

ANNEXURE: I

PROJECT PROPOSAL /RESEARCH IDEAS

**Interested organization/firms can contact Guwahati Biotech Park through email at
bioedp@guwahatibiotechpark.com**

Title of the Project proposal/Research Idea

“BIOAUGMENTED RAPID BIODEGRADATION OF POLYETHYLENE USING ACTINOMYCETES “

10. ANNEXURE I

Project Proposal /Research Ideas (within 3000 words)*

1 Title of the Project proposal/Research Idea -“BIOAUGMENTED RAPID BIODEGRADATION OF POLYETHYLENE USING ACTINOMYCETES “

2 Objective of the proposal

- Isolation and Screening of potential actinomycetes for biodegradation of plastic waste from two entirely different topographical locations.
- Identification of potential microbial culture.
- Comparative study between Non augmented plastic degradation and Augmented plastic degradation using isolated potential microorganism.
- Bio augmentation of plastic waste contaminated soil amended with Coir pith and Cow dung.
- Biodegraded Coir pith and biodegraded polythene for cultivation of Medicinal plants.

3 Nature of business: Specify whether Product or service (50)

Process, is a nature based solution for two wastes, an agrowaste, Coir pith and a synthetic waste, Polyethylene with more emphasis given to the degradation of polythene waste. Process aims in propagating eco friendly approaches in treating hazardous and complex waste materials.

4 Concept Note (400)

Plastic materials over the past decades are causing severe threat to the life on our planet. The man made material is very popular wing to the ease of usability and as an inexpensive material. Among the plastics, Low density polythene(LDPE) is an inseparable commodity used for manufacturing plastic bags which end up as a waste in the environment.

In order to regulate the balance of our ecosystem and to sustain the environment for forth coming generations we should come up with eco friendly approaches to mediate the environmental problems. Through bioaugmentation microorganisms are introduced in a waste filled area where indigenous microorganisms have less role to play. Efforts are made through this process to find the best possible solution for plastic waste problem.

The organism used for bioaugmentation is an Actinomycete, a Gram positive organism having diverse and wide range of habitat. The process of bioremediation is amended with coir pith, an agro waste causing wide solid pollution and cow dung. Coir pith is used as a carrier material for Actinomycetes and cow dung used to nullify high C:N ratio in coir pith. After the treatment ,the end product manure is utilised for cultivation of medicinal plants which shows the quality manure produced. The ecological importance of this work is that an agro waste and synthetic waste is simultaneously biodegraded and the manure utilised for further cultivation posing no threat from the waste.

5.Challenges or risk factors associated with the project (200)

The process does not have any serious challenges. But like any other microbiological field studies this process, particularly bioaugmentation is sometimes affected with drastic climatic changes occurring regionally.

6 Technical Feasibility and innovative aspects of the idea/solution, uniqueness of the solution(400)

Polythene usage is shooting up day by day. Polythene is dumped in to the environment as a waste posing severe ecological problem. The present study is a part of environment friendly initiatives to tackle the grave waste material. Indigenous microorganisms are not able to handle the synthetic waste and hence through bio augmentation, an active Actinomycete strain were used to biodegrade plastic strip through Co composting of Coir pith and Cow dung, thereby converting both synthetic waste and agro waste in to useful manure which is further utilised for cultivating medicinal plants.

7. Stage of Research Idea: Has any preliminary work been carried out? Give status of work done? If no, please provide the background details. (50)

The author has thorough knowledge on the process. The process is the result of multiple field trials under different environmental conditions.

8 Practical Application/Outcome of the project) explain the relevant one: – A Product for customers – A knowledge based service for (350)

100% eco friendly process to tackle the notorious waste of the century for all the countries.

Byproducts are manure and can be utilised or marketed for crop cultivation.

Microorganisms for bioaugmentation are collected from soil itself.

In near future, the farmers can use coir pith, cow dung and plastic waste from their own houses or near by areas together with micro organisms as an eco friendly method of cultivation after composting. Plastic waste will be degraded and utilized by soil microorganism and plants can utilize the manure for growth.

9. Customers – A technology (knowhow) for sale or licensing to industry – An intellectual property right for licensing or sale – Any other, please specify

The process is patented and can be commercialized. The ecofriendly nature of the process will be welcomed by environment friendly industries all over the globe.

10. Commercial Viability and Future Plan of Commercialization

The process is having high industrial potential and is viable for large scale commercialization at different levels. The knowhow or technology is 100% indigenous to our country.

11 Target population and Market Potential of the product or service to be developed

The process is targeted to save our environment and mother nature providing a solution to the anthropogenic waste-Plastics are anthropogenic polymers which were embraced by all before. Now plastics have become a serious pollutant polluting soil, water and air at the same time. Attempt has been made through this work to find an eco friendly alternative for the disposal of polythene. Biodegradation was considered as a boon for mitigating the polyethylene waste.

12 Competitive advantage (400)

100% indigenous patented process with no other competitors at present.

Readily available for commercialisation.

By products of the process are good manure.

Process developed based on field study trials.

Actinomycetes considered for present study as they were seen in a diverse and wide range of habitats producing a wide range of bioactive compounds

13.Social implications (200)

Nature has got solutions for each and everything. We have to identify the problem and adopt the best solution for the problem from nature. Plastic is everywhere as a pollutant from micro to macro form .Bioremediation is an eco friendly way to fight against the pollutant to save our planet. The process discussed is the best available solution to save our mother earth and preserve its beauty and resources to the coming generations too.

B. Information about the applicant:

Principal investigator of the idea

Dr.NAVEEN MOHAN

PRINCIPAL

GEMS Arts and Science College(Affiliated to University of Calicut)

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BIOLOGICAL TREATMENT OF REAL TEXTILE EFFLUENT USING MICROBIAL CONSORTIUM

Reference No. : 182023007112

Saved By : Dr. Nayana P

[SERB Qualified Unique Identification Document: SQUID-1990-NP-2850]

Saved Date : 13-Mar-2023

PROPOSAL DETAILS

Dr. Nayana P

nayanapvenugopal@gmail.com

Assistant Professor (PG Department of General Biotechnology)

GEMS Arts and Science College

Ramapuram town, Malappuram, Kerala-679321

Technical Details :

Scheme : Core Research Grant
Research Area : Interdisciplinary Biological Sciences (IBS) (Life Sciences)
Duration : 36 Months **Contact No :** +919400621213
Date of Birth : 09-Dec-1990
Nationality : INDIAN **Total Cost (INR) :** 31,39,400
Is PI from National Laboratory/Research Institution ? No

Project Summary :

Coloured effluents are the major outcome of industrial processes, such as dye manufacturers, textile, foods, plastics, pharmaceuticals, leathers, rubbers, cosmetics, papers, and pulp, contain dyes. Among them, textile wastewater effluents are considered the most important liquid pollutant that impose a major threat to the environment. It contains several recalcitrant xenobiotics, which is discharged into the environment without any treatment. This affects the soil and the aquatic ecosystem negatively. Conventional methods such as physical, chemical, and some modified techniques, including electrolysis, ozonation, adsorption, photo-ionization, membrane filtrations, and oxidation have been used for the treatment of textile effluent. However, these methods have got several shortcomings. In this view, biological treatment using microbes have been gaining importance in the biodegradation. Although there are studies focusing on the field of dye decolourization, few studies have been reported with the real textile effluents (Ramasany et al., 2012; Costa et al., 2018; Kannan et al., 2022). Thus, more attention should be paid to commercialize and apply microbial consortium in textile effluent treatment.

Objectives :

- 1. Isolation and identification of microbial strains with potent degradation ability 2. Enzyme profiling of the isolated strains 3. Treatment of real textile effluent using the consortium generated using the isolated strains. 4. Characterization of the real textile effluent before and after treatment. 5. Lab scale establishment of a treatment plant and phytotoxicity assessment of the treated effluent by seed germination study.

Keywords :

Textile effluent, microbial consortium, characterization, treatment plant, Phytotoxicity

Expected Output and Outcome of the proposal :

The project is concentrated on treatment of textile wastewater or effluent using microbial consortium, which ultimately leads to reduction in pollution caused to environment. The isolation of potent microbes with efficient degradation capacity will therefore help in reaching the goal. This approach will be beneficial to the society in a way that the harmful effects on plants, animals and human due to pollution can be controlled to a great extent by treating the effluents prior to discharge into the environment. Lab scale establishment of textile effluent treatment plant will benefit the textile industries as well to implement it in the industry for the reduction of pollution caused by them. Further the estimation of toxicity reduction by seed germination study will be an added merit of the work.

Suitability of the proposed work in major national initiatives of the Government:

Make in India

Theme of Proposed Work:

Environment

Collaboration Details for last 5 Years :

Planned Collaboration for the proposed work with any foreign scientist/ institution ?

No

Other Technical Details

1. Origin of the Proposal:

The environmental pollution and toxic substances generated by the manufacturing industries are the major challenges faced worldwide. It is estimated that over 10,000 various dyes and pigments have been used industrially and over 7×10^5 tons of synthetic dyes are produced globally on yearly (Islam and Mustafa, 2018). Textile industries are responsible for one of the major environmental pollution problems because they release undesirable dye effluents. Textile industry wastewater contains a variety of colouring pollutants and synthetic dyes, formaldehyde, phenols, surfactants, phthalates, heavy metals, chlorophenol and aromatic compounds. These dyeing effluents are released into the adjacent waterway, irrigation channels, farming fields, exterior water and these lastly reach into the water bodies like river, sea, etc. These effluents may cause variation of the physical, chemical, and biological nature of waterbodies by the nonstop alteration in the turbidity, odour, temperature, pH, etc. that affects community health, wildlife, fish and biodiversity.

In this scenario, there are several restrictions imposed to release the effluents into the environment without prior treatment. Therefore, the effluents released from the industries undergo different physicochemical treatments and biological treatments. Eventhough microbes have been utilized for treating the industrial effluents, still there is no efficient biological system for the complete degradation of the dyes in the effluents. Due to the limitations of pure strains on decolorization, such as the inability to degrade dyes completely or mineralize and narrow range for decolorization of highly recalcitrant azo dyes, microbial consortia can be beneficial as they can conjointly take part in degradation. This would provide a better insight in the isolation of highly efficient microbial consortium and its utilization in effluent treatment plants for the complete removal of synthetic dyes.

2. Review of status of Research and Development in the subject

2.1 International Status:

Synthetic dyes have been extensively used in textile industries and 15% of the dyes used do not get attached to the fabrics, so they are lost in the wastewater. This coloured effluent increases the biological oxygen demand, chemical oxygen demand, pH and suspended solids in the water released from the industries. The extensive use of dyes therefore causes serious pollution problems. Even very low concentration of dyes in waterbodies is highly visible and reduces the penetration of light and ultimately effects the photosynthesis.

Recently microbial decolourization and degradation of dyes have gained importance. The fungal

species *Aspergillus niger*, *Penicillium* sp, and *Pleurotus ostreatus* have been efficiently utilized for the decolourization of some acid and reactive dyes (Ali and El-Mohamedy, 2012). *Acinetobacter*, *Enterococcus*, *Dyadobacter*, *Delftia*, *Ochrobactrum* sp, *Sedimentibactor* sp, *Dysgonomonas*, *Sphingobium*, *Sphingobacterium*, *Chryseobacterium*, *Alkalibacterium*, are the bacterial species known to cause degradation of multiple textiles dyes (Samuchiwal *et al.*, 2021). Some bacteria have the ability to completely mineralize and degrade the synthetic dyes without forming any secondary sludge (Madhushika *et al.*, 2019). Other than bacteria and fungi, actinomycetes and algae have also been reported to show efficient decolourization potential.

Microbial systems have been utilized for dye decolourization and cleaning up large volume of wastewater. A microbial consortium would be a better option for efficient and rapid decolourization of effluents when compared with a single type of microbial strain. Earlier bacterial consortium has been used for decolourization purpose but recently mixed consortium comprising bacteria and fungi have been successfully used for the degradation of synthetic dyes.

Another study by Afrin *et al.*, 2021 reported the efficient utilization of microbial consortium for the degradation of Novacron dyes present in the textile waste waters. Bera *et al.*, 2022 reported the microbial remediation of the dye acid orange by a novel consortium. They also studied the factors effecting degradation and the mineralization was confirmed using FT -IR spectroscopy and GC-MS.

A review by Ngo and Tischler, 2022 detailed all the aspects of microbial degradation of textile azo dyes using different microbial consortium. They also reported about the different enzymes induced during the mineralization of the dyes. Latest advances in the dye degradation and the factors influencing the dye degradation including pH, temperature, initial dye concentration, carbon and nitrogen sources were discussed in the review by Moyo *et al.*, 2022. The review also details about the recent advances including use of immobilized bacteria, microbial fuel cell, membrane bioreactors and bio-advanced oxidation processes.

2.2 National Status:

Mohanty and Kumar, 2021 reported the degradation of anthraquinone dyes in textile water using microbial monoculture and consortium. A bacterial consortium-BP of *Proteus mirabilis* PMS (PM), *Bacillus fexus* TS8 (BF), and *Pseudomonas aeruginosa* NCH (PA) were developed, which has been efficiently utilized for the dye removal. They have quantified the intracellular enzymes and studied their role in the complete mineralization of dyes. Textile effluent treatment using bacterial isolates have been reported by Murugalatha *et al.*, 2010. Kannan *et al.*, 2022

reported the bioremediation of textile industry effluent using bacterial consortium with a fungal culture. A very few studies have been extended to the industrial level treatment of textile waste water.

2.3 Importance of the proposed project in the context of current status

The work has been established with a novel approach of developing a microbial consortium that has a great potential to degrade the synthetic dyes used in the textile industries. This would reduce the toxicity of the synthetic dyes. The prepared consortia can be effectively incorporated into a lab scale treatment plant to detoxify the effluent released from textile industries.

In this regard the microbial consortium generated will be a promising approach to treat the wastewater effluent from textile industries with more efficiency. Thus, it will serve the society as a good initiative to control the pollution created by textile industries.

2.4 If the project is location specific, basis for selection of location be highlighted:

Not Applicable

3. Work Plan:

3.1 Methodology:

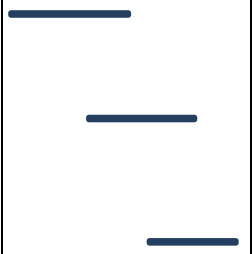
- Collection of soil from different polluted areas
- Screening of potential microbes with degradation ability as per the standard procedure followed for isolation
- The selected microbes will be morphological and molecular characterized.
- Enzymes present in the microbes that could be exploited for degradation, will be profiled using the standard procedures and assays.
- Real textile effluents will be collected from industries and it will be used as the substrate for the action of consortium generated from the isolated strains.
- The characteristics of the real textile effluent such as TS, TSS, BOD, COD, Colour, pH, chlorides, oil and other metals will be studied. The same characteristics will also be studied for the treated effluent using microbial consortium.
- The dye degradation and colour removal will be confirmed by UV-Vis spectroscopy and FTIR

spectroscopy. The degraded products will be determined using GC-MS.

