Report
on
Biotech Innovation Ignition School
(BIIS)
Sristi-BIRAC initiative
at
Ahmedabad
on
December, 9-29, 2017

Biotech Inoovation Ignition School (BIIS)-1
Ahmedabad, December 9-29, 2017
Draft summary report

Biotech Innovation Ignition School (BIIS) is an initiative undertaken by SRISTI in collaboration with BIRAC (Biotech Industry Research Council), DBT, GOI, New Delhi to fuel curiosity of young biotech students from around the country to learn from grassroots innovators and outstanding tradition knowledge holders scouted by the Honey Bee Network. The students are encouraged to hone their skills for validation and value addition in the local knowledge and innovations. It is hoped that in this process, some of the results of student research will lead to product development for community wellbeing either as open source do-it-yourself solutions or commercializable solution through market mediation ensuring fair and just benefit sharing. In most cases, further research may be needed to take the results of the BIIS to their logical conclusion. The first BIIS was addressed by the Padma Vibhushan Dr. Raghunath Anant Mashelkar, FRS, and former, DG, CSIR among various distinguished speakers.

BIIS-1 received an overwhelming response from all concerned. The valedictory address was given by Dr. Rakesh Mishra, Director, CSIR-CCMB (The Centre for Cellular & Molecular Biology, CSIR, Hyderabad). He also chaired the valedictory session in which various participants presented their results and the jury selcted the ten best students for further grant of Rs one lac to take the reproach forward. Our logistic partners, Lok Jagruti group of Institutes and Ahmedabad University collaborated with SRISTI to support the BIIS.

The objective of BIIS is to develop solutions for grassroots applications for human, animals, and agricultural applications including herbal technologies, medical devices, and microbial applications.

Forty students worked on individual projects in primarily four action-research areas drawn upon from the Honey Bee Network Database:-

1. **Pharmacognosy/Phytochemistry** - SRISTI's Grassroots database contains many traditional knowledge practices as well contemporary innovations from across the country. These projects would involve validation/value addition to these practices.
A few of these practices are presented here-http://www.sristi.org/cms/sristi-birac, http://www.sristi.org/hbnew/honeybee database.php

2. **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 these isolated microbes for novel human, animal, and agricultural application would be conducted.

3. **Medical devices**- Value addition/product development of any of the open source projects listed on our summer school website (http://summerschool.sristi.org/ and www.ss.sristi.org) regarding medical devices for human and animal health care or other medical devices for meeting unmet social needs.

4. **Agriculture**- Validation of grassroots practices by conducting field trials for the purpose of product development complemented by lab screening.

The students were selected from ten states across the country, with 52.5% 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-1

Inauguration Schedule

The inaugural session was held on December 9, 2017 at LJ group of Institutes, Ahmedabad. Kindly find below the schedule for Inaugural day and a couple of following days.

BIIS (Biotech Innovation Ignition School)
December 9-29, 2017
Venue*- L.J Group of Institutes LJ Campus, Between Kataria Motors & Sanand-Sarkhej Circle, S.G. Road, Ahmedabad - 382210*

December 9, 2017 Saturday	
10:00-10:20	Welcome speech by **Dr. Vipin Kumar**, Director, National Innovation Foundation (NIF), Ahmedabad, India
10:20-10:30	Inauguration by successful grassroots innovator **Shri. Ramaji Bhimaji Parmar**
10:30-11:00	Introduction session by **Prof Anil K Gupta,** Founder-Honey Bee Network, Coordinator-SRISTI, GIAN, & EVC, NIF Visiting faculty-IIMA
11:00-11:15	**Dr. Manish Shah**, Vice President, L.J group of Colleges, Ahmedabad, India
11:15-11:30	**Dr. Vivek Tanavde**, Associate Professor Ahmedabad University,Ahmedabad, India.
11:30-12:00	**Dr. C. J Shishoo**, Professor, B V Patel PERD Centre, Ahmedabad, India
12:00-12:30	**Dr. Mamta Shah**, LM College of Pharmacy, Ahmedabad, India
12:30-13:30	**Lunch Break**

13:30-14:30	**Prof Anil K Gupta,** Honeybee Overview
14:30-15:15	**Dr. S.R Dave** Gujarat University, Ahmedabad
15:15-16:00	**Dr. Viral Shukla**, H.O.D, Microbiology, L.J Group of Institutes, Ahmedabad
16:00-16:20	High Tea
16:20-18:00	Introduction of students and interaction with faculty Queries regarding proposals
December 10, 2017 Sunday	
9:00-10:00	**Dr. Minoo Parabia**, Retired Professor
10:00-10:45	**Prof. (Dr.) V.K.Srivastava**, Directorate of Research, KU, Govt. of Gujarat,Gandhinagar
10:45-11:30	**Dr. Rajesh Singh,** Central University of Gujarat, Gandhinagar
11:30-12:15	**Question/Answer session with mentors**
12:15-13:15	**Lunch Break**
13:15-18:00	**Prof. Anil K Gupta, Dr. Vipin Kumar, and Dr. Nirmal Sahay, and other faculty**-finalization of work plan of students.
December 11, 2017 Monday	

9:00-10:00	**Dr. Minoo Parabia**, Retired professor
10:00-11:00	**Dr. Charu Jain**, Dept. of Biotechnology, LJ group of institutes

Work schedule and lectures

The students pursued their experiments work at SRISTI Sanshodhan Natural products lab, Ahmedabad University, and Deptt. of Microbiology, LJ group of institutes. The names and the title of projects of students are:

Name	**Project title**
Arpita Bhattacharya	Evaluation of Pesticidal efficacy of *Calotropis procera,Vitex negundo, Cuscuta reflexa* against sucking pest
Baljit Singh	Cattle health monitoring and early disease warning system
Bhagwati Moglappa Gauni	Evaluation of antimicrobial activity of *Azardirachta indica* and *curcuma longa* for bovine mastitis
Bhatt Saumil R.	Isolation and screening of microbes from Shodhyatra of Gurej valley (Kashmir), Yoksum (Sikkim), and Barpali (Orissa)
Bijal Chauhan	Evaluation of cattle milk application to control leaf curl in *Capsicum annum*
Chauhan Irshadkhan Najirkhan	Effect of *Lantana camara* L. extract on insect suspension cell culture of *spodoptera litura*
Divya Gupta	Evaluation of anti-bacterial effect of *citrus limetta*

Divya Y. Kyada	Evaluation of the antibacterial activity of Vicia faba *L.* leaves extract and latex of *Calotropis procera* (Aiton) W.T.Aiton for treatment of skin disease (Eczema)
Eldhose Jose	Evaluation of growth-inhibition effect of *Nerium indicum* L. leaves extract on insect suspension cell culture of *Spodoptera litura*
Haryanth Vaman R	Evaluation of growth-inhibition effect of *Trigonella foenum-graecum* L. seeds on suspension cell culture of *Spodoptera litura*
Ishfaq Ahmad Thoker	Use of Bajra flour for the control of caterpillar in castor field
Janani P	Anti-dysentery and phytochemical studies of the mixture of *Mangifera indica*, *Phyllanthus emblica* & *Syzygium cumini*
Khalid Nabi	Evaluation of Pesticidal activity of *Trigonella foenum-graecum* seeds against white flies.
Khursheed Ahmad Sheikh	*In vitro* evaluation of antimicrobial and antioxidant activity of *Tinospora cordifolia*
Koushani Das	Phytochemical screening and detection of antimicrobial activity of *Solanum xanthocarpum* for the treatment of skin disease (Eczema)
Margie Nileshbhai Patel	Evaluation of growth-inhibition effect of *Agave Americana*. leaves extract on insect suspension cell culture of *Spodoptera litura*
Mohamed Imdhiyas A	*In vivo* validation of Pesticidal potential of *Nerium oleander* against white fly
Mohammad Asif Sheikh	*In vivo* validation and development of value added formulation to control leaf curl

