

**INEXPENSIVE METHOD OF INDOOR FARMING WITH  
VERTICAL AQUAPONICS AND VERMIPONICS IN  
SUSTAINABLE AGRICULTURE**

**THE THESIS SUBMITTED IN PARTIAL FULFILMENT OF THE  
REQUIREMENTS FOR THE DEGREE OF  
MASTER OF SCIENCE IN ZOOLOGY**

Submitted by

**S. NIVETHITHA**

**(Reg. No. 182ZO001)**

Under the Guidance of

**Dr. P. KATHIRESWARI, MSc., Ph.D, PGDCA, PGDBI**

**Assistant Professor in Zoology**



**PG AND RESEARCH DEPARTMENT OF ZOOLOGY**

**KONGUNADU ARTS AND SCIENCE COLLEGE**

**(Autonomous)**

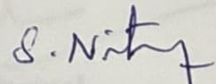
**College of Excellence (UGC)**

**G.N. MILLS POST, COIMBATORE- 641029, TAMIL NADU, INDIA**

**MARCH - 2020**

## DECLARATION

I S. NIVETHITHA hereby declare that the thesis entitled “INEXPENSIVE METHOD OF INDOOR FARMING WITH VERTICAL AQUAPONICS AND VERMIPONICS IN SUSTAINABLE AGRICULTURE”, that I submitted to the PG and Research Department of Zoology, Kongunadu Arts and Science College (Autonomous), Affiliated to Bharathiar University, in partial fulfilment of the requirements for the Degree of Master of Science in Zoology is a record of bonafide and original research work carried out by me during the period of 2019-2020, under the guidance and supervision of Dr. P. KATHIRESWARI MSc., Ph.D, PGDCA, PGDBI, Assistant Professor, PG and Research Department of Zoology, Kongunadu Arts and Science College (Autonomous), Coimbatore – 641 029, TN. To the best of my knowledge no part of this thesis has been submitted to any other University or Institution for the award of any Degree or Diploma.



S. NIVETHITHA

(Reg. No. 182ZO001)

Department of Zoology

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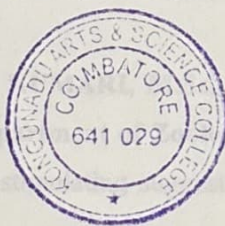
Coimbatore – 641029

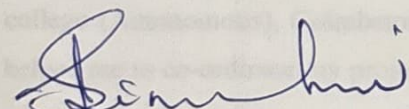
Place: Coimbatore

Date: 18/03/2020

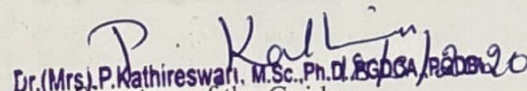
## CERTIFICATE

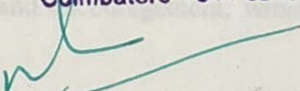
This is to certify that the thesis entitled “**INEXPENSIVE METHOD OF INDOOR FARMING WITH VERTICAL AQUAPONICS AND VERMIPONICS IN SUSTAINABLE AGRICULTURE**” submitted by **S. NIVETHITHA (Reg. No. 182ZO001)**, PG and Research Department of Zoology, Kongunadu Arts and Science College (Autonomous), Affiliated to Bharathiar University, in partial fulfilment of the requirements for the **Degree of Master of Science in Zoology** is a record of bonafide and original research work carried out by me during the period of 2019-2020 of her study, under the guidance and supervision of **Dr. P. KATHIRESWARI MSc., Ph.D, PGDCA, PGDBI, Assistant Professor**, Department of Zoology, Kongunadu Arts and Science College (Autonomous), Coimbatore – 641029, TN. The results embodied in this thesis are new and not been submitted to any other University or Institution for the award of any Degree / Associate / Fellowship / Diploma or other similar title to any candidate.



  
Head of the Department

**HOD OF ZOOLOGY  
KONGUNADU ARTS & SCIENCE COLLEGE  
COIMBATORE - 641029**

  
Dr. (Mrs) P. Kathireswari, M.Sc., Ph.D, PGDCA, PGDBI  
Signature of the Guide  
Assistant Professor  
PG & Research Department of Zoology  
(Kongunadu Arts and Science College  
Coimbatore - 641 029, Tamil Nadu.

  
Principal

**PRINCIPAL  
KONGUNADU ARTS & SCIENCE COLLEGE  
COIMBATORE-641 029.**

Submitted for the Viva – Voce examination held on 23/3/2020 at Kongunadu Arts and Science College (Autonomous), Coimbatore – 641029.

**Examiners:**

1) .....

2) .....

**SEDATIVE EFFECT OF PLANT BASED (*ACORUS CALAMUS*)  
ANAESTHETICS FOR ORNAMENTAL FISH *AMATITLANIA*  
*NIGROFASCIATA* IN AQUARIUM**

Submitted to

**KONGUNADU ARTS AND SCIENCE COLLEGE (AUTONOMOUS),**

**AFFILIATED TO BHARATHIAR UNIVERSITY**

*In partial fulfilment of requirements for the award of the degree of*

**MASTER OF SCIENCE IN ZOOLOGY**

Submitted by

**SREEDHANYA .M**

**(Reg. No. 182ZO002)**

Under the Guidance of

**Dr. S. RAJA M.Sc., Ph.D.**

**Assistant Professor in Zoology**



**PG AND RESEARCH DEPARTMENT OF ZOOLOGY**

**KONGUNADU ARTS AND SCIENCE COLLEGE**

**(Autonomous)**

**College of Excellence (UGC)**

**G.N. MILLS POST, COIMBATORE- 641 029, TAMIL NADU, INDIA**

**MARCH - 2020**

## DECLARATION

I, SREEDHANYA .M., hereby declare that the thesis entitled “**SEDATIVE EFFECT OF PLANT BASED (*ACORUS CALAMUS*) ANAESTHETICS FOR ORNAMENTAL FISH *AMATITLANIA NIGROFASCIATA* IN AQUARIUM**”, that I submitted to the PG and Research Department of Zoology, **Kongunadu Arts and Science College (Autonomous), Affiliated to Bharathiar University**, in partial fulfilment of the requirements for the **Degree of Master of Science In Zoology** is a record of bonafide and original research work carried out by me during the period of 2019-2020, under the guidance and supervision of **Dr . S. RAJA M.Sc., Ph.D., Assistant Professor**, PG and Research Department of Zoology, Kongunadu Arts and Science College (*Autonomous*), Coimbatore – 641029. To the best of my knowledge no part of this thesis has been submitted to any other University or Institution for the award of any Degree or Diploma.



Signature of the candidate

**SREEDHANYA .M**

**(Reg. No. 182ZO002)**

Place: Coimbatore

Date: 18/03/2020

CERTIFICATE

## CERTIFICATE

This is to certify that the thesis entitled "**SEDATIVE EFFECT OF PLANT BASED (ACORUS CALAMUS) ANAESTHETICS FOR ORNAMENTAL FISH AMATITLANIA NIGROFASCIATA IN AQUARIUM**" submitted by **SREEDHANYA M** (Reg. No. **182ZO002**) PG and Research Department of Zoology, Kongunadu Arts and Science College (Autonomous), Affiliated to Bharathiar University, in partial fulfilment of the requirements for the **Degree of Master of Science In Zoology** is a record of bonafide and original research work carried out by me during the period of 2019-2020 of her study, under the guidance and supervision of **Dr. S. RAJA M.Sc., Ph.D, Assistant Professor**, Department of Zoology, Kongunadu Arts and Science College (Autonomous), Coimbatore – 641029. The results embodied in this thesis are new and not been submitted to any other University or Institution for the award of any Degree / Associate / Fellowship / Diploma or other similar title to any candidate.

