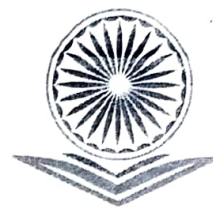




सत्यमेव जयते

University Grants Commission
(Ministry of Human Resource Development, Govt. of India)
Bahadurshah Zafar Marg, New Delhi – 110002



ज्ञान-विज्ञान विमुक्तये

FINAL REPORT OF THE WORK DONE ON THE MAJOR RESEARCH PROJECT

1.	Project report No.	Final
2.	UGC Reference No. & Date	43-2/2014 (SR) and Dated: 13.08.2015
3.	Name of the Principal Investigator	Dr. P. ANANTHARAMAN
4.	Address with e-mail and Mobile No.	Office: Centre for Advanced Studies in Marine Biology, Faculty of Marine Sciences, Annamalai University, Parangipettai – 608 502, Tamilnadu. Email: panantharaman@gmail.com Mobile No: 9994545903 Residential: 9, Dinesh Illam, Shanthi Nagar extension, EDAC Galaxy, Chidambaram - 608001
5.	Department and University/College where the project has undertaken	Centre for Advanced Study in Marine Biology, Annamalai University.
6.	Title of the Project	Efficiency of Seaweed Liquid Fertilizer on Some Pulses and Vegetables
7.	Date of Implementation	01.10.2015
8.	Tenure of the Project:	1 year from 01/10/2015 to 31/12/2016
9.	Name of Project Fellow, date of appointment and % of marks at PG level	Ms. K. Bhakkiyalakshmi: 01.10.2015 & 72.3% Mr. M. Suresh: 16.01.2016 & 74.32% Mr. Thanappan: 01/10/2015 & 74.3%
10.	Grant Received	Total Allocation: Rs. 12,35,179/- - Total Release: Rs. 6,00,000/-
11.	Objective of the Project	1. To Collect seaweeds from Rameshwaram and Kanyakumari coastal area 2. To analyze the biochemical compositions.

		<p>macro and micronutrients of the seaweeds and to select the efficient seaweed for further research</p> <ol style="list-style-type: none"> 3. To Prepare Seaweed Liquid Fertilizer (SLF) with selected seaweed species and evaluate the stability of SLF obtained 4. To study the antimicrobial activity of SLF against the plant pathogens 5. To Evaluate the fertilizing efficacy of SLF using pot culture and field trail of some Vegetables and Pulses <ol style="list-style-type: none"> i) Vegetables: <i>Abelmoschus esculentus</i>, <i>Solanum lycopersicum</i> and <i>Solanum melongena</i>. ii) Pulses: <i>Vigna mungo</i>, <i>Oryza sativa</i> and <i>Pisum sativum</i> 6. To analyze the yield, biochemical and phytochemical composition of cultured plants.
12.	Work done (Completed as per the objective)	<ol style="list-style-type: none"> 1. From Rameshwaram coastal area, 20 seaweeds were collected from the rocky shore which comprises 5 green seaweeds, 7 brown seaweeds and 8 red seaweeds. 2. From Kanyakumari coastal waters, 31 seaweeds were collected which comprised 10 green seaweeds, 10 brown seaweeds and 11 red seaweeds. 3. The collected seaweeds were immediately rinsed with filtered seawater and then washed with 5% ethanol added to fresh water to remove sand particles, prevent salt formation and also to expel epibionts. 4. The cleaned seaweeds were segregated and dried in the shade at room temperature until a constant weight was obtained (da Gama <i>et al.</i>, 2008). 5. The dried seaweed material was made into coarse powder and packed in a vacuum packet. For the identification of collected seaweeds, all the fresh seaweeds were kept in an ice box and brought to the laboratory.
13.	Work remains to be done (please give details)	There is no pending work as per the objectives.

14.	Whether Project work was delayed. If yes, specify reasons	---
15.	Please indicate the difficulties, if any, experienced in implementing the project	
16.	Collaboration, if any (with Department, University, Industry etc.)	---
17.	Ph. D. Enrolled, if yes, details	Yes, The project fellow Mr. M. Suresh has completed his partial Ph.D., research work with financial support from the UGC-MRP project.
18.	Details of Publications resulting from the project work (please attach re-prints) letter of Acceptance of paper communicated.	---
19.	Any other information which would help in evaluation of work done on the project	---
20.	Documents to be attached with this proforma	Two copies of the detailed project report.