- Considering all the data a lab scale treatment plant for the effluent will be designed.
- After the treatment of the effluent in the designed set up, the toxicity of the treated sample will be assessed using phytotoxicity study by employing seed germination study.
- All the experimental data will be reported on the basis of statistical data.

3.2 Time Schedule of activities giving milestones through BAR diagram.

Sl. No	Name of the event	1 st year	2 nd year	3 rd year
	Part A			
1.	1. Isolation of different bacteria and fungi from different polluted regions. 2. Molecular characterization and identification of the strains with degradation potential 3. Enzyme profiling of the selected strains which can be developed into a microbial consortium. 4. Collection of real textile effluents and characterization of it.			
	Part B			
2.	1. Treatment of the real textile effluent with the generated microbial consortium. 2. Characterization of the treated effluent. 3. Development of a pilot scale treatment plant			
	Part C			

3.	1. Validation of the treatment efficiency in pilot scale setup. 2. Toxicity assessment of the treated effluent by phytotoxicity study. 3. Statistical analysis and final report			
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3.3 Suggested Plan of action for utilization of research outcome expected from the project.

The project is concentrated on treatment of textile wastewater or effluent using microbial consortium, which ultimately leads to reduction in pollution caused to environment. The isolation of potent microbes with efficient degradation capacity will therefore help in reaching the goal. This approach will be beneficial to the society in a way that the harmful effects on plants, animals and human due to pollution can be controlled to a great extent by treating the effluents prior to discharge into the environment. Lab scale establishment of textile effluent treatment plant will benefit the textile industries as well to implement it in the industry for the reduction of pollution caused by them. Further the estimation of toxicity reduction by seed germination study will be an added merit of the work.

3.4 Environmental impact assessment and risk analysis.

The proposed work would benefit the textile industries to reduce the pollution caused by them to the environment as well as to the water bodies. To check the environmental impact assessment and risk analysis a seed germination study is designed and proposed.

4. Expertise:

4.1 Expertise available with the investigators in executing the project:

A preliminary study regarding decolourization of synthetic dyes using fungus had been done during the PhD work of the PI at Cochin University of Science and Technology in the Plant Biotechnology Laboratory, Department of Biotechnology under the supervision of Retd. Prof. Dr. Padma Nambisan. Publications of relevant expertise have been attached in the biodata.

Ten different synthetic dyes – Acid yellow, orange G, methyl red, azure B, evans blue, indigo carmine, naphthol blue black, congo red, fast red B and naphthol green B were selected for the decolourization experiments. Effective decolourization by the fungus was observed for azure B, indigocarmine, naphthol blue black, evans blue, and congo red. Decolourization was confirmed using UV-Vis Spectroscopy and FTIR spectroscopy. Dye toxicity was also checked by determining the germination rate of *Vigna unguiculata* seeds



Decolourization of synthetic dyes (C-control, T- treated); 1- evans blue, 2-azure B, 3- congo red, 4- acid yellow, 5- naphthol blue black, 6- fast red B, 7- methyl red, 8- orange G, 9- naphthol green B, 10- indigo carmine

4.2 Summary of roles/responsibilities for all Investigators:

The proposed work has only one investigator Few of the experiments as a part of the project will be carried out at Institute of Advanced Study in Science and Technology (IASST) Guwahati, Assam, India using their infrastructural facilities.

Sl.	Name of the event	Implementing Agency
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No.		
1.	Isolation of different bacteria and fungi from different polluted regions.	GEMS Arts and Science College
2.	Molecular characterization and Identification of the strains with degradation potential	GEMS Arts and Science College
3.	Enzyme profiling of the selected strains which can be developed into a microbial consortium.	GEMS Arts and Science College
4.	Collection of the real textile effluents.	GEMS Arts and Science College
5.	Characterization of the textile effluent.	Only technical assistance will be taken from Institute of Advanced Study in Science and Technology (IASST)
6.	Treatment of the real textile effluent with the generated microbial consortium.	GEMS Arts and Science College
7.	Characterization of the treated effluent	GEMS Arts and Science College
8	Development of a pilot scale treatment plant.	GEMS Arts and Science College
9	Validation of the treatment efficiency in pilot scale setup	GEMS Arts and Science College
10	Toxicity of the treated effluent will be assessed by phytotoxicity study using seed germination method.	GEMS Arts and Science College
11	Statistical analysis and final report	GEMS Arts and Science College

4.3 Key publications published by the Investigators pertaining to the theme of the proposal during the last 5 years

- Ramisha Khathoon M C, **Nayana P**, Balagopalan Unni. Studies on lipase from Monomorium species: *in silico* and *in vitro* approaches. International Journal of Recent Scientific Research **(Accepted)**
- **Nayana P**, Aiswarya C and Padma Nambisan (2020). Dataset on optimization of lignin peroxidase production by *Endomelanconiopsis* sp. under submerged fermentation using one factor at a time approach. Data in Brief, 105244.

- **Nayana P**, Aiswarya C and Padma Nambisan (2018). Screening of fungi isolated from different regions of kerala for lignin peroxidase activity. *International journal of current research in life sciences*, 7(04): 1723- 1728.
- **Nayana P**, Aiswarya C, Soumya P S, Kiran Lakshmi M S, P M Sherief , and Padma Nambisan (2018). Purification of Lignin Peroxidase from *Cocos nucifera* Leaflets. *International Journal of Scientific Progress and Research*, 127 (44):141- 145.
- **Nayana Parambayil**, Aiswarya Chenthamarakshan, Arinnia Anto, Sudha Hariharan and Padma Nambisan (2015). Computational studies on LiP H isolated from *Ganoderma lucidum* GD88. *Arch. Biol. Sci., Belgrade*, 67(3):817-828.
- Kiran Lakshmi M S, Aiswarya C, **Nayana P**, Prasanta K Dash, Padma Nambisan (2018). Enhancement of extracellular laccase production from *Lenzites elegans* KSG32: Taguchi orthogonal array experimental design methodology. *International Journal of Engineering Development and Research*, 6(2): 369- 374.
- C. Aiswarya, **P. Nayana**, and Padma Nambisan (2018). Data of optimization of laccase production by *Marasmiellus palmivorus* LA1 under solid state fermentation using one factor at a time method. *Data in Brief*. <https://doi.org/10.1016/j.dib.2018.02.011>.
- Aiswarya C, **Nayana Parambayil**, Nafeesathul Miziriya; Soumya P S; Kiran Lakshmi M S, Anala Ramgopal, Anuja Dileep, Padma Nambisan (2017). Optimization of laccase production from *Marasmiellus palmivorus* LA1 by Taguchi method of Design of experiments. *BMC Biotechnology*17,12.

4.4 Bibliography

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- Afrin S , Shuvo H R, Sultana B, Islam F, Rus'd A, Begum S , and Hossain M. The degradation of textile industry dyes using the effective bacterial consortium. *Heliyon* 7, e08102, 2021.
- Ali NF and El-Mohamedy R S R. Microbial decolourization of textile water. *Journal of Saudi Chemical Society*, 16, 117-123, 2012.
- Bera S P, Shah M P and Godhaniya M. Microbial Remediation of Textile Dye Acid Orange by a Novel Bacterial Consortium SPB92. *Front. Environ. Sci.* 10:930616, 2022
- Samuchiwal S, Gola D, and Malik A. Decolourization of textile effluent using native microbial consortium enriched from textile industry effluent. *Journal of hazardous material*, 402,123835, 2021.
- Shobina Kannan¹ , Jegathambal Palanichamy^{1,2*}, T. Sugitha¹ , C. Mayilsami. *Bioremediation*

of textile dyeing industry effluent from small scale industries using a microbial consortium of *Bacillus sp.*, *Escherichia coli*, and *Aspergillus niger*. Journal of Applied Biology & Biotechnology Vol. 10(Suppl 2), pp. 100-106, June, 2022.

- Madhushika H G, Ariyadasa T U and Gunawardena S H P. Biological decolourization of textile industry wastewater by a developed bacterial consortium. Water, Science and Technology, 80(10), 2019.
- Mohanty S S and Kumar A. Enhanced degradation of anthraquinone dyes by microbial monoculture and developed consortium through the production of specific enzymes. Scientific Reports, 11(7678), 2021.
- Moyo S, Makhanya B P, and Zwane P E. Use of bacterial isolates in the treatment of textile dye wastewater: A review. Heliyon 8, e09632, 2022.
- N.Murugalatha¹ *, A. Mohankumar² , A. Sankaravadivoo³ and C. Rajesh. Textile effluent treatment by Bacillus species isolated from processed food. African Journal of Microbiology Research Vol. 4(20) pp. 2122-2126, 18 October, 2010
- Ngo A C and Tischler D. Microbial Degradation of Azo Dyes: Approaches and Prospects for a Hazard-Free Conversion by Microorganisms. Int. J. Environ. Res. Public Health 19, 4740, 2022.

5. List of Projects submitted/implemented by the Investigators

5.1 Details of Projects submitted to various funding agencies:

Not Applicable

5.2 Details of Projects under implementation:

Not applicable

5.3 Details of Projects completed during the last 5 years:

Not Applicable

6. List of facilities being extended by parent institution(s)for the project implementation.

6.1 Infrastructural Facilities

Sr. No.	Infrastructural Facility	Yes/No/ Not requiredFull or sharing basis

1.	Workshop Facility	Not required
2.	Water & Electricity	Yes
3.	Laboratory Space/ Furniture	Yes
4.	Power Generator	Yes
5.	AC Room or AC	Yes
6.	Telecommunication including e-mail & fax	Yes
7.	Transportation	Yes
8.	Administrative/ Secretarial support	Yes
9.	Information facilities like Internet/Library	Yes
10.	Computational facilities	Yes
11.	Animal/Glass House	Not required
12.	Any other special facility being provided	Central instrumentation facility

**6.2 Equipment available with the Institute/ Group/
Department/Other Institutes for the project:**

Central Instrumentation Facility (CIF), GEMS Arts and Science College

Sl. NO.	Instrument Name	Make
1.	PCR Thermal cycler	BioRad
2.	Weighing balance	Wensar Electronic balance
3.	Magnetic stirrer	Rotek
4.	pH meter	Systronics
5.	Colorimeter	Electra
6.	Centrifuge	KEMI
7.	Laminar airflow	Rotek
8.	Colony counter	Rohem India
9.	Monocular Microscope	Labomed
10.	Binocular inverted microscope	Magnus
11.	Orbital Shaking Incubator	Rotek
12.	Electric Bacteriological incubator	Labline
13.	Tissue culture Rack with timer and illuminator	Labline
14.	Soxhlet apparatus	KEMI
15.	Hot air oven	Rotek
16.	Agarose gel electrophoresis	Himedia
17.	UV-Transiluminator	BioRad
18.	UV-Vis spectrophotometer	Systronics
19.	Water bath	Rotek
20.	PAGE Apparatus	BioRad

7. Name and address of experts/ institution interested in the subject /outcome of the project.

Not Applicable

Budget Details

Institution wise Budget Breakup :

Budget Head	GEMS Arts and Science College	Total
Research Personnel	10,44,000	10,44,000
Consumables	4,50,000	4,50,000
Travel	1,00,000	1,00,000
Equipment	10,00,000	10,00,000
Contingencies	2,00,000	2,00,000
Other cost	60,000	60,000
Overhead	2,85,400	2,85,400
Total	31,39,400	31,39,400

Institute Name : *GEMS Arts and Science College*

Year Wise Budget Summary (Amount in INR) :

Budget Head	Year-1	Year-2	Year-3	Total
Research Personnel	3,48,000	3,48,000	3,48,000	10,44,000
Consumables	2,50,000	1,50,000	50,000	4,50,000
Travel	50,000	25,000	25,000	1,00,000
Equipments	10,00,000	0	0	10,00,000
Contingencies	75,000	75,000	50,000	2,00,000
Other cost	25,000	25,000	10,000	60,000
Overhead	1,74,800	62,300	48,300	2,85,400
Grand Total	19,22,800	6,85,300	5,31,300	31,39,400

Research Personnel Budget Detail (Amount in INR) :

Designation	Year-1	Year-2	Year-3	Total
Casual worker <i>Casual worker will assist in collection of the textile effluent, and other transportation work.</i>	60,000	60,000	60,000	1,80,000
Project Assistant <i>Project Assistant will be required for the experimental work and a Casual worker will assist in collection of the textile effluent, and other transportation work. Few experiments will be carried out at Institute of Advanced Study in Science and Technology (IASST) Guwahati, Assam, India using their infrastructural facilities.</i>	2,88,000	2,88,000	2,88,000	8,64,000

Consumable Budget Detail (Amount in INR) :

Justification	Year-1	Year-2	Year-3	Total
<i>Chemicals, glass apparatus will be required for carrying out the work in lab further, other lab accessories viz; hand gloves, mask, petri dishes, and sanitizers will also be required in carrying out microbial work. Molecular Biology kits will be desirable for the isolation, and identification of the microbial strains. Chemicals of purified grade will be required in the work to estimate total dissolved solids (TDS), total suspended solids (TSS)</i>	2,50,000	1,50,000	50,000	4,50,000

Travel Budget Detail (Amount in INR) :

Justification (Inland Travel)	Year-1	Year-2	Year-3	Total
<i>Extensive travel for the collection of textile effluents and laboratory trials in the collaborating institute and technical discussion of the progress of the project will be involved. Further, other costs will involve attending seminars, meetings and surveys.</i>	50,000	25,000	25,000	1,00,000

Equipment Budget Detail (Amount in INR) :

Generic Name ,Model No. , (Make)/ Justification	Quantity	Spare time	Estimated Cost
Gel documentation system (Thermofisher) <i>For doing identification of the microbial strains.</i>	1	20 %	6,00,000
Accessories for lab scale treatment (Borosil) <i>For developing a set up for lab scale treatment plant for the textile effluents collected from the site.</i>	1	30 %	4,00,000

Contingency Budget Detail (Amount in INR) :

Justification	Year-1	Year-2	Year-3	Total
<i>A contingency grant will be required for sample testing's, registration fees, publication costs will be required. Others will be required for the partial modification of the existing laboratory to undertake Molecular Biology, pilot scale establishment of treatment plant and other experiments. Repair and maintenance charges of the existing instruments may also be required during the ongoing process of the project.</i>	75,000	75,000	50,000	2,00,000

Overhead Budget Detail (Amount in INR) :

Justification	Year-1	Year-2	Year-3	Total
<i>Ten percentage of total cost is considered as overhead charges</i>	1,74,800	62,300	48,300	2,85,400

Other Budget Detail (Amount in INR) :

Description/Justification	Year-1	Year-2	Year-3	Total
maintenance <i>. Others will be required for the partial modification of the existing laboratory to undertake Molecular Biology, pilot scale establishment of treatment plant and other experiments. Repair and maintenance charges of the existing instruments may also be required during the ongoing process of the project.</i>	25,000	25,000	10,000	60,000

PROFORMA FOR BIO-DATA (to be uploaded)

1. Name and full correspondence address

Dr. Nayana P
Assistant Professor
PG Department of General Biotechnology,
GEMS Arts and Science College (Affiliated to University of Calicut),
Ramapuram,
Malappuram
679321

2. Email(s) and contact number(s)

nayanapvenugopal@gmail.com
9400621213

3. Institution

GEMS Arts and Science College (Affiliated to University of Calicut),

4. Date of Birth

09.12.1990

5. Gender (M/F/T)

F

6. Category Gen/SC/ST/OBC

OBC

7. Whether differently abled (Yes/No)

No

8. Academic Qualification (Undergraduate Onwards)

	Degree	Year	Subject	University/Institution	% of marks
1.	B.Sc	2011	Biotechnology	Amrita vishwa vidyapeetham	81
2.	M.Sc	2013	Biotechnology	Cochin University of Science and Technology	84
3.	PhD	2022	Biotechnology	Cochin University of Science and Technology	
4.					