PLACE : COIMBATORE

DATE : 18/03/2020



**Head of the Department**  
**HOD OF ZOOLOGY**  
**KONGUNADU ARTS & SCIENCE COLLEGE**  
**COIMBATORE - 641 029**

Signature of the Guide

**Dr. S. RAJA, M.Sc., Ph.D.,**  
Assistant Professor  
(S. RAJA)  
Research Department of Zoology  
and Co-ordinator of Eco Club  
Kongunadu Arts & Science College  
G.N Mills Post, Coimbatore - 641 029

**Principal**

**PRINCIPAL**  
**KONGUNADU ARTS & SCIENCE COLLEGE**  
**COIMBATORE-641 029.**

Submitted for the Viva – Voce examination held on.....at Kongunadu  
Arts and Science College (Autonomous), Coimbatore – 641029.

**Examiners:**

1) .....

2) .....

**ROLE OF *LAWSONIA INERMIS* LEAF LITTER ON GROWTH AND  
REPRODUCTION OF EARTHWORM *EUDRILUS EUGENIAE***

THE THESIS SUBMITTED IN PARTIAL FULFILMENT OF THE  
REQUIREMENTS FOR THE DEGREE OF

**MASTER OF SCIENCE IN ZOOLOGY**

Submitted by

**HARITHA .M**

**(Reg. No. 182ZO003)**

Under the Guidance of

**Dr. P. KATHIRESWARI, M.Sc., Ph. D, PGDCA, PGDBI**

**Assistant Professor in Zoology**



**PG AND RESERCH DEPARTMENT OF ZOOLOGY**

**KONGUNADU ARTS AND SCIENCE COLLEGE**

**(Autonomous)**

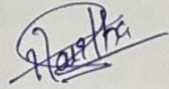
**College of Excellence (UGC)**

**G.N. MILLS POST, COIMBATORE- 641 029, TAMIL NADU, INDIA**

**MARCH - 2020**

## **DECLARATION**

I, HARITHA .M., hereby declare that the thesis entitled “**ROLE OF LAWSONIA INERMIS LEAF LITTER IN GROWTH AND REPRODUCTION OF EARTHWORM EUDRILUS EUGENIAE**”, that I submitted to the PG and Research Department of Zoology, **Kongunadu Arts and Science College (Autonomous), Affiliated to Bharathiar University**, in partial fulfilment of the requirements for the **Degree of Master of Science in Zoology** is a record of bonafide and original research work carried out by me during the period of 2019-2020, under the guidance and supervision of **Dr . P. KATHIRESWARI MSc., PhD, PGDCA, PGDBI, Assistant Professor**, PG and Research Department of Zoology, Kongunadu Arts and Science College (Autonomous), Coimbatore – 641029. To the best of my knowledge ,no part of this thesis has been submitted to any other University or Institution for the award of any Degree or Diploma.



**HARITHA .M**

**(Reg. No. 182ZO003)**

**DEPARTMENT OF ZOOLOGY**

**Kongunadu Arts and Science College (autonomous)**

**Coimbatore – 641029**

Place: Coimbatore

Date: 18/03/2020

**CERTIFICATE**

## CERTIFICATE

This is to certify that the thesis entitled “**ROLE OF *LAWSONIA INERMIS* LEAF LITTER IN GROWTH AND REPRODUCTION OF EARTHWORM *EUDRILUS EUGENIAE***” submitted by **HARITHA.M** (Reg. No. 182ZO003), PG and Research Department of Zoology, Kongunadu Arts and Science College (Autonomous), Affiliated to Bharathiar University, in partial fulfilment of the requirements for the **Degree of Master of Science in Zoology** is a record of bonafide and original research work carried out by me during the period of 2019-2020 of her study, under the guidance and supervision of **Dr. P. KATHIRESWARI MSc., PhD, PGDCA, PGDBI, Assistant Professor**, Department of Zoology, Kongunadu Arts and Science College (Autonomous), Coimbatore – 641029. The results embodied in this thesis are new and not been submitted to any other University or Institution for the award of any Degree /Associate / Fellowship / Diploma or other similar title to any candidate.



Head of the Department

**HOD OF ZOOLOGY  
KONGUNADU ARTS & SCIENCE COLLEGE  
COIMBATORE-641029**

Submitted for the Viva – Voice examination held on 23/03/2020 at Kongunadu Arts and Science College (Autonomous), Coimbatore – 641029.

Examiners:

Signature of the Guide 18/3/2020  
Dr. (Mrs) P. Kathireswari M.Sc., Ph.D., PGDCA, PGDBI,  
Assistant Professor  
Department of Zoology  
Kongunadu Arts & Science College  
Coimbatore - 641 029, Tamil Nadu

Principal

**PRINCIPAL  
KONGUNADU ARTS & SCIENCE COLLEGE  
COIMBATORE-641 029.**

1) \_\_\_\_\_

2) \_\_\_\_\_

AKNOWLEDGEMENT

# **NANOZYME : AN EMERGING PHOSPHATE SOLUBILIZING AND MINERALIZING BACTERIA AS BIOFERTILIZER IN SUSTAINABLE CROP PRODUCTION**

THE THESIS SUBMITTED IN PARTIAL FULFILMENT OF THE  
REQUIREMENTS FOR THE DEGREE OF  
**MASTER OF SCIENCE IN ZOOLOGY**

Submitted by

**ARCHANA HAREESH**  
(Reg. No. 1822O004)

UNDER THE SUPERVISION OF

**Dr. P. BHARATHI MSc., Ph.D.**

Assistant Professor in Zoology



**DEPARTMENT OF ZOOLOGY**

**KONGUNADU ARTS AND SCIENCE COLLEGE (Autonomous)**

College of Excellence (UGC)

G.N. MILLS POST, COIMBATORE- 641029,  
TAMIL NADU, INDIA

**MARCH - 2020**

## DECLARATION

I, ARCHANA HAREESH (182ZO004) hereby declare that the thesis entitled "NANOZYME:AN EMERGING PHOSPHATE SOLUBILIZING AND MINERALIZING BACTERIA AS BIOFERTILIZER IN SUSTAINABLE CROP PRODUCTION", that I submitted to the PG and Research Department of Zoology, Kongunadu Arts and Science College (Autonomous), Affiliated to Bharathiar University, in partial fulfilment of the requirements for the Degree of Master of Science In Zoology is a record of bonafide and original research work carried out by me during the period of 2019-2020, under the guidance and supervision of Dr .P .BHARATHI., MSc., Ph.D, Assistant Professor, PG and Research Department of Zoology, Kongunadu Arts and Science College (Autonomous), Coimbatore – 641029. To the best of my knowledge no part of this thesis has been submitted to any other University or Institution for the award of any Degree or Diploma.

Place : Coimbatore

Date 18/03/2020

Countersigned

Place : Coimbatore

Date : 18/03/2020

Signature of the candidate

ARCHANA HAREESH

(Reg. No. 182ZO004)

HOD OF ZOOLOGY  
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COIMBATORE - 641029

Submitted for the Viva - Voce examination held on \_\_\_\_\_ at Kongunadu  
Arts and Science College (Autonomous), Coimbatore – 641029.

Examiners:

1) \_\_\_\_\_

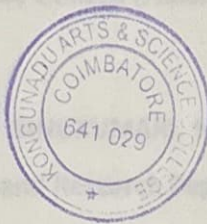
2) \_\_\_\_\_

## CERTIFICATE

This is to certify that the thesis entitled “NANOZYME:AN EMERGING PHOSPHATE SOLUBILIZING AND MINERALIZING BACTERIA AS BIOFERTILIZER IN SUSTAINABLE CROP PRODUCTION” submitted to Kongunadu Arts and Science College (Autonomous), Affiliated to Bharathiar University, in partial fulfilment of the requirements for the **Degree of Master of Science In Zoology** is a record of bonafide and original research work done by Ms. ARCHANA HAREESH (Reg No: 182ZO004) during the period of (2019-2020) of her study in the Department of Zoology at Kongunadu Arts and Science College (Autonomous), Coimbatore under my supervision . The results embodied in this thesis are new and not been submitted to any other University or Institution for the award of any Degree / Associate / Fellowship / Diploma or other similar title to any candidate.