Nathwani Hiral K.	Isolation and screening of microbes from Shodhyatra of Gurej valley (Kashmir), Yoksum (Sikkim) and Barpali (Orissa).
Pandey Priti	Study of *in vitro* anti-bacterial effect of *Rosa indica* for the treatment of ring worm.
Pooja Pachurekar	Evaluation of growth-inhibition effect of mixture of *Annona squamosa* L and *Cassia tora* Linn leaves on insect suspension cell culture of *Spodoptera litura*
Pooja Sunil Patel	Phytochemical investigation and evaluation of antimicrobial potential of *Calotropis procera* for treatment of skin disease (Eczema)
Poonkundran S	Isolation and screening of microbes from Shodhyatras for cellulose degradation activity.
Pramathadhip	Evaluation of *in-vitro* antibacterial activity of mixture of *Curcuma longa* and *Pennisetum typhoides* for treatment of mastitis
Rashmi Dehariya	Evaluation of growth-inhibition effect of *Vachellia nilotica* L. on insect suspension cell culture of *Spodoptera litura*
Raval Vishakha	Evaluation of growth-inhibition effect of *Momordica charantia* and *Zingiber officinale* on suspension cell culture of *Spodoptera litura*
Reyaz Hassan Mir	*In vitro* evaluation of antimicrobial activity of the flower juice of *Hibiscus rosa sinensis* for the remedy of gastric complaints
Rushvi Shah	Evaluation of growth-inhibition effect of *Jatropha curcas* on insect suspension cell culture of *Spodoptera litura*
Saurav Roy	Evaluation of *in-vitro* antibacterial activity of *Aegle marmelos* L. and *Mangifera indica* L. for treatment of mastitis
Savaliya Komal Kantibhai	Study of anti-eczema activity of *Senna italica*

Shagun Shukla	Evaluation of therapeutic effect of *Senna tora* (L.*) Roxb.* seeds and *Calotropis procera flowers* for treatment of skin disease (Eczema)
Shilpa Soni	Phytochemical extraction, quantification and HPTLC fingerprinting of *Cassia fistula* used to treat menstrual problems
Shipra Pandey	Evaluating the Pesticidal efficacy of *Lantana camara* extract on sucking pest
Showkat Ahmad Bhat	Evaluation of Anti-diahorreal activity of *Euphorbia hirta* *Syzgium cumini and Phyllanthus emblica*
Solanki Jeegna Pravinbhai	Study of antibacterial effect of some medicinal plant extracts on Mastitis causing bacterial pathogens
Sonam Gupta	Unravelling the synergistic antimicrobial potential of *Eucalyptus globulu*s seed extract for urinary tract infections(UTI)
Tamajit Datta	Evaluation of antimicrobial activity of *Leptadenia reticulata* (Retz.) Wt. et Arn against bacterial pathogens causing Bovine Mastitis
Tinku Gupta	Evaluation of *Balanites roxburghii* and *Cassia fistula L.* used to cure dysentery in Sheep and Goat
Vijay Vardhan Pandey	Evaluation of Pesticidal efficacy of *Agave americana* against sucking & chewing pest
Weekar Younus Raja	Evaluation of growth-inhibition effect of *Pennisetum typhoides* on insect suspension cell culture of *Spodoptera litura*

Additionally, following experts were invited from all over the country to deliver lectures during BIIS from December 9-29, 2017.

Name and Designation	Date
Prof. Suman Kapur, BITS,Pilani, Hyderabad campus.	15th December 2017
Prof. M Daniel, Retired Professor, Maharaja Sayajirao University, Baroda	20th December 2017
Prof. P K Borad, Dept.of Agriculture Entomology, Anand Agriculture University	22nd December 2017
Dr. Suman Thakur, Senior Scientist, CCMB, Hyderabad	23rd December 2017
Prof. Jayanta Haldar, JNCASR, Bangalore	28th December 2017

Additionally, eight students working in field of Agricultural field trial visited Anand Agriculture University (AAU) on 27th December, 2017 to learn from the agriculture facilities and get guidance from the nationally renowned experts.

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 Ignition School on December 29, 2017.Further a presentation ceremony was conducted where a certification of participation was given by the chairperson of the valedictory session, Dr. Rakesh Mishra, Director, CCMB. Also, the **ten best projects were awarded as Rs. 1 lac each appreciation research grant** to further continue their research work. The schedule for the final day was:-

BIIS (Biotech Innovation Ignition School)
(December 9-29, 2017)
Venue*- School of Law auditorium on 2nd floor at LJ Group of Institutes (Address-LJ Campus, Between Kataria Motors & Sanand-Sarkhej Circle, S.G. Road, Ahmedabad - 382210)*

December 29, 2017 Friday	
9:00-9:05	**Prof. Anil K Gupta,** Founder-Honey Bee Network, Coordinator-SRISTI, GIAN, & EVC, NIF, Visiting faculty-IIMA & IITB

9:05-9:10	Introduction of the session Chairperson **Dr. Rakesh Mishra** by Dr.Chhavi Gupta
9:10-9:15	**Dr. Rakesh Mishra,** Director, Centre for Cellular and Molecular Biology **(Chairperson of the session)**
9:15-9:20	**Dr. Vipin Kumar,** Director, National Innovation Foundation (NIF)
9:20-9:25	**Dr. Shilpy Kocchar,** Entrepreneurship Development Manager, Biotechnology Industry Research Assistance Council (BIRAC)
9:25-9:30	**Dr. Manish Nivsarkar** (Director, PERD)
9:30-9:35	**Prof. Jayant Halder** (Professor, JNCASR, Bangalore)
9:35-9:40	**Dr. Manish Shah**, Vice President, LJ Group of Institutions
9:40-13:15	**Presentation by BIIS participants**
13:15-13:20	**Prof. Prakash Chandra,** Vice Chancellor, Ahmedabad University
13:20-13:25	**Certificate distribution** to the BIIS participants
13:25-13:30	**Remarks** by the Chairperson of the session (Dr.Rakesh Mishra)
13:30-14:30	**Lunch**
14:30-15:45	Valedictory address by Chairperson **Dr.Rakesh Mishra**, Director, Centre for Cellular and Molecular Biology (CCMB)
15:45-15:50	Announcement of ten best projects by Chairperson **Dr.Rakesh Mishra**
15:50-16:00	Vote of thanks by **Mr. Ramesh Patel,** Secretary, SRISTI

Additionally Dr. Vipin Kumar, **Director, National Innnovation Foundation (NIF), announced that five additional students will receive a research grant of Rs. 1 lakh each** on the basis of evaluation of synopsis where they will mention the future work that they will conduct in the same assigned project. Last date for sending the same is on or before 20th January, 2017.

The exhaustive work done for twenty-one days reflected on the outcome and key output is attached herewith where the ten best shortlisted projects of BIIS-1 are given:-

Sr. No.	Name	Project Title	Innovator's approach	Student's approach	Value addition	Future studies to be done	Technical Inputs from our side
1	Arpita Bhattacharya	Evaluation of Pesticidal efficacy of *Calotropis procera,Vitex negundo, Cuscuta reflexa* against sucking pest	Leaves of Amri (*Calotropis procera*), begonia (*Vitex negundo*), Neem and whole plant of nimundi (*Cuscuta reflexa*) are taken in equal quantity. All the ingredients were pounded and poured in water and kept in closed vessel for two days. The solution is mixed with water and sprayed to control pests in crops.	For the fermented formulation as per the innovator's protocol the microbes having ability to utilise nitrogen and phosphorus was screened out.	Along with the fermentation process the decoction of the plant samples was prepared.	Chemical fingerprinting is required to identify the difference the compounds present in both the set of formulations to understand which compounds are possibly enhancing the bio-control properties of the formulation. These compounds identified can then be further isolated and can be used for targeted application on the pest control of white fly infested fields. The in vitro pesticidal activity of the formulations should also be estimated. This will give a better insight and help in further validating the efficacy of the formulations.	Field study with different concentration of formulation.
2	Baljit Singh	Cattle health monitoring and early disease	During a summer school at SRISTI and NIF, a group of students of a polytechnic college in	This device only measures two parameters	Design the protocol and	To design and benefit the cattle farm owners having multiple number of cows.	He has himself designed and implemented

		warning system	Maharashtra have developed a portable temperature and pulse sensor for cattle and have managed to keep it fairly low cost.	and is thus unable to provide an insight to the overall wellbeing of the cattle.	impleme ntation of the same	Decision algorithm takes care of all the parameters as per the Indian conditions. Algorithm needs more learning with live data of multiple cattle and during different climatic conditions Respiration rate measurement could also be implemented by using some indirect methods. Rumination detection can further be improved a lot and using EMG/EOG Electrodes as Rumination sensors is proposed	its processing. We helped him with the idea.
3	Poonkundran S	Isolation and screening of microbes from Shodhyatras for cellulose degradation activity.	Provided the soil samples JK20B4 & TR60B1	Three soil samples were taken for microbial isolation and the results were noted and the microbes were then screened for cellulose degrading ability 100+ pure	Identifica tion and character ization of the novel strain isolated	More detailed characterization studies of the isolates showing degrading capacity. The capacity to degrade could be further studied by enzyme assay, enzyme production and bioethanol production tests. A better and efficient method to maximize the isolation of microbes and screening could be developed.	Preparation of different media, Isolation of bacteria,fungi and actinomycete s Characterizat ion of Cellulose degrading bacteria Biochemical test of bacteria.

