# Report

# on

# Biotech Innovation Ignition School(BIIS-3)

# SRISTI- BIRAC Initiative

# at

# Ahmedabad

# on

# April 30-May 29, 2018

**Biotech Inoovation Ignition School (BIIS)-3**
**Ahmedabad, April 30-May 29, 2018**
**Draft summary report**

SRISTI (Society for Research and Initiatives for Sustainable Technologies and Institutions) in collaboration with BIRAC (Biotechnology Industry Research Assistance Council, Department of Biotechnology, Govt. of India) is organizing a four-week BIIS (Biotech Innovation Ignition School) for validating, value adding and product development around grassroots innovations.

The BIIS will develop solutions for grassroots applications for human, animals, and agricultural applications including herbal technologies, medical devices and microbial application. The BIIS-3 will be held at Ahmedabad, April 30-May29, 2018. It is likely that some other institutes like Loyola Centre for Research & Development, and Navjyoti Analytics and Research Laboratory,Ahmedabad may also join the school.

The selected students will be assigned individual projects in primarily microbiology drawing upon the Honey Bee Network Database:-

Microbiology-SRISTI has a Microbial diversity bank containing 8000+ organisms (bacteria, fungi, and actinomycetes) isolated from the soil samples collected during Shodh Yatras in different parts of the country (http://www.sristi.org/cms/shodhyatra). An extensive study of screening of these isolated microbes for various application like Antibiotic producer / Different antibiotic sensitivity screening, Bioremediation/ Bioaugmentation, Halophilic organism isolation and screening for enzymes, Probiotics, Plastic Degrading/producing Microorganisms would be conducted along with the revival of microorganisms from SRISTI'S Microbial Bank.

The abstracts along with the objective of the projects will be shared with the selected students one week before the start of the BIIS. The participants would be expected to develop a project proposal and a work plan. These students would receive an expert feedback on their proposals from the reviewers. These students will also receive hands-on training in various techniques of microbiology and using various lab equipments (AAS, HPTLC, HPLC etc.) as per the need of the project in the first week of the event.

The students were selected from ten states across the country, with 98% of them being girl participants. The students from different regions of India worked together in one platform (BIIS) towards common goal of making India innovative, collaborative, and inclusive.

Attached below is the following list of programs that was part of BIIS-3

**Inauguration Schedule**

The inaugural session was held on April 30 at Indian Institute of Management, Ahmedabad where SRISTI'S Lab team gave a brief introduction about SRISTI.

**Work schedule and lectures**

The students pursued their experiments work at SRISTI Sanshodhan Natural products lab, Navjyoti Analytical Research Laboratory and Loyola Centre for Research & Development,Ahmedabad . The names and the title of projects of students are:

| Sr. No. | Name | Project Title |
|---|---|---|
| 1. | Krishnapriya Velayuthasamy | Microbial Synthesised Pigments As Natural Food Colorants |
| 2. | Bhanu Kumari | Anti-Microbial activity of microbes isolated from Andaman and Nicobar soil samples |
| 3. | Dhyani Vora | Biosorption of Heavy Metals by Soil Microbes |
| 4. | Mayuri Mathur | Extraction of protease enzyme from microbes using casein as a substrate |
| 5. | Rakshanda Devendra Angchekar | Development and Physico-chemical evaluation of Energy bar |
| 6. | Krutika Ramakant Sawant. | Development of nutritious anti-diabetic desert |
| 7. | Gauri Ashok Sawant | Development of Tri-Pro Bites |
| 8. | Richa | Microbes Assisted Sustainable Decolourization of Azo Dyes |
| 9. | Aatmika Barve | Isolation and Screening of bacteria from soil sample with potential to produce antibiotics. |
| 10. | Bhuvaneshwari. G | Decolourisation of Dye compound using the strains isolated from given soil sample |
| 11. | Abhijeet Pukhraj Gokhroo | Extraction of amylase producing micro-organism from soil and its application in food industry |
| 12. | Shyani Dhrutika Ashokbhai | Isolation and Screening of Zinc absorbing bacteria from Andaman Nicobar Island soil |
| 13. | Poornima Saraswat | Synbiotic formulations of Pearl millet and camel milk using potent combinations of LAB isolated from minor cereals, seeds, and milk |

| | | |
|---|---|---|
| 14. | Kashika Yadav | Revival of Sristi Microbial Bank Cultures and Screening of Potential Cellulose Degrading Bacteria |
| 15. | Kriti Maurya | Revival of bacterial culture collected from various untouched niches of India from SRISTI Microbial Bank |
| 16. | Tanvi Gupta | Comparison of microbial isolation from soil samples in food waste along with the standard media. |
| 17. | Soumya Shyamnarayan Yadav | Isolation & Characterization Single Cell Protein (Phyenylalanine) producing microorganisms from Soil Sample and production & purification of it using Cost Effective Technology |
| 18. | Sagorika Adhikari | Screening of organism from SRISTI'S microbial bank for determination of potential antimicrobial activity along with its characterization |
| 19. | Patel Kalgi Piyushkumar | Isolation and characterization of pigment producing microbes from Andaman and Nicobar soil sample and their applications |
| 20. | Aastha Sareen | Biofertilizer formulation using effective phosphate solublizing fungi |
| 21. | Rutvij N. Chhaya | Isolation of pectinase producing micro-organisms from soil samples of Andaman & Nicobar Islands and Goa |
| 22. | Patel Nirali Piyushkumar | Isolation and screening of antimicrobial producing Actinomycetes from soil samples of Andaman and Nicobar Islands |
| 23. | Bhakti Salgaonkar | Polyhydroxyalkanoates Production by Microorganisms from Sustainable Resources |

Additionally, following experts were invited to deliver lectures during BIIS-3.

| **Name and Designation** | **Date** |
|---|---|
| Dr. Nirmal Sahay,Advisor,SRISTI | 30/04/2018 |
| Dr. Viral Shukla, H.O.D, Deptt. ofMicrobiology,L.J Group of Institutions | 01/05/2018 |
| Dr. Sandip Kumar Ghosh,Admin Director,Loyola Centre for Research & Development,Ahmedabad | 01/05/2018 |

**Valedictory session and Award Ceremony**

All the participating students presented their work in the front of evaluation committee on the final day of Biotech Innovation IgnitionSchool (BIIS-3) from April30-May 29, 2018.Further a presentation ceremony was conducted where a certification of participation was given by the chairperson of the valedictory session, Prof. Anamik Shah, Vice Chancellor,Gujarat Vidyapeeth, Ahmedabad. Also, 8 **best projects were awarded Rs. 1 lac each and four best project were awarded 50,000 each as appreciation research grant** to further continue their research work. The schedule for the final day was:-

| **BIIS-3 (Biotech Innovation Ignition School-3)**<br>***April30-May29,2018***<br>***Venue****- Blue room, KLMDC, Old Campus, IIM-Ahmedabad, Ahmedabad* |
|---|

| **May 29, 2018** | |
|---|---|
| 9:15-9:30 | Tea & Breakfast |
| 9:30-9:40 | **Prof. Anil K Gupta,** Founder-Honey Bee Network, Coordinator-SRISTI, GIAN & EVC, NIF, Visiting faculty-IIM-A & IIT-B |
| 9:40-9:45 | Introduction of the session Chairperson **Prof. Anamik Shah**,Vice Chancellor,Gujarat Vidyapeeth, Ahmedabad |
| 9:45-9:50 | **Dr.Vipin Kumar,** Director &CIO, National Innovation Foundation,Gandhinagar |
| 9:50-9:55 | **Dr.Mahesh Chhabria,** Principal, L.M College of Pharmacy, Ahmedabad |
| 9:55-10:00 | **Dr. Rakesh Rawal**, H.O.D, Department of Biochemistry & Forensic Science, Gujarat University |
| 10:00-10:05 | **Dr. Manish Diwan,** Head, SPED, BIRAC,New Delhi |

| | |
|---|---|
| 10:05-10:10 | **Mr.Harendrasinh Solanki**, Chief Laboratory Officer, Navjyoti Analytics and Research Laboratory, Ahmedabad |
| 10:10-11:25 | **Presentation by BIIS Students** |
| 11:25-11:35 | **Tea break** |
| 11:35-12:45 | **Presentation by BIIS participants** |
| 12:45-13:45 | **Lunch** |
| 13:45-14:15 | Valedictory address by **Prof. Anamik Shah,** Vice Chancellor, Gujarat Vidyapeeth, Ahmedabad |
| 14:15-14:20 | Announcement of ten best projects |
| 14:20-14:30 | Certificate distribution to all the BIIS participants |
| 14:30-14:40 | Vote of thanks by **Mr. Ramesh Patel**, Secretary, SRISTI |

The exhaustive work done for thirty days reflected on the outcome and key output is attached herewith where the ten best shortlisted projects of BIIS-3 are given:-

| Sr. No. | Name | Project Title | Student's approach | Future studies to be done | Technical Inputs from our side |
|---|---|---|---|---|---|
| 1. | Dr. Bhakti Salgaonkar | Polyhydroxyalkanoates Production by Microorganisms from Sustainable Resources | • Isolation of microorganisms from unique eco-niches using various media | • Bulk PHA production and its quantitative estimation by the potential bacterial | Selection of media and experiment designing for identification and characterization of Polyhydroxyalkanoates |

| | | | | | |
|---|---|---|---|---|---|
| | | | • Screening of the microorganisms for production of polyhydroxyalkanoates using commercial and agro-industrial wastes<br>• Isolation, purification and characterization of the polymer and identification of the potential strain using polyphasic approach. | isolate AN39BS (B2) and AN39BS(B4) using various carbon rich waste material as substrates.<br>• Study on the growth kinetics of potential bacterial isolate AN39BS (B2) and AN39BS(B4) and understanding its PHA accumulation pattern.<br>• Characterization of the agro-industrial wastes for various physical and chemical parameters such as Total solids (TS) and volatile solids (VS), chemical oxygen demand (COD), The carbon (C), hydrogen (H), nitrogen (N) and | producing bacteria |

| | | | | | |
|---|---|---|---|---|---|
| | | | | sulphur (S), Total carbohydrates Total Kjeldahl Nitrogen (TKN).<br>• Fermentor scale polymer production, extraction and characterization of the polymer using various techniques such as UV-visible spectrophotometry, XRD analysis, DSC analysis, FT-IR spectroscopy, NMR spectroscopy.<br>• Identification of the potential strain using polyphasic approach. | |
| 2. | Gauri .A. Sawant | DEVELOPMENT OF TRI-PRO BITES | • To study traditional recipes.<br>• To prepare ready to eat food using *Tridax porcumbens* | • Studying anti-microbial activity of the product against diarrhoea causing | • Water extract of plant by hot water extraction |

| | | | | | |
|---|---|---|---|---|---|
| | | | • Analysis of *Tridax procumbens* extract using different extraction method (hot and cold extraction / water extract)<br>• Preliminary test of extract i.e antioxidant, Saponins, flavonoids, alkaloids , steroids , tannins , carbohydrates<br>• Proximate analysis of extract.<br>• Product formulation (conc.of extract)<br>• Analysis of the product (proximate analysis)<br>• Sensory evaluation | organisms<br>• To increase the self-life of the product by altering processing factors and without using any preservatives<br>• Making it cost effective<br>• Infusing Ashwagandha (rennet) as it has many medicinal properties<br>• Studying the market and working on packaging of the product | • Determination of phytochemicals of *Tridax procumbens* and proximate analysis (carbohydrate, protein, phenol, total ash, lipid and fibre of product |
| 3. | Patel Kalgi Piyushkumar | Isolation and characterization of pigment producing<br>microbes from Andaman and Nicobar soil sample and<br>their applications. | • Study the microbial diversity of shodhyatra soil sample of Andaman & Nicobar and Goa region.<br>• Extraction and morphological characterization of pigments.<br>• Screening of antimicrobial compound producing microorganisms. | • Checking antioxidant activity.<br>• Characterization of pigments based on biochemical properties.<br>• Estimation of pigment contents and its global availability.<br>• Utilization of natural pigments in foodstuff, | Selection of extraction process for pigments, bioactive compound extraction, antimicrobial activity and purification of pigments by TLC |

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| | | | • Separation of pigments by TLC. | dyestuff, cosmetic and pharmaceutical manufacturing. | |
| 4 | KashikaYadav | Revival Of Sristi Microbial Bank Cultures and Screening of Potential Cellulose Degrading Bacteria | • Revival of 100 cultures from Jharkhand, Madhya Pradesh, Manipur, Maharashtra.<br>• Isolation of potential cellulose-degrading bacteria<br>• Determination of their cellulolytic potential for industrial application. | • CMC test<br>• Primary screening<br>• Secondary screening | Experiment set up for short term preservation(eg. glycerol stock, slant preparation)<br>long term preservation(eg. cryopreservation) |
| 5. | Krishnapriya.V | Microbial Synthesised Pigments As Natural Food Colorants | • Isolation of microorganisms from the "Shodh Yatra" soil samples of Andaman and Nicobar Islands (AN-32, AN-43) and Goa (GA-8).<br>• Screening of the microbes for production of pigments.<br>• Isolation, purification and characterization of the pigments.<br>• Identification of the potential strain at molecular level. | • Characterization of the pigments using various analytical techniques such as HPLC, TLC, HPTLC.<br>• Screening of potential strain and Production of natural pigments producing carotenoids in large scale.<br>• Identification of potential strain at molecular level.<br>• Improved techniques to identify biosorbent properties which are efficient in removal of | Experiment set up for extraction of pigments from bacteria and characterisation of pigments |