9. Ph.D thesis title, Guide's Name, Institute/Organization/University, Year of Award.

Lignin peroxidase from an ascomycete, *Endomelanconiopsis endophytica* LP01: production, characterization and application , under the guidance of Dr. Padma Nambisan, Department of Biotechnology, Cochin University of Science and Technology, May 2022

10. Work experience (in chronological order).

S.No.	Positions held	Name of the Institute	From	To	Pay Scale
1	Research officer/ Assistant Professor	GEMS Arts and Science College	25.11.2021	present	Rs 23000/ month
2.	Skilled Assistant	Kerala agricultural University	17.07.2013	31.01.2014	Rs 9000/ month

11. Professional Recognition/ Award/ Prize/ Certificate, Fellowship received by the applicant.

S.No	Name of Award	Awarding Agency	Year
1	Junior Research Fellowship	Kerala State Council for Science Technology and Environment	2013
2	National Eligibility Test	Indian Council of Agricultural Research- Agriculture scientist Recruitment Board	2018

12. Publications (*List of papers published in SCI Journals, in year wise descending order*).

S.No.	Author(s)	Title	Name of Journal	Volume	Page	Year
1	Ramisha Khathoon M C, Nayana P , Balagopalan Unni	Studies on lipase from Monomorium species: <i>in silico</i> and <i>in vitro</i> approaches.	International Journal of Recent Scientific Research			Accepted
2	Nayana P , Aiswarya C and Padma Nambisan	Dataset on optimization of lignin peroxidase production by <i>Endomelanconi</i> <i>opsis</i> sp. under submerged fermentation using one factor at a time approach.	Data in Brief		105244	2020
3	Nayana P , Aiswarya C and Padma Nambisan	Screening of fungi isolated from different regions of kerala for lignin peroxidase activity	International journal of current research in life sciences	7(04)	1723- 1728	2018
4	Kiran Lakshmi M S, Aiswarya C, Nayana P , Prasanta K Dash, Padma Nambisan	Enhancement of extracellular laccase production from <i>Lenzites elegans</i> KSG32: Taguchi orthogonal array experimental design methodology	International Journal of Engineering Development and Research	6(2)	369- 374	2018
5	C. Aiswarya,	Data of	Data in Brief			2018

	P. Nayana, and Padma Nambisan	optimization of laccase production by <i>Marasmiellus</i> <i>palmivorus</i> LA1 under solid state fermentation using one factor at a time method				
6	Nayana P, Aiswarya C, Soumya P S, Kiran Lakshmi M S, P M Sherief , and Padma Nambisan	Purification of Lignin Peroxidase from <i>Cocos nucifera</i> Leaflets	International Journal of Scientific Progress and Research	127 (44)	141- 145	2018
7	Aiswarya C, Nayana Parambayil, Nafeesathul Miziriya; Soumya P S; Kiran Lakshmi M S, Anala Ramgopal, Anuja Dileep, Padma Nambisan	Optimization of laccase production from <i>Marasmiellus</i> <i>palmivorus</i> LA1 by Taguchi method of Design of experiments	BMC Biotechnology	17	12	2017
8	Nayana Parambayil, Aiswarya Chenthamarak shan, Arinnia Anto, Sudha Hariharan and Padma Nambisan	Computational studies on LiP H isolated from <i>Ganoderma</i> <i>lucidum</i> GD88	Arch. Biol. Sci., Belgrade	67(3)	817-828	2015

13. Detail of patents.

S.No	Patent Title	Name of Applicant(s)	Patent No.	Award Date	Agency/Country	Status

14. Books/Reports/Chapters/General articles etc.

S.No	Title	Author's Name	Publisher	Year of Publication
1	Ligninases	Kiran Lakshmi M S, Nayana P. and Padma Nambisan	Microbial bioproducts	2015

15. Any other Information (maximum 500 words)



GEMS ARTS AND SCIENCE COLLEGE

(A Unit of Global Education and Management Studies Co-operative Ltd., No.M.782)

(Affiliated to University of Calicut)

Kadungapuram.P.O, Ramapuram, Malappuram Dt., Kerala, Pin-679 321 Ph:04933-256123

www.gemscollege.in, email: gemsasc@gmail.com

Endorsement from the Head of the Institution of PI

(To be given on University/ Institute/Organization/College Letter head)

This is to certify that:

1. Institute welcomes participation of Name:**Dr. Nayana P** Designation:**Assistant Professor** as the Principal Investigator and as the Co-Investigator/s for the project titled '**Biological treatment of real textile effluent using microbial consortium**' and that in the unforeseen event of discontinuance by the Principal Investigator, the Co-Investigator will assume the responsibility of the fruitful completion of the project with the approval of SERB.
2. The PI, **Dr. Nayana P** is a permanent or regular employee of this Institute/University/Organization and has **more than 25 years** of regular service left before superannuation.
3. The project starts from the date on which the University/Institute/ Organization/College receives the grant from SCIENCE & ENGINEERING RESEARCH BOARD (SERB), New Delhi.
4. The investigator will be governed by the rules and regulations of University/Institute/Organization/College and will be under administrative control of the University/Institute/Organization/College for the duration of the project.
5. The grant-in-aid by the SCIENCE & ENGINEERING RESEARCH BOARD (SERB), New Delhi will be used to meet the expenditure on the project and for the period for which the project has been sanctioned as mentioned in the sanction order.
6. No administrative or other liability will be attached to SCIENCE & ENGINEERING RESEARCH BOARD (SERB), New Delhi at the end of the project.
7. The University/Institute/Organization/College will provide basic infrastructure and other required facilities to the investigator for undertaking the research project.
8. The University/ Institute/Organization/College will take into its books all assets created in the above project and its disposal would be at the discretion of SCIENCE & ENGINEERING RESEARCH BOARD (SERB), New Delhi.

9. The University/Institute/Organization/College assumes to undertake the financial and other management responsibilities of the project.

Bm
09/03/2023

Seal of Signature

University/Institute/

Date:

DIRECTOR
ACADEMIC & RESEARCH,
GEMS ARTS AND SCIENCE COLLEGE,
RAMAPURAM, MALAPPURAM, KERALA-679321
(Affiliated to University of Calicut)

Registrar of University/Head of the Institute/
Head of organization/Principal of College

Bm

Dr. NAVEEN MOHAN
PRINCIPAL
GEMS ARTS AND SCIENCE COLLEGE
KADUNGAPURAM (P.O), RAMAPURAM
MALAPPURAM DT., KERALA- 679321



Undertaking by the Principal Investigator

To

The Secretary
SERB, New Delhi

Sir

I **Dr. Nayana P** hereby certify that the research proposal titled **Biological treatment of real textile effluent using microbial consortium** submitted for possible funding by SERB, New Delhi is my original idea and has not been copied/taken verbatim from anyone or from any other sources. I further certify that this proposal has been checked for plagiarism through a plagiarism detection tool i.e. online plagiarism checker Institute and the contents are original and not copied/taken from any one or many other sources. I am aware of the UGCs Regulations on prevention of Plagiarism i.e. University Grant Commission (Promotion of Academic Integrity and Prevention of Plagiarism in Higher Educational Institutions) Regulation, 2018. I also declare that there are no plagiarism charges established or pending against me in the last five years. If the funding agency notices any plagiarism or any other discrepancies in the above proposal of mine, I would abide by whatsoever action taken against me by SERB, as deemed necessary.

Signature of PI with date

Name / designation



Dr. Nayana P

Assistant Professor

**Certificate from the
Investigator**

Project Title: Biological treatment of real textile effluent using microbial consortium

It is certified that

1. The same project proposal has not been submitted elsewhere for financial support.
2. We/I undertake that spare time on equipment procured in the project will be made available to other users.
3. We/I agree to submit a certificate from Institutional Biosafety Committee, if the project involves the utilization of genetically engineered organisms. We/I also declare that while conducting experiments, the Biosafety Guidelines of Department of Biotechnology, Department of Health Research, GOI would be followed in toto.
4. We/I agree to submit ethical clearance certificate from the concerned ethical committee, if the project involves field trails/experiments/exchange of specimens, human & animal materials etc.
5. The research work proposed in the scheme/project does not in any way duplicate the work already done or being carried out elsewhere on the subject.
6. We/I agree to abide by the terms and conditions of SERB grant.

Name and signature of Principal Investigator:



Dr. Nayana P

Date: 13.03.2023

Place: Ramapuram

Name and signature of Co-PI (s) (if
any):Date:

Place:



CSIR-ASPIRE: A Special Call for Research Grants for Women Scientists
R&D Proposal Submitted

1. CSIR Funding Scheme	CSIR-ASPIRE		
2. General area of the proposed research:	Life Sciences		
3. Institute to Administer the Grant	GEMS Arts and Science College [Private]		
*(Recognition/Affiliation Certificate is attached)			
4. Title of the Proposal	Development of an efficient microbial consortium for bioremediation of real textile effluent		
5. Details of Project Investigator(PI)			
Name:	Dr. Nayana P	Department:	PG Department of General Biotechnology
Gender:	Female	Institute:	GEMS Arts and Science College
Date of Birth:	09-12-1990	City:	Ramapuram, Malappuram
Position:	Assistant Professor	PIN:	679321
Email:	nayanapvenugopal@gmail.com	State:	Kerala
Mobile No.:	9400621213		
6. Highest Degree University & Date of Award:		24/05/2022	
7. Total Time to be devoted to project (in man months per year):		12	
8. Contact Details Co-PIs			
Name:	NIL	Name:	NIL
Email:		Email:	
Highest Degree:	NIL	Highest Degree:	NIL
Address:	NIL	Address:	NIL
9. Details of Research Scientists actively engaged in the general area of the proposed research			

1. Name:	Padma Nambisan	2. Name:	Sarita G Bhat
Affiliation:	Cochin University of Science and Technology	Affiliation:	Cochin University of Science and Technology
Email:	padmanambisan@gmail.com	Email:	saritagbhat@gmail.com
Contact.No:	9249886987	Contact.No:	9846033486
3. Name:	Harvinder Singh Saini	4. Name:	Veena gayathri Krishnaswamy
Affiliation:	Guru Nanak Dev University	Affiliation:	Stella Maris College
Email:	sainihs@yahoo.com	Email:	veenagayathri@stellamariscollege.edu.in
Contact.No:	1832258802	Contact.No:	04428111951

10. Details of Research Support Availed

NIL

11. Proposed Budget Details (in INR)

S.No.	Budget Head	Year 1	Year 2	Year 3	Total
(a)	Manpower [JRF/SRF/RA]	JRF-1			JRF-1
(b)	Contingency	₹1,00,000	₹1,00,000	₹60,000	₹2,60,000
(c)	Equipment	₹10,00,000	₹0	₹0	₹10,00,000
(d)	Total	₹11,00,000	₹1,00,000	₹60,000	₹12,60,000

List of Equipment Gel documentation system-600000.00,Accessories for lab scale treatment plant-400000.00

12. Duration of the Project Proposal [in months] :

36

13. Credibilities**Awards:****Research Specialization:**

Microbiology, enzymology

Research Experience:

10 years

14. Research Outputs/Outcomes in the last 5 Years

Number of publications in the last 5 years	7
Number of Patents in the last 5 years	0

15. Available Institutional Facilities	
S1 N0 Instrument Name Manufacturing company 1.PCR Thermal cycler BioRad 2.Weighing balanceWensar Electronic balance 3.Magnetic stirrerRotek 4.pH meterSystronics 5.ColorimeterElectra 6.Centrifuge KEMI 7.Laminar airflowRotek 8.Colony counterRohem India 9.Monocular MicroscopeLabomed 10.Binocular inverted microscopeMagnus 11.Orbital Shaking IncubatorRotek 12.Electric Bacteriological incubatorLabline 13.Tissue culture Rack with timer and illuminatorLabline 14.Soxhlet apparatusKEMI 15.Hot air ovenRotek 16.Agarose gel electrophoresisHimedia 17.UV-TransiluminatorBioRad 18.UV-Vis spectrophotometerSystronics 19.Water bathRotek 20.PAGE ApparatusBioRad	
16. Schemes already completed	0
17. Schemes in hand	0
18. Keywords seperated by comma(,) (at leat 5-10, relevant to the proposal)	Consortium, Synthetic dyes, Effluent, Treatment, Phytotoxicity
19. I Certify that all the details declared in the form are correct and complete:	Yes
20. Document(in PDF) of Detailed Research Proposal is attached [Yes/No]:	Yes
21. Document(in PDF) of Attestation Certificate (in PDF) is attached [Yes/No]:	Yes

ANNEXURE:1

PROJECT PROPOSAL/RESEARCH IDEAS

TOPIC:*IN-VITRO* EVALUATION OF SELECTED PLANTS FOR ANTIUROLITHIATIC
ACTIVITY AND PHYTOCHEMICAL CHARACTERIZATION.

I. Title of the project proposal/Research idea:

“*In-vitro* evaluation of selected plants for antiurolithiatic activity and phytochemical characterization.”

II. Objective of the proposal

Analysis of plant extracts of some selected plants for antiurolithiatic activity by preparing calcium oxalate crystals *in-vitro* condition.

III. Nature of the business: specify whether product or service:

Extracts of plants can be prepared from easily available plants and can replace side effects of drugs and surgical procedures by oral consumption and also without the help of medical professionals.

IV. Concept note:

The project uses easily available and less expensive selected plants. Selected plants which also have the properties like help in lowering blood sugar, fight infections, protect skin, rich in immune boosting antioxidant and anxiety relieving property and lower cholesterol etc. Studies show that the plants which contain different bioactive substances like polyphenols, flavanoids, saponins, furanochromes, alkaloids and terpenoids help in halting the development of kidney stones. Plants also alleviate kidney stone pain and inhibit lithogenesis.