Place : Coimbatore

Date 18/03/2020



Countersigned

Signature of the Guide

**Dr. P. BHARATHI M.Sc., Ph.D.**  
Assistant Professor,  
Department of Zoology,  
Kongunadu Arts and Science  
College (Autonomous),  
Coimbatore - 641 029.

Head of the Department *ilc*

**HOD OF ZOOLOGY**  
**KONGUNADU ARTS & SCIENCE COLLEGE**  
**COIMBATORE-641029**

Principal

**PRINCIPAL**  
**KONGUNADU ARTS & SCIENCE COLLEGE**  
**COIMBATORE-641 029.**

Submitted for the Viva – Voce examination held on \_\_\_\_\_ at Kongunadu

Arts and Science College (Autonomous), Coimbatore – 641029.

Examiners:

1) \_\_\_\_\_

2) \_\_\_\_\_

**HISTOPATHOLOGICAL CHANGES IN THE FRESH WATER FISHES,  
*CATLA CATLA*, *LABEO ROHITA* AND *OREOCHROMIS  
MOSSAMBICUS* OF KUMARASWAMY LAKE, COIMBATORE**

PROJECT REPORT

SUBMITTED TO

**KONGUNADU ARTS AND SCIENCE COLLEGE (AUTONOMOUS)**

MASTER OF SCIENCE IN ZOOLOGY

SUBMITTED BY

**ARYA.V.S**

**REG NO: 182ZO005**

UNDER THE SUPERVISION OF

**Dr. S. BINUKUMARI, M.Sc., M.Ed., M.Phil., Ph.D., PGDMB**



**DEPARTMENT OF ZOOLOGY**

**KONGUNADU ARTS AND SCIENCE COLLEGE (AUTONOMOUS)**

COLLEGE OF EXCELLENCE(UGC)

**G. N. Mills Post, Coimbatore-641029, Tamil Nadu, India**

**March 2020**

## DECLARATION

I, ARYA.V.S, hereby declare that the project entitled "**HISTOPATHOLOGICAL CHANGES IN THE FRESH WATER FISHES, CATLA CATLA, LABEO ROHITA AND OREOCHROMIS MOSSAMBICUS OF KUMARASWAMY LAKE, COIMBATORE**" submitted to Kongunadu Arts and Science College (Autonomous), affiliated to Bharathiar University in partial fulfilment of the requirements for the award of degree of **MASTER OF SCIENCE IN ZOOLOGY** is a record of original research work done by me during the period of **2019-2020**, under the guidance of **Dr. S. BINUKUMARI, M.Sc., M.Ed., M.Phil., Ph.D., PGDMB.**, Assistant professor and HOD i/c., Department of Zoology, Kongunadu Arts and Science College (Autonomous), Coimbatore-641 029. This thesis has not formed on the basis of the award of any Degree/ Diploma/ Associate/ fellowship or other similar title to any candidate of any university.

Place: *Coimbatore*

Date: *18/03/2020*



Signature of the candidate

(**ARYA.V.S**)

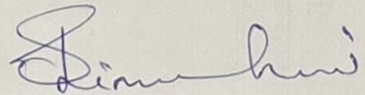
(**Reg. No. 182ZO005**)

## CERTIFICATE

This is to certify that the project entitled "**HISTOPATHOLOGICAL CHANGES IN THE FRESH WATER FISHES, CATLA CATLA, LABEO ROHITA AND OREOCHROMIS MOSSAMBICUS OF KUMARASWAMY LAKE, COIMBATORE**" submitted to Kongunadu Arts and Science College (Autonomous), affiliated to Bharathiar University in partial fulfilment of the requirement for the award of degree of **MASTER OF SCIENCE IN ZOOLOGY** is a record of original research work done by **Ms. ARYA.V.S (Reg No:182ZO005)** during the period **(2019-2020)** of her study in the Department of Zoology at Kongunadu Arts and Science College (Autonomous), Coimbatore under my supervision and project has not formed on the basis of the award of any Degree/ Diploma/ Associate/ fellowship or other similar title to any candidate of any university.

Place: Coimbatore

Date: 18/03/2020

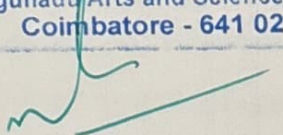
  
Signature of the Guide

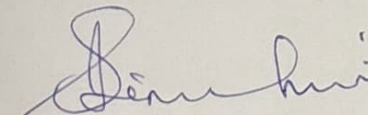
(Dr. S. BINUKUMARI)



Countersigned

**Dr. S. BINUKUMARI**  
M.Sc., M.Ed., M.Phil., Ph.D., PGDMB.,  
Assistant Professor in Zoology  
Kongunadu Arts and Science College  
Coimbatore - 641 029.

  
Principal  
PRINCIPAL  
KONGUNADU ARTS & SCIENCE COLLEGE  
COIMBATORE-641 029.

  
Head of the Department  
HOD OF ZOOLOGY  
KONGUNADU ARTS & SCIENCE COLLEGE  
COIMBATORE - 641029

Submitted for the viva-voice examination held on \_\_\_\_\_ at Kongunadu Arts and Science College (Autonomous), Coimbatore.

Examiners: 1. \_\_\_\_\_

2. \_\_\_\_\_

**STUDIES ON CROP MANAGEMENT AND ITS LOSSES DUE TO  
ELEPHANT CONFLICT IN AROUND COIMBATORE FOREST  
RANGE.**

PROJECT REPORT

SUBMITTED TO

**KONGUNADU ARTS AND SCIENCE COLLEGE (AUTONOMOUS)**

MASTER OF SCIENCE IN ZOOLOGY

SUBMITTED BY

**GAYATHRI.C**

**REG NO: 182ZO006**

UNDER THE SUPERVISION OF

**Dr. M. SAMYNATHAN M.Sc., B.Ed., Ph.D.**



**DEPARTMENT OF ZOOLOGY**

**KONGUNADU ARTS AND SCIENCE COLLEGE (AUTONOMOUS)**

COLLEGE OF EXCELLENCE(UGC)

**G. N. Mills Post, Coimbatore-641029, Tamil Nadu, India**

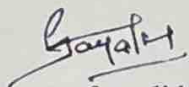
**March 2020**

## DECLARATION

I, GAYATHRI.C hereby declare that the project entitled "**STUDIES ON CROP MANAGEMENT AND ITS LOSSES DUE TO ELEPHANT CONFLICT IN AROUND COIMBATORE FOREST RANGE** " submitted to Kongunadu and Science College (Autonomous), affiliated to Bharathiar University in partial fulfilment of the requirements for the award of degree of **MASTER OF SCIENCE IN ZOOLOGY** is a record of original research work done by me during the period of **2019-2020**, under the guidance of **Dr. M SAMYNATHAN** Assistant professor of Department of Zoology, Kongunadu Arts and Science College (Autonomous), Coimbatore-641 029. This project has not formed on the basis of the award of any Degree/ Diploma/ Associate/fellowship or other similar title to any candidate of any university.

Place: Coimbatore

Date: 18/03/2020.

  
Signature of candidate

(GAYATHRI.C)

(Reg. No. 182ZO006)

## CERTIFICATE

This is to certify that the project entitled "STUDIES ON CROP MANAGEMENT AND ITS LOSSES DUE TO ELEPHANT CONFLICT IN AROUND COIMBATORE FOREST RANGE " submitted to Kongunadu Arts and Science College (Autonomous), affiliated to Bharathiar University in partial fulfilment of the requirement for the award of degree of **MASTER OF SCIENCE IN ZOOLOGY** is a record of original research work done by **Ms.GAYATHRI.C (Reg No:182ZO006)** during the period(2019-2020) of her study in the Department of Zoology at Kongunadu Arts and Science College (Autonomous), Coimbatore under my supervision and project has not formed on the basis of the award of any Degree/ Diploma/ Associate/fellowship or other similar title to any candidate of any university.