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| | | | | heavy meals from industrial waste water. | |
| 6. | Kriti Maurya | Revival of bacterial culture collected from various untouched niches of India from SRISTI Microbial Bank | • To revive bacteria and study its morphology<br>• Isolation of cellulose-degrading bacteria.<br>• Determination of their cellulolytic potential for industrial application. | • Optimization of growth and production of enzyme at large scale.<br>• Enzyme assay test.<br>• 16s rRNA gene sequencing .<br>• Separation of active compounds by HPTLC fingerprinting.<br>• Chemical characterization of the compounds obtained.<br>• Further on obtaining any novel products going for LC/MS. | Experiment set up for short term preservation(eg. glycerol stock, slant preparation)<br>long term preservation(eg. cryopreservation) |
| 7. | Krutika Sawant | Development of nutritious anti-diabetic dessert | • To develop formulation for Antidiabetic desert<br>• To study physicochemical and Antioxidant activity of the product | • Addition of *Tinospora Cordifolia* also known as Giloy.<br>• To make it an antidiabetic food which may have ability to cure the type 2 diabetes | Selection of plants, nutrient composition of products and antioxidant analysis |
| 8. | Poornima Saraswat | Synbiotic formulations of | • Isolation and | • To validate this | Isolation of microbes |

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|---|---|---|---|---|---|
| | | Pearl millet and camel milk using potent combinations of LAB isolated from minor cereals, seeds, and milk. | characterisation of LAB cultures from camel milk. Selection of the potent LAB for developing probiotic starter culture.<br>• To develop the functional food model system with pearl millet, soybean and camel milk for pro and prebiotic efficacy.<br>• For assessment of food model system in hydrocolloidal systems, high protein content, fiber index, glycemic response, sensory analysis and in-vitro digestibilities before and after the fermentation.<br>• Incorporation of the developed starter culture into the food model system. | Functional food model for formulation of synbiotic pearl millet and camel milk. Potent LAB needs to be characterised.<br>• Stability of the culture into the food model needs to be studied.<br>• The digestibility assays, glycemic Index and antihypertensive assays needs to be formulated to commercialise the product as a functional synbiotics. | from soil and experiment set up for LAB to be characterised |
| 9. | Richa Kumari | Microbes Assisted Sustainable Decolourization of Azo Dyes | • Isolation of microorganisms (bacteria, fungi and actinomycetes) from given soil samples by using various media<br>• Screening of selected potential isolates for their dye-decolorization potential | • The decolorizing activity of selected bacterial culture should studied further with respect to different parameters like pH, temperature, time, carbon and nitrogen sources, oxygen and | Dye selection and experimental set up to study decolourization of azo dye. |

| | | | | | |
|---|---|---|---|---|---|
| | | | • Standardization and efficiency estimation of dye-decolorizing potential of selected microbial isolates with UV-VIS spectrophotometer. | agitation, dye structure, electron donor and redox mediator % dye decolorization estimation.<br>• Optimization and standardization of the decolorizing process is warranted to obtain maximum decolorizing activity and to identify the factors affecting the high activity.<br>• Since the soil samples comes from untapped area in India where anthropological interference is restricted, identification of the selected bacterial culture with suitable molecular techniques (16S rRNA sequencing) could lead us to the novelty of this study (a possible novel organism for bioremediation of azo dyes). | |

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|---|---|---|---|---|---|
| 10. | Sagorika Adhikari | Screening of organism from SRISTI'S microbial bank for determination of potential antimicrobial activity along with its characterization | • To perform primary screening of organisms isolated from soil (obtained from Andaman Shodh Yatra) for antimicrobial activity.<br>• To perform primary screening of Actinomycetes isolates from SRISTI microbial bank.<br>• Further secondary screening of any positive results obtained from step 1 and 2. | • Optimization of growth and production of secondary metabolites.<br>• Separation of active compounds by HPTLC fingerprinting<br>• Chemical characterization of the compounds obtained<br>• Further on obtaining any novel products going for LC/MS | Primary screening for potential microbes, method selection and media selection |
| 11. | Soumya Yadav | Isolation & characterization single cell protein (phyenylalanine) producing microorganisms from soil sample and production & purification of it using cost effective technology | • To study biodiversity of soil samples collected from Goa and Andaman<br>• To screen phenylalanine producing microorganisms<br>• Isolation and identification of phenylalanine by HPTLC. | • Characterization of bacteria through biochemical and molecular approach<br>• Quantification.<br>• Morphological study of potential organisms<br>• Microscopy of organisms | Screening of microbes for SCP and identification |
| 12. | Tanvi Gupta | Comparison of microbial isolation from soil samples in food waste along with the standard media. | • Comparison of the different microorganisms with the commercialized media.<br>• To prepare a cost effective media out of the food waste generated with the minimal | • Molecular identification of microbes<br>• Formulation to make effective media to industrialized | ICP and proximate analysis of formulated media |

| | | | | | |
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| | | | nutrients required.<br>• To be used at industrial level production. | | |

## Announcement

**BIIS**:Opportunity for Women biotechnology students to work on grassroots innovations and microbial diversity

**Isolation, Characterization and Augmentation**

SRISTI (Society for Research and Initiatives for Sustainable Technologies and Institutions) is organizing a four-week BIIS (Biotech Innovation Ignition School) for validating, value adding and product development around grassroots innovations. The BIIS will develop solutions for microbial application. The BIIS-3 will be held at Ahmedabad, April 30 to May 29, 2018. It is being launched on International Women's Day to unleash the talent of women students. It is likely that BIRAC (Biotechnology Industry Research Assistance Council, Department of Biotechnology, Govt.of India) might support this initiative. The selected students will be assigned individual projects in microbiology research areas drawing upon the Honey Bee Network Database and microbial diversity collection:-

SRISTI has a Microbial diversity bank containing 8000+ organisms (bacteria, fungi, and actinomycetes) isolated from the soil samples collected during Shodh Yatras in different parts of the country (http://www.sristi.org/cms/shodhyatra, http://www.sristi.org/cms/?q=en/sristi-laboratory,http://www.sristi.org/cms/microbial-memories,http://www.sristi.org/cms/outcomes).An extensive study of screening, characterizing and augmenting these isolated microbes for novel human, animal, agricultural and industrial application would be conducted.

The abstracts along with the objective of the projects will be shared with the selected students one week before the start of the BIIS. The participants would be expected to develop a project proposal and a work plan. These students would receive an expert feedback on their proposals from the reviewers. These students will also receive hands-on training in various techniques of microbiology along with various lab equipments (AAS, HPTLC, HPLC, PCR, Gel Doc etc.) as per the need of the project in the first week of the event. The Faculty from the institutions of participants can also be associated with their projects as external supervisors.

It is hoped that each participant becomes a volunteer of the Honey Bee Network which has helped in scouting and disseminating rural creativity and innovation over the last three decades.

All the output will be credited to the knowledge providers and can be published thereafter with prior written concurrence and in some cases, as applicable, with the involvement of the BIIS team and knowledge providers.

Highest ethical code of Biotech research is expected to be followed. Team spirit and willingness to develop open source solutions will be highly encouraged. Peer learning will be strongly encouraged. The findings will be shared with knowledge providers and community conservators of soil ecosystem health and consequent microbial diversity in local language with the help of SRISTI and Honey Bee Network team.

Students are invited to participate in this SRISTI-BIRAC initiative by sending their resumes at BIIS@sristi.org. Students of microbiology/biotechnology, are specially invited to apply and preference will be given to women candidates. Those who are interested to work on SRISTI's microbial resources should write one page note on what kind of research they would like to do, why & how? All the students would get an invaluable opportunity to interact with both national and international experts as well as grassroots practitioners/innovators in their respective fields.

Last date for submission of application is April 27, 2018.

Kindly email at BIIS@sristi.org or call at 9227761140 for further queries

# Annexure I

**The fifteen awarded projects of BIIS -3 (February 5th -26th, 2018)**

1. **Project Title**:- Polyhydroxyalkanoates Production by Microorganisms from Sustainable Resources
   **Participant's Name-** Dr. Bhakti Salgaonkar

## Results

Microbiological analysis of the given soil sample AN39, AN41 & GA10

↓

(a) Nutrient Agar (Bacteria)
(b) Soil Extract Media (bacteria)
(c) Potato dextrose agar (Fungi)
(d) Actinomycetes Isolation agar (Actinomycetes)

↓

Isolation & Purification of unique microorganisms

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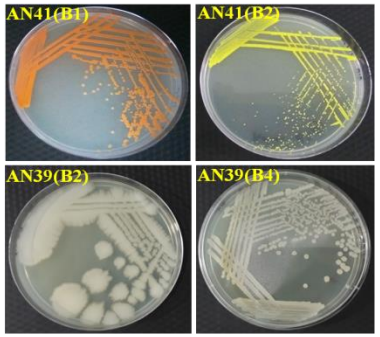
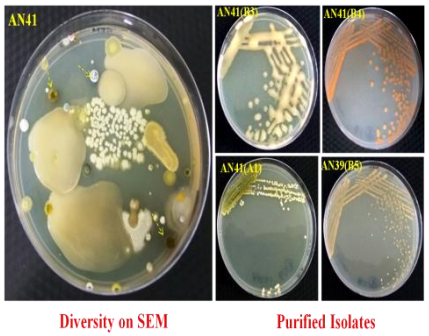
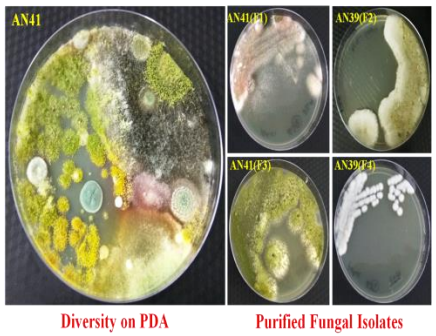
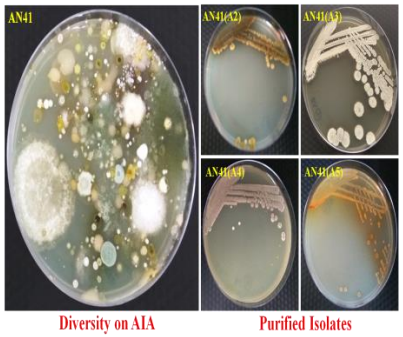
Colony characterization & maintenance of microorganisms on slant

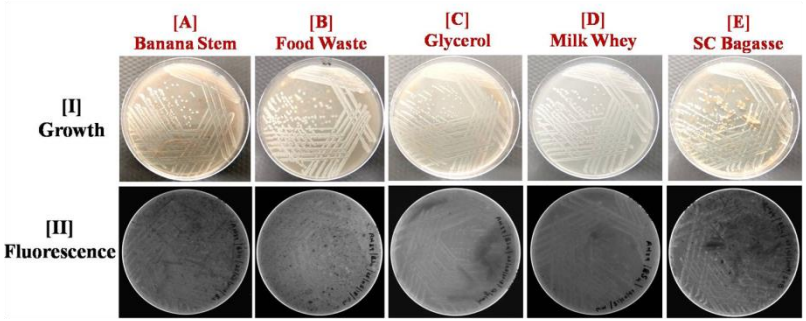


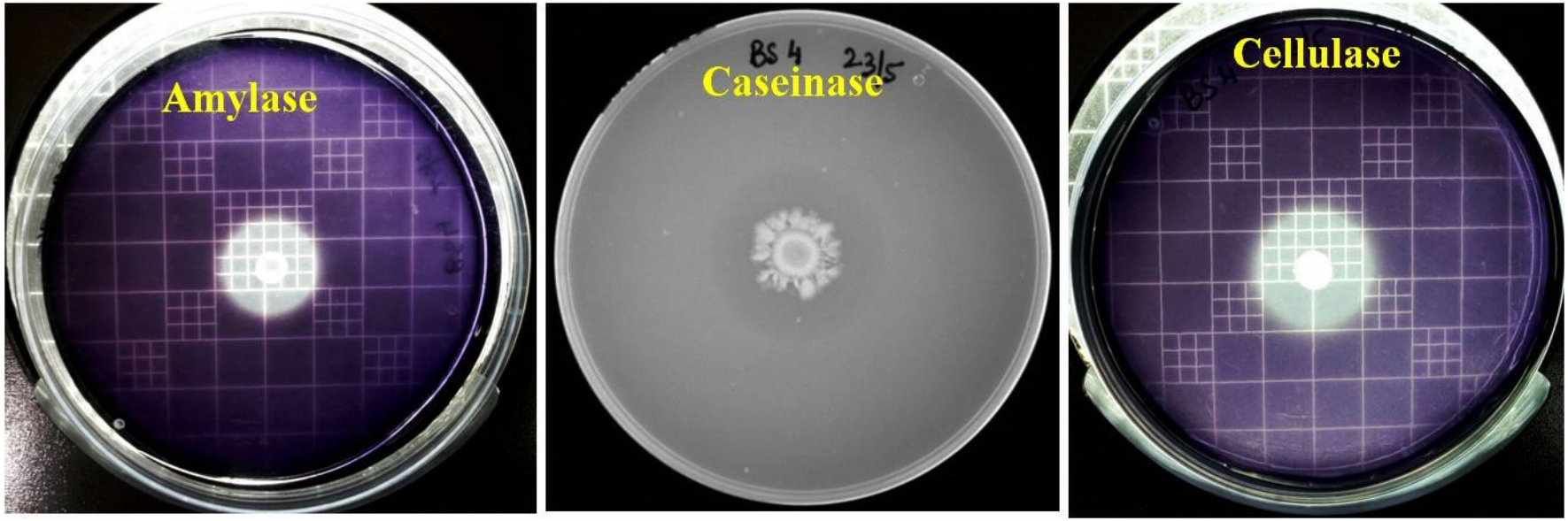

## Screening using waste substrates




**Results:**

Among the thirty two bacterial isolates screened for synthesis of polyhydroxyalkanoates (PHAs), two isolates AN39BS(B2) and AN39BS(B4) exhibited the best PHA accumulation and were tentatively identified as *Bacillus* sp. based on phenotypic characterization.