				cultures were screened for cellulose degrading ability.			
4	Reyaz Hassan Mir	*In vitro* evaluation of antimicrobial activity of the flower juice of *Hibiscus rosa sinensis* for the remedy of gastric complaints	The flower juice of plant *Hibiscus rosa sinensis* for gastric complaints	Flower juice of Hibiscus Rosa sinensis do possess the antimicrobial activity.	Validation of innovator's practice was tried with different extraction for analysis of phytochemicals	Characterization of extract through NMR, LCMS and IR Spectrometry	Hot & cold Extraction with different solvent as based on polarity. Preliminary phytochemical screening Determination of Antioxidant, Antiflavonoid &total phenolic content, scavenging activity of DPPH & Deoxyribose. Antibacterial Activity TLC analysis
5	Saurav Roy	Evaluation of *in-vitro* antibacterial activity of *Aegle*	Extract of Aegle marmelos (Bael) and ash of Mangifera indica(Mango) to cure mastitis	Prepared aqueous and solvent extracts for validation of	Validation of innovator's practice	Analysis of heavy metal through AAS, Phytochemical screening by HPLC & HPTLC	Hot & cold Extraction with different solvent as based on

		marmelos L. and *Mangifera indica* L. for treatment of mastitis		Mastitis.	was tried with different extraction for analysis of phytochemicals		polarity. Antibacterial Activity TLC analysis
6	Shagun Shukla	Evaluation of therapeutic effect of *Senna tora* (L.*) Roxb.* seeds and *Calotropis procera flowers* for treatment of skin disease (Eczema)	Collection of a palm of Senna tora (L.) Roxb. seeds, pounded and a handful of akada flower chopped into small pieces boil into one cup of buttermilk. Cool it and applied on affected area.	Procurement of raw material and herbal drug from reliable source. Extraction via cold and hot sxohelation method using different solvents like water, methanol, chloroform, Pet. ether. Phytochemical screening /invitro antioxidanrt study. Antibacterial study. Quantification	Validation of innovator's practice was tried with different extraction for analysis of phytochemicals	The compounds of these extracts found after further research would provide a broad spectrum of drug discovery of immense importance which maybe further studied for toxicological analysis in in-vivo and in-vitro eczema studies.	Hot & cold Extraction with different solvent as based on polarity. Preliminary phytochemical screening Determination of Antioxidant, Antiflavonoid &total phenolic content, scavenging activity of DPPH &Deoxyribose. Antibacterial Activity TLC analysis

				by TLC/HPTLC			
7	Shilpa Soni	Phytochemical extraction, quantification and HPTLC fingerprinting of *Cassia fistula* used to treat menstrual problems	Oral application. Cassia Fistula root paste was given twice daily for eight days.	To study the effect of extraction techniques phyto-constituents of Cassia fistula aqueous extract. To study the effect of extraction solvents on the phyto-constituents of Cassia fistula using soxhlet extraction. To extract and isolate phytoestrogen from Cassia fistula and quantify the	Validation of innovator's practice was tried with different extraction for analysis of phytochemicals.	More research is required for further characterization of the phyto-constituents to confirm the identified compounds. In-vitro and in-vivo study should be studied to completely validate efficacy of Cassia fistula root to treat menstrual problem. Cassia fistula has therapeutic effect as per current results and reported literature so it can be utilized as potential phyto-constituent source for product formulation.	Various methods of extraction(maceration method,soxhlet with different solvent ,autoclave,microwave oven)

				phyto-constituents HPTLC.			
8	Shipra Pandey	Evaluating the Pesticidal efficacy of *Lantana camara* extract on sucking pest	Take 3 kg tender leaves of plant Lantana camara, add 20 liter water. Boil it for three to four hours till the water remains 5 liter. Let it be cool then filter and use 75 to 80 mL extract in a pump to overcome Aphids, Jassid and Whitefly.	Synthesis of extract formulation by innovator's method and modified extract formulation. Evaluate the physico-chemical property of leaf extract. To validate the efficacy of the grassroot innovator's formulation acts against the whitefly pest and compare with its counterparts	Neem oil was added to the formulation.	The activity of Lantana extract will be enhanced by using nanotechnology. Toxicity of formulation is major health concern in agriculture practices, that can be minimize by nanoemulsion technology. Nanoemulsion, synthesized by the oil obtained from the can leaves of Lantana camara, enhanced the efficiency of extract formulation. So, Nanoemulsion of Lantana proves as a new weapon to diminish the activity of sucking pest in cost-effective, green and safe manner.	Field study with different concentration of formulation.
9	Tinku Gupta	Evaluation of *Balanites roxburghii* and *Cassia fistula L.* used	Use of *Balanites roxburghii* and *Cassia fistula L.* for dysentery in Sheep and Goat	Prepared aqueous and solvent extracts.	Validation of innovator's practice	Validate herbal formulation by in vivo studies.	Hot & cold Extraction with different solvent as based on

		to cure dysentery in Sheep and Goat		Qualitative and quantities analysis of extracts for phytochemical study Antibacterial study of different extracts and HPTLC analysis	was tried with different extraction for analysis of phytochemicals		polarity. Preliminary phytochemical screening Determination of Antioxidant, Antiflavonoid &total phenolic content, scavenging activity of DPPH &Deoxyribose. Antibacterial Activity TLC analysis
10	Vijay Vardhan Pandey	Evaluation of Pesticidal efficacy of *Agave americana* against sucking & chewing pest	Certain larvae attack the cotton during monsoon when crop is around 30 to 40 days old. To prevent it, local farmers use a decoction of a plant locally known as 'ketaki' (Agave americana). The leaves are crushed, boiled in water and the decoction is filtered. Approximately 200 ml filtrate is added in 15 litres water and sprayed over the crop.	To check the efficacy of the grassroot innovator's formulation acts against the white fly pest. To check the efficacy of the grassroots innovator's formulations acts against	We validate the method of innovator in different ways like; direct apply to the field and also	Again field trials with some specific criterion like soil analysis, monitoring of control plant and treated plant, spraying of herbal formulations to different crops and for different pests, also we go for antibacterial, antifungal and plant growth promoting activity of herbal formulations. Effect on herbal formulations on pupa deformation Chemical screening of herbal formulations, which chemical or	Field study with different concentration of formulation.

			About five pumps of spray are needed for one vigha (0.16 ha) of land each time. Since he was trying out the method for the first time, Buvabhai tested it on a few plants in a small portion of the field and studied its effect on the crop as well as its effectivity over the pest. After verifying its effects, he continued spraying the same over the entire field at intervals of one week till larva was eliminated.	the larvicidal activity. Presumptive chemical screening of the formulations.	in lab conditions. We can make the different formulations and do the chemical analysis for which chemical is responsible for pest control effect. Also we apply those formulations to the control fungal/bacterial pathogens.	group of chemicals responsible for pesticidal activity.	

The advent of BIIS-1 gave the opportunity to forge ahead and conduct the second BIIS which will duly start from February 5-26, 2018.

Attached herewith is the announcement for our second innovative pedagogy BIIS2:-

ANNOUNCEMENT

BIIS: Opportunity for technology students to work on grassroots innovations

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 three-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-2 will be held at Ahmedabad, February 5-26, 2018. It is likely that some other institutes like GSBTM, LJ Group of Institution, PERD, Nirma University may also join the school.

The selected students will be assigned individual projects in primarily four action-research areas drawing upon the Honey Bee Network Database:-

1. Pharmacognosy/Phytochemistry - SRISTI's Grassroots database contains many traditional knowledge practices as well contemporary innovations from across the country. These projects would involve validation/value addition to these practices. A few of these practices are presented here - http://www.sristi.org/cms/sristi-birac, http://www.sristi.org/hbnew/honeybee_database.php

2. 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 these isolated microbes for novel human, animal, and agricultural application would be conducted.

3. Medical devices- Value addition/product development of any of the open source projects listed on our summer school website (http://summerschool.sristi.org/) regarding medical devices for human and animal health care or other medical devices for meeting unmet social needs.

4. Agriculture- Validation of grassroots practices by conducting field trials for the purpose of product development complemented by lab screening.

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, phytochemical extraction procedures, and using various lab equipments (AAS, HPTLC, HPLC 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. At least ten of the outstanding selected projects from BIIS would further receive a research grant of Rs.1 lac to take their projects into subsequent stages of product development either at their institute or at SRISTI lab. In selected cases,

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 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 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 biotechnology, agriculture, microbiology, bioengineering, phytochemistry, pharmacology, pharmacognosy etc., are specially invited to apply. Above all, students would get an invaluable opportunity to interact with both national and international experts as well as grassroots practitioners/innovators in their respective fields.