Place: Coimbatore

Date: 18-03-2020



Signature of the Guide



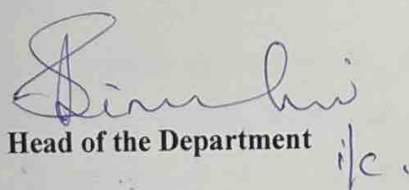
Countersigned

**Dr. MISKAMUTHAN**, M.Sc., B.Ed., Ph.D.  
Assistant Professor  
Department of Zoology  
Kongunadu Arts and Science College (Autonomous)  
G.N. Mills Post, Coimbatore-641 029, Tamil Nadu



Principal

**PRINCIPAL**  
**KONGUNADU ARTS & SCIENCE COLLEGE**  
**COIMBATORE-641 029,**



Head of the Department

**HOD OF ZOOLOGY**  
**KONGUNADU ARTS & SCIENCE COLLEGE**  
**COIMBATORE-641029**

Submitted for the viva-voice examination held on \_\_\_\_\_ at Kongunadu Arts and Science College (Autonomous), Coimbatore.

Examiners: 1. \_\_\_\_\_

2. \_\_\_\_\_

**STUDIES ON DIVERSITY AND POPULATION  
DYNAMICS OF DAMSELFLIES IN MADHAMPATTY  
AGRICULTURAL FIELD, NOYYAL RIVER BASIN,  
COIMBATORE DISTRICT, TAMIL NADU,**

**SOUTH INDIA**

**Dissertation submitted to**

**KONGUNADU ARTS AND SCIENCE COLLEGE (AUTONOMOUS),**

**AFFILIATED TO BHARATHIAR UNIVERSITY**

**IN PARTIAL FULFILMENT OF REQUIREMENTS**

**FOR THE AWARD OF THE DEGREE OF**

**MASTER OF SCIENCE IN ZOOLOGY**

**Submitted by**

**PRIYA. P. V**

**(Reg. No. 182ZO007)**

**Under the Guidance of**

**Dr. S. MANIVANNAN, M.Sc., M.Phil., PGDCA, Ph.D., NET**

**Assistant Professor in Zoology**



**DEPARTMENT OF ZOOLOGY**

**KONGUNADU ARTS AND SCIENCE COLLEGE**

**(Autonomous)**

**College of Excellence (UGC)**

**G. N. MILLS POST, COIMBATORE- 641 029, TAMIL NADU, INDIA**

**MARCH- 2020**

## DECLARATION

I, PRIYA. P. V (182ZO007), hereby declare that the dissertation entitled "STUDIES ON DIVERSITY AND POPULATION DYNAMICS OF DAMSELFLIES IN MADHAMPATTY AGRICULTURAL FIELD, NOYYAL RIVER BASIN, COIMBATORE DISTRICT, TAMIL NADU, SOUTH INDIA" is an authentic record of the project work submitted to the Kongunadu Arts and Science College (Autonomous), Affiliated to Bharathiar University, in partial fulfilment of the requirements for the award of Degree of Master of Science In Zoology is a record of bonafide and original research work carried out by me during the period of 2019-2020, under the guidance and supervision of Dr. S. MANIVANNAN, M.Sc., M.Phil., PGDCA, Ph.D., NET., Assistant Professor, Department of Zoology, Kongunadu Arts and Science College (Autonomous), Coimbatore – 641029 and the dissertation has not formed the basis for the award of any Degree/Diploma/Associateship/Fellowship or other similar title to any candidate in any University.

Place: Coimbatore

Date: 18/03/2020



Signature of the Guide:

Dr. S. MANIVANNAN

Signature of the candidate

Place: Coimbatore

Date: 18/03/2020

PRIYA.P.V

(Reg. No. 182ZO007)

Head of the Department

HOD OF ZOOLOGY

KONGUNADU ARTS & SCIENCE COLLEGE

COIMBATORE - 641029

Project work submitted to the Kongunadu Arts and Science College (Autonomous), Coimbatore - 641029

College (Autonomous), Coimbatore - 641029

Examiner

II

II

## CERTIFICATE

This is to certify that the dissertation entitled "STUDIES ON DIVERSITY AND POPULATION DYNAMICS OF DAMSELFLIES IN MADHAMPATTY AGRICULTURAL FIELD, NOYYAL RIVER BASIN, COIMBATORE DISTRICT, TAMIL NADU, SOUTH INDIA" submitted by PRIYA.P.V (Reg. No. 182ZO007) Department of Zoology, Kongunadu Arts and Science College (Autonomous), Coimbatore, Affiliated to Bharathiar University, in partial fulfilment of the requirements for the **Degree of Master of Science in Zoology** is a record of bonafide and original research work carried out by her during the period of 2019-2020 of her study, under the guidance and supervision of Dr. S. MANIVANNAN, M.Sc., M.Phil., PGDCA, Ph.D., NET., Assistant Professor, Department of Zoology, Kongunadu Arts and Science College (Autonomous), Coimbatore – 641029. The results embodied in this dissertation are new and not been submitted to any other University or Institution for the award of any Degree / Associate/ Fellowship / Diploma or other similar title to any candidate.

Place: Coimbatore

Date: 18/03/2020



Counter signed

S. N. V.  
Signature of the Guide:

**Dr. S. MANIVANNAN**

Dr. S. MANIVANNAN, M.Sc., M.Phil., PGDCA, Ph.D., NET.,  
Assistant Professor  
Department of Zoology,  
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S. N. V.  
Head of the Department  
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S. N. V.  
Principal  
KONGUNADU ARTS & SCIENCE COLLEGE  
COIMBATORE-641 029.

~~Signature for the Viva - Voce examination held on.....~~ at Kongunadu Arts and Science College (Autonomous), Coimbatore – 641029.

Examiners:

1) .....

2) .....

**DIVERSITY OF BUTTERFLIES AS POLLINATOR IN  
THE KALLAR HORTICULTURE FARM,  
WESTERGHATS, TAMILNADU**

Submitted to

KONGUNADU ARTS AND SCIENCE COLLEGE (AUTONOMOUS) AFFILIATED TO  
BHARATHIAR UNIVERSITY IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE  
AWARD OF THE DEGREE OF

**MASTER OF SCIENCE IN ZOOLOGY**

Submitted by

**SREEDHANYA.M**

**(Reg. No. 182ZO008)**

Under the Guidance of

**Dr. S.RAJESHKUMAR, MSc., Ph.D**

**Assistant Professor in Zoology**



**DEPARTMENT OF ZOOLOGY**

**KONGUNADU ARTS AND SCIENCE COLLEGE (Autonomous)**

**College of Excellence (UGC)**

**G.N. MILLS POST, COIMBATORE- 641029,**

**TAMIL NADU, INDIA**

**MARCH- 2020**

## **DECLARATION**

I, **SREEDHANYA M(182ZO008)** hereby declare that the thesis entitled **“DIVERSITY OF BUTTERFLIES AS POLLINATOR IN THE KALLAR HORTICULTURE FARM, WESTERGHATS, TAMILNADU”**, that I submitted to the PG and Research Department of Zoology, **Kongunadu Arts and Science College (Autonomous), Affiliated to Bharathiar University**, in partial fulfilment of the requirements for the **Degree of Master of Science In Zoology** is a record of bonafide and original research work carried out by me during the period of 2019-2020, under the guidance and supervision of **Dr. S.RAJESHKUMAR MSc., PhD, Assistant Professor**, PG and Research Department of Zoology, Kongunadu Arts and Science College (Autonomous), Coimbatore – 641029. To the best of my knowledge no part of this thesis has been submitted to any other University or Institution for the award of any Degree or Diploma.



Signature of the Candidate

**SREEDHANYA.M**  
(Reg. No. 182ZO008)

Place: Coimbatore

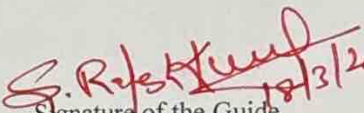
Date: 18-03-2020

## CERTIFICATE

This is to certify that the Project entitled “ **DIVERSITY OF BUTTERFLY AS POLLINATOR IN THE KALLAR HORTICULTURE FARM WESTERNGHATS, TAMILNADU**” submitted by **SREEDHANYA.M** (Reg. No. **182ZO008**) PG and Research Department of Zoology, Kongunadu Arts and Science College (Autonomous), Affiliated to Bharathiar University, in partial fulfilment of the requirements for the **Degree of Master of Science In Zoology** is a record of bonafide and original research work carried out by me during the period of 2019-2020 of her study, under the guidance and supervision of **Dr.S.RAJESHKUMAR, MSc., PhD, Assistant Professor**, Department of Zoology, Kongunadu Arts and Science College (Autonomous), Coimbatore - 641029. The results embodied in this thesis are new and not been submitted to any other University or Institution for the award of any Degree / Associate / Fellowship / Diploma or other similar title to any candidate.