# Screening for extracellular enzymes




**Future work to be done:**

**Bulk PHA production** and its quantitative estimation, **Growth kinetics** & understanding its PHA accumulation pattern, **Characterization of the wastes, Fermentor scale polymer production**, extraction and characterization of the polymer, and **Identification of the potential strain**

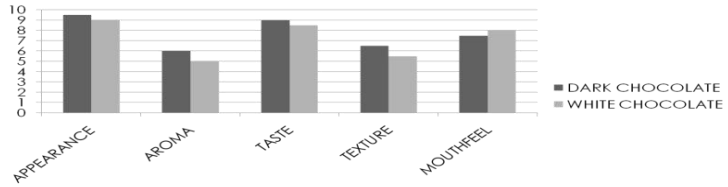
2. **Project Title:-** Development of Tri-Pro Bites

**Participant's name: -** Gauri .A. Sawant

## Sensory evaluation

Sensory evaluation was conducted on the parameter of **taste** , **aroma** , **mouthfeel**,**overall acceptance**
Sensory panel was of 25 people, which were asked to rate the product according to the parameter mentioned, in the score of 10.
They were asked to write their suggestion and were asked a question i.e "**will you like to buy the product at the price mentioned, yes /no? why?**

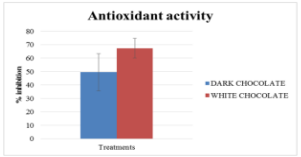
## Results & Discussion

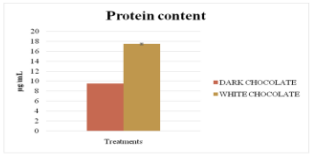


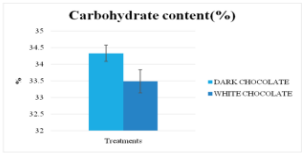

As per the sensory evaluation it was found that , people liked more white chocolate over dark chocolate and even agreed to buy the product t the given cost.

## Proximate composition of Product

| Parameters | White chocolate | Dark chocolate |
|---|---|---|
| Moisture (%) | 17.63% | 16.42% |
| Ash | 2.06g | 2.45g |
| Total Carbohydrates (%) | 34% | 33.5% |
| Total Fibre (%) | 3.6% | 2.8% |
| Protein | 8.5% | 16.5% |
| Antioxidant | 50% | 65% |




## Preliminary screening of extract

| Test | Observation | Results |
|---|---|---|
| Carbohydrates | Purple band (fig.1) | + |
| Alkaloids | Formation of redish brown ring (fig.2) | + |
| Saponins | Formation of foam(fig.3) | + |
| Steroids | No yellow colour with green florosence(fig. 4) | - |
| Tannins | Formation of green colour(fig.5) | + |

## Proximate analysis of extract

| Parameters | Wet weight basis | Dry weight basis |
|---|---|---|
| Moisture (%) | 88.30 +/- 0.02 | ——— |
| Total ash (%) | 050+/- 0.01 | 4.27 +/- 0.09 |
| Crude protein (%) | 4.38 +/- 0.03 | 37.44 +/- 0.26 |
| Total carbohydrates (%) | 4.80+/- 0.01 | 41.03 +/- 0.09 |
| Crude lipid (%) | 0.10 +/- 0.01 | 0.85+/- 0.09 |
| Crude fibre (%) | 1.92+/- 0.03 | 16.41+/- 0.26 |
| Energy (kcal/100g) | 37.62+/- 0.61 | 321.54+/- 5.21 |

**Results:**

As per the sensory evaluation it was found that, people liked more white chocolate over dark chocolate and even agreed to buy the product t the given cost.

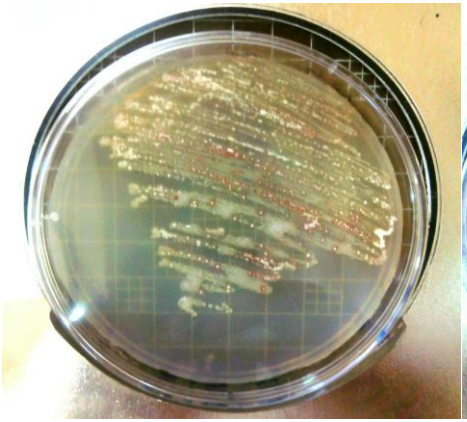
**Future work to be done**: -

- To study **anti-microbial activity** of the product against **diarrhea** causing organisms
- To increase the **self-life** of the product by altering **processing factors** and without using any preservatives
- Making it **cost effective**
- Infusing **Ashwagandha** (rennet) as it has many medicinal properties
- Studying the market and working on packaging of the product

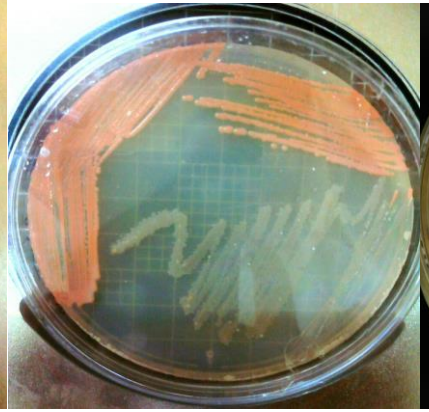
**3. Project Title:-** Isolation and characterization of pigment producing microbes from Andaman and Nicobar soil sample and their applications.

**Participant's name: -** Patel Kalgi Piyushkumar

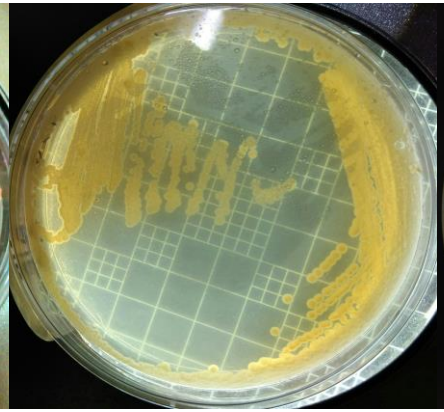
# Microbial colonies with pigments



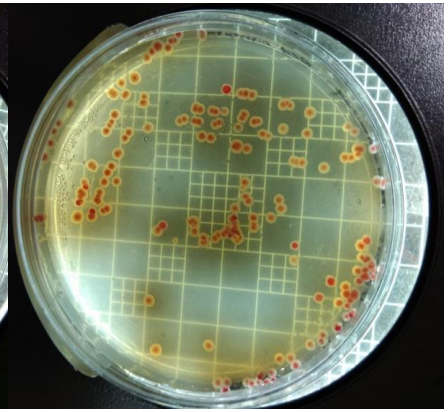
AN 17.1



AN 17.2

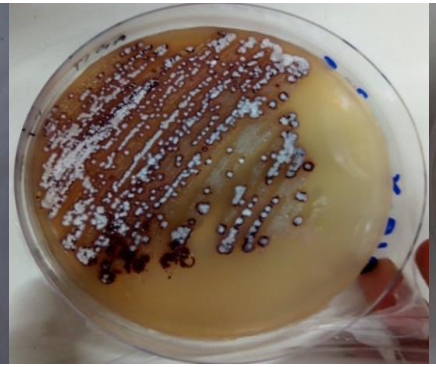


AN 17.3

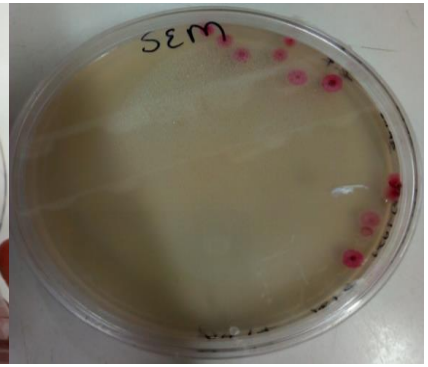


AN 17.4

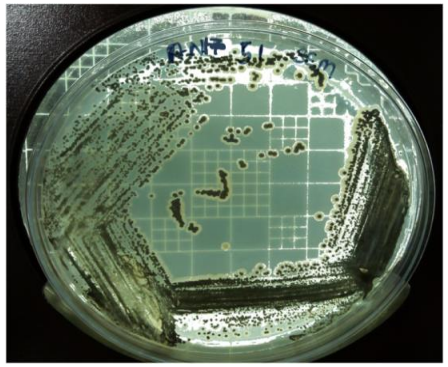
AN 17.5



AN 17.6




AN 17.7



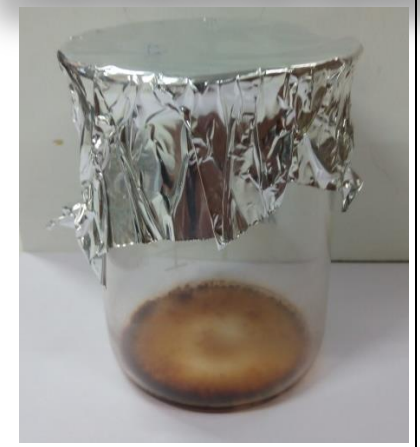
AN 17.8

**Pigments in fermentation broth.**

**Extraction by solvent extraction method.**

**Separation by separating funnel.**

**Thin layer chromatography**



**Dry weight pigment**

**Results: -** One of the isolate has produced 0.7677 gm pigments per 100ml broth. At optimum conditions of pH - 6.84 and Temp - 30.7 ºC, a significant yield of 7.67 ± 0.6 mg/mL was observed.

**Future work to be done**: -

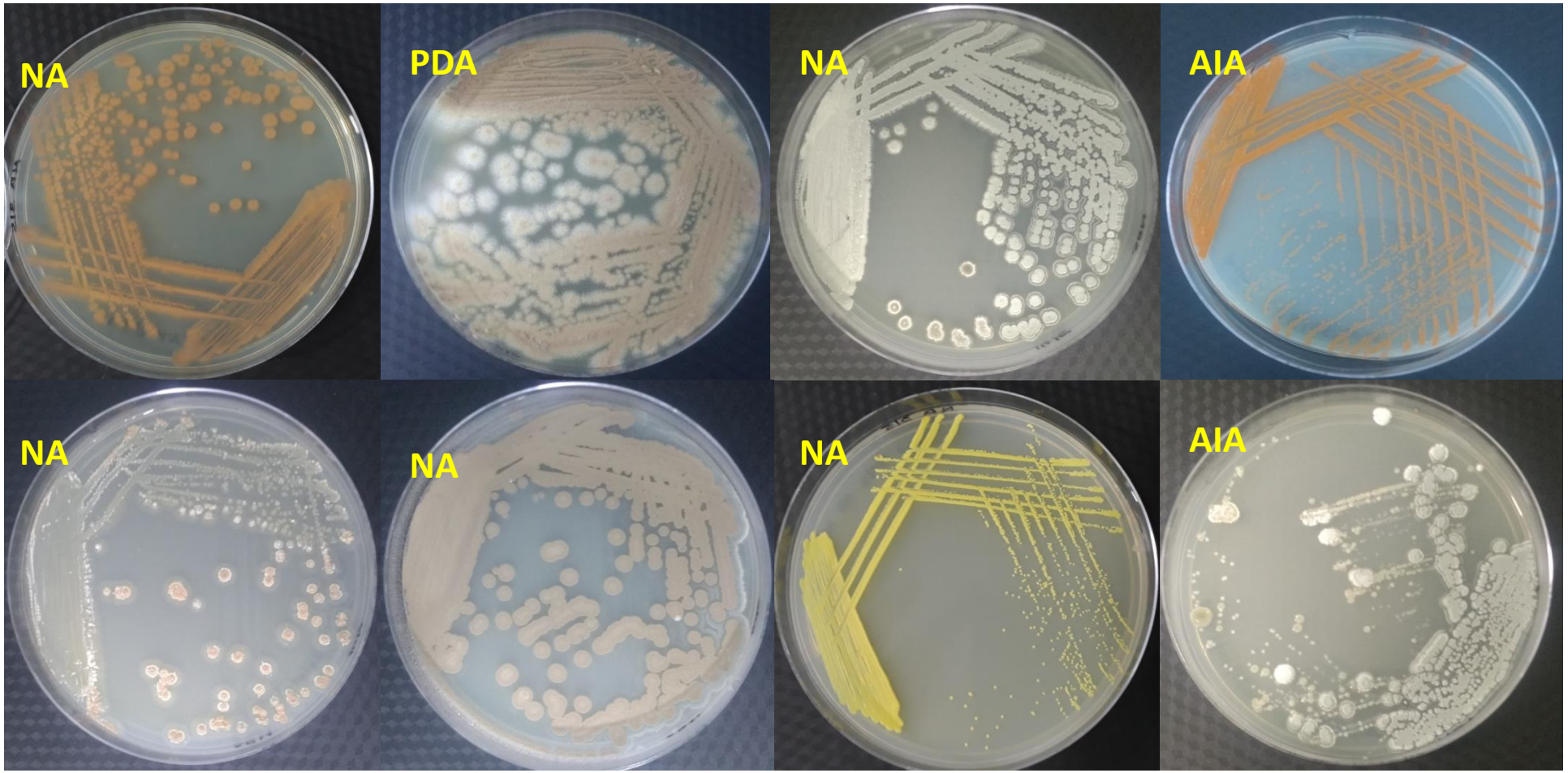
- To check antioxidant activity.
- Characterization of pigments based on biochemical properties.
- Estimation of pigment contents and its global availability.
- Utilization of natural pigments in foodstuff, dyestuff, cosmetic and pharmaceutical manufacturing.