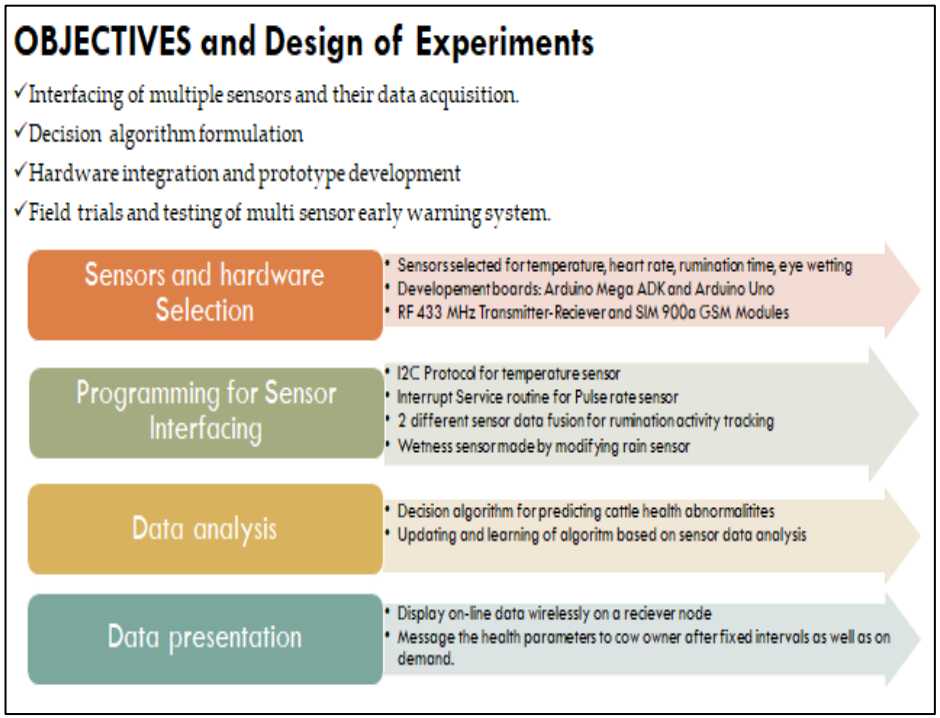
Last date for submission of application is 20th January 2018.

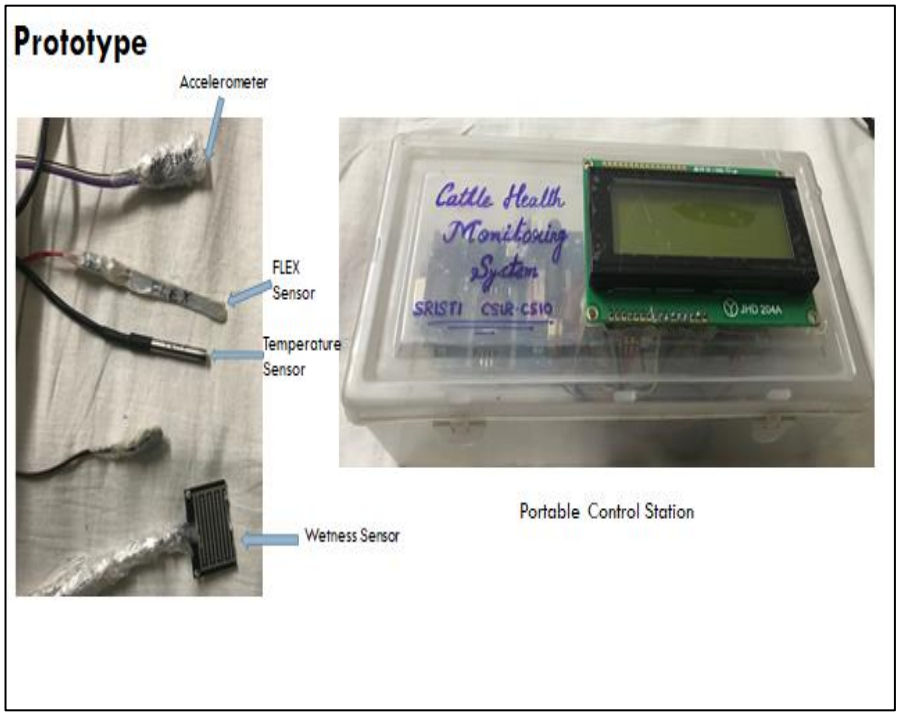
Kindly email at BIIS@sristi.org or call at 9227761140 for further queries.

Annexure I

The ten awarded projects of BIIS (Decenber 9-29,2017)

1. **Project Title:- Cattle health monitoring and early warning system**
   Participant's name:- Baljit Singh





Results:-

- Helpful for cattle farm owners having huge number of cows.
- Decision algorithm takes care of all the parameters as per the Indian conditions.

Future work to be done:-

- Algorithm needs more learning with live data of multiple cattle and during different climatic conditions
- Respiration rate measurement could also be implemented by using some indirect methods.
- Rumination detection can further be improved a lot and using EMG/EOG Electrodes as Rumination sensors is proposed.

2. **Project Title:-** Evaluation of Pesticidal efficacy of *Calotropis procera, Vitex nigundo, Cuscuta reflexa* and *Azarachita indica* against sucking pest

   Participant's name:- Arpita Bhattacharya

Treatments Used

Negative Control Water	Positive Control 2ml/l Neem oil	Positive Control 4ml/l Neem oil	Positive Control 6ml/l Neem oil
Grass-root innovator's formulation	100% conc	50% conc	25% conc
Modified Grass-root innovator's formulation	100% conc	50% conc	25% conc

Physico-chemical properties of the formulations:

S.No	Parameter	Grass-root innovator's formulation	Modified Grass-root innovator's formulation
1.	Solubility	Aqueous	Aqueous
2.	Odour	Pungent smell	Characteristic smell
3.	Colour	Brown	Brown
4.	pH	6	6
5.	Density	0.98gm/ml	1.045gm/ml

$$\%\ Reduction\ of\ Pests = \frac{No.\ in\ plant\ before\ treatment - No.\ in\ plant\ after\ treatment}{No.\ in\ plant\ before\ treatment}$$

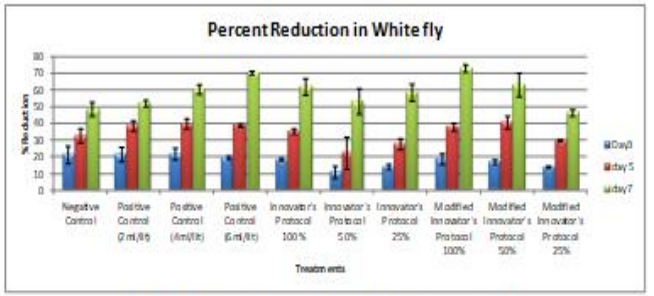


Fig: Percent reduction in number of white flies on the tomato plant leaves

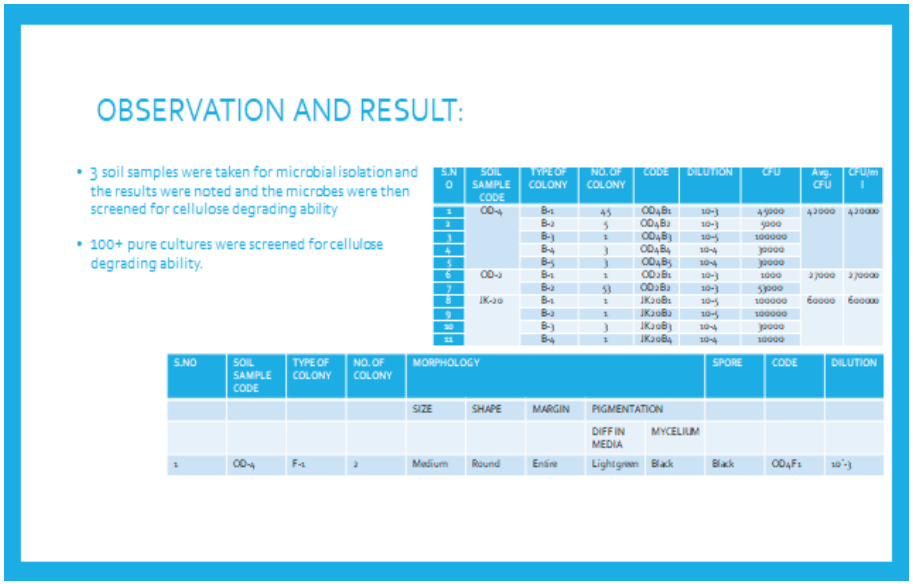
Results:-

- The results suggests that the grassroot innovator's herbal formulation is effective against the sucking pests and the modified grassroot innovator's herbal formulation was more effective than the original formulation. Thus, based on the above result, both the null hypothesis were rejected.
- The number of dead white flies were found in all the plants including the negative control, which might be as a result of completion of the life cycle of the white fly.

