



UGC - Human Resource Development Centre
Pt. Ravishankar Shukla University, Raipur



Organized

**Online Multidisciplinary Refresher Course in
Biotechnology**

December 13 to 28, 2021

Report

Name of Course/Program:	Online Multidisciplinary Refresher Course in Biotechnology
Name of Contact person from HRDC:	Dr. Arvind Agrawal
Date of Course/Program:	13.12.2021 to 28.12.2021
Name of Course Coordinator:	Dr. Keshav Kant Sahu Professor & Head School of Studies in Biotechnology Pt. Ravishankar Shukla University, Raipur
Theme of Course/Program:	Multidisciplinary Refresher Course in Biotechnology
Number of Participants:	25
State wise number of participants:	Chhattisgarh- 18, New Delhi- 02, Uttar Pradesh- 02, West Bengal- 01, Maharashtra- 01, Manipur- 01
Gender wise number of participants:	Male: 08, Female: 17
Number of Resource Persons	37
Name and Signature of the Course Coordinator	
Dr. Keshav Kant Sahu Professor & Head School of Studies in Biotechnology Pt. Ravishankar Shukla University Raipur	Dr. Arvind Agrawal Assistant Professor Human Resource Development Centre Pt. Ravishankar Shukla University Raipur

Multidisciplinary Refresher Course in Biotechnology

(13.12.2021 - 28.12.2021)

A Multidisciplinary Refresher Course in “Biotechnology” was organized by Human Resource Development Centre, Pt. Ravishankar Shukla University Raipur, in collaboration with School of Studies in Biotechnology, Pt. Ravishankar Shukla University, Raipur from 13th -28th , December 2021. The course was attended by twenty Five registered participants from across the country. 16 outstation and 09 local participants attended the same. 37 resource persons delivered lectures.

DAY 1

Session I (10.30-12.00) Inaugural Function

The Program commenced with the Inaugural Function at 10.00 a.m. with **Chief Guest as Hon’ble Vice Chancellor Prof. K L Verma, Pt. Ravishankar Shukla University, Raipur.** With Director - **Prof. Shailendra Saraf, Director, Human Recourse Development Center, Pt Ravishankar Shukla University, Raipur** and Course Coordinator **Dr. Keshav Kant Sahu, Professor & Head, School of Studies in Biotechnology, Pt Ravishankar Shukla University, Raipur** the Program commenced by welcoming them, which was followed by Introduction of the Participants, Introduction about the course by Course Coordinator and Address by the Director HRDC- Pt RSU.

Inaugural Address was given by Hon’ble Vice Chancellor Sir who focused his speech on the developments made in the Biotechnology field and how this course will be beneficial in updating the teachers. Finally Vote of Thanks was given by the Course Coordinator.



Session II (12:15 to 13:45)



1. Dr. Sujoy Kumar Das Gupta of Department of Microbiology, Centenary Campus Bose Institute, Kolkata, West Bengal, spoke on the topic entitled 'DNA the Beautiful Molecule of Life'.

He elaborated all the concepts of the chronological development of DNA as genetic material. He also explored the importance of basic research with the contribution of different Scientists in the journey of DNA to the genome and the new emerging technologies in the field of Biotechnology. At the last, all the participants interacted and asked their queries to Dr. Sujoy Kumar Das Gupta.

Session III (14.15 to 15.45)



2. Dr. Rinkoo D Gupta of Faculty of Biotechnology, South Asian University, Chankyapuri, New Delhi, delivered lecture on the topic entitled 'Designing and Production of Therapeutic Monoclonal Antibody'.