Kidney stone is small, hard deposits of minerals and acid salts in urinary tract and kidneys, there are various types calcareous (calcium oxalate monohydrate, calcium oxalate dehydrate, apatite) and non-calcareous (uric acid, struvite, cystine and others). Formation of kidney stone is a complex process that involves supersaturation, nucleation, growth, aggregation, and retention with kidneys. These stones block the flow of urine and cause severe pain, Surgical removal of stones and pain management are the main treatment procedures for this condition, but there is high chance for recurrence and may have side effects of drugs. So a major part of the population is trying to replace modern drugs with medicinal plants.

Use of medicinal plants against kidney stones can reduce rate of recurrence of stones, can avoid surgical procedures and also side effects of drugs in an effective way.

The main objective would be as:

- Preparation of aqueous plant extracts.
- *In vitro* preparation of calcium oxalate crystals.
- Determination of antiurolithiatic activity
- Phytochemical analysis of aqueous plant extract.

V. Challenges or risk factors associated with the project:

- Main challenge associated with this work is efficient action plant extracts against kidney stones.
- *In vivo* analysis of antiurolithiatic activity of the selected plant aqueous extract.
- Obtaining approval from ethics committee for doing *in vivo* studies.

VI. Technical feasibility and innovative aspects of the idea-solution, uniqueness of the solution:

- Preparation of plant extracts from easily available plants.
- Inexpensive and effective treatment for kidney stones.
- No side effects of using drugs.

VII. Stages of research idea: has any preliminary work been carried out? Give status of work done? If no, please provide the background details:

The preliminary work has been started at PG Department of General Biotechnology, GEMS Arts and Science college under the guidance of Dr. Nayana P, Assistant Professor, PG Department of General Biotechnology, GEMS Arts and Science college. She has completed her PhD from Department of Biotechnology, Cochin University of Science and Technology.

VIII. Practical application/outcome of the project:

- Effective elimination of kidney stone.
- Can avoid use of surgical procedure and side effects of drugs.
- Plant extracts also have the activities like lowering BP, immune boosting antioxidants, fight infections, anxiety relieving property, and help in blood circulation.

IX. Commercial viability and future plan of commercialization:

- Plants are inexpensive and easily available.
- It provides painless, effective and inexpensive cure.
- Use of surgical procedure or extra corporeal shock wave lithotripsy have high rate of recurrence of stone, use of medicinal plants can reduce rate of recurrence
- can produce dried plant extract will be easy for storage and transport.

X. Target population and market potential of the product or service to be developed:

It is estimated that one in ten people will have a kidney stone at some time in their lives. People who have conditions like hypercalciuria, hyperoxaluria, blockage of UT are more likely to develop kidney stones.

XI. Competitive advantage:

- The most critical advantage of using plants for treating kidney stones is that rate of recurrence is low.
- Can be intake orally without the help of medical professionals.
- It can be prepared and intake by all age groups.
- Demand of medicinal plants over commercial drugs is very high.

XII. Social implication:

Medicinal plant extracts over commercial drugs can reduce recurrence rate, side effects of drugs, surgical procedures and will be painless treatment method. Plants which also can be used for other problems.

B. Information about the applicant

1. Name: Rinshida N

2. Address for communication: MSc Student (Fourth Semester)

PG Department of General Biotechnology
GEMS Arts and Science College,
Affiliated to University of Calicut,
Ramapuram,
Malappuram,679321

3. Mobile number: 6238764271

4. Email address – Rinshida.n0909@gmail.com

5. Date of Birth: 09/09/2000

6. Age: 22

7. Sex: Female

8. Educational qualification:

- **MSc Biotechnology (Pursuing)** from GEMS Arts and Science College, Affiliated to University of Calicut.
- **BSc Biotechnology** from GEMS Arts and Science College, Affiliated to University of Calicut.

9. Present occupation: MSc Student

PG Department of General Biotechnology
GEMS Arts and Science College
Affiliated to University of Calicut.

10. Relevant Experience: The work will be carried out under the guidance of **Dr. Nayana P, Assistant Professor**, PG Department of General Biotechnology, GEMS Arts and Science College, Affiliated to University of Calicut. For further reference, publications of the guide is also attached.



Rinshida N (Principal Investigator)

MSc Student

PG Department of General Biotechnology

GEMS Arts and Science College

Affiliated to University of Calicut

Enclosure:

Information about the guide:

1. Name: Dr. Nayana P

2. Address for communication: Assistant Professor

PG Department of General Biotechnology

GEMS Arts and Science College,

Affiliated to University of Calicut,

Ramapuram,

Malappuram,679321

3. Mobile number: 9400621213

4. Email address – nayanapvenugopal@gmail.com

5. Date of Birth: 09/12/1990

6. Age: 32

7. Sex: F

8. Educational qualification:

- **Ph.D Biotechnology**
- Qualified **KSCSTE JRF (Kerala State Council for Science Technology and Environment Junior Research Fellowship)** 2013.
- Qualified **ICAR-ASRB (Indian Council of Agricultural Research-Agriculture scientist Recruitment Board) NET (National Eligibility Test)-** 2018.

9. Present occupation: Assistant Professor

PG Department of General Biotechnology

GEMS Arts and Science College

Affiliated to University of Calicut.

10. Relevant Experience: List of publications enclosed



Dr. Nayana P (Guide)

Assistant Professor
PG Department of General Biotechnology,
GEMS Arts and Science College,
Affiliated to University of Calicut,
Ramapuram, Malappuram.

Expertise and Experiences of the guide in the field

Research publications

- Ramisha Khathoon M C, **Nayana P**, Balagopalan Unni. Studies on lipase from *Monomorium* species: *in silico* and *in vitro* approaches. (**Communicated**)
- **Nayana P**, Aiswarya C and Padma Nambisan (2020). Dataset on optimization of lignin peroxidase production by *Endomelanconiopsis* sp. under submerged fermentation using one factor at a time approach. Data in Brief, 105244.
- **Nayana P**, Aiswarya C and Padma Nambisan (2018). Screening of fungi isolated from different regions of kerala for lignin peroxidase activity. International journal of current research in life sciences, 7(04): 1723- 1728.
- **Nayana P**, Aiswarya C, Soumya P S, Kiran Lakshmi M S, P M Sherief , and Padma Nambisan (2018). Purification of Lignin Peroxidase from *Cocos nucifera* Leaflets. International Journal of Scientific Progress and Research, 127 (44):141- 145.
- **Nayana Parambayil**, Aiswarya Chenthamarakshan, Arinnia Anto, Sudha Hariharan and Padma Nambisan (2015). Computational studies on LiP H isolated from *Ganoderma lucidum* GD88. Arch. Biol. Sci., Belgrade, 67(3):817-828.
- Kiran Lakshmi M S, Aiswarya C, **Nayana P**, Prasanta K Dash, Padma Nambisan (2018). Enhancement of extracellular laccase production from *Lenzites elegans* KSG32: Taguchi orthogonal array experimental design methodology. International Journal of Engineering Development and Research, 6(2): 369- 374.
- C. Aiswarya, **P. Nayana**, and Padma Nambisan (2018). Data of optimization of laccase production by *Marasmiellus palmivorus* LA1 under solid state fermentation using one factor at a time method. Data in Brief. <https://doi.org/10.1016/j.dib.2018.02.011>.
- Aiswarya C, **Nayana Parambayil**, Nafeesathul Miziriya; Soumya P S; Kiran Lakshmi M S, Anala Ramgopal, Anuja Dileep, Padma Nambisan (2017). Optimization of laccase production from *Marasmiellus palmivorus* LA1 by Taguchi method of Design of experiments. BMC Biotechnology 17,12.

Abstracts presented

- **Nayana P**, Aiswarya C and Padma Nambisan (2016). Screening of fungi isolated from Western Ghats and other regions of Kerala for lignin peroxidase activity. Proceedings of 28th Kerala Science Congress.
- **Nayana P**, Aiswarya C, Soumya P S and Padma Nambisan (2017). Exhibition of lignin peroxidase like activity by *Cocos nucifera* leaflets. Proceedings of 29th Kerala Science Congress.
- Aiswarya C, **Nayana P** and Padma Nambisan (2016). Isolation of a novel laccase producing fungi from Kerala. Proceedings of 28th Kerala Science Congress.
- Aiswarya C, Nafeesathul Miziriya, **Nayana P** and Padma Nambisan (2017). Optimization of laccase production from basidiomycetes fungi by one factor at a time method. Proceedings of 29th Kerala Science Congress.

Book Chapter

- Kiran Lakshmi M S, **Nayana P**, and Padma Nambisan. Ligninases. Microbial bioproducts, 150-165. ISBN-978-93-800095-51-6

C. No Objection Certificate from the Head of the Department/Supervisor in the prescribe format (Annexure II)
11. ANNEXURE II

No Objection Certificate

This is to certify that Mr/Mrs/Ms **RINSHIDA .N** is a Assistant Professor/Post Graduate/PhD Student/ Research Associate/ Postdoctoral fellow/employee student of this College (**GEMS Arts & Science College (University of Calicut)**). This organization has no objection in participation of Mr/Mrs/ Ms **RINSHIDA .N** in the 7th edition of GBP's 'Talent Search Contest on Innovative Research Ideas Leading To Entrepreneurial Venture In Biotechnology and allied areas' with the Research Idea entitled "*In-vitro* evaluation of selected plants for antiuro lithiatic activity and its phytochemical characterization"

	
Signature.....	Signature:
	
Name & Designation	Name & Designation
Place Ramapuram	
Date 20/02/2023	

Note: If the person is not associated with any organization a self-declaration certificate required to be attached along with the proposal.

Title of the Project proposal/Research Idea

“Non-targeted metabolite identification in a medicinal plant in response to stress condition”

ANNEXURE I

Project Proposal /Research Ideas (within 3000 words) *

1. Title of the Project proposal/Research Idea - Non-targeted metabolite identification in a medicinal plant in response to stress condition

2. Objective of the proposal –

- Identification of non- targeted metabolites in response to stress condition.
- Authentication of species identification by molecular tools
- Metabolite profiling and comparative analysis in the selected species

3. Nature of business: Specify whether Product or service (50 words)

Product:

The methodology is relatively inexpensive, sample collections are also easy, no technical expertise is required for this study. Thus, the identification and formulation of important unique metabolite and other value-added products will effective for medicinal purpose.

4. Concept Note (400 words)

Worldwide, medicinal plants have been utilized due to their ethnomedicinal values. Most of the species are widely used in traditional folk medicines and also possess various therapeutic effects such as antimicrobial, anti-allergic, antihypertensive activities, etc. Although, plant metabolomics has mainly developed with branches in functional genomics, it is independently applied to assessment of medicinal plants, based on metabolite diversity, through non-targeted or widely targeted metabolite analysis. The comprehensive analysis of diverse metabolites produced in medicinal plants, has greatly expanded metabolite fingerprinting and profiling as well as the selection/ identification of marker metabolites.

Secondary metabolites (SMs) found in medicinal plants are one of the main sources of health products, drugs, various cosmetics etc. With the increase in demand for bioactive compounds, improving the content, yield and their identification has become increasingly important. The metabolomics not only evaluated the basis of limited number of pharmacologically important metabolites, but also fingerprints minor metabolites and bioactive components present in the plants. Thus, the accurate species identification and proper metabolite detection is of utmost importance for the utilization of important medicinal plants in breeding programmes. The study envisages selecting an important medicinal plant which is locally available and address the metabolomics of the species. The understanding of complex

regulation of metabolic response in the species during stress conditions will be ascertained. The metabolite data obtained in the study can further assist in identification of genes involved in various biosynthetic pathways. If any novel marker/ metabolite through non-targeted identification will be useful for the detection of adulteration in exploited medicinal species.

5. Challenges or risk factors associated with the project (200 words)

The only challenge facing in the study will be the accurate species identification due to the existing taxonomic complexities in the taxa. This will be tackled by adopting molecular tool like DNA barcoding. The current study is entirely focused on medicinal plants, the accurate identification of species and further non-targeted identification of metabolite is also considered to be challenge for the proper development of products from the identified metabolite.

6. Technical Feasibility and innovative aspects of the idea solution, uniqueness of the solution (400 words)

Currently metabolite identification has been reported in most of the medicinal plant species. But limited studies on the non-targeted metabolite identification in response to various stress conditions. Through the advent of recent chromatographic techniques, identification of novel metabolite and further utilization in downstream processing for the development of a product will be possible. Thus, the project will contribute towards new concept to metabolomics in medicinal plant research.

7. Stage of Research Idea: Has any preliminary work been carried out? Give status of work done? If no, please provide the background details (50 words)

The investigator had previous experience in accurate species identification by means of molecular tool. So, the major challenge associated with the study will be tackled. Previous research studies are reported on identification of secondary metabolite identification in related medicinal plant species. A limited number of studies has been available on non-targeted metabolite identification in response to stress condition in related species.

8. Practical Application/Outcome of the project) explain the relevant one: (350 words)

□ **A Product for customers:** Value added products will be obtained from plant source. They are having additional environmental and economic benefits. The important or unique metabolite identified will be further utilized in downstream processing for the formulation of new product. The developed products will have a wide range of medicinal applications.

9. Any other, please specify: Enable to identify the gene involved in metabolic pathways and thereby detect species adulteration. Thus, the important species can be utilized for breeding programme.

10. Commercial Viability and Future Plan of Commercialization (450 words)

Plant systems are beneficial because they have the capability to produce proteins that are properly glycosylated, folded and assembled without the risk of toxin contamination, associated with mammalian or microbial production systems. Thus, in the study, value added products will be purely based on plant origin. Development of novel markers/metabolites will be utilized for the formulation of new drugs.

11. Target population and Market Potential of the product or service to be developed (400 words)

Development of valuable medicinal products through plant-based ingredients will enhance their functional properties without much side effects and also serve an important compound having medicinal values. The outcome of the study will enable the identification of adulterants by means of molecular tools and novel marker will have an important role for the formulation of new drug.

12. Competitive advantage (400 words)

The metabolite identified through non-targeted mechanism will have great advantage over the usual secondary metabolite identification. In the present study non-targeted identification of metabolites will be done in response to stress condition. If it's in biotic stress condition, the novel marker identified will be definitely utilized for the development of therapeutic product in down-stream process

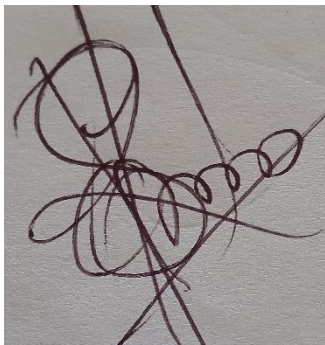
13. Social implications (200 words)

Secondary metabolite obtained from medicinal plants are usually associated with improved nutritive as well as medicinal values. They are having beneficial effects on human beings and animals for therapeutic effects. The unique or novel metabolite identified will help in further assistance for the development of therapeutic drug in down streaming process.