Future work to be done:-

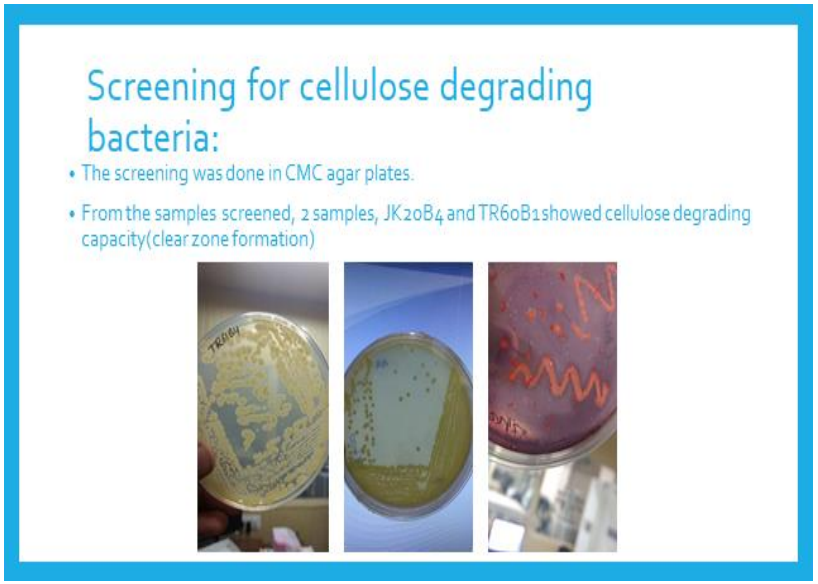
- To further validate the efficacy of the formulations, their effect needs to be studied during the different stages of the life cycle.
- Further phytochemical screening of the formulations should be carried out to understand the difference in the composition of the two formulations and to identify the bio-active compounds responsible for the pesticidal activity.

3. **Project Title:-** Isolation Of Microbes From Soil Samples And Screening For Cellulose Degrading Bacteria
   Participant's name:- Poonkundran S



S.NO	SOIL SAMPLE CODE	TYPE OF COLONY	NO. OF COLONY	CODE	DILUTION	CFU	Avg. CFU	CFU/ml
1	OD-4	B-1	45	OD_4B_1	10^{-3}	45000	42000	420000
2		B-2	5	OD_4B_2	10^{-3}	5000		
3		B-3	1	OD_4B_3	10^{-5}	100000		
4		B-4	3	OD_4B_4	10^{-4}	30000		
5		B-5	3	OD_4B_5	10^{-4}	30000		
6	OD-2	B-1	1	OD_1B_1	10^{-3}	1000	27000	270000
7		B-2	53	OD_2B_2	10^{-3}	53000		
8	JK-20	B-1	1	$JK_{20}B_1$	10^{-5}	100000	60000	600000
9		B-2	1	$JK_{20}B_2$	10^{-5}	100000		
10		B-3	3	$JK_{20}B_3$	10^{-4}	30000		
11		B-4	1	$JK_{20}B_4$	10^{-4}	10000		

S.NO	SOIL SAMPLE CODE	TYPE OF COLONY	NO. OF COLONY	MORPHOLOGY					SPORE	CODE	DILUTION
				SIZE	SHAPE	MARGIN	PIGMENTATION				
							DIFF IN MEDIA	MYCELIUM			
1	OD-4	F-1	2	Medium	Round	Entire	Lightgreen	Black	Black	OD_4F_1	10^{-3}



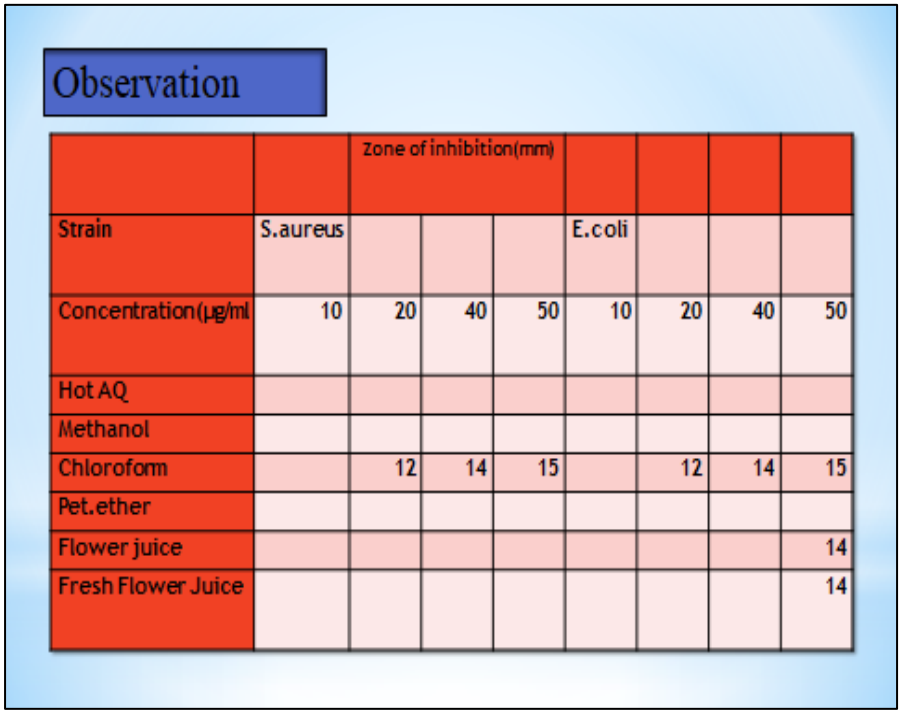
Results:-More detailed characterization studies of the isolates showing degrading capacity

Future work to be done:-

- The capacity to degrade could be further studied by enzyme assay, enzyme production and bioethanol production tests.
- A better and efficient method to maximize the isolation of microbes and screening could be developed.

4. **Project Title:-**In Vitro Evaluation of Antimicrobial Activity of The Flower Juice Of Hibiscus Rosa Sinensis For The Remedy Of Gastric Complaints.

   Participant's name:-Reyaz Hassan



Observation

		Zone of inhibition(mm)						
Strain	S.aureus				E.coli			
Concentration(µg/ml	10	20	40	50	10	20	40	50
Hot AQ								
Methanol								
Chloroform		12	14	15		12	14	15
Pet.ether								
Flower juice								14
Fresh Flower Juice								14

Phytochemical Screening

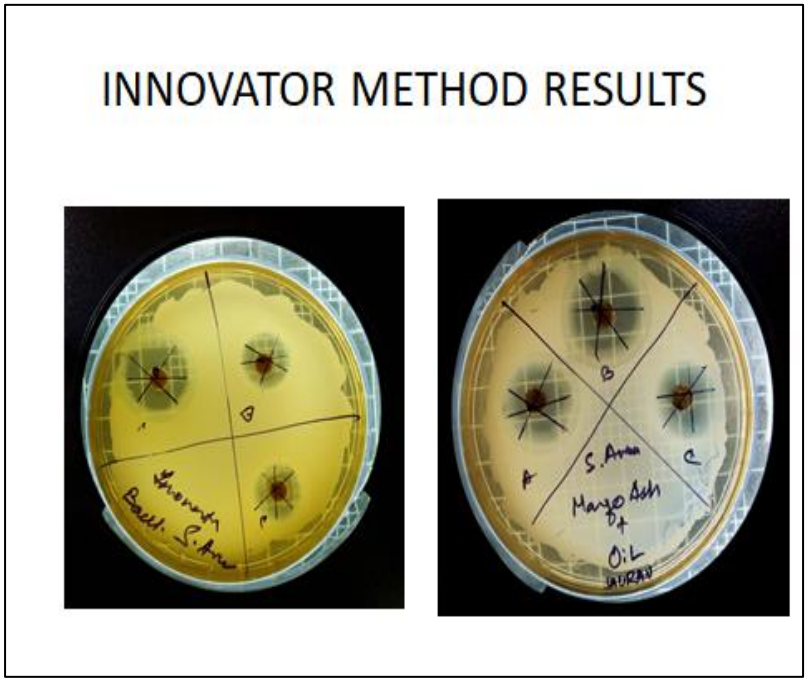
Phytochemical extract Tests	Hibiscus Rosa Sinensis flower extract					
	Hot (Aq. Extract)	Methanolic extract	Chloroform extract	Pet. Ether extract	Flower juice	Fresh flower juice
Molish	++	++	++	+++	-	+
Saponin's (Foam test)	-	-	-	-	-	-
Steroids	+	+	+	+	-	+
Flavonoids	-	-	+	+++	-	-
Tannins	++	+	-	-	-	-
Alkaloids	-	-	++	+	-	
Glycosides	+	-	-	-	-	-