4. **Project Title:-** Revival Of Sristi Microbial Bank Cultures and Screening of Potential Cellulose Degrading Bacteria
   **Participant's name: -** KashikaYadav

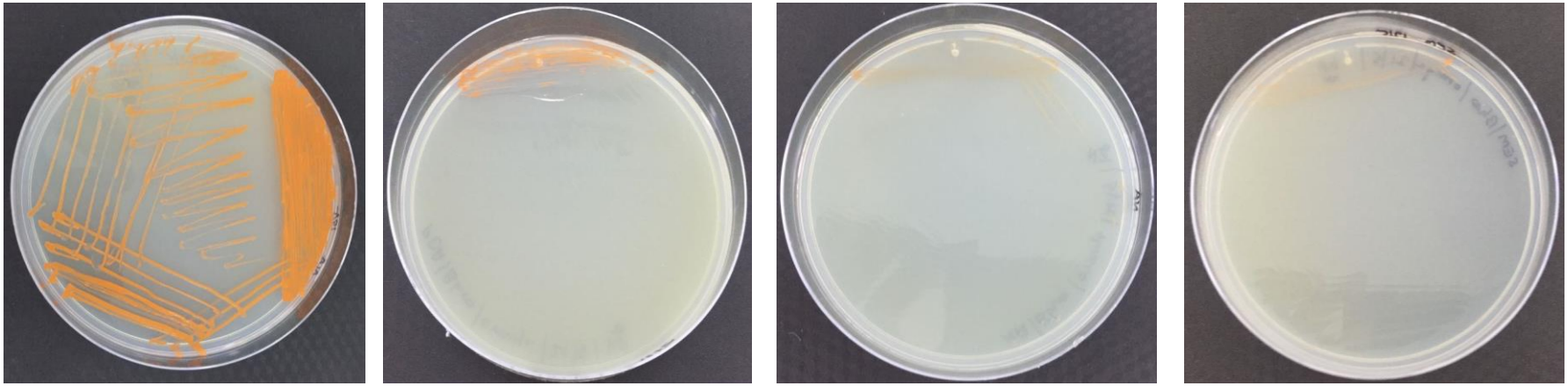
**Results:-**
**Future work to be done:-**

5. **Project Title:-** Microbial Synthesized Pigments as a Natural Food Colorants
   **Participant's name: -** Krishnapriya. V

# PURE CULTURE OBTAINED



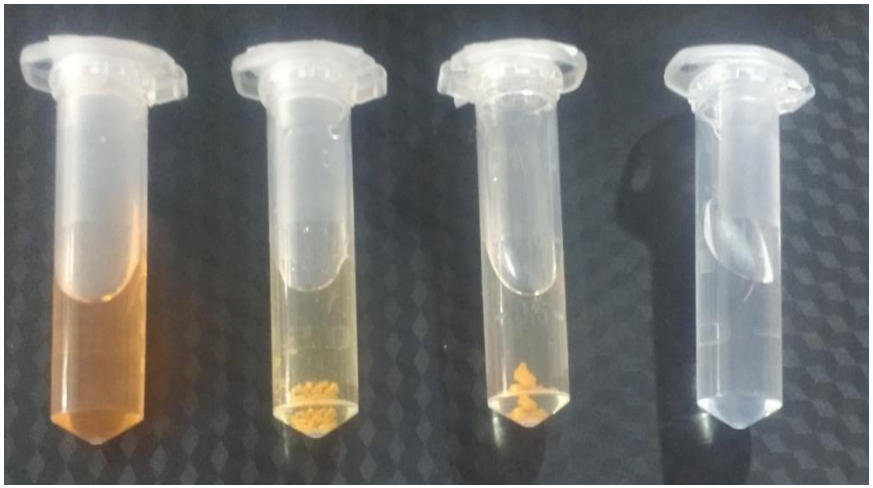
# Pure culture in 4 different media



**AIA** **PDA** **SEM** **NA**

# Pigment production in broth and extraction

**DMSO ACETONE METHANOL CONTROL**

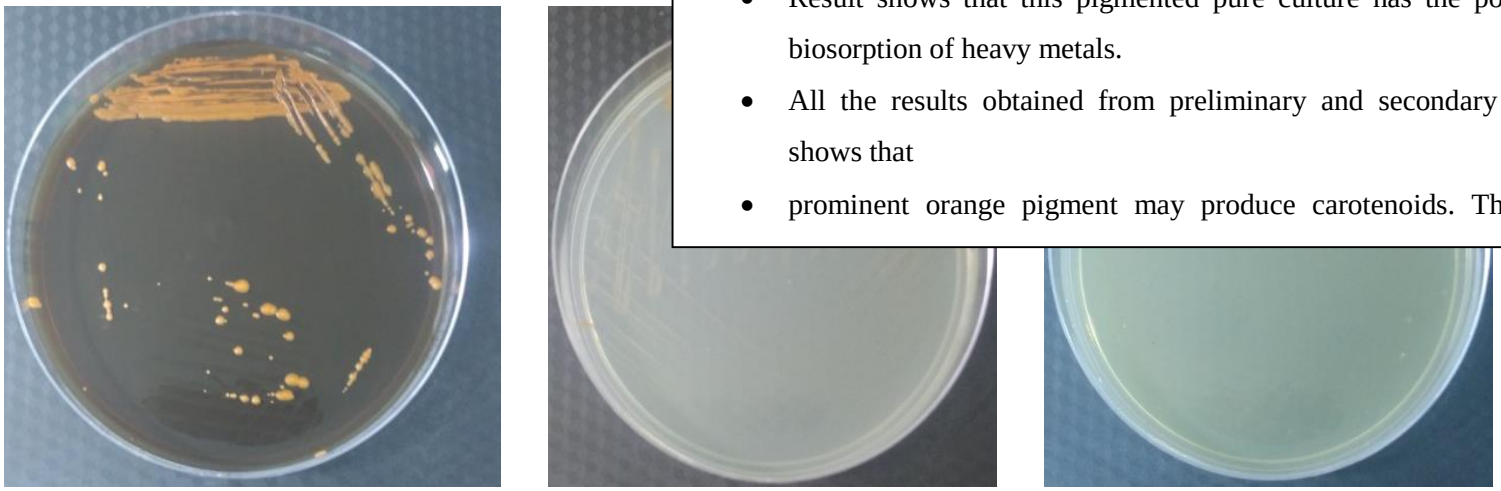


**Extraction in DMSO is more when compared to acetone and methanol**

# BIOSORPTION

Results:-

- DMSO acts as best solvent for pigment extraction.
- Result shows that this pigmented pure culture has the potential for biosorption of heavy metals.
- All the results obtained from preliminary and secondary screening shows that
- prominent orange pigment may produce carotenoids. This can be



**$AgNO_3$** **$CuSO_4$** **$FeCl_2$**

This organism may act as biosorbents since it tolerate heavy metals and survive in the metal coated media

**Future work to be done:-**

- Characterization of the pigments using various analytical techniques such as HPLC, TLC, HPTLC.
- Screening of potential strain and Production of natural pigments producing carotenoids in large scale.
- Identification of potential strain at molecular level.
- Improved techniques to identify biosorbent properties which are efficient in removal of heavy meals from industrial waste water.

6. **Project Title:-** Revival of bacterial culture collected from various untouched niches of India from SRISTI Microbial Bank
   **Participant's name: -** Kriti Maurya

**Results:-**

**Future work to be done:-**

- Optimization of growth and production of enzyme at large scale.
- Enzyme assay test.
- 16s rRNA gene sequencing.
- Separation of active compounds by HPTLC fingerprinting.
- Chemical characterization of the compounds obtained.
- Further on obtaining any novel products going for LC/MS.

**7. Project Title:-** Development of nutritious anti-diabetic dessert

**Participant's name: -** Krutika Sawant

Sensory score card

| Color | Aroma | Flavour | Taste | Body & texture | Mouthfeel | Overall acceptability |
|---|---|---|---|---|---|---|
| 7.40±1.20 | 7.09±1.20 | 7.4±1.20 | 7.10±1.20 | 7.30±1.20 | 7.1±1.20 | 7.3±1.20 |

Table 2

| Sample | Moisture In % | Ash In % |
|---|---|---|
| 1 | 30.085 | 7.53 |
| 2 | 11.32 | 7.01 |
| 3 | 11.69 | 8.13 |

Table 2

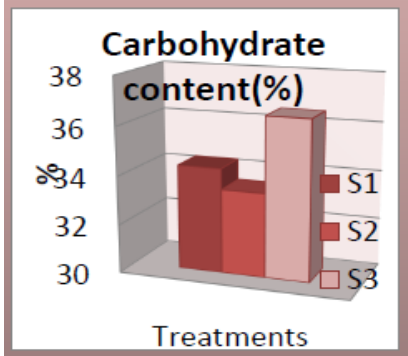



Fig 1:Carbohydrate content for attempt 3,4 and 5

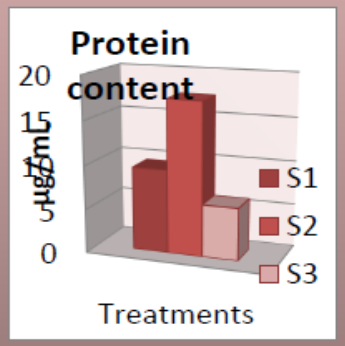



Fig 2:protein content for attempt 3,4 and 5

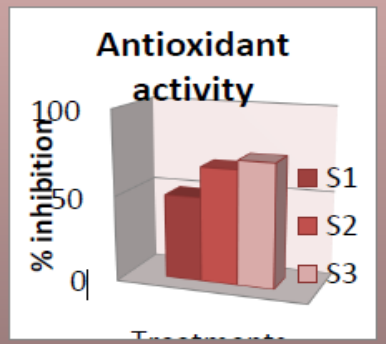



Fig 3: Antioxidant activity for attempt 3,4 and 5

**Results:-**

- Proximate composition increased with increase in flour concentrations
- Keeping in consideration the sample 3 may be used as an antidiabetic dessert

**Future work to be done**:-

- Addition of *Tinospora Cordifolia* also known as Giloy
- To make it an antidiabetic food which may have ability to cure the type 2 diabetes

8. **Project Title: -** Synbiotic formulations of Pearl millet and camel milk using potent combinations of LAB isolated from minor cereals, seeds, and milk.

**Participant's Name-** Poornima Saraswat

# Formulation of Food Model System:

## Model 1 (Control)

- Pearl millet +Soybean (1:1)
- Soaked overnight in 5 times volume of RO Water
- Boiled with toned ‘amul’ milk till milk becomes consistent
- Added with Jaggery syrup in 1:4 Ratio

## Model 2 (Fermented with Whey of camel milk)

- Pearl millet +Soybean (1:1)
- Soaked overnight in whey of
- Boiled with camel milk till mil
- Added with Jaggery syrup in

## Model 3 (Fermented with came

- Pearl millet +Soybean (1:1)
- Soaked overnight in pasteuriz
  ‘amul’ yogurt.
- Boiled with camel milk till milk becomes consistent
- Added with Jaggery syrup in 1:4 Ratio

**Results:**

Fermentation with camel milk of cereal based food product is not only enhancing the total protein, Anti-oxidants and minerals but it is also showing ‘likeable’ acceptability in sensory evaluation. Also, potent Lactic acid producing bacteria needs to be isolated from camel milk through which this model food system can be fermented, and its nutritional index can be more enhanced with some novel single cell proteins called ‘Bacteriocins’.

**Future work to be done:**

- To validate this Functional food model for formulation of synbiotic pearl millet and camel milk. Potent LAB needs to be characterised.
- Stability of the culture into the food model needs to be studied.
- The digestibility assays, glycemic Index and antihypertensive assays needs to be formulated to commercialise the product as a functional synbiotics.

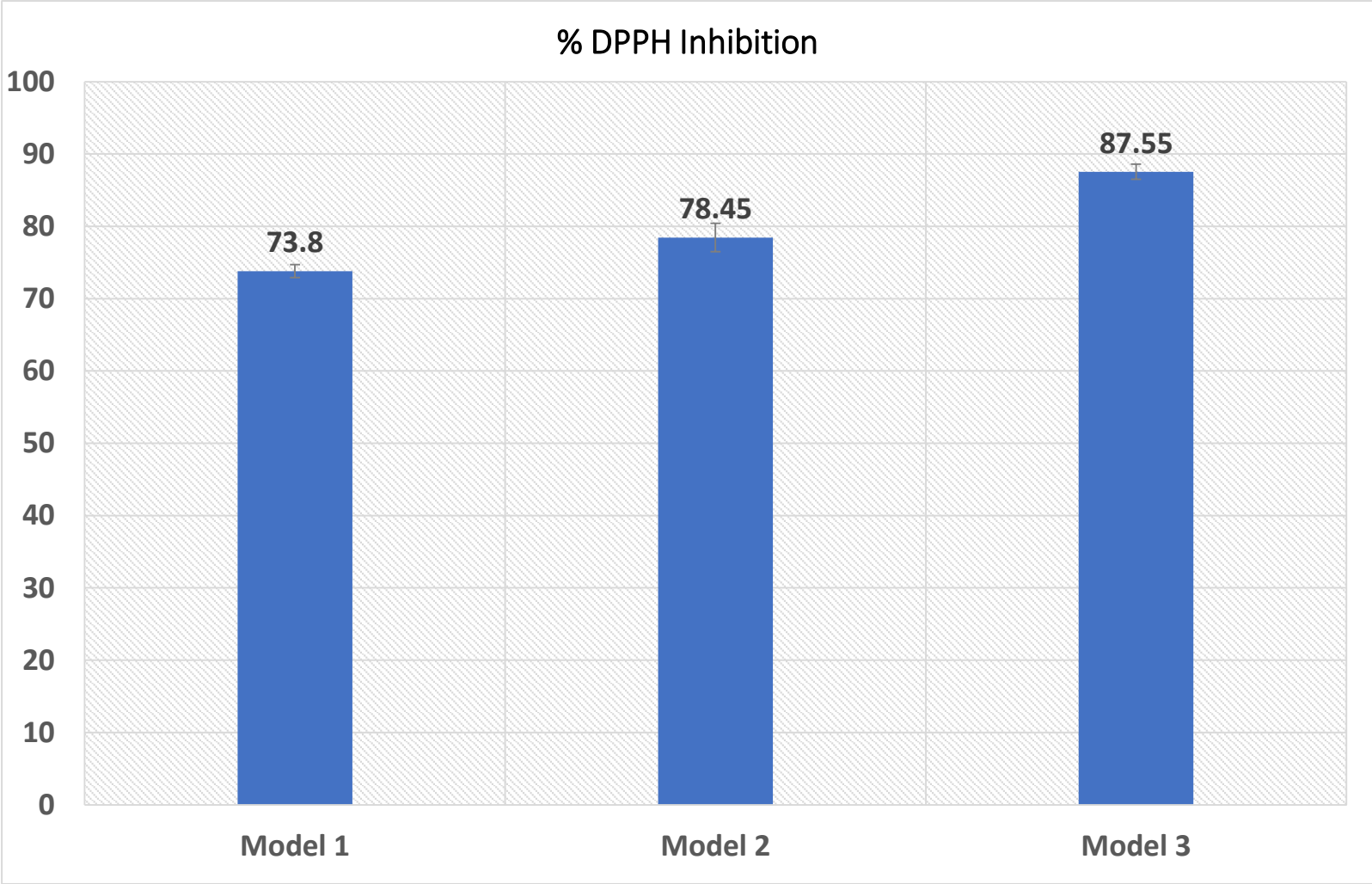
ory
ation

- Proximate analysis of the developed food model system following standard methods. (AOAC, 1990)