(as per maximum word limit by Google)

B. Information about the applicant:

Name : **Dr. SIJI MOL K**
Designation : Assistant Professor
Department : PG Department of Biotechnology
Qualifications : PhD in Biotechnology
Mobile number : 8157023980
Email : sijurose@gmail.com
Date of Birth : 10.12.1986
Age : 36
Sex (M/F) : F



Dr. SIJI MOL K (Principal Investigator)

Assistant Professor
PG Department of Biotechnology
GEMS Arts and Science College (Affiliated to University of Calicut)
Kadungapuram.P.O, Ramapuram,
Malappuram District
Kerala, India-679 321
sijurose@gmail.com
+91-9746638498

EDUCATIONAL BACKGROUND

2019: **Ph.D. in Forest Biotechnology**, Forest Research Institute, Dehra Dun, India
Thesis: Molecular systematics and phylogeny of the genus *Ochlandra* Thw. (Poaceae)
2009: **M.Sc. (Biotechnology)**, Bharathiar University, Coimbatore, India
2007: **B.Sc. (Botany)**, University of Calicut, Kerala, India

PUBLICATIONS

Articles in referred journals/ Proceedings

- Sijimol K**, Suma Arun Dev, Sreekumar VB (2022) Inferring population genetic structure of reed bamboo, *Ochlandra travancorica* in the Western Ghats for resource conservation, *Journal of Bamboo and Rattan*, 21(1):8-21
- Sijimol K**, Dev SA, Sreekumar VB (2020) DNA barcoding reveals morphospecies complex in the endemic reed bamboo genus of the Western Ghats, India. *Journal of Genetics*, 99: 68.
- Dev SA, **Sijimol K**, Prathibha PS, Sreekumar VB, Muralidharan EM (2020) DNA barcoding as a valuable molecular tool for the certification of planting materials in bamboo. *3 Biotech*, 10: 59.
- Sijimol K**, Suma Arun Dev, Sreekumar VB (2016) A review of the ecological functions of reed bamboo, genus *Ochlandra* in the Western Ghats of India: Implications for sustainable conservation. *Tropical Conservation Science*, 9(1), 389-407.
- Sijimol K**, Suma Arun Dev, Muralidharan EM, Sreekumar VB (2014) DNA barcoding: An emerging tool for precise identification and certification of planting stock in taxonomically challenging bamboo species. *Journal of Bamboo and Rattan* 13 (1&2), 29-43.
- Sijimol K**, Suma Arun Dev, Sreekumar VB (2017) Molecular systematics of the subtribe Melocanninae in paleotropical woody bamboos. In: Proc. 29th Kerala Science Congress, Extended Abstracts, Mar Thoma College, Thiruvalla, Kollam 28th -30th January 2017, 726p.
- Sijimol K**, Suma Arun Dev, Sreekumar VB (2016) Selection of suitable DNA barcodes for species identification in bamboos. In: Proc. 28th Kerala Science Congress, Extended Abstracts, Calicut University, 28th -30th January 2016, pp 2455-2464.
- Suma Arun Dev, **Sijimol K**, Muralidharan EM, Sreekumar VB (2016) DNA barcoding for the certification of planting materials in bamboos. In: National seminar on “Bamboo reserve management and advances in utilization options, Institute of Wood Science and Technology, Bangalore, 23rd– 25th February 2016. pp20.

Publications in Book chapters:

- Sijimol K** and Minu S (2022) Genome Editing in Plants: CRISPR Cas Technology in a Future Perspective. In book: *The Recent Advancement and Development in Plant Science (Volume - 2)*

C. No Objection Certificate from the Head of the Department/Supervisor in the prescribe format (Annexure II)
11. ANNEXURE II

No Objection Certificate

This is to certify that Mr/Mrs/Dr **SIJI MOL K** is a **Assistant Professor/Post Graduate/PhD Student/ Research Associate/ Postdoctoral fellow/employee** of this **College (GEMS Arts & Science College (University of Calicut) since 2022** This organization has no objection in participation of Mr/Mrs/Dr.Sijimol in the 7th edition of GBP's 'Talent Search Contest on Innovative Research Ideas Leading To Entrepreneurial Venture In Biotechnology and allied areas' with the Research Idea entitled **"Non-targeted metabolite identification in a medicinal plant in response to stress condition"**

Signature.....

(Principal)

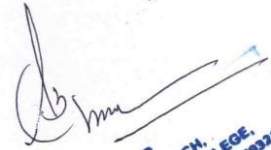


Dr. NAVEEN MOHAN
PRINCIPAL
GEMS ARTS AND SCIENCE COLLEGE
KADUNGAPURAM (PO), RAMAPURAM
MALAPPURAM DT. KERALA - 679321

DIRECTOR
ACADEMIC & RESEARCH,
GEMS ARTS & SCIENCE COLLEGE,
RAMAPURAM, MALAPPURAM, KERALA-679321
(Affiliated to University of Calicut)

Signature.....

(Director Academic & Research)



Place MALAPPURAM Name & Designation

Date 08-02-2023

Note: If the person is not associated with any organization a self-declaration certificate required to be attached along with the proposal.

Proposal submitted to ICMR (no-reply to this email)

5 messages

<no-reply@hq.icmr.org.in>
To: ICMR-ePMS <finose.sunny@gmail.com>
Cc: ICMR-ePMS <po.epms@icmr.gov.in>

Fri, 28 Apr at 16:30

Dear Dr FINOSE ASSAMAKKANTTAKATH,

Your INVESTIGATOR-INITIATED RESEARCH PROPOSALS proposal titled "Potential Secondary Metabolites against Lung Adenocarcinoma from Natural Sources" has been successfully submitted at the ICMR e-PMS portal

The reference id of your proposal is <IIRP-2023-4316/F1>.

Login to see your proposal at <https://epms.icmr.org.in/>

has been successfully submitted on dated 28-Apr-2023 16:30:11 PM at ICMR-ePMS Portal.

Important Note: This is a system generated email. Please do not reply to this email. For Any Further Correspondence please write only at "po.epms@icmr.gov.in" OR call us at "011- 26589571".

With Regards

Dr L K Sharma

Scientist E & Program Officer
+91-11-26589571 | po.epms@icmr.gov.in



e-Project Management System
Division of Bio-Medical Informatics(BMI)
Indian Council of Medical Research
Department of Health Research
Ministry of Health & Family Welfare
Government of India
po.epms@icmr.gov.in
Ansari Nagar, New Delhi - 110029, India
www.icmr.gov.in

Dr. Finose A <finose.sunny@gmail.com>

Fri, 28 Apr at 19:26

To: Balagopalan Unni <bgunni1953@gmail.com>, Dr Manash Sarma <manash3268@gmail.com>, <longkumer@yahoo.co.in>

Respected Sir,

The project proposal to ICMR has been successfully uploaded. Let's hope for the best.

Thanks once again to Dr. Manas Pratim sarma sir and Dr. Imliwati longkumer sir for their timely cooperations.

[Quoted text hidden]

DrBalagopalan Unni <bgunni1953@gmail.com>

Fri, 28 Apr at 21:08

To: <finose.sunny@gmail.com>

--
*Dr.B.G.Unni,Ph.D (Alld) FRES(London), FIANS, FISAgBc
Director-Academic & Research, GEMS Arts & Science College-Affiliated to University of Calicut
Ramapuram, Malappuram (Dt), Kerala-679321,
[Email:dir.ac.res@gemscollege.in](mailto:dir.ac.res@gemscollege.in)
&
Adviser Research
Assam Down town University,*Panikhaiti, Guwahati 781026 ASSAM, INDIA
Mobile 91- 94350 52133 / Residence :0466-2102280
Email :adviser.research@adtu.in,bgunni@yahoo.com bgunni1953@gmail.com
bgunni@daadalumni.de' balagopalanunni@fulbright-org
(Former Director Research (2015-2019)Assam down town university



Project Proposal On

"POTENTIAL SECONDARY METABOLITES FOCUSING COLORECTAL CANCER FROM NATURAL SOURCES -[41790]"

Submitted to:

**Department of Biotechnology
Ministry of Science and Technology
Government of India
New Delhi, India**

**Submitted By
Project Coordinator:**

**Dr. Papia Dutta
(ASSAM DOWN TOWN UNIVERSITY - Guwahati)**



Part 1: General Information



1. Name of the Institute/University/Organisation submitting the Project Proposal :

ASSAM DOWN TOWN UNIVERSITY

2. State: Assam

3. Status of the Institute: NGO/VO/Foundation/Trust

4. Designation of the Executive Authority of the Institute/University forwarding the application :

DR. NAREN DUTTA

5. Project Title :

POTENTIAL SECONDARY METABOLITES FOCUSING COLORECTAL CANCER FROM NATURAL SOURCES -[41790]

6. Category of the Project R & D [1]

:

7. Specific Area : NER Programme

Is the Proposal Submitted Under Specific Call for Proposal: Yes

8. Project Duration : 3 Years and 0 Months

9. Project Total Cost (Rs): 4961000.00



10. **Single/Multiple-Institutional:** Multi-Institute

11. **If the project is multi-institutional, please furnish the following :**

Project Coordinator : Dr.Papia Dutta

Affiliation : Assistant Professor in Chemistry, Faculty of Sciences, Assam down town University

Address : Assam down town University, Sankar Madhab Path, Gandhinagar, Panikhaiti, Assam 781026

12. **Project Keywords:** Cancer, Cardiovascular diseases, pharmacology, epidemiology, medicinal herbs, secondary metabolites, bioactivity.

13. **Require Regulatory Clearance:** No

Uploaded Regulatory Clearance Document: **Not uploaded**

14. **Require Ethical Clearance:** No

15. **Industry Collaboration:** No

16. **Project Summary (Not to exceed one page. Please use separate sheet).**

Cancer is one of the leading causes for death in India & abroad. In spite of remarkable advancements in the field of diagnosis and treatment, it's still a major threat to our society. It's the second most common disease after cardiovascular disorders for maximum



deaths in the world. The usual consumption of traditional herbs has also been observed in several ethnic communities as they have been passed from ancestral generations to the present. The medicinal herb is a plant or a part used for therapeutic properties. It is a widely recognized fact that many pharmacologically active drugs are derived from natural resources. Epidemiological evidences also focus on herbs as dietary constituents with multiple anticancer characteristics. It would be crucial to define appropriate strategies to achieve benefits from medicinal herbs. The main aim here is to isolate and characterize a secondary metabolite with anticancer potential and can be further assayed for other bioactivity studies with patenting.

Part 2: Particulars of Investigators



Principal Investigator:

1) Name: Dr. Papia Dutta

Date of Birth: 16/09/1985

Designation : Assistant Professor

Department: Chemistry

Institute/University: ASSAM DOWN TOWN UNIVERSITY

Address: Assam down town University, Sankar Madhab Path,
Gandhi Nagar, Panikhaiti, Guwahati, Kamrup (M), Assam,
India

Pin: 781026

Email: papiadutta3@gmail.com

Fax: 0

Phone: 8638979093

Number of Projects being submitted/pursued/carried out by PI(s): 2

2) Name: Dr. Finose Assamakkantakath



Date of Birth: 25/04/1985

Designation : Assistant Professor

Department: Microbiology

Institute/University: GEMS Arts and Science College

Address: GEMS Arts and Science College (Affiliated to University of Calicut) Kadungapuram(PO) Ramapuram, Malappuram (Dist) Kerala - 679321

Pin: 679321

Email: finose.sunny@gmail.com

Fax: 0

Phone: 8075498763

Number of Projects being submitted/pursued/carried out by PI(s): 0

Co-Investigator:

Concept Proposal submitted to ICMR (no-reply to this email)

2 messages

<no-reply@hq.icmr.org.in>

Thu, 30 Sep 2021 at 11:52

To: ICMR-ePMS <finose.sunny@gmail.com>

Cc: ICMR-ePMS <po.epms@icmr.gov.in>

Dear Dr FINOSE ASSAMAKKANTTAKATH,

Your Task Force proposal titled "Potential Secondary Metabolites Preventing Proliferative Potential of Cancer cells from Natural Sources" has been successfully submitted at the ICMR e-PMS portal

The reference id of your proposal is <2021-6902>.

Login to see your proposal at <https://epms.icmr.org.in/>

has been successfully submitted on dated 30-Sep-2021 11:52:57 at ICMR-ePMS Portal.

Important Note: This is a system generated email. Please do not reply to this email. For Any Further Correspondence please write only at "po.epms@icmr.gov.in" OR call us at "011- 26589571".

With Regards**Program Officer**+91-11-26589571 | po.epms@icmr.gov.in

e-Project Management System
Division of Bio-Medical Informatics(BMI)
Indian Council of Medical Research
Department of Health Research
Ministry of Health & Family Welfare
Government of India
[Ansari Nagar, New Delhi - 110029, India](mailto:Ansari.Nagar@icmr.gov.in)
www.icmr.gov.in

Dr. Finose A <finose.sunny@gmail.com>

Sun, 6 Nov 2022 at 14:12

Draft to: Balagopalan Unni <bgunni1953@gmail.com>, Dr Manash Sarma <manash3268@gmail.com>, Dr.Balagopalan Unni <dir.ac.res@gemscollege.in>, ajai78@gmail.com <ajai78@gmail.com>

With Regards

Dr. FINOSE.A ., PhD
Assistant Professor in Biochemistry
Dept. of Microbiology
Global Education and Management Studies(GEMS) College of Arts and Science
Malappuram,Kerala,India
Ph: +918075498763

[Quoted text hidden]

ANNEXURE: I

PROJECT PROPOSAL/RESEARCH IDEAS

TOPIC: PREPARATION OF NANOFERTILIZER FROM ONION PEEL AND ITS APPLICATION ON SEED GERMINATION.