P.A. Rao

Principal Investigator
(Signatures with seal)

Dean
Faculty of Marine Sciences
Annamalai University
Parangipettai - 608 502
Tamil Nadu

Q. 6/13/24

REGISTRAR
ANNAMALAI UNIVERSITY
Signature with seal

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Annexure I

Objectives of the study

The present research proposal is aimed to assess the fertilizing efficacy of seaweeds with the following objectives

- Collection of seaweeds from Rameshwaram and Kanyakumari.
- To analyze the biochemical compositions, macro and micronutrients of the seaweeds and to select the efficient seaweed for further research.
- Preparation of Seaweed Liquid Fertilizer (SLF) with selected seaweed species and evaluate the stability of SLF obtained
- To study the antimicrobial activity of SLF against the plant pathogens
Evaluation of the fertilizing efficacy of SLF using pot culture and field trail of some Vegetables and Pulses
 - i) **Vegetables:** *Abelmoschus esculentus*, *Solanum lycopersicum* and *Solanum melongena*
 - ii) **Pulses:** *Vigna mungo*, *Oryza sativa* and *Pisum sativum*.
- To analyze the yield, biochemical and phytochemical composition of cultured plants

Annexure II

Work done

From Rameshwaram coasta area eight seaweeds were collected from the rocky shore which comprise 5 green seaweeds (*Caulerpa racemosa*, *Chaetomorpha linum*, *Halimeda macroloba*, *Halimeda gracilis*, *Codium decorticatum*), 7 brown seaweeds (*Stochespermum marginatum*, *Turbinaria ornata*, *Padina tetrastratica*, *Padina boergesenii*, *Hydroclathrus clathratus*, *Dictyota pinnatifida*, *Dictyota dichotama*) and 8 red seaweeds *Sarconema filiforme*, *Gracilaria fergusonii*, *Gelidiella acerosa*, *Acanthopora spicifera*, *Gracilaria edulis*, *Gracilaria foliifera*, *Gracilaria spinulosa*, *Laurentia obtusa*.

From Kanyakumari coastal waters thirty seaweeds were collected which comprise 9 green seaweeds such as *Caulerpa taxifolia*, *Caulerpa scalpelliformis*, *Chaetomorpha antennina*, *Chaetomorpha area*, *Valoniopsis pachynema*, *Caulerpa peltata*, *Halimeda macroloba*, *Ulva lactuca*, *Ulva fasciata*, *Enteromorpha flexuosa*), 10 brown

seaweeds namely *Sargassum wightii*, *Sargassum cristaefolium*, *Sargassum cenereum*, *Padina gymnosphora*, *Sargassum sp.*, *Sargassum swartzii*, *Stochespermum marginatum*, *Colpomenia sinuosa*, *Spatoglossum asperum*, *Dictyota dichotama* and 11 red seaweeds such as *Halymenia floresia*, *Amphiroa anceps*, *Gracillaria corticata*, *Halymenia porphyraeformis*, *Gracilaria fergusonii*, *Galaxaura oblongata*, *Spyridia hypnoides*, *Caulerpa racemosa*, *Gracilaria verrucosa*, *Gracilaria dura*, *Hypnea musciformis*, *Grateloupia filicina*.

The collected seaweeds were immediately rinsed with filtered seawater and then washed with 5% ethanol added to fresh water to remove sand particles, prevent salt formation and also to expel epibionts. The cleaned seaweeds were segregated and dried in the shade at room temperature until a constant weight was obtained (da Gama *et al.*, 2008). The dried seaweed material was made into coarse powder and packed in a vacuum packet.