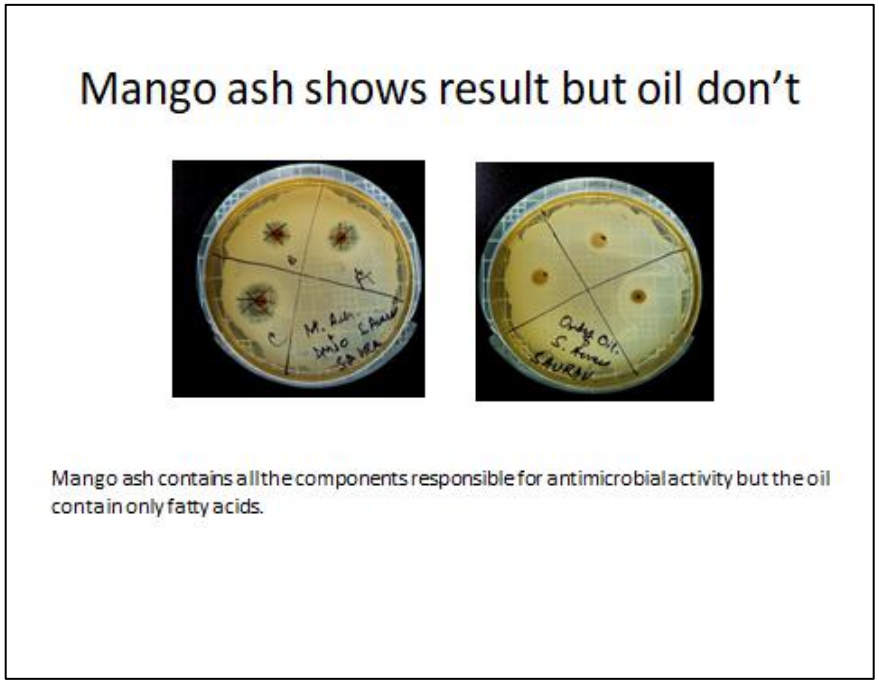
Results:-

- While analysing all the extracts it was found that chloroform extract shows more zone of inhibition as compared to other extracts.Thus can be used for further analysis such as isolation and characterisation purpose.

Future work to be done:-Further isolation and characterisation of the active moiety responsible for antimicrobial activity.

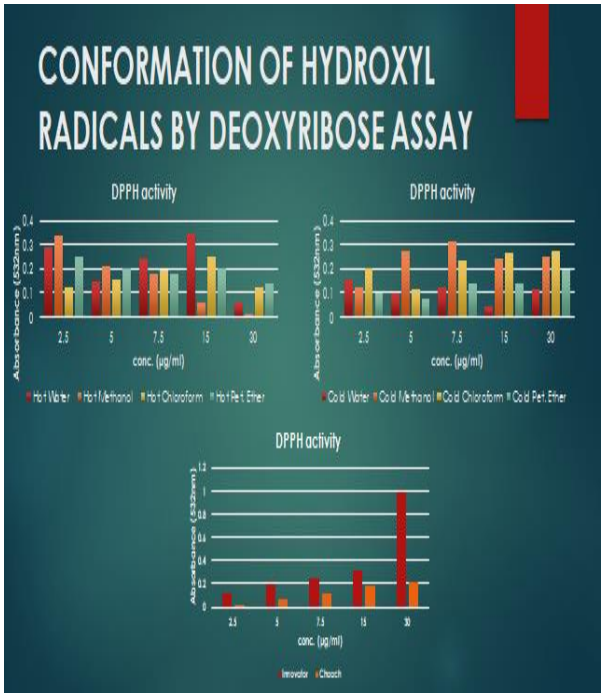
5. **Project Title:-** Evaluation of In-Vitro Antibacterial Activity Of Aegle Marmelos L. And Mangifera Indica L.for Treatment Of Mastitis
Participant's name:-Saurav Roy

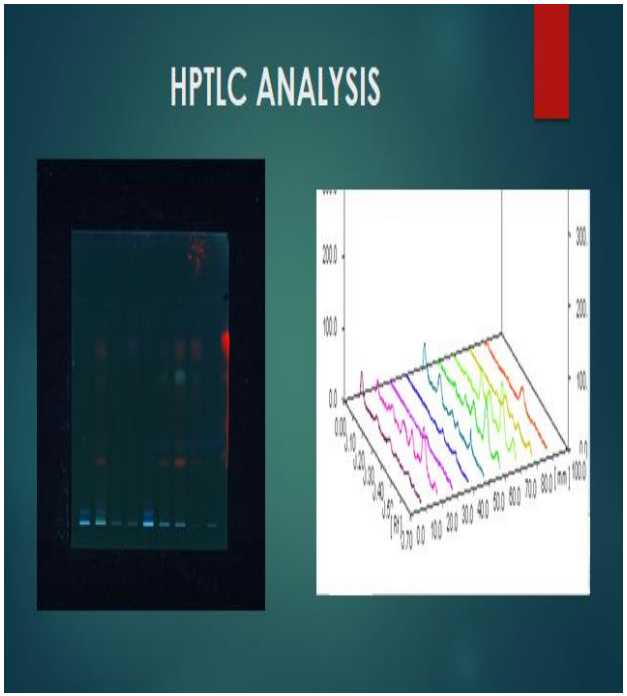


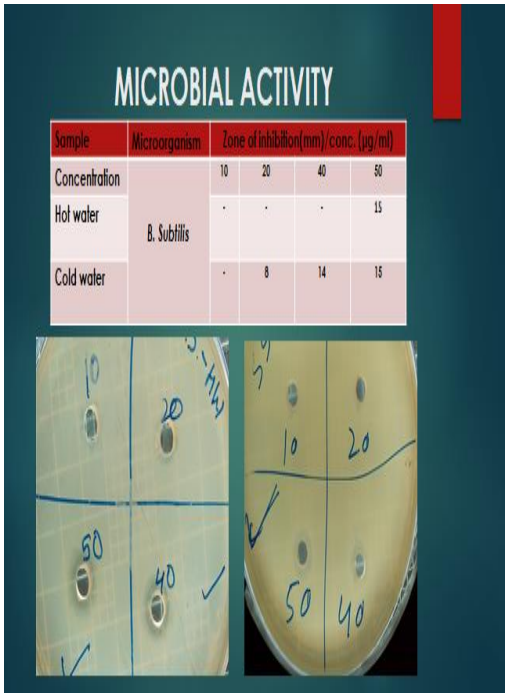


Results:- Validation of innovator's practice was tried with different extraction for analysis of phytochemicals.
Future work to be done:-Analysis of heavy metal through AAS, Phytochemical screening by HPLC & HPTLC.

6. **Project Title:-**Evaluation of therapeutic effect of *Senna tora* (L.*) Roxb.* seeds and *Calotropis procera flowers* for treatment of skin disease (Eczema)
   Participant's name:- Shagun Shukla







Results:- The compounds of these extracts found after further research would provide a broad spectrum of drug discovery of immense importance which maybe further studied for toxicological analysis in in-vivo and in-vitro eczema studies.

Future work to be done:-The compounds of these extracts found after further research would provide a broad spectrum of drug discovery of immense importance which maybe further studied for toxicological analysis in in-vivo and in-vitro eczema studies.

7. **Project Title:-** Phytochemical extraction, quantification and HPTLC fingerprinting of *Cassia fistula* for Menstrual Problems
   Participant's name:- Shilpa Soni

Result and Discussion

Objective 1: *To study the effect of extraction techniques phyto-constituents of Cassia fistula aqueous extract.*

S.no	Extraction Technique	Extract yield (%)	TPC (mg/10mg)	TFC (mg/10mg)	TAA (mg/10mg)	DSA (%)
1	Innovator	5.51	1.30	5.94	0.07	62.96
2	COLD	6.00	3.19	15.46	0.19	79.02
3	HOT	8.00	5.32	13.08	0.17	63.75
4	Autoclave	20.00	3.33	11.71	0.15	69.39
5	Microwave	20.00	3.30	13.13	0.15	63.35
6	Sequential	8.00	3.13	14.71	0.09	20.24

Result and Discussion

Objective 2:To extract and isolate phytoestrogen from *Cassia fistula* and quantify the phyto-constituents HPTLC.