She mentioned that first of all we should think about purpose of designing a monoclonal antibody. She explained three different approaches for designing a new protein : (i) rational protein designing, (ii) directed laboratory evolution and (iii) semi rational designing. She elaborated the steps to be followed for protein engineering including selection of gene, mutagenesis (3-4 rounds), creating a gene library, selection process of mutant colonies and finally selection of mutated gene. Mutagenesis can be done by in silico designing, random mutagenesis, site directed mutagenesis, insertions-deletions, DNA shuffling and domain swapping. She explained in detail the targeted or site directed mutagenesis by using degenerate primers. The gene functionality is checked by using expression hosts. The expression hosts which are being used generally are *Escherichia coli* (Bacteria), *Saccharomyces*, mammalian cell lines, *Xenopus* oocyte and baculovirus in insect larva. There is also cell free expression system. While selecting the expression hosts, there is a need to take into consideration the limitations of this approach like codon bias, protein folding and post translational modifications. Libraries are screened using ELISA or agar plate method if the number of colonies to be screened is less whereas high throughput screening is done by fluorescent activated cell sorter (FACS) when the library size is greater than 10^6 . Later, she explained the strategies being followed in her laboratory for development of monoclonal antibodies against dengue virus. Variable CDRs have been identified for raising the monoclonal antibodies. She apprised the participants about the major challenges being faced by her and group in the development of effective monoclonal antibodies against 4 serotypes of dengue virus.

Session IV (16.00 to 17.30)



3. Dr. Debashish Chakrabarty, Senior Scientist Biotechnology Division NBRI, Rana Pratap Marg Lucknow, Uttar Pradesh, delivered lecture on ‘Application of NGS (New Generation Sequencing) for Functional Genomics Study’.

His area of research is improvement of new cultivar of rice because Uttar Pradesh state is prone to drought conditions. He collected 106 cultivars, exposed them to drought conditions to identify the drought tolerant varieties of rice. One of the rice variety is “Kiran” which is drought tolerant. Transcriptome analyses were done at different time intervals. Bioinformatics analyses of the transcriptome data help in the identification of differential genes between the markers present on chromosome 3. Using proteome analysis differential protein in 2 cultivars were identified and found the correlation between transcriptome and proteome data. Proteins were identified by MALDI-TOF. His studies revealed the chaperone protein activities in relation to stress. There is a role of dehydrin FK506 binding protein complex in enhancing the drought tolerance. Dehydrin mechanism of working was described by morphological and anatomical studies. Lignin synthesis occurs when there is expression of dehydrin. The dehydrin gene was localized and it was found that it is involved in transcriptional regulation. His group explained the role of OmMYB-R1 transcription factor in drought conditions. The OmMYB-R1 is a stress responsive gene whose overexpression provides tolerance to drought, heavy metals and fungal infection. They also deciphered the pathway of genes working during stress conditions. He also explained the studies which proved that nitric oxide mediated transcriptional modulation enhance the adaptive plant responses against arsenic stress. He described the methyl jasmonate treatment for managing the arsenic toxicity in rice plants. He apprised the participants about the usefulness of new generation sequencing methods in the identification of useful SNPs for developing characters and phenotypes of plants

DAY 2

Session I (10.30-12.00)



4. Prof Josef Selvin of Department of Microbiology, Pondicherry University, Puducherry, spoke on 'Synthetic Biology Advances: Creation of Aliens and Synthetic Life'.

He delivered very interesting lecture on recent developments in genomics and metagenomics which created a new platform for synthetic or designer genome which is important for pharmaceutical industries it also play an important role in bio engineering of secondary metabolite. By a interesting video he explained that synthetic biology show hope for rebirth of endangered animal like woolly mammoth.

Session II (12.15-13.45)



5. Dr. Sujoy Kumar Das Gupta of Department of Microbiology, Centenary Campus Bose Institute, Kolkata, West Bengal, spoke on the topic entitled 'The Evolving Story of CRISPR cas.'

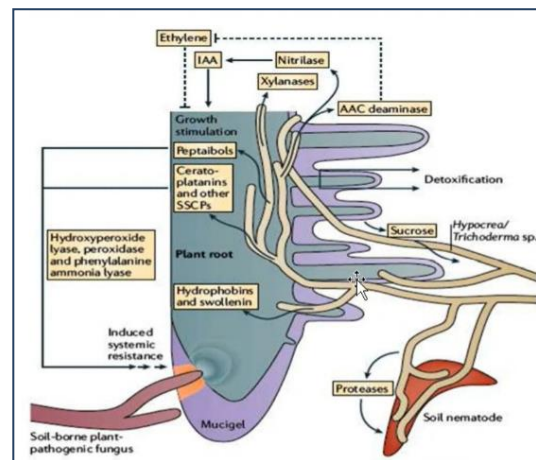
It's a new kind of working area where we come to know about relationship between bacteria and their viruses. The study shows that bacteria also show immunity against adversaries. CRISPR cas. is also an excellent example of Lamarckism evolution.