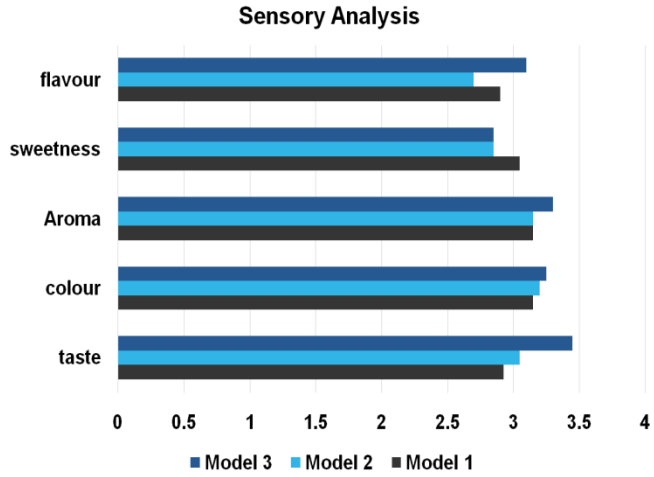
| | Model 1 | Model 2 | Model 3 |
|---|---|---|---|
| Moisture% | 62 | 80.5 | 65 |
| Fat% | 1.81 | 2.325 | 2.23 |
| Carbohydrates% | 30.8 | 30.46 | 31.36 |
| Crude Protein% | 5.42 | 4.525 | 8.97 |
| Ash% | 3.5 | 1 | 6.5 |
| TS% | 38 | 19.5 | 35 |
| Kcal ~100gm | 164.79 | 164.36 | 185.42 |

(Proximate analysis of food models as per AOAC,1990, Std error*±5)

# Antioxidant assay:

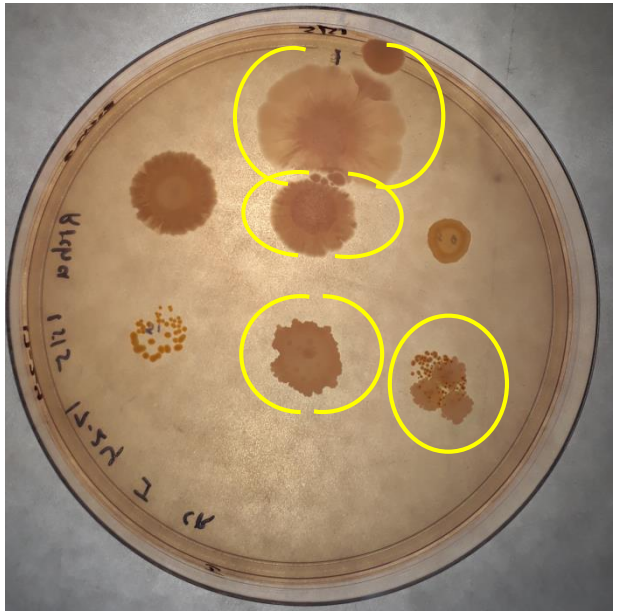


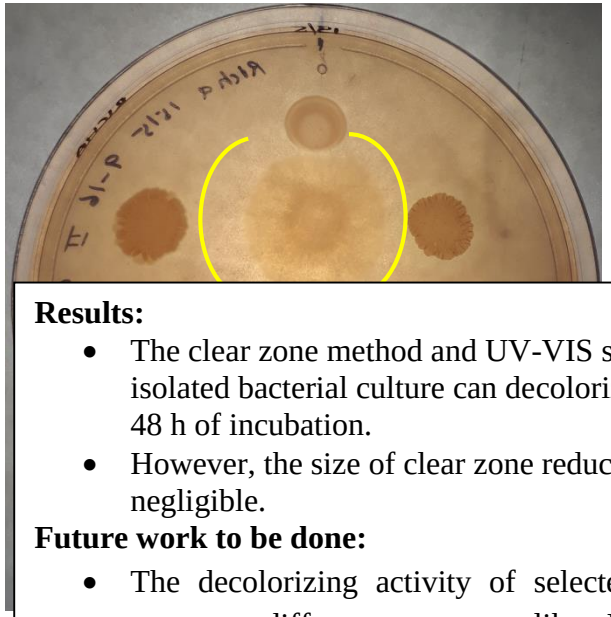

**% DPPH inhibition for the food models**

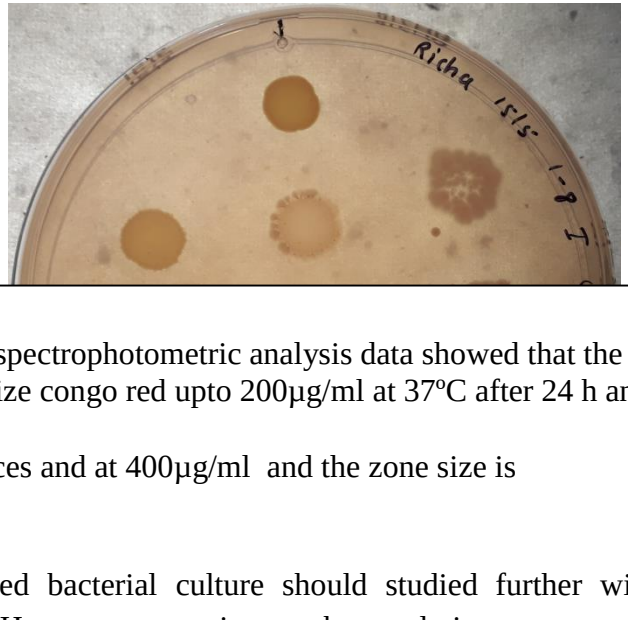



9. **Project Title:-** Microbes Assisted Sustainable Decolourization of Azo Dyes
   **Participant's name: -** Richa Kumari

# Preliminary results of dye decolorization







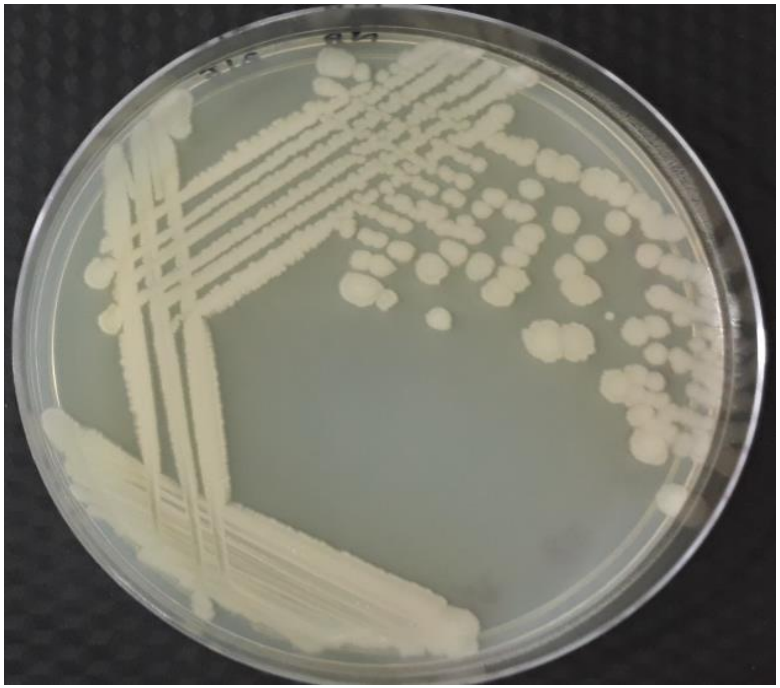
**Potential cultures producing clear zone agar plates**

**Results:**

- The clear zone method and UV-VIS spectrophotometric analysis data showed that the isolated bacterial culture can decolorize congo red upto 200µg/ml at 37ºC after 24 h and 48 h of incubation.
- However, the size of clear zone reduces and at 400µg/ml and the zone size is negligible.

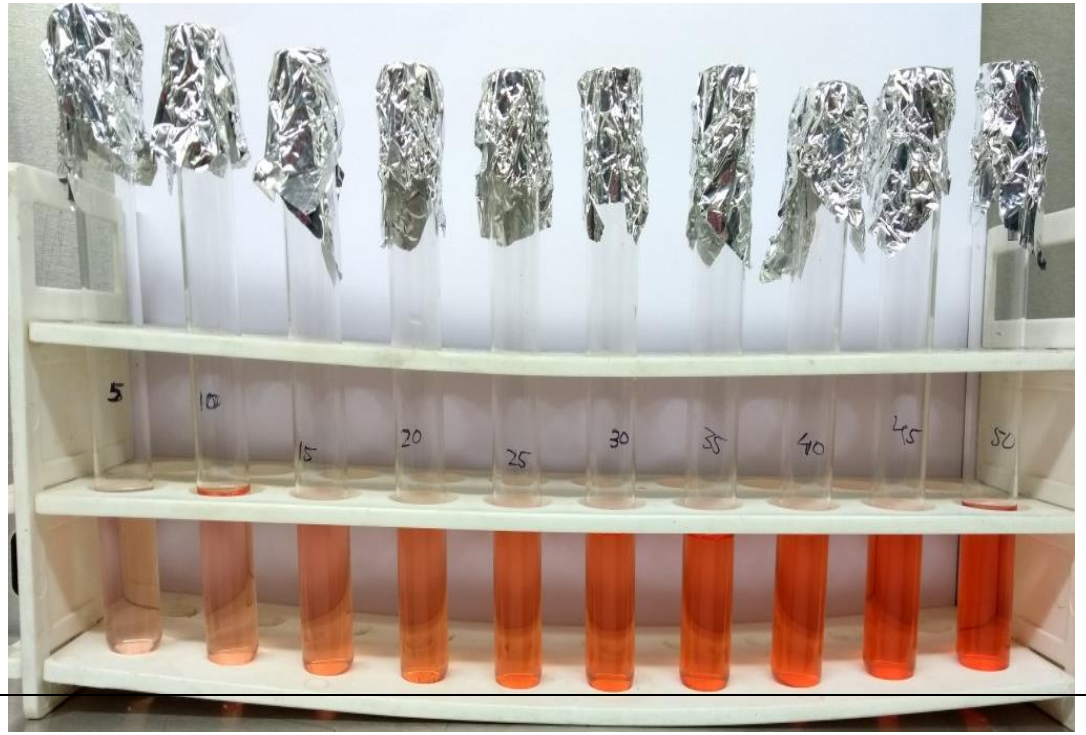
**Future work to be done:**

- The decolorizing activity of selected bacterial culture should studied further with respect to different parameters like pH, temperature, time, carbon and nitrogen sources, oxygen and agitation, dye structure, electron donor and redox mediator % dye decolorization estimation.
- Optimization and standardization of the decolorizing process is warranted to obtain maximum decolorizing activity and to identify the factors affecting the high activity.
- Since the soil samples comes from untapped area in India where anthropological interference is restricted, identification of the selected bacterial culture with suitable molecular techniques (16S rRNA sequencing) could lead us to the novelty of this study (a possible novel organism for bioremediation of azo dyes).