- I. **Title of the project proposal/research idea:**
“Preparation of nanofertilizer from onion peel and its application on seed germination.”
- II. **Objective of the proposal:**
- Synthesis of nanoparticle from onion peel extract.
 - Characterization of the nanoparticle
 - Application of the synthesized nanofertilizer on germination of various seeds- tomato, fenugreek, cowpea and green chilly.
 - Large scale synthesis of nanofertilizer and commercialization.
- III. **Nature of business: specify whether product or service:**
The proposed Nanobiofertilizer is a product prepared from common household waste onion peel. This product increase nutrient use efficiency by the plants compared to conventional fertilizers. This product employs the successful utilization of vegetable waste onion peel and can be considered an added merit of the work.
- IV. **Concept Note:**
Onion peel is a more concentrated source of phytochemicals than edible flesh. It has anticholesterol, antioxidant, antidiabetic, antithrombotic like properties which make it a useful substrate in many industries such as food processing, nutraceutical, cosmetical and pharmaceutical sectors.
Nano fertilizers have shown great potential for their sustainable uses in soil fertility, crop production and with minimum or no environmental tradeoffs. They are of sub microscopic sizes, have large surface area to volume ratio, can have nutrient encapsulation, and greater mobility hence they may increase plant nutrient access and crop yield.
Preparation of nanofertilizer from onion waste is important because it not only help to reduce waste accumulation but also improve the crop quality. Onion skins and peelings are a normal part of general house hold kitchen waste. Outer skin of onions provide an exceptionally rich source of plant compounds called flavonoids,, especially the powerful antioxidant and anti inflammatory compound, quercetin. It increase soil fertility yield and quality parameters of crop. They are non toxic as well. As the onion peel is rich in potassium, magnesium, copper, calcium and iron, It help the plant grow strong.
- V. **Challenges or risk factors associated with the project:**
Scaling up of the process is the most challenging step in translating the present work. The major challenges are production of the nanofertilizer, quality assurance and to meet the regulatory requirements for the industry. Another challenge related to the production of nanofertilizer is the cost of the production.

VI. Technical Feasibility and innovative aspects of the idea – solution, uniqueness of the solution:

- 1) The method used for nanofertilizer synthesis
- 2) Faster germination of seeds on applying nanofertilizers.
- 3) Increment in the length of shoot and leaves, number of leaves and branches of the plants.
- 4) Increase of fresh and dry weight of plants.
- 5) Increase in crop yield.
- 6) Minimizes nutrient leaching into ground water.
- 7) Improve wastewater management.

VII. Stage of research idea: has any preliminary work been carried out? Give status of work done? if no, please provide the background details:

The preliminary work has been started at PG Department of General Biotechnology, GEMS Arts and Science college under the guidance of Dr. Nayana P, Assistant Professor, PG Department of General Biotechnology, GEMS Arts and Science college. She has completed her PhD from Department of Biotechnology, Cochin University of Science and Technology.

VIII. Practical application/outcome of the project:

- 1) Faster germination rate of seeds.
- 2) Nanofertilizers have higher transport and delivery of nutrients through plasmodesmata
- 3) Increased yield for farmers.
- 4) It results in the controlled waste management.

IX. Commercial viability and future plan of commercialization:

- 1) Development of new production line for nanofertilizers.
- 2) Added applications of onion waste especially onion peel.
- 3) Project will contribute towards employment generation.

X. Target population and Market potential of the product or service to be developed:

Target population is mainly farmers.

This new proposal will utilize the waste generated from kitchen mainly onion peel and develop into nanofertilizer which can be utilized as fertilizers for plants and crops.

XI. Competitive advantage:

The most critical advantage of nanofertilizer is that they have minimal impact on environment. They increase agricultural potential by improving the faster seed germination and plant growth. Green methods for synthesizing nanoparticles with plant extracts are advantageous as it is simple, convenient, eco-friendly and require less reaction time. The large surface area offered by the tiny nanoparticles, which

have high surface area, makes them attractive to address challenges not met by physical, chemical pesticides and biological control methods.

XII. Social implications:

Nanofertilizer prepared from onion peel can increase crop yield. It offers benefit to farmer's income and food security and also produce environmental benefits.

Nanofertilizers offer benefits in nutrition management through their strong potential to increase nutrient use efficiency.

B. Information about the applicant

1. Name: Safeeda K

2. Address for communication: MSc Student (Fourth Semester)
PG Department of General Biotechnology
GEMS Arts and Science College,
Affiliated to University of Calicut,
Ramapuram,
Malappuram,679321

3. Mobile number: 7994622739

4. Email address – safeedajafar@gmail.com

5. Date of Birth: 19/09/1993

6. Age: 29

7. Sex: F

8. Educational qualification:

- **MSc Biotechnology (Pursuing)** from GEMS Arts and Science College, Affiliated to University of Calicut.
- **BSc. Genetics** from AWH special college, kallayi, Affiliated to University of Calicut.

9. Present occupation: MSc Student

PG Department of General Biotechnology
GEMS Arts and Science College
Affiliated to University of Calicut.

10. Relevant Experience: The work will be carried out under the guidance of **Dr. Nayana P, Assistant Professor**, PG Department of General Biotechnology, GEMS Arts and Science College, Affiliated to University of Calicut. For further reference, publications of the guide is also attached.



Safeeda k (Principal Investigator)

MSc Student

PG Department of General Biotechnology

GEMS Arts and Science College

Affiliated to University of Calicut

Enclosure:

Information about the guide:

1. Name: Dr. Nayana P

2. Address for communication: Assistant Professor

PG Department of General Biotechnology

GEMS Arts and Science College,

Affiliated to University of Calicut,

Ramapuram,

Malappuram,679321

3. Mobile number: 9400621213

4. Email address – nayanapvenugopal@gmail.com

5. Date of Birth: 09/12/1990

6. Age: 32

7. Sex: F

8. Educational qualification:

- **Ph.D Biotechnology**
- **Qualified KSCSTE JRF (Kerala State Council for Science Technology and Environment Junior Research Fellowship) 2013.**
- **Qualified ICAR-ASRB (Indian Council of Agricultural Research-Agriculture scientist Recruitment Board) NET (National Eligibility Test)-2018.**

9. Present occupation: Assistant Professor

PG Department of General Biotechnology

GEMS Arts and Science College

Affiliated to University of Calicut.

10. Relevant Experience: List of publications enclosed



Dr. Nayana P (Guide)

Assistant Professor

PG Department of General Biotechnology,
GEMS Arts and Science College,
Affiliated to University of Calicut,
Ramapuram, Malappuram.

Expertise and Experiences of the guide in the field

Research publications

- Ramisha Khathoon M C, **Nayana P**, Balagopalan Unni. Studies on lipase from *Monomorium* species: *in silico* and *in vitro* approaches. (**Communicated**)
- **Nayana P**, Aiswarya C and Padma Nambisan (2020). Dataset on optimization of lignin peroxidase production by *Endomelanconiopsis* sp. under submerged fermentation using one factor at a time approach. Data in Brief, 105244.
- **Nayana P**, Aiswarya C and Padma Nambisan (2018). Screening of fungi isolated from different regions of kerala for lignin peroxidase activity. International journal of current research in life sciences, 7(04): 1723- 1728.
- **Nayana P**, Aiswarya C, Soumya P S, Kiran Lakshmi M S, P M Sherief, and Padma Nambisan (2018). Purification of Lignin Peroxidase from *Cocos nucifera* Leaflets. International Journal of Scientific Progress and Research, 127 (44):141- 145.
- **Nayana Parambayil**, Aiswarya Chenthamarakshan, Arinnia Anto, Sudha Hariharan and Padma Nambisan (2015). Computational studies on LiP H isolated from *Ganoderma lucidum* GD88. Arch. Biol. Sci., Belgrade, 67(3):817-828.
- Kiran Lakshmi M S, Aiswarya C, **Nayana P**, Prasanta K Dash, Padma Nambisan (2018). Enhancement of extracellular laccase production from *Lenzites elegans* KSG32: Taguchi orthogonal array experimental design methodology. International Journal of Engineering Development and Research, 6(2): 369- 374.
- C. Aiswarya, **P. Nayana**, and Padma Nambisan (2018). Data of optimization of laccase production by *Marasmiellus palmivorus* LA1 under solid state fermentation using one factor at a time method. Data in Brief. <https://doi.org/10.1016/j.dib.2018.02.011>.
- Aiswarya C, **Nayana Parambayil**, Nafeesathul Miziriya; Soumya P S; Kiran Lakshmi M S, Anala Ramgopal, Anuja Dileep, Padma Nambisan (2017). Optimization of laccase production from *Marasmiellus palmivorus* LA1 by Taguchi method of Design of experiments. BMC Biotechnology 17,12.

Abstracts presented

- **Nayana P**, Aiswarya C and Padma Nambisan (2016). Screening of fungi isolated from Western Ghats and other regions of kerala for lignin peroxidase activity. Proceedings of 28th Kerala Science Congress.
- **Nayana P**, Aiswarya C, Soumya P S and Padma Nambisan (2017). Exhibition of lignin peroxidase like activity by Cocos nucifera leaflets. Proceedings of 29th Kerala Science Congress.
- Aiswarya C, **Nayana P** and Padma Nambisan (2016). Isolation of a novel laccase producing fungi from Kerala. Proceedings of 28th Kerala Science Congress.
- Aiswarya C, Nafeesathul Miziriya, **Nayana P** and Padma Nambisan (2017). Optimization of laccase production from basidiomycetes fungi by one factor at a time method. Proceedings of 29th Kerala Science Congress.

Book Chapter

- Kiran Lakshmi M S, **Nayana P**, and Padma Nambisan. Ligninases. Microbial bioproducts, 150-165. ISBN-978-93-800095-51-6

C. No Objection Certificate from the Head of the Department/Supervisor in the prescribe format (Annexure II)
11. ANNEXURE II

No Objection Certificate

This is to certify that Mr/Mrs/Ms **SAFEEDA .K** is a Assistant Professor/Post Graduate/PhD Student/ Research Associate/ Postdoctoral fellow/employee student of this College (**GEMS Arts & Science College (University of Calicut)**). This organization has no objection in participation of Mr/Mrs/ Ms.**SADEEDA .K** in the 7th edition of GBP's 'Talent Search Contest on Innovative Research Ideas Leading To Entrepreneurial Venture In Biotechnology and allied areas' with the Research Idea entitled "Preparation of nanofertilizer from onion peel and its application on seed germination"

Signature.....
Dr. N. S. MANOHAN
Principal
GEMS ARTS & SCIENCE COLLEGE
MUNGAPURAM (PO), RAMAPURAM
RAMAPURAM DT. KERALA- 679321

Signature.....
Dr. B.G Unni, Director Academic Research
GEMS ARTS & SCIENCE COLLEGE,
RAMAPURAM, MALAPURAM KERALA-679321
(Affiliated to University of Calicut)

Place Ramapuram
Date 20/10/2023

Note: If the person is not associated with any organization a self-declaration certificate required to be attached along with the proposal.



CSIR-ASPIRE: A Special Call for Research Grants for Women Scientists
R&D Proposal Submitted

1. CSIR Funding Scheme	CSIR-ASPIRE		
2. General area of the proposed research:	Life Sciences		
3. Institute to Administer the Grant	GEMS Arts and Science College [Private]		
*(Recognition/Affiliation Certificate is attached)			
4. Title of the Proposal	The targeted and untargeted metabolite exploration in Cinnamomum agasthyamalyanum of the Western Ghats		
5. Details of Project Investigator(PI)			
Name:	Dr. SIJI MOL K	Department:	PG Department of Biotechnology
Gender:	Female	Institute:	GEMS Arts and Science College
Date of Birth:	10-12-1986	City:	Ramapuram, Malappuram
Position:	Assistant Professor	PIN:	679321
Email:	ksiji2009@gmail.com	State:	Kerala
Mobile No.:	8157023980		
6. Highest Degree University & Date of Award:		28/02/2019	
7. Total Time to be devoted to project (in man months per year):		12	
8. Contact Details Co-PIs			
Name:	NIL	Name:	NIL
Email:		Email:	
Highest Degree:	NIL	Highest Degree:	NIL
Address:	NIL	Address:	NIL
9. Details of Research Scientists actively engaged in the general area of the proposed research			

1. Name:	Dr Ramar Murugan	2. Name:	Dr Pradeepa C GBandaranayake
Affiliation:	School of Chemical and Biotechnology, SASTRA University, Thanjavur 613 401, Tamil Nadu, India	Affiliation:	Faculty of Agriculture University of Peradeniya Sri Lanka
Email:	ramamurugan@yahoo.com	Email:	pradeepag@agri.pdn.ac.lk
Contact.No:	9443951465	Contact.No:	9481238718
3. Name:	Dr Satpal Singh	4. Name:	Dr Rajesh Dabur
Affiliation:	Department of Biochemistry, Indian Institute of Science, Bengaluru	Affiliation:	Department of Biochemistry, Maharishi Dayanand University, Rohtak, Haryana, 124001, India..
Email:	singh@iisc.ac.in	Email:	rajeshdabur@yahoo.com
Contact.No:	8022932444	Contact.No:	01262293489

10. Details of Research Support Availed

Grant Agency	Title of the Project	Reference Number	Duration	Amount (in lakh Rs.)
Nil	Nil	0	0	0

11. Proposed Budget Details (in INR)

S.No.	Budget Head	Year 1	Year 2	Year 3	Total
(a)	Manpower [JRF/SRF/RA]	JRF-1			JRF-1
(b)	Contingency	₹80,000	₹40,000	₹10,000	₹1,30,000
(c)	Equipment	₹2,00,000	₹0	₹0	₹2,00,000
(d)	Total	₹2,80,000	₹40,000	₹10,000	₹3,30,000

List of Equipment	HPLC A1100 (Agilent) Cost: 2,00,000
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12. Duration of the Project Proposal [in months] :	36
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13. Credibilities

Awards:

NIL

Research Specialization:

Plant Biotechnology, Metabolomics, Bioinformatics, Genetic Engineering

Research Experience:

For more than 8 years of experience in plant Genomics, Transcriptomics, Metabolomics and NGS based research

14. Research Outputs/Outcomes in the last 5 Years

Number of publications in the last 5 years	5
Number of Patents in the last 5 years	0

15. Available Institutional Facilities	
PCR machine, Agarose Gel Electrophoresis Unit, Gel Documentation system, Incubator, Cooling centrifuge, Refrigerator	
16. Schemes already completed	0
17. Schemes in hand	0
18. Keywords seperated by comma(,) (at least 5-10, relevant to the proposal)	Metabolomics, profiling, bioactive, barcode
19. I Certify that all the details declared in the form are correct and complete:	
	Yes
20. Document(in PDF) of Detailed Research Proposal is attached [Yes/No]:	
	Yes
21. Document(in PDF) of Attestation Certificate (in PDF) is attached [Yes/No]:	
	Yes

ANNEXURE: I

PROJECT PROPOSAL /RESEARCH IDEAS

Title of the Project proposal/Research Idea:

“Topical Ayurvedic Prophylactic for COVID-19 in Rural Area”

10. ANNEXURE I

Project Proposal /Research Ideas (within 3000 words)*

1 Title of the Project proposal/Research Idea - - Topical Ayurvedic Prophylactic for COVID-19 in Rural Area

2 Objective of the proposal –

- a) Identification, Authentication and Isolation of bioactive principles from 4 specific medicinal plants.
- b) Cocktail preparation using the isolated bioactive compounds and finalisation of the dosage along with the volume to be administered.
- c) Administration of the sample dosage to the common people of specific remote villages in COVID-19 affected districts.