Place: Coimbatore

Date: 18.03.2020

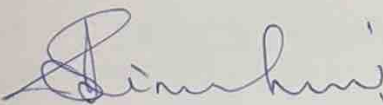
  
Signature of the Guide

**Dr.S.RAJESHKUMAR**

Counter signed



**Dr. S. RAJESHKUMAR, M.Sc., Ph.D.,**  
Assistant Professor,  
Department of Zoology,  
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G.N. Mills- Post, Coimbatore - 641 029,  
Tamil Nadu, India.

  
Head of the Department i/c

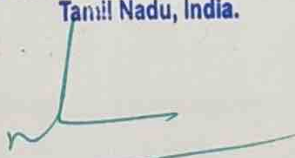
**HOD OF ZOOLOGY**  
**KONGUNADU ARTS & SCIENCE COLLEGE**  
**COIMBATORE - 641 029**

Submitted for the Viva – Voce examination held on.....at Kongunadu Arts and Science College (Autonomous), Coimbatore - 641029.

Examiners:

1) .....

2) .....

  
Principal

**PRINCIPAL**  
**KONGUNADU ARTS & SCIENCE COLLEGE**  
**COIMBATORE - 641 029**

**GREEN SYNTHESIS OF TITANIUM DIOXIDE NANOPARTICLES  
AND THEIR TOXIC EFFECTS ON ZEBRA FISH (*DANIO RERIO-  
HAMILTON 1822*)**

**THE THESIS SUBMITTED IN PARTIAL FULFILMENT OF THE  
REQUIREMENTS FOR THE DEGREE OF  
MASTER OF SCIENCE IN ZOOLOGY**

Submitted by

**V.DEVI**

**(Reg. No. 182ZO010)**

Under the Guidance of

**Dr. M. LEKESHRMANASWAMY, M.Sc., M.Phil., Ph.D., B.Ed.,**

**Associate Professor and HOD of Zoology**



**DEPARTMENT OF ZOOLOGY**

**KONGUNADU ARTS AND SCIENCE COLLEGE**

**(Autonomous)**

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**G.N. MILLS POST, COIMBATORE- 641029, TAMIL NADU, INDIA**

**MARCH - 2020**

## DECLARATION

I, DEVI.V(182ZO010) hereby declare that the thesis entitled “ GREEN SYNTHESIS OF TITANIUM DIOXIDE NANOPARTICLES AND THEIR TOXIC EFFECTS ON ZEBRA FISH (*DANIO RERIO*)”, that I submitted to the PG and Research Department of Zoology, Kongunadu Arts and Science College (Autonomous), AFFILIATED TO BHARATHIAR UNIVERSITY, in partial fulfilment of the requirements for the **Degree of Master of Science In Zoology** is a record of bonafide and original research work carried out by me during the period of 2019-2020, under the guidance and supervision of **Dr. M. LEKESHMNASWAMY, M.Sc., M.Phil., Ph.D., B.Ed., Associate Professor**, and Head Department of Zoology, Kongunadu Arts and Science College (Autonomous), Coimbatore – 641029. To the best of my knowledge no part of this thesis has been submitted to any other University or Institution for the award of any Degree or Diploma.

  
V.DEVI

(Reg. No. 182ZO010)

Place: Coimbatore

Date: 18-03-2020

CERTIFICATE

## CERTIFICATE

This is to certify that the thesis entitled “**GREEN SYNTHESIS OF TITANIUM DIOXIDE NANOPARTICLES AND THEIR TOXIC EFFECTS ON ZEBRA FISH (DANIO RERIO)**”, “submitted by **DEVI.V (Reg. No. 182ZO010)** PG and Research Department of Zoology, Kongunadu Arts and Science College (Autonomous), Affiliated to Bharathiar University, in partial fulfilment of the requirements for the **Degree of Master of Science In Zoology** is a record of bonafide and original research work carried out by me during the period of 2019-2020 of her study, under the guidance and supervision of **Dr. M. LEKESHMNASWAMY, M.Sc., M.Phil., Ph.D., B.Ed., Associate professor**, and Head Department of Zoology, Kongunadu Arts and Science College (Autonomous), Coimbatore -641029. The results embodied in this thesis are new and not been submitted to any other University or Institution for the award of any Degree / Associate / Fellowship / Diploma or other similar title to any candidate.

  
Signature of the Guide

  
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**Dr. M. LEKESHMNASWAMY**  
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Coimbatore - 641 029, TN.

Submitted for the Viva – Voce examination held on 23-03-2020 at Kongunadu Arts and Science College (Autonomous), Coimbatore – 641029.

**Examiners:**

1) .....

2) .....

**Study of the potential wild animal conflict with special reference to  
impact of Indian Peafowl (*Pavo cristatus*) on the agricultural crops  
in the foot hills of Coimbatore Forest Division in Tamil Nadu**

THE DISSERTATION SUBMITTED IN PARTIAL FULFILMENT OF THE  
REQUIREMENTS FOR THE DEGREE OF  
MASTER OF SCIENCE IN ZOOLOGY

**Submitted by**

**R.ISHWARYA  
(182ZO012)  
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**Under the Guidance of**

**Dr. R.VENKITACHALAM., M.Sc., M. Phil., DCA, Ph. D.**

**Assistant Professor**

**Submitted to**



**Department of Zoology  
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G.N. Mills, Post, Coimbatore - 641029.**

**March, 2020**

## DECLARATION

I, ISHWARYA R(182ZO012) hereby declare that the dissertation entitled “ **STUDY OF THE POTENTIAL WILD ANIMAL CONFLICT WITH SPECIAL REFERENCE TO IMPACT OF PEAFOWL (*PAVO CRISTATUS*) ON THE AGRICULTURAL CROPS IN THE FOOT HILLS OF COMBATORE FOREST DIVISION IN TAMIL NADU**”, that I submitted to the PG and Research Department of Zoology, **Kongunadu Arts and Science College (Autonomous), Affiliated to Bharathiar University**, in partial fulfillment of the requirements for the **Degree of Master of Science In Zoology** is a record of bonafide and original research work carried out by me during the period of 2019-2020, under the guidance and supervision of **Dr. R. VENKITACHALAM, M.Sc., M. Phil., DCA., Ph.D. Assistant Professor**, PG and Research Department of Zoology, Kongunadu Arts and Science College (Autonomous), Coimbatore – 641029. To the best of my knowledge no part of this dissertation has been submitted to any other University or Institution for the award of any Degree or Diploma.



**R ISHWARYA**  
**(Reg. No. 182ZO012)**  
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Coimbatore – 641029

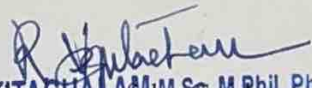
Place: Coimbatore

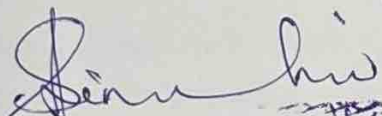
Date: 18/3/2020

## CERTIFICATE

This is to certify that the dissertation entitled “ **STUDY OF THE POTENTIAL WILD ANIMAL CONFLICT WITH SPECIAL REFERENCE TO IMPACT OF PEAFOWL (PAVO CRISTATUS) ON THE AGRICULTURAL CROPS IN THE FOOT HILLS OF COIMBATORE FOREST DIVISION IN TAMIL NADU**”, “submitted by **R. ISHWARYA (Reg. No. 182ZO012)** PG and Research Department of Zoology, Kongunadu Arts and Science College (Autonomous), Affiliated to Bharathiar University, in partial fulfillment of the requirements for the **Degree of Master of Science in Zoology** is a record of bonafide and original research work carried out by me during the period of 2019-2020 of her study, under the guidance and supervision of **Dr. R. VENKITACHALAM., M.Sc., M.Phil., DCA., Ph.D. Assistant Professor**, Department of Zoology, Kongunadu Arts and Science College (Autonomous), Coimbatore – 641029. The results embodied in this dissertation new and not been submitted to any other University or Institution for the award of any Degree / Associate / Fellowship / Diploma or other similar title to any candidate.