Session III (14:15 to 15:45)



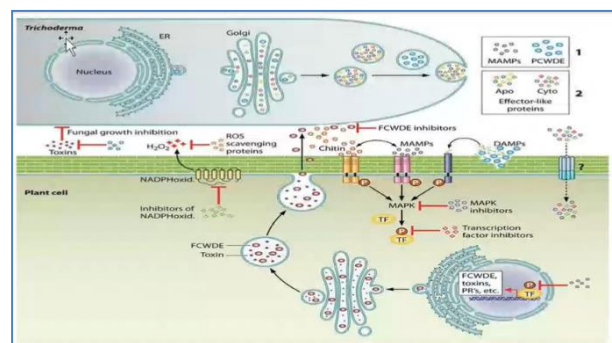
6. Prof. Anita S Patil of Plant & Microbial Secondary Metabolite Lab Department of Biotechnology Sant Gadge Baba Amravati University, Amravati, Maharashtra, delivered lecture on the topic entitled '**Trichoderma: A Potential Biocontrol Tool/Boon for Management of Plant Pathogens**'.

She began by explaining that *Trichoderma* is a genus of filamentous fungus occurring in soil and capable of colonizing and multiplying in various habitats. Now more than 200 species are recorded of which only about 20 have been recorded from soil. The common species of *Trichoderma* that are opportunistic human pathogens include *T. reesei*, *T. virens*, *T. asperellum*, *T. atroviride* and more. These



species are fast growing under an optimum range between 25-20°C and can use a variety of compounds as C and N source. *Trichoderma* spp. act as biocontrol agents against different phytopathogens either by indirect or direct mechanisms. An indirect mechanism comprises of competing for space, nutrients, plant growth promotion, antibiosis produce cell wall degrading enzymes, bioactive compounds in addition to secondary metabolites. The

essential feature required for an effective function of any biocontrol agent is its potential to survive in a variety of environmental conditions and its ability to colonize plant roots to control plant pathogens. In spite of enormous scientific



research on biological control of plant pathogens with *Trichoderma* spp., the most effective species against wide range of pathogens yet remains to be identified.

Popularization of biopesticides is very slow as compared to chemicals and only 2% biopesticides are available. Among the different biopesticides, *Trichoderma* is most exploited and have many success stories. *Trichoderma viride* and *Trichoderma harzianum* have carved a niche for themselves in India as important biocontrol agents for management of various diseases. A number of successful products based on different species of *Trichoderma* have been commercialized in India.

Session IV (16:00 to 17:30)



7. Prof. Biswadeep Das, of Department of Life Sciences and Biotechnology, Jadavpur University, Kolkata, West Bengal, spoke on 'The RNA World'.

He began with a brief introduction to the structure of DNA and RNA. He explained how pH affects the H-bonding in DNA and how RNA has the intrinsic property to form internal loops, hairpin loops, and bulges i.e. secondary structures. Additionally it may also undergo folding back onto itself to form tetraloops or pseudoknots by stacking interactions. Also RNA may exhibit an unusual interaction called as U.A.U base triple. Such structures make RNA quite different from DNA in terms of being structurally very dynamic as against the monotonous DNA. RNA structures play a significant role in a variety of cellular functions. A hairpin loop structure formed upstream of *prfA* gene affects the transcription or gene expression of the gene which in turn is related to producing a virulence response. RNA can also form Riboswitches i.e. two alternating forms of the RNA secondary structure – one based on pseudoknot and the other a base triple. A classic example of these riboswitches is the leader sequence in a Tryptophan operon. Therefore RNA is structurally very versatile. Initially, around a century back, it was considered to be merely a passive carrier of genetic information.

Day 3

Session I (10.30-12.00)



8. Prof. Biswadeep Das, of Department of Life Sciences and Biotechnology, Jadavpur University, Kolkata, West Bengal, spoke on the topic '**Killing Messengers before they are Born: A New Paradigm of Gene Regulations**'.