ACHIEVEMENTS FROM THE PROJECT:

- In total, 39 seaweeds were collected from the Rameshwaram and Kanyakumari coastal area
- All the collected seaweeds were evaluated for their biochemical and mineral composition studies.
- The high minerals possessing brown seaweeds were extracted for SLF through hot water extraction
- The seaweeds were extracted with different solvents (Methanol, Hexane and Dichloromethane)
- The SLF and solvent extracts were tested against the plant microbial pathogens such as (Bacteria and Fungi)

SUMMARY OF THE FINDINGS

Totally, we have collected 39 seaweeds such as *Caulerpa racemosa*, *Chaetomorpha linum*, *Halimeda macroloba*, *Halimeda gracilis*, *Codium decorticatum*, *Stochespermum marginatum*, *Turbinaria ornata*, *Padina tetrastromatica*, *Padina boergesenii*, *Sarconema filiforme*, *Hydroclathrus clathratus*, *Gracilaria fergusonii*, *Gelidiella acerosa*, *Acanthopora spicifera*, *Dictyota pinnatifida*, *Gracilaria edulis*, *Dictyota dichotama*, *Gracilaria foliifera*, *Gracilaria spinulosa*, *Laurentia obtuse*, *Caulerpa taxifolia*, *Caulerpa*

scalpelliformis, *Chaetomorpha antennina*, *Chaetomorpha area*, *Valoniopsis pachynema*, *Caulerpa peltata*, *Halimeda macroloba*, *Ulva lactuca*, *Ulva fasciata*, *Enteromorpha flexuosa*, *Sargassum wightii*, *Sargassum cristaefolium*, *Sargassum cenereum*, *Padina gymnosphora*, *Sargassum sp.*, *Sargassum swartzii*, *Stochespermum marginatum*, *Colpomenia sinuosa*, *Spatoglossum asperum*, *Halymenia floresia*, *Dictyota dichotama*, *Amphiroa anceps*, *Gracilaria corticata*, *Halymenia porphyraeformis*, *Gracilaria fergusonii*, *Galaxaura oblongata*, *Spyridia hypnoides*, *Caulerpa racemosa*, *Gracilaria verrucosa*, *Gracilaria dura*, *Hypnea musciformis*, *Grateloupia filicina* and *Halimeda gracilis*, from the Rameshwaram and Kanyakumari coastal area. The maximum protein (24.17%), carbohydrate (45.19%) and lipid (21.15%) were in *Spatoglossum asperum*, *Hydroclathrus clathratus* and *Padina tetrastromatica* respectively. The mineral composition was found to be abundant in brown seaweeds and the maximum was observed in *Sargassum cenereum*. The antibacterial activity of the extracted SLF and solvent extracts of all the brown seaweeds showed remarkable inhibition against the test plant pathogens.

CONTRIBUTION TO THE SOCIETY

Through this project, an awareness programme was made among the farmers about the importance of Seaweed Liquid fertilizers on the growth and yield of food crops. Further, the SLF was tested on the Paddy in the nearest area of the Centre of Advanced Study in Marine Biology. There was a much more prominent result was observed when compared with the chemical fertilizer.

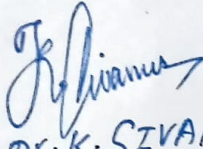
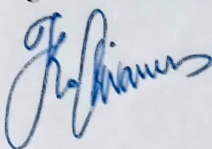
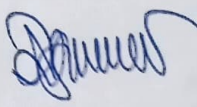
Final Report Assessment / Evaluation Certificate (Two Members Expert Committee Not Belonging to the Institute of Principal Investigator) (to be submitted with the final report)

It is certified that the final report of Major Research Project entitled "Efficiency of Seaweed Liquid Fertilizer on Some Pulses and Vegetables." by Dr. P. Anantharaman, CAS in Marine Biology has been assessed by the committee consisting the following members for final submission of the report to the UGC, New Delhi under the scheme of Major Research Project.

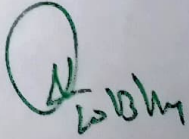
Comments/Suggestions of the Expert Committee:-

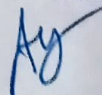
The PI has successfully completed the objectives of the proposal.

Name & Signatures of Experts with Date:-

Name of Expert	University/College name	Signature with Date
1.  DR. K. SIVAKUMAR	Dr. K. SIVAKUMAR PROFESSOR OF PLANT SCIENCE SCHOOL OF BIOLOGICAL SCIENCES MADURAI KAMARAJ UNIVERSITY MADURAI - 625 019	
2. N. RAJENDRAN	Dr. N. RAJENDRAN, M.Sc., Ph.D., Assistant Professor of Zoology Government Arts College Chidambaram- 608 102	

It is certified that the final report has been uploaded on UGC-MRP portal on It is also certified that final report, Executive summary of the report, Research documents, monograph academic papers provided under Major Research Project have been posted on the website of the University/College.


(Registrar)
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