3 Nature of business: Specify whether Product or service (50)

Product, It is relatively inexpensive, easily obtained, no expertise needed for application, and an Ayurveda treatment that people in small towns and villages will be inclined to use. The cocktail will be comparatively cost effective as the raw materials are easily available in the Western Ghats due to its rich biodiversity.

4 Concept Note (400)

Coronavirus disease 2019 (COVID-19), which is caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), has globally spread to an ongoing pandemic since the first case of infection was reported in 2019. Numerous recommendations and suggestions have been published to prevent the acquisition and spread of the SARS-CoV-2, especially to protect health workers and front-line caregivers. Polyherbal formulations using medicinal herbs with a wide variety of properties like antiviral, anti-inflammatory, antioxidant and immunomodulating can be effectively deployed for management of current COVID-19 pandemic. Potential clinically tested medicinal herbs with antiviral properties are presented with its possible mode of action. Currently, these medicinal herbs are actively used, either singly or in combination, for the preventive or treatment of COVID-19 or respiratory viral infections

A cocktail of two or more of the inhibitors with different modes of action in natural solvents from traditional sources which has the unique ability to solubilize the viral outer membrane envelope phospholipids, which causes the disintegration of the virus. It has also been suggested that the proposed compounds can disrupt the virus replication cycle and also binding of the virus to the cell. Therefore, this may be the ideal component to make the cocktail. This could be a deadly combination for the virus. The cocktail can be smeared inside the nasal

chambers with most common and simple application methods which even the common man can implement. This is a procedure which has been used in Ayurveda.

5.Challenges or risk factors associated with the project (200)

The invention does not have any serious challenges. Since it is developed from naturally available medicinal plants, chances of side effects would be not possible. However it requires animal studies. Development and standardization of the products, organoleptic evaluation and consumer acceptance testing is needed. The comparative study obtained from the drug treated and vehicle (saline) treated groups of animals should be done along with the estimation of efficacy of the product.

6 Technical Feasibility and innovative aspects of the idea solution, uniqueness of the solution(400)

Presently we have few vaccines in use, both with limited availability and the Russian vaccine is also becoming available (The DRDO drug 2-Deoxy- D-Glucose has been approved for emergency use). Still the amount of vaccines is far short of the required quantities to vaccinate a majority of the population. There are also a couple of drugs with limited use and effectiveness, Remdesivir and Hydroxychloroquine. A few reports have also come out indicating that Ayurvedic and Homeopathic medicines have been used successfully to treat the disease. However, many traditional medicines have not been tested widely and so they remain underused.

COVID-19 is an RNA virus with a lipid envelope and typical spike proteins. The latter dock with Angiotensin - Converting Enzyme 2 (ACE2) receptors of the host cell membrane and the Transmembrane Serine protease (TMPRSS2) facilitates fusion of the viral envelope with the cell membrane, followed by endocytosis, endosome formation etc .It now appears that the nasal epithelium is the main gateway for entry of the virus, the mouth and eyes also to a lesser extent. Aspiration leads to the passage of the virus via the throat into the respiratory system. Why not try a simple method to prevent viral attachment and entry via the nasal epithelium ? The drug seems to be eco friendly and no chances of side effects and the raw material for the cocktail is available.

7.Stage of Research Idea: Has any preliminary work been carried out? Give status of work done? If no, please provide the background details. (50)

The authors have good practical experiences with the experiments related to Antiproliferative activity, Cell line studies, Phytochemical screening, HPTLC and GC-MS profiling and other various Phytochemical and Chromatographic studies in phytochemistry.Isolation and characterization off secondary metabolites has been a major expertise of the author.

8 Practical Application/Outcome of the project) explain the relevant one:

- A Product for customers
- A knowledge based service for (350)

A Product for customers

Shall provide knowledge to industries for Bio-commodities.

Added applications in the area of vaccines, a new formulation for children/adults.

Value added products from the plant based products.

Adding technical, environmental and economic benefits to plant based bio-molecules residues.

Development of new production lines for bioactive molecules based industries.

Development of Biomass based industries to open new markets for bio-products/vaccines.

Project will contribute towards societal benefit/employment generation.

9. Customers

- A technology (knowhow) for sale or licensing to industry
- An intellectual property right for licensing or sale
- Any other, please specify

The product is having good chances for getting a patent either for filing process based or product based. This may also lead to links with MSME pharma based industries for commercialization of the product in the market. All the facilities are possible from the proposal. Since the originator of the proposal is planning to submit the idea for patenting, more details of the cocktail combination are not discussed in detail in this project.

10. Commercial Viability and Future Plan of Commercialization (450)

Added applications of Bio- molecule based residues.

Development of new production lines for biomass/biomolecule based industries.

Development of Bio-molecule based industries to open new markets for vaccines.

Technology can also be commercialized using licensing.

Project will contribute towards societal benefit/ employment generation.

11 Target population and Market Potential of the product or service to be developed (400)

Development of cocktails using plant based ingredients will enhance its functional properties as well as serve as an important tool to improve overall health of the population with special reference to Covid infection on a short

or long term basis. Value added product development will also provide a platform for building competitive advantage in terms of entrepreneurship developments. The outcome of the study will facilitate the global acceptance of value added product mix for different categories of people like infants, adults and old aged peoples too, or overall population.

NOTE: *Since we are in the process of applying the contents and other processes for filing a patent, we are not in a position to disclose more details in this write up. However it will be disclosed at the final stage.*

12 Competitive advantage (400)

As compared to available vaccines in the market, the cocktail can be smeared inside the nasal chambers with a clean finger or cotton buds. Smearing oil inside the nose is a procedure used in Ayurveda. In cities one may in addition to the double mask, smear the cocktail when going to crowded places. On returning home it should be washed off. If a family member is quarantined in the house, apply it twice a day. It is relatively inexpensive, easily obtained, no expertise needed for application, and an Ayurvedic treatment that people in small towns and villages will be inclined to use.

13. Social implications (200)

The dreadful COVID-19 pandemic devastated entire world including our country while the Health services are being stretched to the limits. In this context, any and all ideas, however offbeat or outlandish, are worth considering for trial to save lives if possible. Under such circumstances an idea that we think are worth examining, particularly for use as a prophylactic in small towns and villages with poor infrastructure and medical establishments*

(as per maximum word limit by Google)

B. Information about the applicant:

Principal investigator of the idea

Dr. Finose A

Assistant Professor in Biochemistry

Department of Microbiology, GEMS Arts and Science College

(Affiliated to University of Calicut)

Kadungapuram.P.O, Ramapuram, Malappuram Dt., Kerala-679 321

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BIODATA AND PUBLICATIONS OF Dr.FINOSE A



Dr. FINOSE.A., Ph.D

Fardhinacottage, PuthurPallikal, Tenhipalam, Malappuram, Kerala, India, 673636

Tel: + 91-80754 98763, +91-98473 27844

@: finose.sunny@gmail.com

I. PERSONAL SUMMARY and OBJECTIVE

Having excellent research, teaching and business development potential and has an ability to actively contribute to the academic goals, with good standard of workmanship. Able to interact in a constructive, creative and professional manner during the processing, teaching, guidance, client relationship and instrument handling

Age 37

Religion : ISLAM

Languages known : ENGLISH, HINDI, MALAYALAM & TAMIL

II. CAREER DETAILS

Overall experience: 10 years

Sl. No	Position	Organization	From	To
1.	Assistant Professor	GEMS College of Arts and Science, University of Calicut	Aug 2019	Till date
2.	Teaching Assistant	College of Dairy Science & Technology, Kerala Veterinary and Animal Sciences University	Oct 2017	June 2019
3.	Research Associate	ICAR-Indian Institute of Spices Research	Sept 2016	Oct 2017
4.	Teaching Assistant	College of Dairy Science & Technology, Kerala Veterinary and Animal Sciences University	Oct 2015	Aug 2016
5.	Research Assistant	College of Dairy Science & Technology, Kerala Veterinary and Animal Sciences University	June 2015	Sept 2015
6.	Teaching Assistant	College of Dairy Science & Technology, Thrissur, Kerala Veterinary and Animal Sciences University	Nov 2014	Mar 2015
7.	Research Assistant	College of Veterinary and Animal Sciences, Kerala Veterinary and Animal Sciences University	Nov 2013	June 2014
8.	Senior Research Fellow	Malabar Institute of Medical Sciences Research Foundation	May 2012	Oct 2013
9.	Scientific Officer & Lecturer	UWIN Life sciences	April 2009	April 2012

Career highlights:

- Handling different courses in Biochemistry, Molecular Biology, Human Nutrition, Biology and Chemistry subjects along with practical and research experiments.
- Has managed and supervised the Institute Technology Management-Business Planning and Development [ITM-

BPD] Units of ICAR-Indian Institute of Spices Research.

- Has set up the major laboratories and research facilities of College of Dairy Science and Technology, Pookode, Wayanad including equipment purchase, negotiations and financial settlements.
- Has worked as Assistant Warden (Mens Hostel), Information technology Officer of the college, Program Officer for Students sports and National Service scheme Department.
- Has conducted different trainings and extension programs for students, farmers and entrepreneurs.
- Peer reviewer of the Journal-Phytochemistry by ELSEVIER.

No of Papers Published: 4 International

Project GUIDANCE EXPERIENCE [Major academic projects-University Level]

- M.Phil Scholars : 2 Post Graduates : 29
- Higher secondary & Undergraduates : 20
- Handled Animal handling, Blood collection and safety classes for Bachelors and Masters in Medical Laboratory Techniques.
- Quality Analysis, Antibiotic residue detection of Milk and Dairy Products.
- Antiproliferative Assays and Animal Cell culturing and Fluorescent staining procedures [JC-1, DAPI]
- Quantification of the marker compounds in plants and Phytoformulations using HPLC, GLC and HPTLC and developing fingerprints for plant products and characterization of single compounds
- Isolation and characterization of secondary metabolites & bioactive components from Natural products
- Data interpretation of spectral outputs including HPLC, GLC, GCMS & LCMS
- Expertised in Activity prediction of Biomolecules using PASS software [Russian academy of Medical science], Pharmexpert structure and activity prediction.
- Expertised in ACD Labs, Chemsketch structure softwares

Analytical experience:

HPLC	FTIR	DNA isolation
GLC	UV SPECTROPHOTOMETER	Column chromatography
ELECTROPHORESIS-SDS-PAGE	Cell Culture	Gel Documentation
Double beam spectrophotometer	Fluorescence Microscope [Inverted]	HPTLC
Blotting Techniques	Rotary flash evaporator	Polarimeter
Flame Photometer	Micro kjehldahls apparatus	Lyophilizer

III. EDUCATIONAL QUALIFICATIONS

- Ph.D** in Biochemistry from KARPAGAM UNIVERSITY, Coimbatore (2015)
- M.Sc** in Biochemistry (80%) from BHARATHIAR UNIVERSITY, Coimbatore (2009)
- B.Sc** in Biochemistry (72%) from CALICUT UNIVERSITY, Kerala (2007)
- Higher secondary** with 73% (2003)
- S.S.L.C** with 86% (2001)
- Advanced PG Diploma in Phytochemistry, Food Technology, Quality Control (2009)**
- Trained in Phytochemical techniques** from CMPR, Arya Vaidya Sala, Kottakkal, Kerala (2007)
- HACCP** certified from Central Institute Of Fisheries Technology, Cochin (2009)
- Laboratory Animal Handling** trained from Sree Chithra Thirunnaal Institute of Medical science and Technology, Trivandrum (2012).

IV. ACHIEVEMENTS:

- Presented a paper in 4th World Ayurveda Congress at Bengaluru, 2010
- Member of Board of Studies of KARPAGAM UNIVERSITY, Coimbatore
- Member of Western pharmacological society, India
- Best Paper award in 2nd Annual Research Congress, KARPAGAM UNIVERSITY

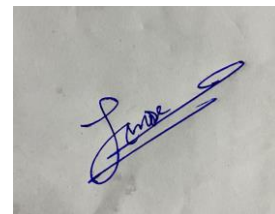
- 1 paper in young scientist award category, 23rd Kerala science congress, 2010
- Member of National Service Scheme from 2003-2007

V. I.T SKILLS

MS OFFICE, WINDOWS XP, VISTA , BIOINFORMATICS TOOLS –FASTA,BLAST,CLUSTAL W, RASMOL, ADOBE PHOTOSHOP, ZOTERO-Bibliography management software.

RECENT PUBLICATIONS OF Dr.FINOSE A

1. Phytochemical and chromatographic studies in the flowers of *Woodfordia fruticosa* (L) Kurz, **A. Finose** and K Devaki, Asian Journal Of Plant Science And Research, 2011, 1 (3):81-85
2. Phytochemical screening, hptlc and gc-ms profiling in the rhizomes of *Zingiber nimmonii* (J. Graham) Dalzell **Assamakantakath Finose** and Velliyur Kanniappan Gopalakrishnan, Asian journal of pharmaceutical and Clinical Research, 2014 vol 7, suppl 2, , 54-57
3. Antiproliferative activity of chloroform extract of *Z.nimmonii* (J. Graham) Dalzell on hct-15 cell lines. **Assamakantakath Finose** & Velliyur Kanniappan Gopalakrishnan., International Journal Of Pharmacy And Biological Sciences., volume 4, issue 4, oct-dec, 2014, 100-107.
4. Antioxidant potential of *Zingiber nimmonii* (J. Graham) Dalzell., **Assamakantakath Finose**, Velliyur Kanniappan Gopalakrishnan International Journal Of Pharmacy And Pharmaceutical Sciences, 2014, Vol 6, issue 6, 50-5.



Coordinator

Dr.BG Unni, (Former Chief Scientist-CSIR)

Director Academic & Research, GEMS Arts and Science College

(Affiliated to University of Calicut)

Kadungapuram.P.O, Ramapuram, Malappuram Dt., ‘Kerala-679 321

dir.ac.res@gemscollege.in, 9435052133

Dr.B.G.Unni,(Balagopalan Unni) Former Chief Scientist and Area Coordinator (Biotechnology & Biological Sciences) and DADD-Fellow (Germany) and Fulbright Fellow (USA) retired from CSIR service on 31st Jan 2015 after 38 years of research career at CSIR North East Institute of Science & Technology Jorhat Assam. Appointed at **Assam down town University** as Director-Research in March 2015 and continued up to June 2019 and then re-designated as **Adviser Research since August 2019**).