Sir has described in detail about the nuclear exosomes and C-text. Sir has also elaborated that how the targeted decay of specific mRNA in the nucleus is responsible for the telomere length; how the preferential degradation of mRNA creates new paradigm and regulation of gene expression.

Session II (12.15-13.45)



9. Dr. Meetu Gupta of Ecotoxicogenomics Lab, Department of Biotechnology, Jamia Millia Islamia University, New Delhi, delivered lecture on the topic '**Way Out of the Obnoxious Web of Arsenic Stress for Rice**'.

In her lecture Madam emphasized mainly on the toxicity of arsenic that how the arsenic does affects neuronal system of the plants. Madam Gupta has also explained in detail that how the arsenic does reacts with plants along with the description of molecular reaction of arsenic and its behavior with plants. She also discussed about the role of time and sequence on stress mainly with rice plant; How does the nitrogen signaling pathway affects the rice plants; and most importantly she describes the process for identification of those genes and synthesis of mRNA such that plants with arsenic resistant properties can be grown. Madam's lecture was very succinct and important.

Session III (14:15 to 15:45)



10. Dr. Tanushree Banerjee (Department of Biotechnology Research Laboratory, Dr. D. Y. Patil Biotechnology and Bioinformatics Institute Dr. D. Y. Patil Vidyapeeth, Tathawade, Pune, Maharashtra) talk on the topic entitled 'Design Thinking and Innovation'.

For economic development and mitigating the challenges faced by the humanity, it is crucial to promote the culture of critical thinking and innovation in the country. Government of India is taking various initiatives to promote a start-up economy and critical thinking culture in India through establishment of 'Institute Innovation Council' under 'Ministry of Education (MoE)' for motivating the young minds towards innovation

Government is establishing institution and team of specialist to mentoring young minds to understand how to identify a significant problem A number of scheme like Promoting Innovations in Individuals, Start-ups and MSMEs (PRISM) SERB Distinguished Investigator Award (SERB-DIA) scheme TARE (Teacher Associates for Research Excellence) Mobility Scheme for early identification and empowerment of exceptional scientists, researchers MANAK (Million Minds Augmenting National Aspiration and Knowledge), Design Innovation Centre (DIC) are available and facilitates its partners to forge mutually beneficial linkages to initiate and assist innovation activities and act as a catalyst and facilitator for Innovation in the country. Its primary objective is to create an ecosystem that connects and facilitates various stakeholders on all aspects of the innovation process including training and support. By promoting innovation, channeling various incentives that benefit the cluster, DIC acts as an incubating body managing the growth of innovation in this ecosystem.

Session IV (16:00 to 17:30)



11. Prof. Harsh Bais of Department of Plant and Soil Sciences University of Delaware, 311 AP Biopharma 590 Avenue 1743, Lab 357, Newyork, DE 19713, USA, spoke on 'The Role of Benign Root Microbiome in Plant Defense and Health'.

With increase in population day by day the world is facing challenge for production of food for human population. Climate change and emergence of Pesticide Resistance is making it harder .Genetically modified crops could be a solution but ethical issue, cost and suspected danger makes it not a preferential choice. Prof Bias research group is trying to study plant microbiome, and its effect of plant health and defence against pathogen.

The rhizosphereic microbiome consists of good bacteria which may help plant to tolerate abiotic stress, nutrient acquisition, protection against pathogen and help in immune response. On other side Bad one the Plant pathogens are infectious agents that make plants sick and causes 10-30% annual yield loss. Upto 25% of plant genes respond to pathogen infection the arms race between plant and pathogens drives diversity in defence and pathogenicity.

Day 4

Session I (10.30-12.00)



12. Dr. Shailza Singh of National Centre For Cell Science, NCCS Complex, Ganeshkhind, Pune, Maharashtra, spoke on the topic entitled 'System Driven Synthetic Machines for Therapeutics in Infection Model (Part-I)'.

She began by an introduction to systems and synthetic biology of infectious disease Leishmaniasis wherein, her group tries to integrate the action of regulatory circuits.

She explained system biology is the computational and mathematical modeling of biological systems. It provides a holistic view of different interconnecting pathway involved in biological processes. Analysis of various networks simultaneously will help in finding out target that can be modified synthetically to achieve therapeutic effects.