**Isolated and purifies streak plate of the microbial culture giving maximum clear zone with congo red infused nutrient media. (B4, AN 39)**

**Different dilutions of congo red made with nutrient broth in increasing concentrations for UV-VISIBLE spectrophotometric analysis with selected bacterial inoculum.**



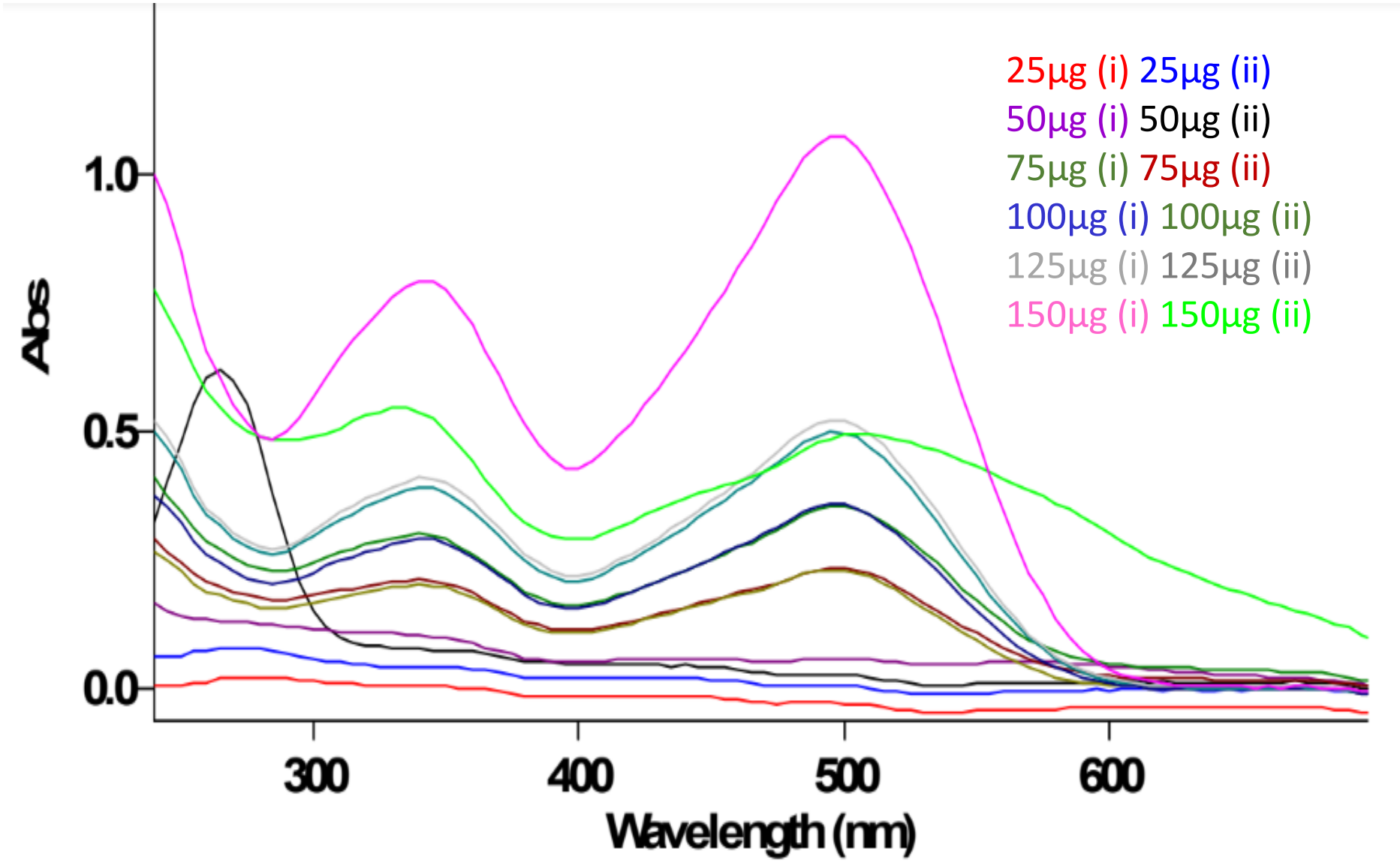



**Figure 12. UV-VIS spectrum of the 0h old cell free supernatant**

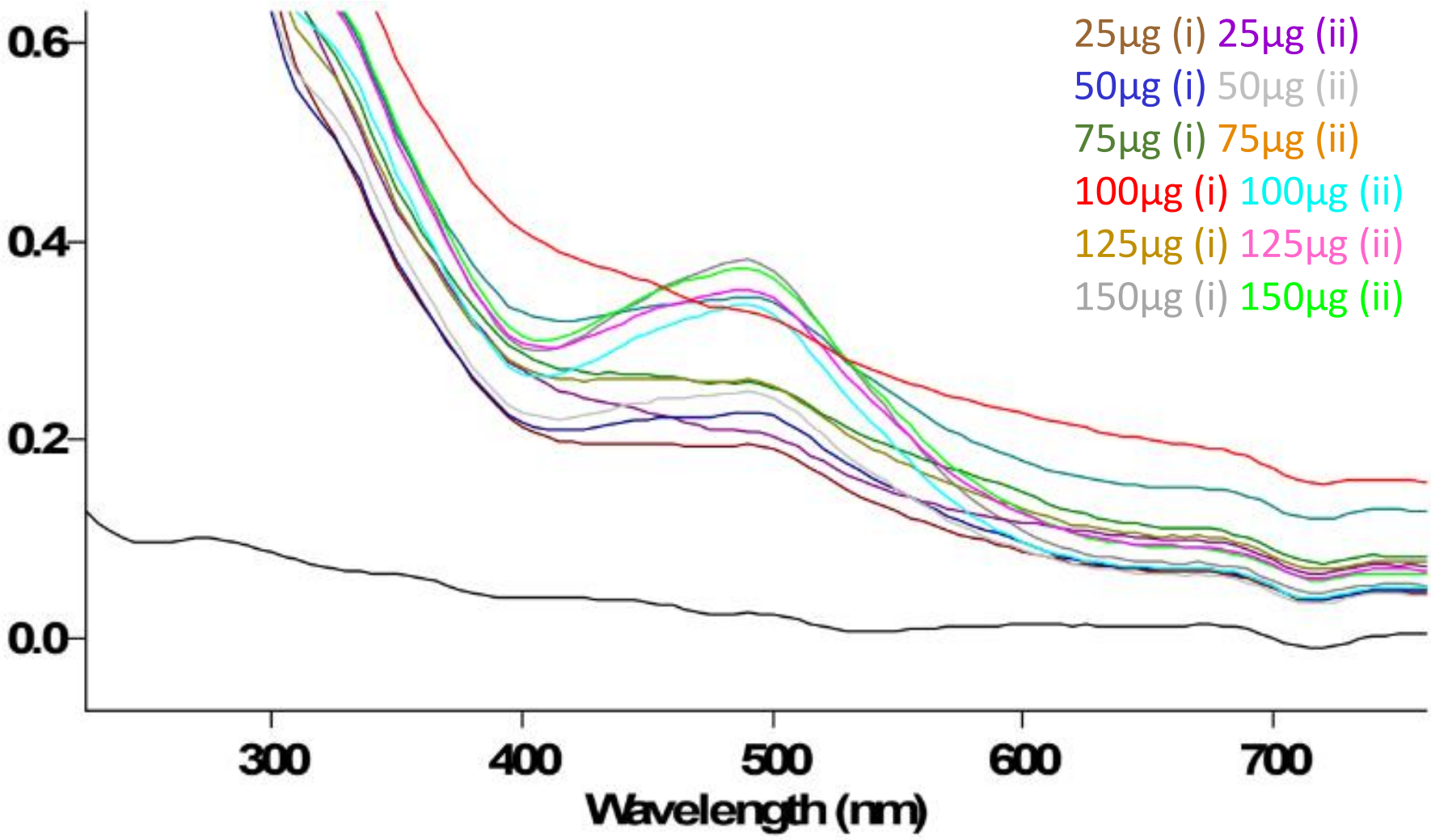
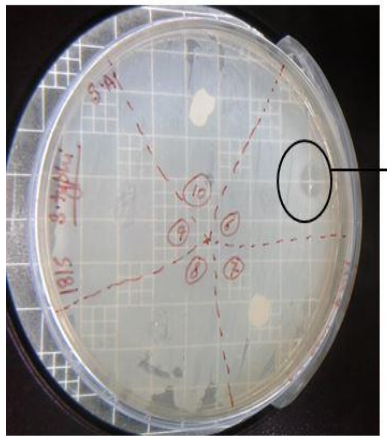



**Figure 13. UV-VIS spectrum of the 24 h old cell free supernatant**

**10. Project Title: -** Screening of organism from SRISTI'S microbial bank for determination of potential antimicrobial activity along with its characterization

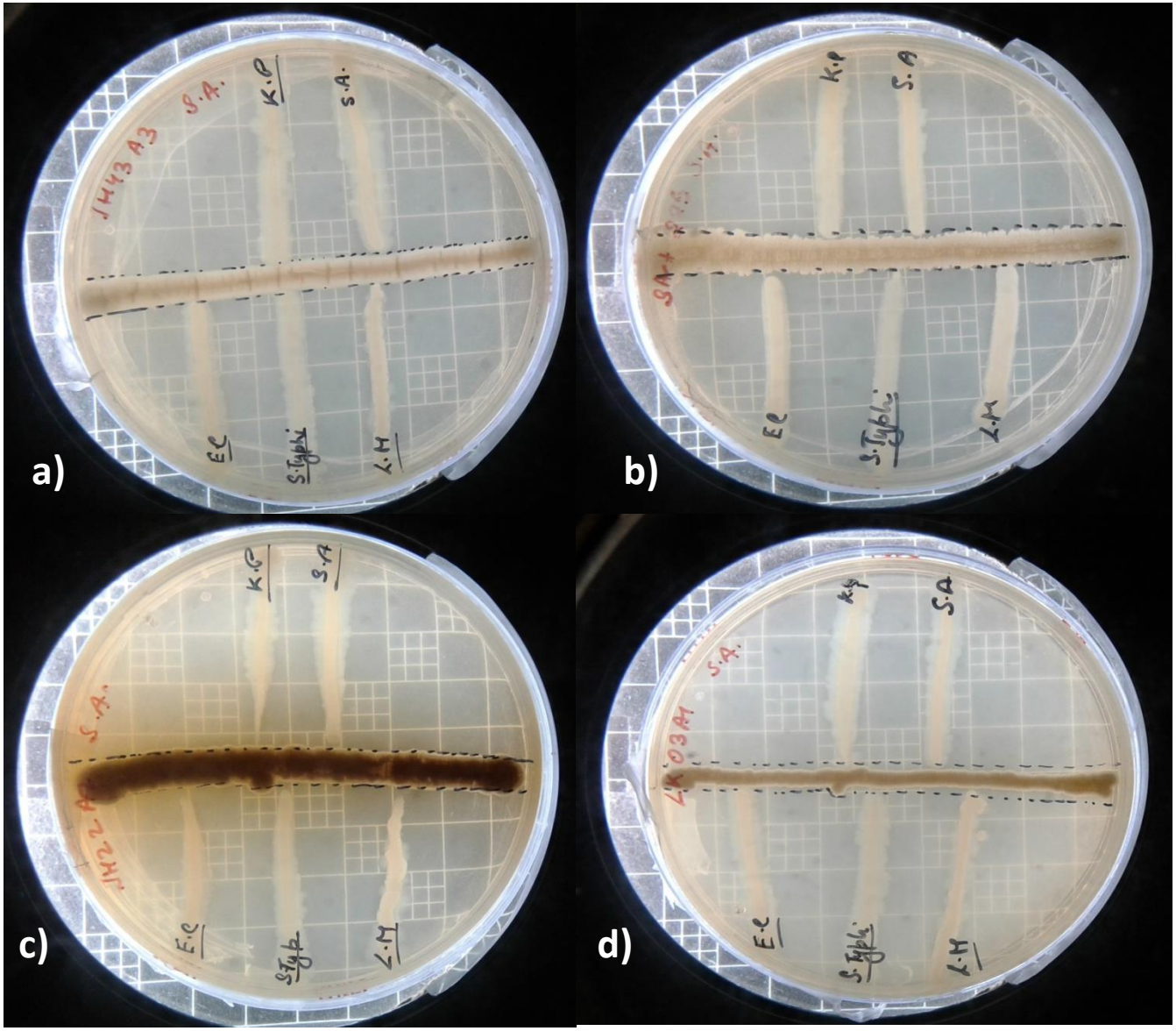
**Participant's name: -** Sagorika Adhikari

Potential antibiotic activity shown by a bacteria on *Salmonella typhimurium*



Zone of inhibition of a potential isolate from sample AN-45

# Actinomycetes primary screening against human pathogens.



## RESULT
## (potential antimicrobial activity)


**Potential antimicrobial activity.**

**Results: -**

- From the results so far obtained, we have observed a few potential isolates that has shown antimicrobial activity.
- Further their secondary screening and chemical characterization would be done to check its commercial viability.

**Future work to be done:-**

- Optimization of growth and production of secondary metabolites.
- Separation of active compounds by HPTLC fingerprinting
- Chemical characterization of the compounds obtained
- Further on obtaining any novel products going for LC/MS

**11. Project Title:-** Isolation & characterization single cell protein (phyenylalanine) producing microorganisms from soil sample and production & purification of it using cost effective technology