  
**Dr. R. VENKITACHALAM, M.Sc., M.Phil., Ph.D.**  
Assistant Professor  
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Tamil Nadu, India.

  
**Head of the Department**  
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**KONGUNADU ARTS & SCIENCE COLLEGE**  
**COIMBATORE - 641 029**

  
**Principal**  
**PRINCIPAL**  
**KONGUNADU ARTS & SCIENCE COLLEGE**  
**COIMBATORE - 641 029.**

Submitted for the Viva – Voce examination held on 23/3/2020 at Kongunadu Arts and Science College (Autonomous), Coimbatore – 641029.

**Examiners:**

1) .....

2) .....

**SEDATIVE EFFECT OF PLANT BASED (*LAWSONIA  
INERMIS*) ANAESTHETICS FOR ORNAMENTAL FISH,  
*XIPHOPHORUS HELLERII* IN AQUARIUM**

THE THESIS SUBMITTED IN PARTIAL FULFILMENT OF THE  
REQUIREMENTS FOR THE DEGREE OF

**MASTER OF SCIENCE IN ZOOLOGY**

Submitted by

**ADITHYA KRISHNA ANAND**

**(Reg. No. 182ZO013)**

UNDER THE SUPERVISION OF

**Dr. S. RAJA MSc.,Ph.D.**

Assistant Professor in Zoology



**DEPARTMENT OF ZOOLOGY**

**KONGUNADU ARTS AND SCIENCE COLLEGE**

**(Autonomous)**

College of Excellence (UGC)

**G.N. MILLS POST, COIMBATORE- 641 029, TAMIL NADU, INDIA**

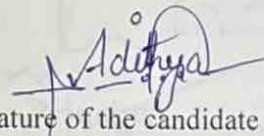
**MARCH-2020**

## DECLARATION

I, ADITHYA KRISHNA ANAND (182ZO013) hereby declare that the thesis entitled "SEDATIVE EFFECT OF PLANT BASED (*LAWSONIA INERMIS*) ANAESTHETICS FOR ORNAMENTAL FISH, *XIPHOPHORUS HELLERII* IN AQUARIUM", that I submitted to the PG and Research Department of Zoology, Kongunadu Arts and Science College (Autonomous), Affiliated to Bharathiar University, in partial fulfilment of the requirements for the Degree of Master of Science In Zoology is a record of bonafide and original research work carried out by me during the period of 2019-2020, under the guidance and supervision of Dr .S. RAJA, MSc., Ph.D, Assistant Professor, PG and Research Department of Zoology, Kongunadu Arts and Science College (Autonomous), Coimbatore – 641029. To the best of my knowledge no part of this thesis has been submitted to any other University or Institution for the award of any Degree or Diploma.

Place : coimbatore

Date : 18-03-2020

  
Signature of the candidate

ADITHYA KRISHNA ANAND

(Reg. No. 182ZO013)

## CERTIFICATE

This is to certify that the thesis entitled “**SEDATIVE EFFECT OF PLANT BASED (LAWSONIA INERMIS) ANAESTHETICS FOR ORNAMENTAL FISH, XIPHOPHORUS HELLERII IN AQUARIUM**” submitted to Kongunadu Arts and Science College (Autonomous), Affiliated to Bharathiar University, in partial fulfilment of the requirements for the **Degree of Master of Science In Zoology** is a record of bonafide and original research work done by Ms. ADITHYA KRISHNA ANAND (Reg No: 182ZO013) during the period of (2019-2020) of her study in the Department of Zoology at Kongunadu Arts and Science College (Autonomous), Coimbatore under my supervision. The results embodied in this thesis are new and not been submitted to any other University or Institution for the award of any Degree / Associate / Fellowship / Diploma or other similar title to any candidate.

Place : Coimbatore

Date : 18-03-2020



Countersigned

  
Signature of the Guide

(Dr. S. RAJA)

Dr. S. RAJA, M.Sc., Ph.D.,  
Assistant Professor  
PG & Research Department of Zoology  
and Co-ordinator of Eco Club  
Kongunadu Arts & Science College  
Q.N. Mills Post., Coimbatore - 641 029

  
Head of the Department *ilc*

**HOD OF ZOOLOGY**  
**KONGUNADU ARTS & SCIENCE COLLEGE**  
**COIMBATORE-641029**



**Principal**

**PRINCIPAL**  
**KONGUNADU ARTS & SCIENCE COLLEGE**  
**COIMBATORE-641 029.**

Submitted for the Viva – Voce examination held on.....at Kongunadu Arts and Science College (Autonomous), Coimbatore – 641029.

Examiners:

- 1) ..... 2) .....

**EXPLORATION OF DIVERSITY AND POPULATION DYNAMICS OF  
DRAGONFLY IN MADHAMPATTY AGRICULTURAL FIELD, NOYYAL  
RIVER BASIN, COIMBATORE DISTRICT, TAMIL NADU, SOUTH INDIA**

**Dissertation submitted to**

**KONGUNADU ARTS AND SCIENCE COLLEGE (AUTONOMOUS),**

**AFFILIATED TO BHARATHIAR UNIVERSITY**

**IN PARTIAL FULFILMENT OF REQUIREMENTS**

**FOR THE AWARD OF THE DEGREE OF**

**MASTER OF SCIENCE IN ZOOLOGY**

**Submitted by**

**GOPIKA S VIJAYAN**

**(Reg. No. 182ZO014)**

**Under the Guidance of**

**Dr. S. MANIVANNAN, M.Sc., M.Phil., PGDCA, Ph.D., NET**

**Assistant Professor in Zoology**



**DEPARTMENT OF ZOOLOGY**

**KONGUNADU ARTS AND SCIENCE COLLEGE**

**(Autonomous)**

**College of Excellence (UGC)**

**G.N. MILLS POST, COIMBATORE- 641029,**

**TAMIL NADU, INDIA**

**MARCH – 2020**

## DECLARATION

I, **GOPIKA S VIJAYAN (182ZO014)**, hereby declare that the dissertation entitled "**EXPLORATION OF DIVERSITY AND POPULATION DYNAMICS OF DRAGONFLY IN MADHAMPATTY AGRICULTURAL FIELD, NOYYAL RIVER BASIN, COIMBATORE DISTRICT, TAMIL NADU, SOUTH INDIA**" is an authentic record of the project work submitted to the Kongunadu Arts and Science College (Autonomous), Affiliated to Bharathiar University, in partial fulfilment of the requirements for the award of **Degree of Master of Science In Zoology** is a record of bonafide and original research work carried out by me during the period of 2019-2020, under the guidance and supervision of **Dr. S. MANIVANNAN, M.Sc., M.Phil., PGDCA, Ph.D., NET, Assistant Professor**, Department of Zoology, Kongunadu Arts and Science College (Autonomous), Coimbatore – 64102 and the dissertation has not formed the basis for the award of any Degree/Diploma/Associateship/Fellowship or other similar title to any candidate in any University.