Back in Kerala, Dr.Unni is appointed as **Director Academic & Research** at **GEMS College of Arts & Science affiliated to University of Calicut since August 2019**. Both the positions are on honorary basis to strengthen the institutions in research areas. He did his BSc Biology (1972-74, Ewing Christian College, Alld University), MSc in Biochemistry(1974-76)(Second Rank) and Ph.D in Biochemistry from Allahabad University(1976-80) and PDF in Molecular Biology from Texas A&M University, USA(1988-91). Dr. Unni is specialized in Biochemistry Molecular Biology, and Biotechnology and well established in his area of research and completed more than 38 years of research in both basic and applied field of research.Dr.Unni got more than 130 research papers 180 abstracts, 35 papers in proceedings, 4 patents,1 technology.18 chapters in books, edited 3 books and 29 students received PhD degree under his guidance and supervision. Dr. Unni had completed more than 20 projects sponsored by Commonwealth Science Council, London, Ministry of Non conventional Energy Sources, Department of Non conventional Energy Sources Govt of India, North Eastern Council Govt of India, Department of Science &Technology, Department of Biotechnology, Central Silk Board,GB Pant Institute of Himalayan Environment and Development, CSIR and DRDO, Ministry of Defense, Govt of India during his scientific tenure at CSIR NE-IST. Dr Unni received- Fulbright Travel Award/Fellowship (USA) Dr. B.M. Das Memorial Science award, Hebrew University Award-Awarded in the area of Juvenile Hormone Research H.R. Cama Memorial Travel Award,COSTED Travel Award,. DAAD- fellowship-Germany, Well Mark International Scholarship (USA) & Technology award in life sciences by CSIR,Govt of India . Best Fulbright Alumni Chapter Leader-South Asia Selected by the United States Education Foundation In India (USIEF), New Delhi .Nominated to represent India at the International Fulbright Scholars meet at Marrakech, Morocco- Nominated by United States Education Foundation In India, New Delhi . Dr. Unni is in the editorial board of more than eight indexed journal in the country. Dr.Unni was nominated to various state and central committees such as High power committee for development of sericulture activities Muga, Eri,Tassar and Mulberry in Assam nominated by Governor of Assam,

Expert in the area of non mulberry sericulture, Ministry of Textiles, Advisory Board, Post graduate Biotechnology programme, Academic Council, Assam Agricultural University, Research Council, Central Silk Board, Ministry of Textiles , DBT's Nominee for Bio-safety Committee ,Vice President SBC (India) Indian Institute of Science Bangalore, Vice President Indian Academy of Neuro-sciences, Member Fulbright Academy of Science & Technology, USA, Board of studies- Botany Nagaland University and Biotechnology Saugar University Madhya Pradesh., Fellow, Indian Academy of Neurosciences & Indian Society of Agricultural Biochemists, Fellow Royal Entomological Society, London UK and Scientific Advisor International. Foundation of Science, Sweden, Member, Board of Studies Raiganj University (2017----), Member Research Review committee Tea Board of India (2016--2018), Member Advisory Committee Cancer Research Advisory Board, North East Cancer Hospital & Research Institute (2017--) President, Tea Improvement Consortium, Ltd, Tocklai Assam (2018-2020) . Dr.Unni visited USA, Germany, Israel,Jordan, France, Morocco ,UK, Thailand ,Jordan, Singapore ,UAE (Dubai) and China under various exchange programs

C. No Objection Certificate from the Head of the Department/Supervisor in the prescribe format (Annexure II)
11. ANNEXURE II

No Objection Certificate

This is to certify that Mr/Mrs/Dr **Finose A** is a **Assistant Professor/Post Graduate/PhD Student/ Research Associate/ Postdoctoral fellow/employee** of this **College (GEMS Arts & Science College (University of Calicut) since 2019** This organization has no objection in participation of Mr/Mrs/Dr **Finose** in the 7th edition of GBP's 'Talent Search Contest on Innovative Research Ideas Leading To Entrepreneurial Venture In Biotechnology and allied areas' with the Research Idea entitled "**Topical Ayurvedic Prophylactic for COVID-19 in Rural Area** "

Signature.....

(Principal)

Place **MALAPPURAM** Name & Designation

Date **08-02-2023**

Dr. NAVEEN MOHAN
PRINCIPAL
GEMS ARTS AND SCIENCE COLLEGE
KADUNGAPURAM (PO), RAMAPURAM
MALAPPURAM DT. KERALA- 679321

Signature.....

(Director Academic & Research)

Name & Designation

DIRECTOR
ACADEMIC & RESEARCH
GEMS ARTS AND SCIENCE COLLEGE,
RAMAPURAM, MALAPPURAM, KERALA-679321
(Affiliated to University of Calicut)

Note: If the person is not associated with any organization a self-declaration certificate required to be attached along with the proposal.

ANNEXURE: 1

Project Proposal / Research Ideas

Title of the Project proposal/Research idea

“Utilization of vegetable for the production of single cell protein by *Saccharomyces cerevisiae*”

1. Title of the project proposal /Research idea :

“Utilization of vegetable for the production of single cell protein by *Saccharomyces cerevisiae*”

2. The objectives of the proposal are:

- Fermentation of the substrate with desired yeast.
- Production of single cell protein and extraction.
- Optimization of SCP production by One Factor at a Time method.
- Characterization of single cell protein.

3. Nature of business: specify whether product or service

The proposed “Single cell protein” is a product produced from easily available and cheap vegetable source. This product consist of many nutritive factors and can be used as a food supplement. Large scale production of SCP may extend the scope of work to commercialization as well.

4. Concept note:

The proposal mainly uses an easily available low-cost vegetable. It is cultivated both as a summer and rainy season crop.

Single cell protein has high protein content with wide range of amino acids, fat contents, higher carbohydrate ratio etc. It provides instant energy and is extremely good for health especially for undernourished children. Protein deficiency can be cured through SCP production in an ever-increasing global population.

The fermentation procedures as well as the culture conditions are both simple. By providing appropriate conditions a high amount of protein can be produced.

A highly hygienic environment is essential for the increased production by avoiding serious contamination. This protein can be used as additive added to the main diet instead of sources which are very expensive.

The utilization of vegetable can be done to produce value added products, production of low cost protein and to meet the protein demand of growing population. By utilizing various ingredients present in the vegetable there is a possibility of converting them into proteinaceous food or feed. Thus the substrate should be exploited for the production of cellular biomass. So they can be used as protein supplement with least expenditure of money.

The pulp and seed of the vegetable is the key ingredient used along with the Bakers yeast. The fermentation of the yeast and the substrate will give rise to a biomass under optimized conditions. Analysis of this biomass content determines the production of single cell protein.

5. Challenges / risk factors associated with the project

The main challenge associated with this project is the production of required quantity of biomass under optimized conditions and the analysis of each nutritive content. The

quality assurance and to meet the regulatory requirements for the industry is also a challenge of the proposed work.

6. Technical feasibility and innovative aspects of the idea – solution, uniqueness of the solution:

- Production of single cell protein using inexpensive vegetable.
- Easy availability of the raw material.
- Utilization of non-hazardous materials and methods.
- Decreased risk of toxicity.

7. Stage of research idea: has any preliminary work been carried out? Give status of work done. If no, please provide the background details.

The preliminary work has been started at PG Department of General Biotechnology, GEMS Arts and Science college under the guidance of Dr. Nayana P, Assistant Professor, PG Department of General Biotechnology, GEMS Arts and Science college. She has completed her PhD from Department of Biotechnology, Cochin University of Science and Technology.

8. Practical application /outcome of the project:

- Provides instant energy
- Extremely good for health
- Provides best protein supplement food for undernourished children
- Serves as a good source of amino acids, vitamins, minerals, crude fibres etc.

9. Commercial viability and future plan of commercialization :

- Since it has high rate of multiplication, large biomass can be produced.
- It helps to reduce pollutants associated with vegetable waste.
- It is not affected by any weather conditions.
- Raw materials are quite cheap and are easily available.

10. Target population and Market potential of the product or service to be developed:

The main target population is:

- Individual with low immunity
- Athletes
- Under-nourished children

By examining the market size the product has to be delivered throughout the market .The customer base should be properly checked and also there should be a clear idea about the competitors.

11. Competitive advantage:

- The popularity of single cell protein is because of their high nutritional profile
- They serve as a food or feed supplement and can be an alternative to conventional protein with all essential amino acids.
- It is environment friendly and non – hazardous.

- It can be taken by all age groups without any risks.
- Demand for a sustainable protein alternative is increasing as there is an increase in the malnourished population around the globe.
- Due to a strong hit by the pandemic, COVID 19 there is a greater need for a pure nutrient rich supplement among population.

12. Social implication:

- With the increasing world population, there is strong evidence that agriculture alone would not be able to meet the demand and there will be a serious food shortage.
- Therefore, SCP represents an alternative option of safe food production even under changing climatic conditions.
- Nowadays the people are busy with living and are not able to ingest adequate amount of nutrients through their food. So SCP can be a great choice for getting enough nutrition.

B. Information about the applicant

1. Name: Ashfena C

2. Address for communication: MSc Student (Fourth Semester)

PG Department of General Biotechnology
GEMS Arts and Science College,
Affiliated to University of Calicut,
Ramapuram,
Malappuram, 679321

3. Mobile number: 9961206095

4. Email address – ashfinachelakkoden@gmail.com

5. Date of Birth: 26 / 11 / 1999

6. Age: 23

7. Sex: Female

8. Educational qualification:

- **MSc Biotechnology (Pursuing)** from GEMS Arts and Science College, Affiliated to University of Calicut.
- **BSc Biotechnology** from GEMS Arts and Science College, Affiliated to University of Calicut.

9. Present occupation: MSc Student

PG Department of General Biotechnology
GEMS Arts and Science College
Affiliated to University of Calicut.

10. Relevant Experience: The work will be carried out under the guidance of **Dr. Nayana P, Assistant Professor**, PG Department of General Biotechnology, GEMS Arts

and Science College, Affiliated to University of Calicut. For further reference, publications of the guide is also attached.



Ashfena. C (Principal Investigator)

MSc Student

PG Department of General Biotechnology

GEMS Arts and Science College

Affiliated to University of Calicut

Enclosure:

Information about the guide:

1. Name: Dr. Nayana P

2. Address for communication: Assistant Professor

PG Department of General Biotechnology

GEMS Arts and Science College,

Affiliated to University of Calicut,

Ramapuram,

Malappuram,679321

3. Mobile number: 9400621213

4. Email address – nayanapvenugopal@gmail.com

5. Date of Birth: 09/12/1990

6. Age: 32

7. Sex: F

8. Educational qualification:

- **Ph.D Biotechnology**
- **Qualified KSCSTE JRF (Kerala State Council for Science Technology and Environment Junior Research Fellowship) 2013.**
- **Qualified ICAR-ASRB (Indian Council of Agricultural Research-Agriculture scientist Recruitment Board) NET (National Eligibility Test)-2018.**

9. Present occupation: Assistant Professor

PG Department of General Biotechnology

GEMS Arts and Science College

Affiliated to University of Calicut.

10. Relevant Experience: List of publications enclosed



Dr. Nayana P (Guide)

Assistant Professor

PG Department of General Biotechnology,
GEMS Arts and Science College,
Affiliated to University of Calicut,
Ramapuram, Malappuram.

Expertise and Experiences of the guide in the field

Research publications

- Ramisha Khathoon M C, **Nayana P**, Balagopalan Unni. Studies on lipase from *Monomorium* species: *in silico* and *in vitro* approaches. (**Communicated**)
- **Nayana P**, Aiswarya C and Padma Nambisan (2020). Dataset on optimization of lignin peroxidase production by *Endomelanconiopsis* sp. under submerged fermentation using one factor at a time approach. Data in Brief, 105244.
- **Nayana P**, Aiswarya C and Padma Nambisan (2018). Screening of fungi isolated from different regions of kerala for lignin peroxidase activity. International journal of current research in life sciences, 7(04): 1723- 1728.
- **Nayana P**, Aiswarya C, Soumya P S, Kiran Lakshmi M S, P M Sherief , and Padma Nambisan (2018). Purification of Lignin Peroxidase from *Cocos nucifera* Leaflets. International Journal of Scientific Progress and Research, 127 (44):141- 145.
- **Nayana Parambayil**, Aiswarya Chenthamarakshan, Arinnia Anto, Sudha Hariharan and Padma Nambisan (2015). Computational studies on LiP H isolated from *Ganoderma lucidum* GD88. Arch. Biol. Sci., Belgrade, 67(3):817-828.
- Kiran Lakshmi M S, Aiswarya C, **Nayana P**, Prasanta K Dash, Padma Nambisan (2018). Enhancement of extracellular laccase production from *Lenzites elegans* KSG32: Taguchi orthogonal array experimental design methodology. International Journal of Engineering Development and Research, 6(2): 369- 374.
- C. Aiswarya, **P. Nayana**, and Padma Nambisan (2018). Data of optimization of laccase production by *Marasmiellus palmivorus* LA1 under solid state fermentation using one factor at a time method. Data in Brief. <https://doi.org/10.1016/j.dib.2018.02.011>.
- Aiswarya C, **Nayana Parambayil**, Nafeesathul Miziriya; Soumya P S; Kiran Lakshmi M S, Anala Ramgopal, Anuja Dileep, Padma Nambisan (2017). Optimization of laccase production from *Marasmiellus palmivorus* LA1 by Taguchi method of Design of experiments. BMC Biotechnology 17,12.

Abstracts presented

- **Nayana P**, Aiswarya C and Padma Nambisan (2016). Screening of fungi isolated from Western Ghats and other regions of kerala for lignin peroxidase activity. Proceedings of 28th Kerala Science Congress.
- **Nayana P**, Aiswarya C, Soumya P S and Padma Nambisan (2017). Exhibition of lignin peroxidase like activity by Cocos nucifera leaflets. Proceedings of 29th Kerala Science Congress.
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Book Chapter

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C. No Objection Certificate from the Head of the Department/Supervisor in the prescribe format (Annexure II)
11. ANNEXURE II

No Objection Certificate

This is to certify that Mr/Mrs/Ms. **ASHFENA .C** is a Assistant Professor/Post Graduate student /PhD Student/ Research Associate/ Postdoctoral fellow/employee **student** of this College (**GEMS Arts & Science College (University of Calicut)**). This organization has no objection in participation of Mr/Mrs/ Ms.**ASHFENA .C** in the 7th edition of GBP's 'Talent Search Contest on Innovative Research Ideas Leading To Entrepreneurial Venture In Biotechnology and allied areas' with the Research Idea entitled "**Utilization of vegetable for the production of single cell protein by Saccharomyces cerevisiae**"

 DR. NAVÉEN MOHAN PRINCIPAL GEMS ARTS AND SCIENCE COLLEGE KADUNGAPURAM (PO), RAMANANGALAM, KADAPPURAM DT. KERALA	 DR. BG UNNI Director Academic & Research GEMS ARTS AND SCIENCE COLLEGE, KADUNGAPURAM, MALAPPURAM, KERALA-679221 (Affiliated to University of Calicut)
Signature..... (Principal) Name & Designation	Signature..... Name & Designation
Place <u>Ramanangalam</u> Date <u>20/2/23</u>	

Note: If the person is not associated with any organization a self-declaration certificate required to be attached along with the proposal.