pH 4. The temperature for ethanol production is most effective at 29°C. By using protein isolated strains, maximum ethanol production can be achieved from the saccharification of water hyacinth.

Water hyacinth is a promising plant for bioethanol production, as it has a high carbohydrate content and low lignin content, which makes it suitable for ethanol production. The optimization of bioethanol production using whole plant of water hyacinth as substrate has been studied using acid/ base pretreatment, detoxification and Simultaneous Saccharification and Fermentation (SSF) processes.

In addition to the technical aspects of ethanol production from water hyacinth, the economic feasibility of the process should also be considered, including the cost of harvesting and transportation of the biomass. The valorization of water hyacinth for bioethanol production has been studied in terms of its economic feasibility, and it has been shown to be a promising alternative to traditional fossil fuels.

In conclusion, ethanol production from water hyacinth is a promising sustainable biofuel source that can help reduce the negative impact of this invasive plant on aquatic environments while providing a renewable energy source. Further research and optimization of the production process can lead to increased efficiency and reduced costs, making water hyacinth ethanol a viable alternative to traditional fossil fuels.

**“Preparation of Nanofertilizer from *Azotobacter* spp. and its
Evaluation on Growth of *Coriandrum sativum* (Coriander)”**

Dissertation submitted in partial fulfilment of
Masters of Science in Microbiology
(M.Sc. Microbiology)

Submitted By

Miss. Shreya Subhash Tapshale

Miss. Pranjal Pankaj Ghone

Under the guidance of

Dr. Mukund S. Ambawade

Assistant Professor

Department of Microbiology

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2023-2024





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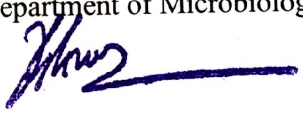
This is to certify that **Miss. Shreya Subhash Tapshale** and **Miss. Pranjal Pankaj Ghone** from Department of Microbiology; Haribhai V. Desai College of Arts Science and Commerce has successfully completed the dissertation, "**Preparation of Nanofertilizer from *Azotobacter* spp. and its Evaluation on Growth of *Coriandrum sativum* (Coriander)**" for the partial fulfilment of Masters in Microbiology in the academic year 2023-2024.

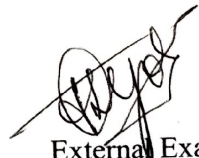

Dr. Mukund Ambawade
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4/05/24
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Ms. Sudha M. Adya
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Principal


04/05/2024
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Abstract

Two isolates of *Azotobacter spp.* were isolated from agricultural soil habitat of "Jejuri village Pune, Maharashtra" and identified by morphological characterization and biochemical tests. Zinc nanoparticles were synthesized from *Azotobacter spp.* and characterized using UV spectroscopy, FTIR, X-ray diffraction techniques. These nanoparticles were converted to nanofertilizer. A pot experiment was formulated to study effect of nanofertilizer on *Coriandrum sativum* (coriander). Different parameters were tested like Shoot height, root length, leaf area, dry weight, Photosynthetic pigments, hormones, sugars, polyphenols, proteins. The results revealed that the nanofertilizer is responsible to enhance plant growth and health.

Keywords: Zinc acetate, Nanofertilizer, UV, XRD, FTIR.