S.no	Extraction Technique	Extract yield (%)	TPC (mg/10mg)	TFC (mg/10mg)	TAA (mg/10mg)	DSA (%)
1	Hexane	0.20	1.35	16.13	0.21	72.46
2	Chloroform	0.20	0.93	38.17	0.19	77.33
3	Ethyl Acetate	2.20	8.22	46.67	0.13	70.24
4	Acetone	5.40	8.91	24.00	0.33	68.21
5	MeOH : DW	5.60	10.15	20.75	0.36	56.08

Result and Discussion

Preliminary Phyto-chemical Screening

S.No.	Extract ID	Sugars	Saponins	Steroids	Flavanoids	Tannins	Glycosides	Alkaloids
1	Cold	++	+	++	+++	+	+++	+
2	Hot	+++	+	++	++	+++	+++	+
3	Autoclave	++	+	++	++	++	++	-
4	Microwave	++	+	++	++	++	++	+
5	Sequential	+++	+	++	++	-	++	+
6	Innovator's	+	+	+	+	+++	+	+
7	Hexane	+	+	+	+	+++	+	-
8	Chloroform	+	+	+	++	+++	+	-
9	Ethyl Acetate	++	+	+++	+++	++	++	+
10	Acetone	++	+	+++	++	++	++	+
11	MeOH:DW	+++	+	+++	++	+++	+++	-

* *+++ : High presence ; ++ : Medium presence; + : Low presence; - : Absent*

Antibacterial activity

- *Cassia fistula* root showed **negative antibacterial activity** against *E. coli* and *S. typhi*.
- Results are in line with the reported negative for gram negative bacteria [1],[2] .

Result and Discussion

Objective 3:To extract and isolate phytoestrogen from *Cassia fistula* and quantify the phyto-constituents HPTLC.

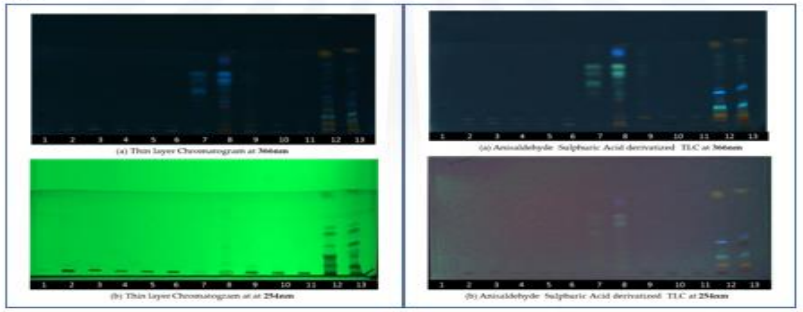


Figure: High Performance Thin Layer Chromatography Separation of phyto-constituents of Cassia fistula root extract.

Figure: High Performance Thin Layer Chromatogram of Cassia fistula root extract derivitized with anisaldehyde sulphuric acid.

Results:-

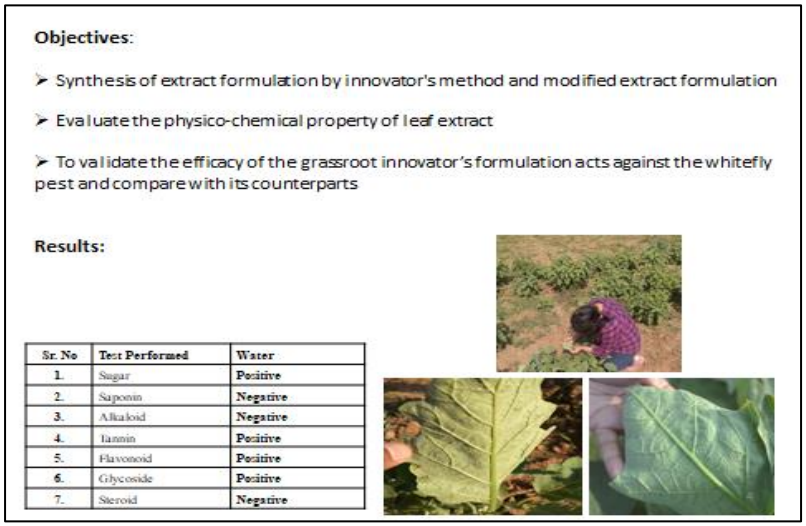
- The presence of phytoestrogen β-sitosterol in the Phytoestrogen extract from HPTLC analysis, partially validate the efficacy of Cassia fistula for the menstrual problem.
- The idetification of anti-inflammatory compounds; **Anthraquinones** and **Coumarins (Scopoletin, Umbelliferone)** can also be responsible for the addressing menstrual problem for relieving pain due to menstrual cramps.
- Presence **β-sitosterol and scopoletin** also make cassia fistula therapeutic for prophylaxis treatment of **migraine**
- Presence of **anthraquinones and anthrones** make cassia fistula therapeutic for **dysentery**

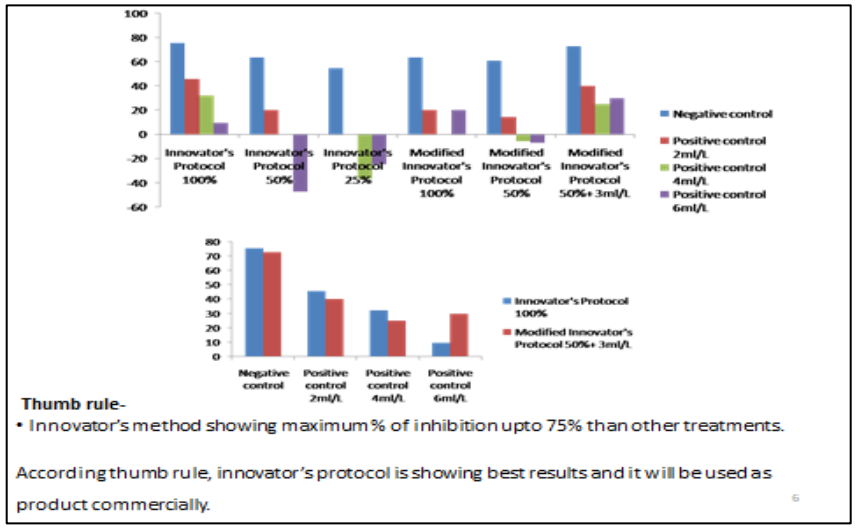
Future work to be done:-

- More research is required for further characterization of the phyto-constituents to confirm the identified compounds.
- In-vitro and in-vivo study should be studied to completely validate efficacy of Cassia fistula root to treat menstrual problem.
- *Cassia fistula* has therapeutic effect as per current results and reported literature so it can be utilized as potential phyto-constituent source for product formulation.

8. **Project Title:-***Invitro* & *invivo* (field trail) validation and development of value added formulation to control sucking pest along with evaluation

Participant's name:- Shipra Pandey





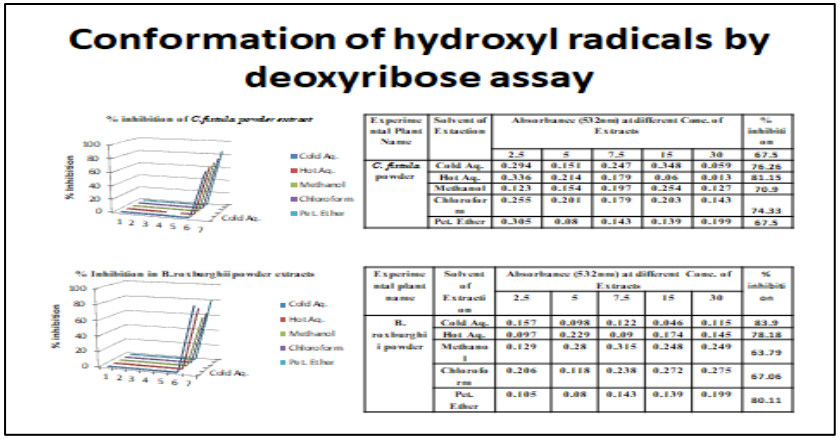
Results:-

- Older leaves contains more phenolic content than fresh leaves, so it might be the reason of good pesticidal activity (Achakzai et al., 2009).
- Neem oil, a well known insecticide against sucking pest reported that it is effective from 6-10ml/L on brinjal, And our treatment shows 10-30% more results over the positive control(6ml/L).
- After application of different treatment on brinjal plant for controlling Whitefly, Innovator's method and modified method (50% extract + 3ml/L) showing best results.
- Leaf extract of *Lantana camara* will be a promising biopesticides in an eco-nomical, eco-friendly manner and sustainable agriculture.