Place : Coimbatore

Date : 18/03/2020

  
Signature of the candidate

**GOPIKA S VIJAYAN**

(Reg. No. 182ZO014)

CERTIFICATE

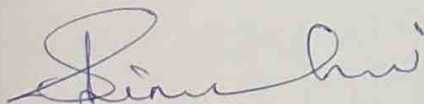
# CERTIFICATE

This is to certify that the dissertation entitled “**EXPLORATION OF DIVERSITY AND POPULATION DYNAMICS OF DRAGONFLY IN MADHAMPATTY AGRICULTURAL FIELD, NOYYAL RIVER BASIN, COIMBATORE DISTRICT, TAMIL NADU, SOUTH INDIA**” submitted by **GOPIKA S VIJAYAN** (Reg. No. 182ZO014) Department of Zoology, Kongunadu Arts and Science College (Autonomous), Affiliated to Bharathiar University, in partial fulfilment of the requirements for the **Degree of Master of Science in Zoology** is a record of bonafide and original research work carried out by me during the period of 2019-2020 of her study, under the guidance and supervision of **Dr. S. MANIVANNAN, M.Sc., M.Phil., PGDCA, Ph.D., NET, Assistant Professor**, Department of Zoology, Kongunadu Arts and Science College (Autonomous), Coimbatore – 641029. The results embodied in this thesis are new and not been submitted to any other University or Institution for the award of any Degree / Associateship/ Fellowship / Diploma or other similar title to any candidate.

Place: Coimbatore (KASC)

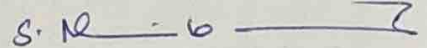
Date: 18/03/2020



  
Head of the Department *ik.*

**HOD OF ZOOLOGY  
KONGUNADU ARTS & SCIENCE COLLEGE  
COIMBATORE - 641029**

Counter signed

  
Signature of the Guide

**(Dr. S. MANIVANNAN)**  
Dr.S.MANIVANNAN, M.Sc., M.Phil., P.G.D.C.A., B.Ed., Ph.D.,  
Assistant Professor  
Department of Zoology,  
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Tamil Nadu, India.

  
**Principal**  
**PRINCIPAL**  
**KONGUNADU ARTS & SCIENCE COLLEGE**  
**COIMBATORE-641 029.**

Submitted for the Viva – Voce examination held on March 2020 at Kongunadu Arts and Science College (Autonomous), Coimbatore – 641029.

Examiners:

1) .....

2) .....

**DETECTION, EXTRACTION AND SEPARATION OF ANTIBACTERIAL  
MOLECULE(S) FROM *PIPER BETLE* LEAVES**

**THE DISSERTATION SUBMITTED IN PARTIAL FULFILMENT OF THE  
REQUIREMENTS FOR THE DEGREE OF  
MASTER OF SCIENCE IN ZOOLOGY**

Submitted by

**A.NIDHINADAS**

**(Reg. No. 182ZO015)**

Under the Guidance of

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**Assistant professor in Zoology**



**DEPARTMENT OF ZOOLOGY**

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**G.N. MILLS POST, COIMBATORE- 641029, TAMIL NADU, INDIA**

**APRIL - 2020**

## DECLARATION

I, NIDHINADAS.A hereby declare that the dissertation entitled “**DETECTION, EXTRACTION AND SEPARATION OF ANTIBACTERIAL MOLECULE(S) FROM PIPER BETEL LEAVES**”, submitted to the PG and Research Department of Zoology, Kongunadu Arts and Science College (Autonomous), Affiliated to Bharathiar University, in partial fulfillment of the requirements for award of the **Degree of Master of Science in Zoology** is a record of bonafide and original research work carried out by me during the period of 2019-2020, under the guidance and supervision of **Dr. V. MEIYALAGAN, M.Sc., Ph.D., Assistant Professor**, PG and Research Department of Zoology, Kongunadu Arts and Science College (Autonomous), Coimbatore – 641029. To the best of my knowledge no part of this thesis has been submitted to any other University or Institution for the award of any Degree or Diploma.

*Neechy*

A.NIDHINADAS

(Reg. No. 182ZO015)

DEPARTMENT OF ZOOLOGY

Kongunadu Arts and Science College (autonomous)

Coimbatore – 641029

Place: Coimbatore

Date: 18-03-2020

## CERTIFICATE

This is to certify that the dissertation entitled “**DETECTION, EXTRACTION AND SEPARATION OF ANTIBACTERIAL MOLECULE(S) FROM PIPER BETEL LEAVES**” submitted by **NIDHINADAS A (Reg. No. 182ZO015)** PG and Research Department of Zoology, Kongunadu Arts and Science College (Autonomous), Affiliated to Bharathiar University, in partial fulfilment of the requirements for the **Degree of Master of Science In Zoology** is a record of bonafide and original research work carried out under my guidance during the period of 2019-2020 at Department of Zoology, Kongunadu Arts and Science College (Autonomous), Coimbatore – 641029. The results embodied in this dissertation are new and not been submitted to any other University or Institution for the award of any Degree / Associate / Fellowship / Diploma or other similar title to any candidate.

*V. Meiyalagan* 18/03/2020  
Signature of the Guide

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**Assistant Professor**  
**Department of Zoology**  
**Kongunadu Arts and Science College**  
**G. N. Mills Post, Coimbatore - 641 029**  
**Tamil Nadu, India.**  
**Principal**

*[Signature]*  
**Head of the Department**  
**HOD OF ZOOLOGY**  
**KONGUNADU ARTS & SCIENCE COLLEGE**  
**COIMBATORE - 641029**



**PRINCIPAL**  
**KONGUNADU ARTS & SCIENCE COLLEGE**  
**COIMBATORE - 641 029.**

Submitted for the *Viva-Voce* examination held on ~~23.03.2020~~ **23.03.2020** at Kongunadu Arts and Science College (Autonomous), Coimbatore – 641029.

**Examiners:**

1) .....

2) .....

# **NANOZYME : AN EMERGING PHOSPHATE SOLUBILIZING AND MINERALIZING BACTERIA AS BIOFERTILIZER IN SUSTAINABLE CROP PRODUCTION**

THE THESIS SUBMITTED IN PARTIAL FULFILMENT OF THE  
REQUIREMENTS FOR THE DEGREE OF  
**MASTER OF SCIENCE IN ZOOLOGY**

Submitted by

**DEEPIKA T**  
**(Reg. No. 1822O016)**

UNDER THE SUPERVISION OF

**Dr. P. BHARATHI MSc., Ph.D.**

**Assistant Professor in Zoology**



**DEPARTMENT OF ZOOLOGY**  
**KONGUNADU ARTS AND SCIENCE COLLEGE (Autonomous)**  
College of Excellence (UGC)  
**G.N. MILLS POST, COIMBATORE- 641029,**  
**TAMIL NADU, INDIA**

**MARCH - 2020**

## DECLARATION

I, DEEPIKA T (182ZO016) hereby declare that the thesis entitled "NANOZYME:AN EMERGING PHOSPHATE SOLUBILIZING AND MINERALIZING BACTERIA AS BIOFERTILIZER IN SUSTAINABLE CROP PRODUCTION", that I submitted to the PG and Research Department of Zoology, Kongunadu Arts and Science College (Autonomous), Affiliated to Bharathiar University, in partial fulfilment of the requirements for the **Degree of Master of Science In Zoology** is a record of bonafide and original research work carried out by me during the period of **2019-2020**, under the guidance and supervision of **Dr .P .BHARATHI., MSc., Ph.D, Assistant Professor**, PG and Research Department of Zoology, Kongunadu Arts and Science College (Autonomous), Coimbatore – 641029. To the best of my knowledge no part of this thesis has been submitted to any other University or Institution for the award of any Degree or Diploma.

Place : Coimbatore

Date : 18/03/2020

Signature of the candidate

DEEPIKA T

(Reg. No. 182ZO016)

## CERTIFICATE

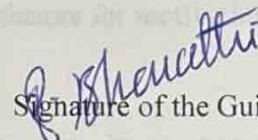
This is to certify that the thesis entitled “**NANOZYME:AN EMERGING PHOSPHATE SOLUBILIZING AND MINERALIZING BACTERIA AS BIOFERTILIZER IN SUSTAINBALE CROP PRODUCTION**” submitted to Kongunadu Arts and Science College (Autonomous), Affiliated to Bharathiar University, in partial fulfilment of the requirements for the **Degree of Master of Science In Zoology** is a record of bonafide and original research work done by Ms. DEEPIKA T (Reg No: 182ZO016) during the period of (2019-2020) of her study in the Department of Zoology at Kongunadu Arts and Science College (Autonomous), Coimbatore under my supervision . The results embodied in this thesis are new and not been submitted to any other University or Institution for the award of any Degree / Associate / Fellowship / Diploma or other similar title to any candidate.