She explained immunobiology of Leishmaniasis and explained about Work Flow. And phylogenetic Analysis. She explained about phenotype responses. She told about role of IL-6 in macrophage polarization that IL-6 induces anti-inflammatory responses in the absence of SOCS3 in macrophages.

Session II (12.15-13.45)



13. Prof. A.S. Raghavendra of School of Life Sciences, Department of Plant Science, University of Hyderabad, Hyderabad, Andhra Pradesh, delivered lecture on 'How Plants Respond to Biotic or Abiotic Stress: The Guard Cells Sense Water Stress and Pathogen Attack to Induce Stomatal Closure'.

He started with his presentation on how stomatal guard cells sense and transducer the hormonal signal of abscisic acid. He described how stomata guard plants and how guard cells and turgor pressure works and the role of abscisic acid.

He explained about guard cells which are good model system to study the signal transduction pathway in plants as they respond to range of environment stimuli. He explained how stomata open as the turgor of guard cells increases and explained about the role of calcium, potassium and turgor. He explained stomatal aperture is regulated by controlling K^+ concentration in the guard cells and Abscisic acid can invoke this stomatal closure in addition to blue light. He also explained how ABA is or MJ (signal) is sensed by the cell and the final effect is manifested or the message is transduced.

Session III (14:15 to 15:45) & Session IV (16:00 to 17:30)

Micro Teaching



14. Dr. Arvind Agrawal of HRDC Pt. Ravishankar Shukla University, Raipur, Chhattisgarh, evaluated the Microteaching Activity of the participants.

The first micro teaching session of this refresher course started as per the instructions of Dr. K.K. Sahu Sir (Course coordinator). Evaluation of micro teaching was done by Dr. Arvind Agrawal of HRDC Pt. Ravishankar Shukla University, Raipur. Micro teaching started with Dr. Arpita's presentation. Presentation details of all the participants are as follows;

No.	NAME	TOPIC
01.	Ms Reenu Verma	Taxis behavior
02.	Dr. Arpita Rakshit	Plasmid
03.	Mr. Omprakash Maravi	Phyllotaxy
04.	Dr. Kritika Jyoti Namdev	Lichen
05.	Mrs. Rajeshwari Verma	Oogenesis in animal
06.	Dr. Alka Ekka	Recombinant DNA
07.	Mr. Manoj Kumar	Plant tissues
08.	Dr. Shomendra Singh	Economic importance of fish
09.	Dr. Renu Sholanki	Antigen and Antibody interaction
10.	Dr. Shailly Anand	Restriction Enzyme
11.	Dr. Swetlana Nagal	Glycolysis
12.	Mr. Rajiv Panigrahi	Mycorrhiza
13.	Dr. Tuneer Khelkar	Nucleotide

Day 5

Session I (10.30-12.00)



15. Dr. Shailza Singh (National Centre For Cell Science, NCCS Complex, Ganeshkhind, Pune, Maharashtra) spoke on the topic entitled '**System Driven Synthetic Machines for Therapeutics in Infection Model (Part-II)**'.

She began by an introduction on system driven synthetic machines for therapeutics in infection model. She has given information about biological complexity, computers for exploration and experiments for conformation. Knowledge about data science which is an interdisciplinary subject that uses scientific techniques, procedures, algorithm and systems to extract information was very useful.

She explained about identification of aptamer like sequences in Lesmanial transcriptome to construct a regulatory switch. Aptamers are small RNA/ DNA elements which can form the specific secondary and tertiary structures and can bind to specific proteins. In modern research these are used for achieving a specific activity as they have high specificity and lesser in size. For gene regulation these aptamers can act like a riboswitches upon binding to a specific small molecule metabolite.

Session II (12.15-13.45) & Session III (14:15 to 15:45)

Micro Teaching



16. Dr. Arvind Agrawal of HRDC Pt. Ravishankar Shukla University, Raipur, Chhattisgarh, evaluated the Microteaching Activity of the participants.