**Participant's name: -** Soumya Yadav

# Isolation of potential organisms

**Spread dilution on specific media.**

**Fig . 1 Growth of organisms on selective plate**

**Isolated and purified on selective plate (paraffin , dodecane containing N agar plate)**

**Fig. 2 Isolated colony on selective plate**

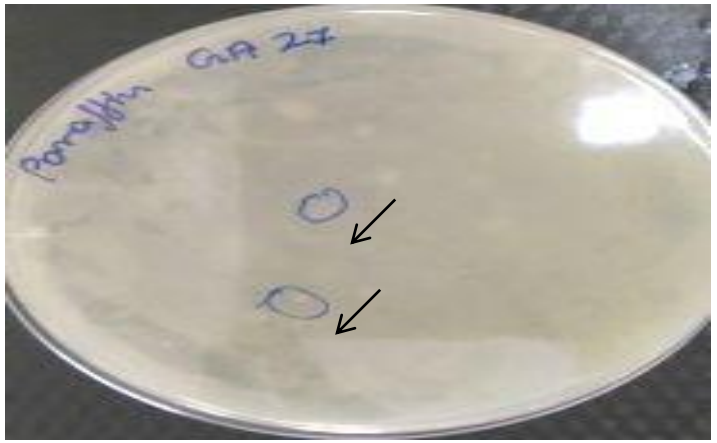


**Fig. 3 Growth of organisms on selective plate**

**Fig. 4 Isolated colony on selective plate**

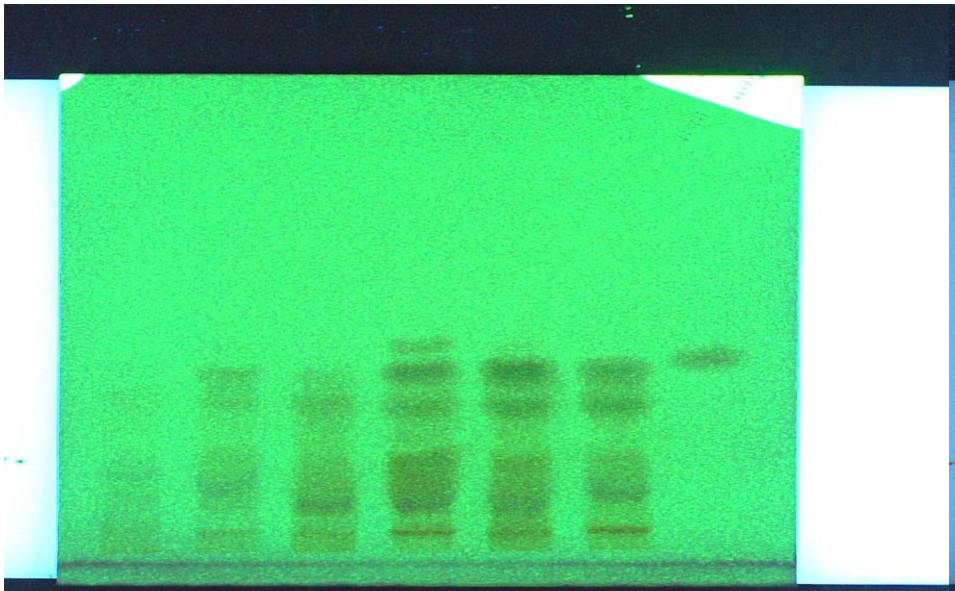


Fig. 7 Scanning at 254 after derivatization

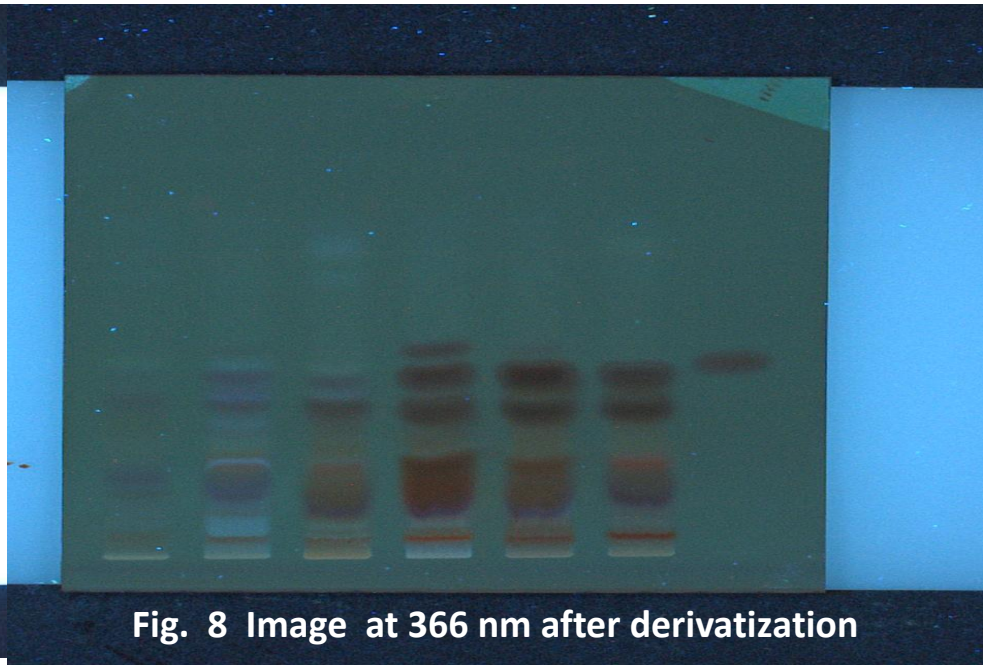


Fig. 8 Image at 366 nm after derivatization

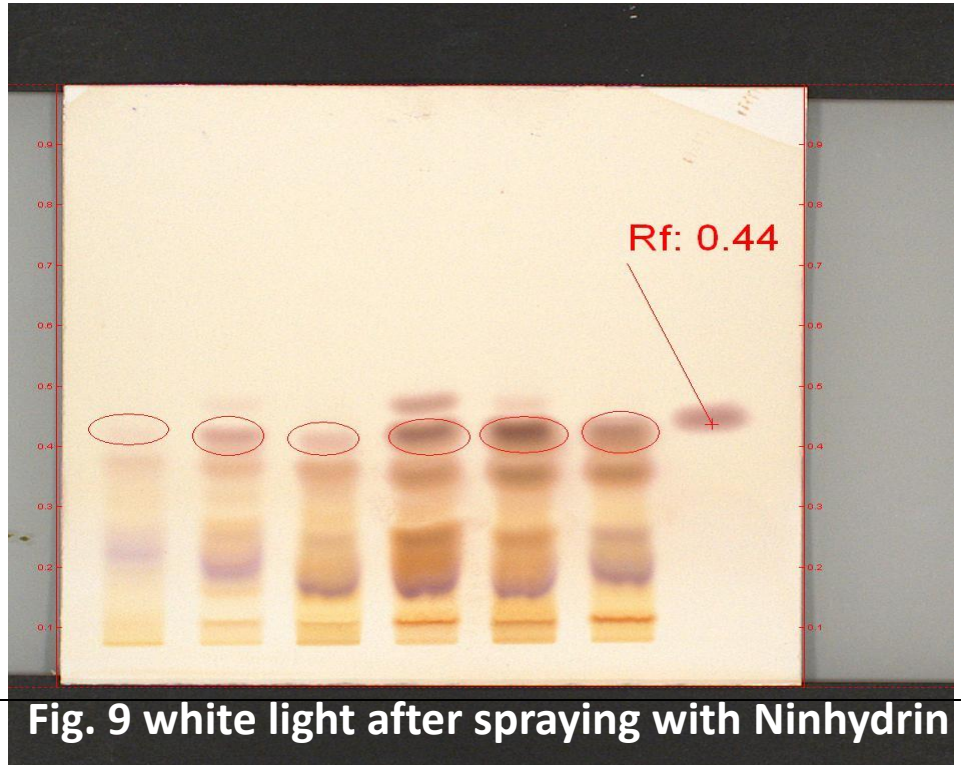
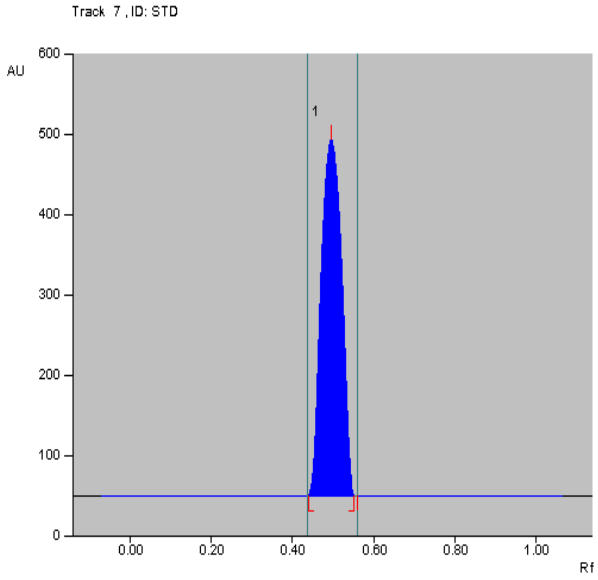



Fig. 9 white light after spraying with Ninhydrin

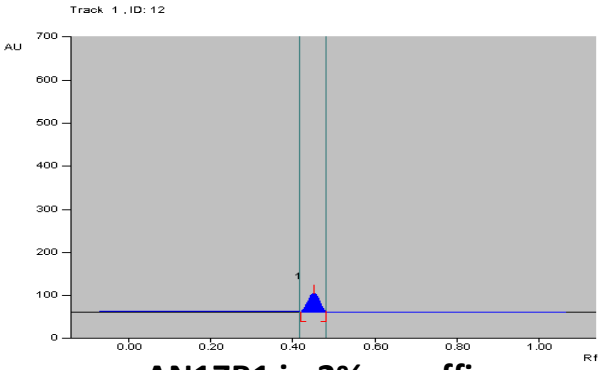
**Phenylalanine detection in each sample and comparison**

| Track no. | RF VALUE | AREA | Compounds |
|---|---|---|---|
| 1 | 0.44 Rf | 434.5 AU | Phenylalanine |
| 2 | 0.44 Rf | 1773.3 AU | Phenylalanine |
| 3 | 0.44 Rf | 238.6 AU | Phenylalanine |
| 4 | 0.44 Rf | 4392.1 AU | Phenylalanine |
| 5 | 0.44 Rf | 6962.2 AU | Phenylalanine |
| 6 | 0.44 Rf | 6227.7 AU | Phenylalanine |
| 7 | 0.44 Rf | 10172.4 AU | Standard Phenylalanine |

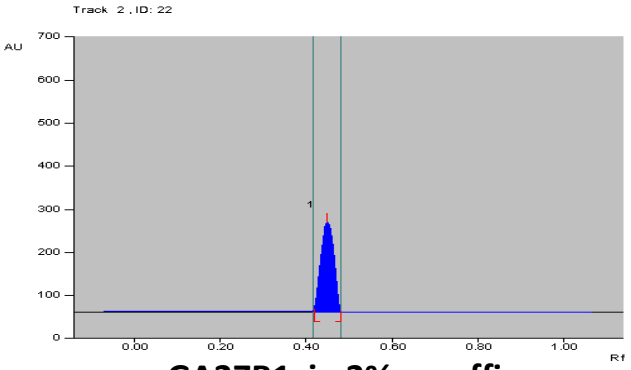
# HPTLC analysis



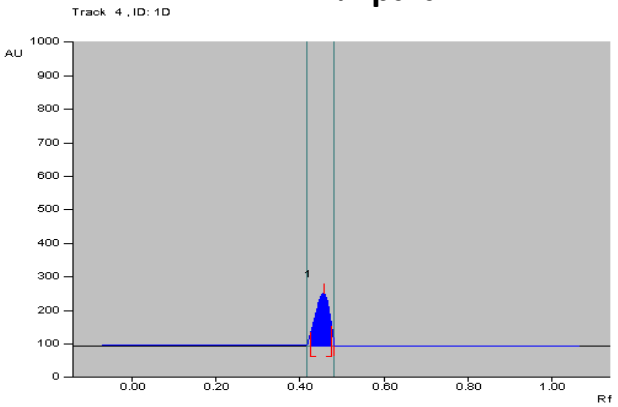

Standard



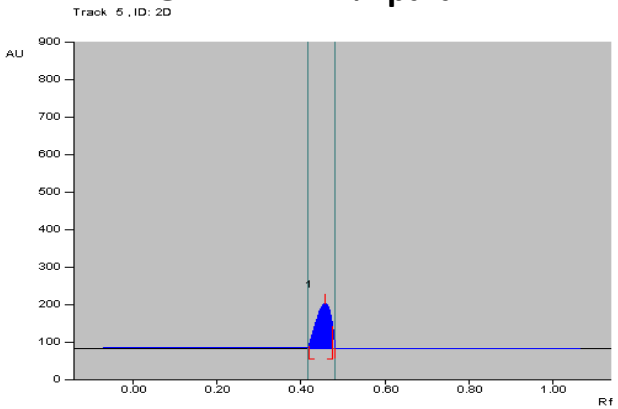

AN17B1 in 2% paraffin



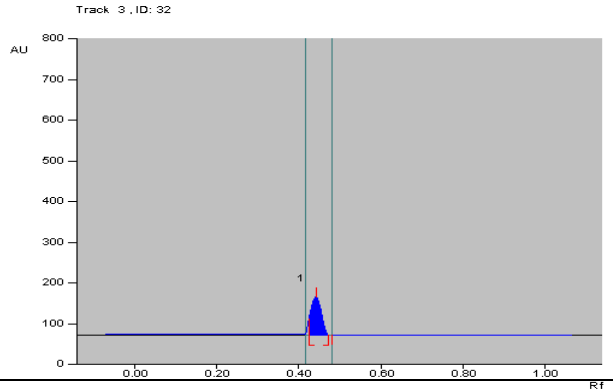

GA27B1 in 2% paraffin



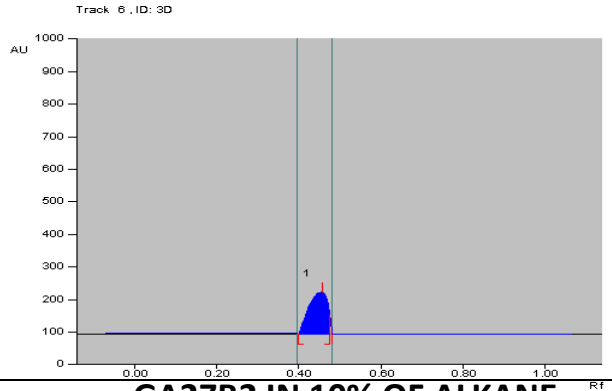

GA27B2 IN 2% OF PARAFFIN




AN17B1 IN 10% OF ALKANE




GA27B1 IN 10% OF ALKANE




GA27B2 IN 10% OF ALKANE

**Results:**

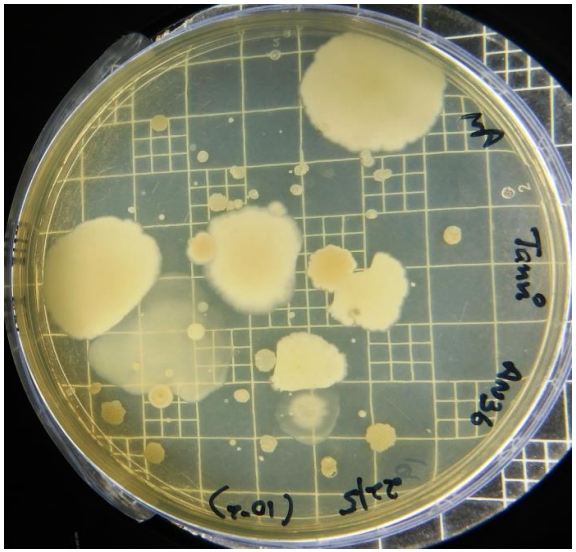
- All the three isolated (AN17B1, GA27B1and GA27B2) were able to produce phenylalanine.
- Organisms cultivated in media containing n-alkane (Dodecane) showed better result than organisms cultivated in paraffin.
- In microbial diversity study soil sample from Andaman shown better diversity than soil from Goa.