Place : Coimbatore

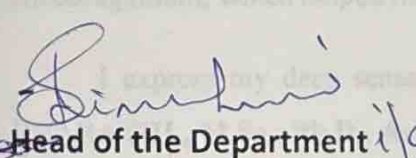
Date 18/03/2020



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(Dr. P. BHARATHI)  
**Dr. P. BHARATHI M.Sc., Ph.D.**  
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Principal  
**PRINCIPAL**  
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**COIMBATORE-641 029.**

Submitted for the Viva – Voce examination held on \_\_\_\_\_ at Kongunadu Arts and Science College (Autonomous), Coimbatore – 641029.

Examiners:

1) \_\_\_\_\_

2) \_\_\_\_\_

**IN VITRO ANTIOXIDANT, ANTIMICROBIAL, ANTI-CANCER  
AND INSECTICIDAL ACTIVITY OF NANOFORMULATION  
USING *MANGIFERA INDICA***

**Dissertation Submitted to the  
KONGUNADU ARTS AND SCIENCE COLLEGE (AUTONOMOUS)  
AFFILIATED TO BHARATHIAR UNIVERSITY, COIMBATORE**

*In partial fulfilment of requirements for the  
Award of the degree of*

**MASTER OF SCIENCE IN ZOOLOGY**

Submitted by

**SREYA RAMESH**

**(Reg. No. 182ZO017)**

Under the Guidance of

**Dr. K. VELMURUGAN. M.Sc., M. Phil., B.Ed., Ph. D (SET)**

**Assistant Professor in Zoology**



**DEPARTMENT OF ZOOLOGY**

**KONGUNADU ARTS AND SCIENCE COLLEGE**

**(Autonomous)**

**College of Excellence (UGC)**

**G.N MILLS POST, COIMBATORE - 641029, TAMILNADU, INDIA**

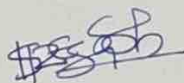
**MARCH - 2020**

## DECLARATION

I, **SREYA RAMESH**, hereby declare that the dissertation entitled "**IN VITRO ANTIOXIDANT, ANTIMICROBIAL, ANTI-CANCER AND INSECTICIDAL ACTIVITY OF NANOFORMULATION USING MANGIFERA INDICA**" is an authenticated record of the project work submitted to the Department of Zoology, Kongunadu Arts and Science College (Autonomous), Affiliated to Bharathiar University, in partial fulfilment of the requirements for the award of **Degree of Master of Science in Zoology** is a record of bonafide and original research work carried out by me during the period of 2019-2020, under the guidance and supervision of **Dr. K. VELMURUGAN, M.Sc., M.Phil., B.Ed., Ph. D (SET)**, Assistant Professor, Department of Zoology, Kongunadu Arts and Science College (Autonomous), Coimbatore - 641029. To the best of my knowledge the dissertation has not formed the basis for the award of any Degree / Diploma / Fellowship / Associateship or other similar title to any candidate of any University.

Place: Coimbatore

Date: 18/03/2020



Signature of the Candidate

(SREYA RAMESH)

CERTIFICATE

## CERTIFICATE

This is to certify that the dissertation entitled "*IN VITRO* ANTIOXIDANT, ANTIMICROBIAL, ANTI-CANCER AND INSECTICIDAL ACTIVITY OF NANOFORMULATION USING *MANGIFERA INDICA*" submitted by SREYA RAMESH (Reg. No. 182ZO017) to the Department of Zoology, Kongunadu Arts and Science College (Autonomous), Affiliated to Bharathiar University, in partial fulfilment of the requirements for the **Degree of Master of Science in Zoology** is a record of bonafide and original research work carried out by her during the period of 2019-2020 of her study, under the guidance and supervision of **Dr. K. VELMURUGAN, M.Sc., M.Phil., B.Ed., Ph.D (SET), Assistant Professor**, Department of Zoology, Kongunadu Arts and Science College (Autonomous), Coimbatore – 641029. The results embodied in this dissertation are new and not been submitted to any other University or Institution for the award of any Degree / Associate / Fellowship / Diploma or other similar title to any candidate.

Place: Coimbatore

Date: 18/03/2020



K. Velmurugan 18/03/2020

Signature of the Guide

(Dr. K. VELMURUGAN)

DEPARTMENT OF ZOOLOGY,  
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COIMBATORE - 641 029

Counter signed by

*[Signature]*

Head of the Department *ilc*

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Principal

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COIMBATORE-641 029.

Submitted for the Viva – Voce examination held on.....at Kongunadu Arts and Science College (Autonomous), Coimbatore – 641029.

Examiners:

1) .....

2) .....

**GREEN SYNTHESIS OF CARBON QUANTUM DOTS AND  
ITS CELL VIABILITY STUDIES ON HUMAN BREAST  
CANCER CELL LINE**

THESIS SUBMITTED IN PARTIAL FULFILMENT OF THE  
REQUIREMENTS FOR THE DEGREE OF

**MASTER OF SCIENCE IN ZOOLOGY**

Submitted by

**MALAVIKA.J.P**

**(Reg. No. 182ZO018)**

Under the Guidance of

**Dr. C. SHOBANA, M.Sc., M.Phil., M.Ed., Ph.D.**

**Assistant Professor in Zoology**



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**(Autonomous)**

**College of Excellence (UGC)**

**G.N. MILLS POST, COIMBATORE- 641 029, TAMIL NADU, INDIA**

**MARCH-2020**

## DECLARATION

I, **MALAVIKA.J.P**, hereby declare that the thesis entitled "**GREEN SYNTHESIS OF CARBON QUANTUM DOTS AND ITS CELL VIABILITY STUDIES ON HUMAN BREAST CANCER CELL LINE**", submitted to the PG and Research Department of Zoology, Kongunadu Arts and Science College (autonomous), affiliated to Bharathiar University, in partial fulfilment of the requirements for the award of **DEGREE OF MASTER OF SCIENCE IN ZOOLOGY** is a record of original research work done by me during the period of **2019-2020**, under the guidance and supervision of **Dr.C. SHOBANA, M.Sc., M.Phil., M.Ed., Ph.D., Assistant Professor**, PG and Research Department of Zoology, Kongunadu Arts and Science College (Autonomous), Coimbatore – 641029. This project has not formed on the basis of the award of any Degree/ Diploma/ Associate/ fellowship or other similar title to any candidate of any university.

Place: Coimbatore

Date: 18/03/2020



Signature of the Candidate

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Signature of the candidate

Place: Coimbatore

**MALAVIKA.J.P**

Date: 18/03/2020

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Kongunadu Arts and Science College

Coimbatore - 641029

Submitted for the award of the degree of Master of Science in Zoology

and Science College (Autonomous), Coimbatore.

Signature of the Candidate

✓

## CERTIFICATE

This is to certify that the thesis entitled "**GREEN SYNTHESIS OF CARBON QUANTUM DOTS AND ITS CELL VIABILITY STUDIES ON HUMAN BREAST CANCER CELL LINE**", submitted to Kongunadu Arts and Science College (Autonomous), affiliated to Bharathiar University in partial fulfilment of the requirement for the award of degree of **MASTER OF SCIENCE IN ZOOLOGY** is a record of original research work done by **Ms. MALAVIKA.J.P (Reg No:182ZO018)** during the period **(2019-2020)** of her study in the Department of Zoology at Kongunadu Arts and Science College (Autonomous), Coimbatore under my supervision and project has not formed on the basis of the award of any Degree/ Diploma/ Associate/ fellowship or other similar title to any candidate of any university.

Place: Coimbatore

Date: 18/03/2020



Countersigned

*C. Shobana*  
18/3/2020  
Signature of the Guide

(Dr.C.SHOBANA)

**Dr. C. Shobana, M.Sc., M.Phil., M.Ed., Ph.D.,**  
Assistant Professor  
PG and Research Department of Zoology  
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*[Signature]*  
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