Future work to be done:-

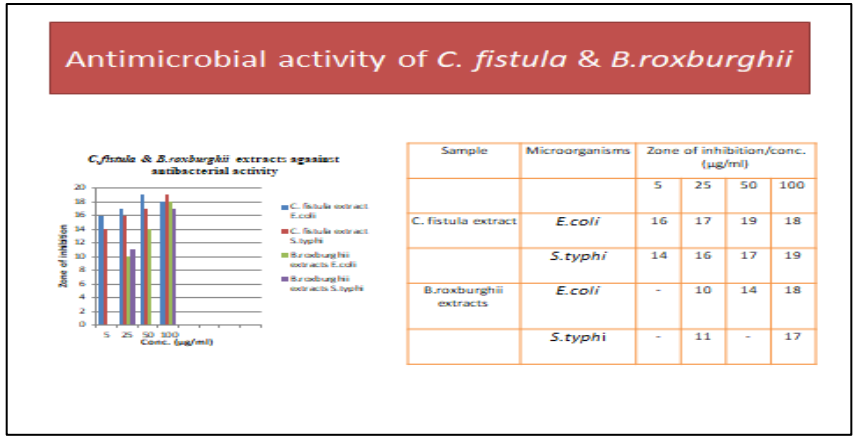
- The activity of Lantana extract will be enhanced by using nanotechnology.
- Toxicity of formulation is major health concern in agriculture practices, that can be minimize by nanoemulsion technology. Nanoemulsion, synthesized by the oil obtained from the can leaves of Lantana camara, enhanced the efficiency of extract formulation. So, Nanoemulsion of Lantana proves as a new weapon to diminish the activity of sucking pest in cost-effective, green and safe manner.

9. **Project Title:-** Evaluation of Balanties roxburghii (Egori) & Cassia fistula L. (Garmalo) used to cure dysentery in Sheep and Goat
   Participant's name:-Tinku Gupta



Experimental Plant Name	Solvent of Extraction	Absorbance (532nm) at different Conc. of Extracts					% inhibition
		2.5	5	7.5	15	30	
C. fistula powder	Cold Aq.	0.294	0.151	0.247	0.348	0.059	67.5
	Hot Aq.	0.336	0.214	0.179	0.06	0.013	81.15
	Methanol	0.123	0.154	0.197	0.254	0.127	70.9
	Chloroform	0.255	0.201	0.179	0.203	0.143	74.33
	Pet. Ether	0.305	0.08	0.143	0.139	0.199	67.5

Experimental plant name	Solvent of Extraction	Absorbance (532nm) at different Conc. of Extracts					% inhibition
		2.5	5	7.5	15	30	
B. roxburghii powder	Cold Aq.	0.157	0.098	0.122	0.046	0.115	83.9
	Hot Aq.	0.097	0.229	0.09	0.174	0.145	78.18
	Methanol	0.129	0.28	0.315	0.248	0.249	63.79
	Chloroform	0.206	0.118	0.238	0.272	0.275	67.06
	Pet. Ether	0.105	0.08	0.143	0.139	0.199	80.11



Sample	Microorganisms	Zone of inhibition/conc. (µg/ml)			
		5	25	50	100
C. fistula extract	*E.coli*	16	17	19	18
	S.typhi	14	16	17	19
B.roxburghii extracts	*E.coli*	-	10	14	18
	S.typhi	-	11	-	17

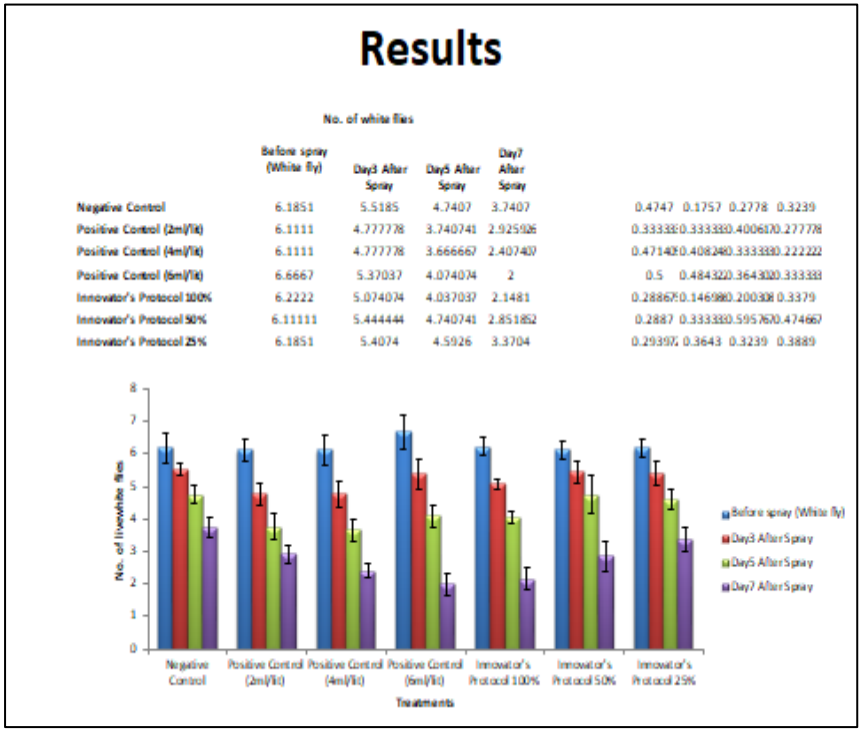
Results:-

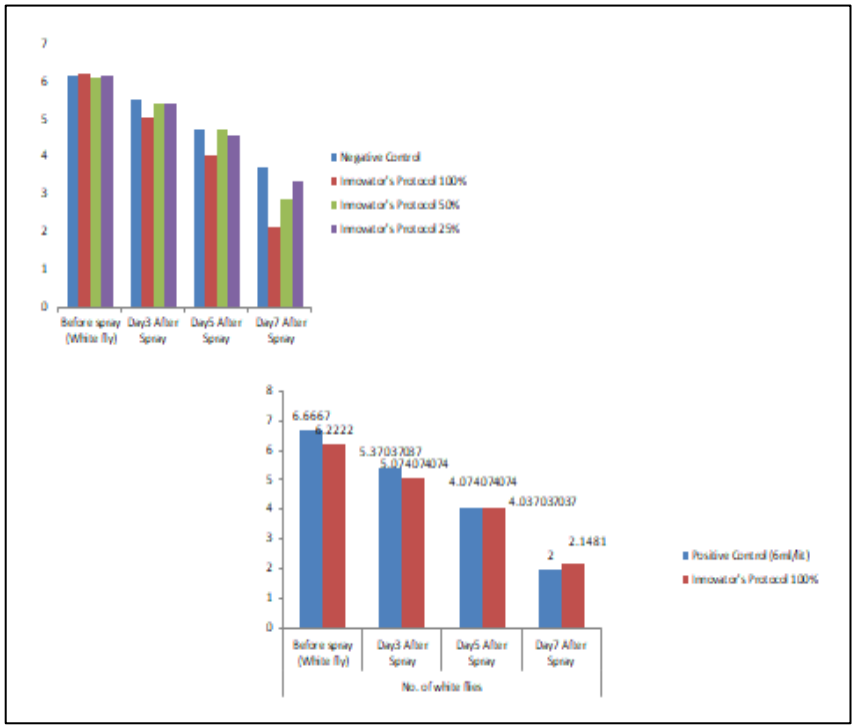
- It may be concluded from the present finding that different extracts of C.fistula & B.roxburghii contains phenolic which is an important source of antioxidant. These phenolic have been significant applications in pharmacological as well as in biological systems.

Future work to be done:-

- Validate herbal formulation by in vivo studies.

10. **Project Title:-**Evaluation of pesticidal efficacy of *Agave americana* extract against sucking and chewing pest
Participant's name:- Vijay Vardhan Pandey





Results:-

- The calculated result signify the effect of herbal formulations on controlling the sucking pest, F-statistic greater than the critical value is equivalent to a p-value less than alpha and both mean that this experiment reject the null hypothesis.The larvicidal effect not shows significant effect but may be in later stage it may show pupicidal effect/ adult abnormalities.

Future work to be done:-

- Again field trials with some specific criterion like soil analysis, monitoring of control plant and treated plant, spraying of herbal formulations to different crops and for different pests, also we go for antibacterial, antifungal and plant growth promoting activity of herbal formulations.
- Effect on herbal formulations on pupa deformation
- Chemical screening of herbal formulations, which chemical or group of chemicals responsible for pesticidal activity.