**Future work to be done:**

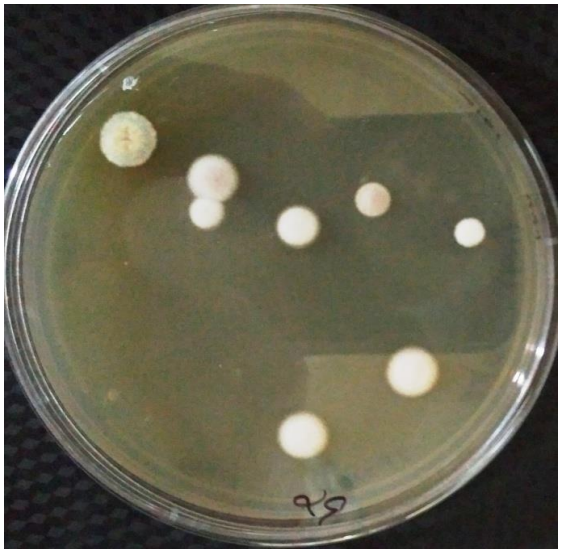
- Characterization of bacteria through biochemical and molecular approach
- Quantification.
- Morphological study of potential organisms
- Microscopy of organisms

**12. Project Title:-** Comparison of microbial isolation from soil samples in food waste along with the standard media.

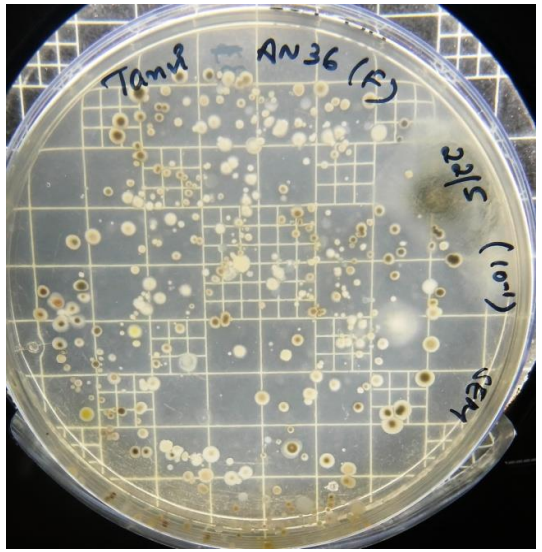
**Participant's Name-** Tanvi Gupta



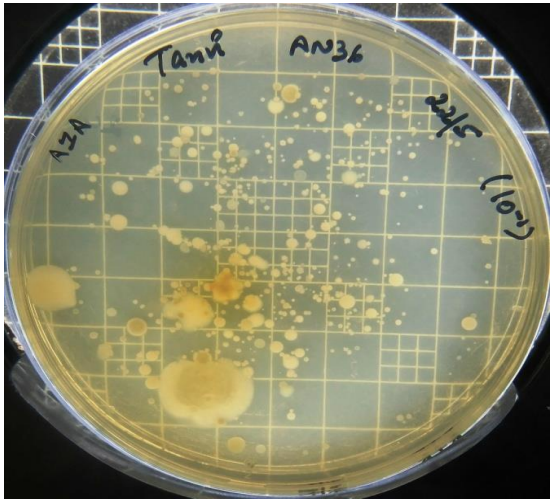

Nutrient Agar Plate



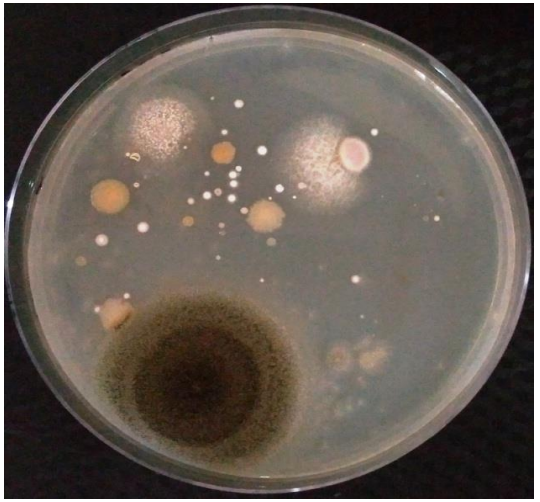
Potato Dextrose Agar Plate




Soil Extract Media Plate

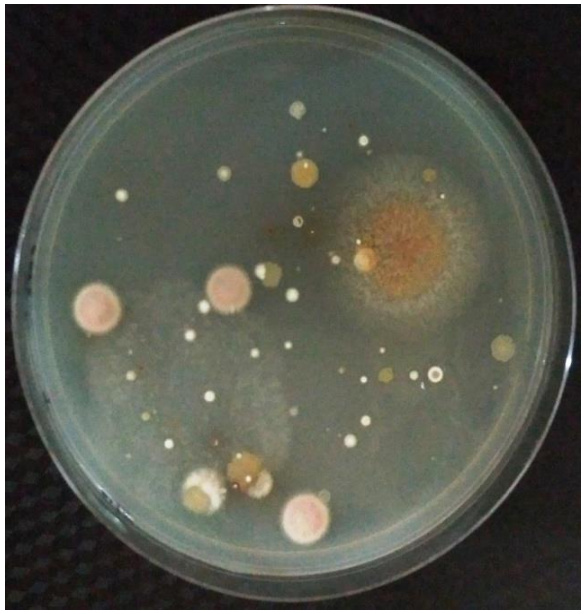



Soil Extract Media Plate

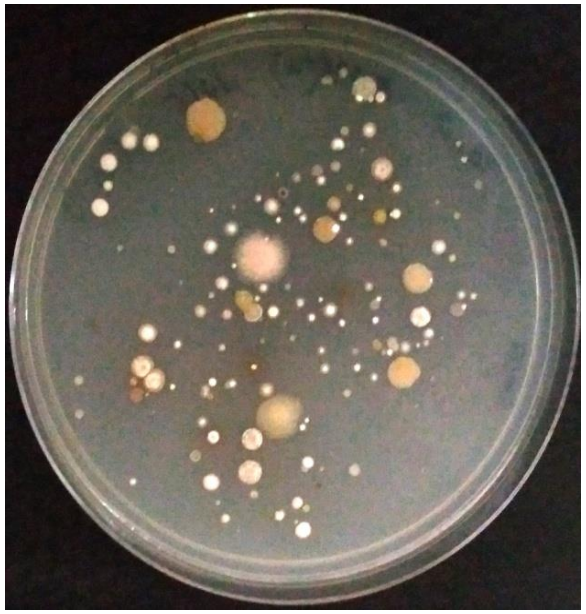


Food Waste Media Plate

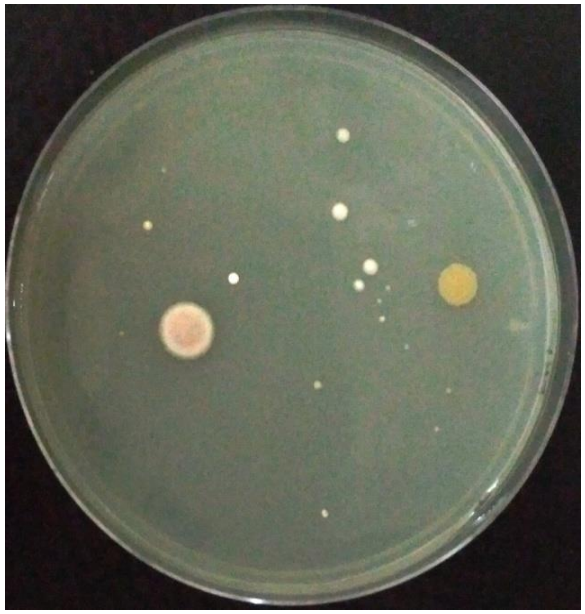
**Comparison of the standardized media with the formulated media from the food waste**



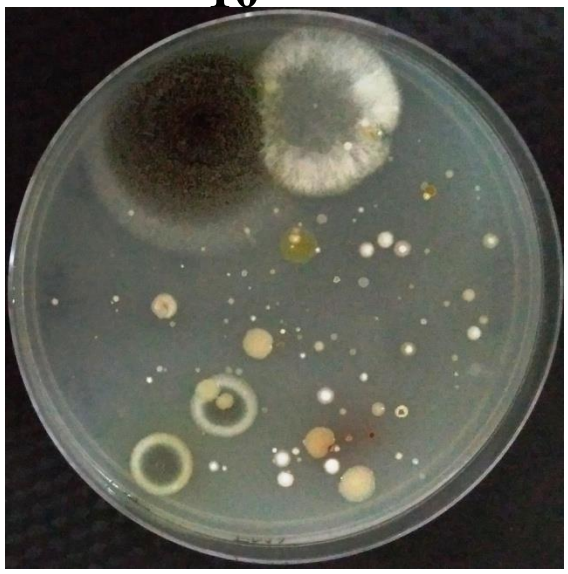
$10^{-1}$



$10^{-2}$

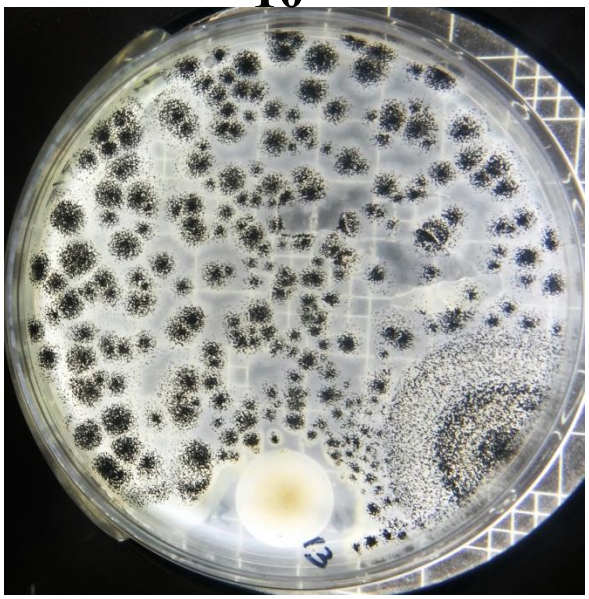


$10^{-2}$



$10^{-1}$

$10^{-3}$



$10^{-2}$



**Figure 2- Food waste media plates, where fungal as well as bacterial growth can be seen at different dilutions**

# Analysis of Protein and Carbohydrate Content in food waste sample

| Parameters | Concentration | Values |
|---|---|---|
| Sun dried food waste sample | | |
| Moisture (%) | - | 17.79% |
| Ash (%) | - | 6 % |
| Carbohydrate (%) | 0.5 | 59.36±0.087% |
| | 0.1 | 56.04±0.035% |
| Protein (ug) | 0.1 | 16.850±0.022 µg/mL |
| | 0.2 | 10.028±0.033 µg/mL |
| Oven dried food waste sample | | |
| Moisture (%) | - | 14.6% |
| Ash (%) | - | 6% |
| Carbohydrate (%) | 0.5 | 60.00±0.16 % |
| | 0.1 | 61.50±0.21 % |
| Protein (µg/mL) | 0.1 | 19.40±0.02 µg/mL |
| | 0.2 | 17.45±0.02 µg/mL |
| Centrifuged food waste sample | | |
| Moisture (%) | - | 97.29% |
| Ash (%) | - | 1% |
| Carbohydrate (%) | 100µL | 0.736±0.042 % |
| | 300µL | 3.340±0.046 % |
| | 500µL | 4.296±0.082 % |

# Elemental Analysis of Food Waste Sample (ICP-OES)

| Solution Label | As (188.980 nm) | Cd (214.439 nm) | Cr (267.716 nm) | Fe (238.204 nm) |
|---|---|---|---|---|
| Blank | 0.00 (ppb) | 0.00 (ppb) | 0.00 (ppb) | 0.00 (ppb) |
| Standard 1 | 20.00 (ppb) | 20.00 (ppb) | 50.00 (ppb) | 50.00 (ppb) |
| Standard 2 | 40.00 (ppb) | 40.00 (ppb) | 100.00 (ppb) | 100.00 (ppb) |
| Standard 3 | 100.00 (ppb) | 100.00 (ppb) | 250.00 (ppb) | 250.00 (ppb) |
| Standard 4 | 200.00 (ppb) | 200.00 (ppb) | 500.00 (ppb) | 500.00 (ppb) |
| Std Blank | 1.60 u (ppb) | 0.11 (ppb) | 0.06 u (ppb) | 1.02 (ppb) |
| Std 3 1 | 96.21 (ppb) | 98.03 (ppb) | 245.53 (ppb) | 245.81 (ppb) |
| Std 3 2 | 98.73 (ppb) | 99.71 (ppb) | 248.34 (ppb) | 248.30 (ppb) |
| Food extract | 11.67 u (ppb) | 9.75 (ppb) | 237.78 (ppb) | 2093.14 (ppb) |
| Food extract R | 30.07 (ppb) | 10.91 (ppb) | 245.40 (ppb) | 2395.28 (ppb) |
| Food mixture | 306.38 (ppb) | 72.46 (ppb) | 1445.60 (ppb) | 90777.47 o (ppb) |

| Hg (184.887 nm) | Pb (220.353 nm) |
|---|---|
| 0.00 (ppb) | 0.00 (ppb) |
| 20.00 e (ppb) | 20.00 (ppb) |
| 40.00 (ppb) | 40.00 (ppb) |
| 100.00 (ppb) | 100.00 (ppb) |
| 200.00 (ppb) | 200.00 (ppb) |
| 1.14 u (ppb) | -0.77 u (ppb) |
| 96.95 (ppb) | 97.98 (ppb) |
| 101.32 (ppb) | 100.37 (ppb) |
| 9.48 u (ppb) | 220.67 (ppb) |
| 12.82 u (ppb) | 215.53 (ppb) |
| 116.64 (ppb) | 1062.01 (ppb) |

**Results:** The cost of the commercial media is high whereas the formulated media cost is economical and many more experiments can be run with minimal nutrients required. The solid and liquid media is formulated and growth of the microorganisms was observed on the plates as well as broth culture.

**Future work to be done:**

- Molecular identification of microbes
- Formulation to make effective media to industrialized