The first micro teaching session of this refresher course started as per the instructions of Dr. K.K. Sahu Sir (Course coordinator). Evaluation of micro teaching was done by Dr. Arvind Agrawal of HRDC Pt. Ravishankar Shukla University, Raipur. Presentation details of all the participants are as follows;

Sr.No.	NAME	TOPIC
14.	Dr. Chancha Chaturvedi	Plant adaptation
15.	Ms Vinita Sahu	Transgenic plants
16.	Dr. Shweta Agniwanshi	Transgenic animal
17.	Mr Atul Trivedi	Threats of environment
18.	Ms Priya Dewangan	Data deficient
19.	Ms Uma Gupta	Human blood
20.	Ms Archana Masram	Vaccine
21.	Dr Bhupendra Kumar	Mimicry and protective coloration
22.	Ms Pallavi Sinha	Data deficient
23.	Dr Ajit Singh	Inter cellular chemical communication
24.	Ms Swati Tiwari	Data deficient
25.	Ms Indu Soni	Plant tissue

Session IV (16:00 to 17:30)



17. Dr. Dipankar Chakraborti of Department of Genetics from University of Calcutta, Kolkata, West Bengal, delivered lecture on the topic entitled '**Biotechnological Approaches for Development of Biotic Stress Tolerance in Pigeon pea**'.

He enlightened that how plant genetic engineering recently developed transgenic insect resistance plants for us they are easily integrated with conventional crop. His study will be contributed to biotechnological improvement of pigeon pea for biotic stress. A very interesting conversation we all had with Dr. Chakraborti after his lecture he answered our all queries with lots of passion and in very elaborated

Day 6

Session I (10.30-12.00)



18. Prof. Madan Mohan Chaturvedi of **Laboratory for Chromatin Biology, Department of Zoology, University of Delhi, New Delhi**, spoke on the topic entitled '**Regulation of Gene Expression: Linkage Between Metabolism and Epigenetics**'.

He discussed on the histones, chromatin and epigenetic codes. He initially emphasized on the lac operon model, its structure and regulation. Thereafter he gave emphasis on the epigenetic modifications of histones, like linkage and metabolism. He explained the structure of core histone proteins, which consist of a globular domain and an unstructured N- or C-terminus tail. The latter are the frequent sites for diverse posttranslational modifications, and primarily act as docking sites for binding of chromatin interacting machineries. In addition, the unstructured N- or C-terminus tails form the basis of a code called as histone code; and along with DNA methylation, the unstructured tails form the basis of epigenetic inheritance.

Prof. Chaturvedi further added that there are evidences that explain that enzymes histone acetyl transferases, histone methyl transferases, and histone kinases fall into the class of "*writers*" of "*epigenetic marks*" that regulate the expression of genes. There are also the "*readers*" of the epigenetic marks, which include the proteins that contain the chromo-domains and the bromo-domains. Moreover, there are the "*erasers*" to remove the epigenetic marks that include the enzymes Histone deacetylases (HDACs) and histone demethylases. The molecules required as cofactors for all such modifications are ATP, Acetyl CoA, and S-adenosyl methionine. These cofactors are the intermediate products of different metabolic pathways, viz. Krebs cycle, oxidative phosphorylation, and amino acid metabolism. Enzymes that erase the *epigenetic marks* also use other cofactors derived from the metabolic pathways. These are NAD for Sir2 family of HDACs, FAD for LSD1 histone demethylase, and F₂⁺ and alpha-ketoglutarate for JMjC-domain containing histone and DNA demethylases. Thus, different metabolites that directly attach to the histone proteins in chromatin are actually the regulators of gene expression.

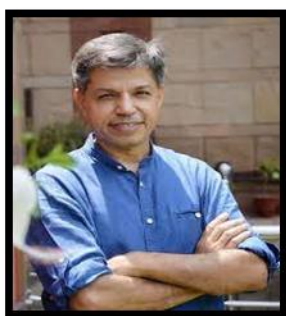
Session II (12.15-13.45)



19. Prof. Pradipta K. Mohapatra of Department of Botany, Ravenshaw University, Cuttack, Odisha, spoke on the topic entitled '**Evolution of Z-Scheme: A Visit Through the History**'.

Giving emphasis on the photosynthesis, Prof. Mohapatra told that photosynthesis is an extremely complex process, which is carried out by plants, algae and cyanobacteria. Many scientists contributed a lot in the past to enrich our basic understanding of the complex life-sustaining process of photosynthesis. Photosynthetic pigments have different absorption and emission maxima. In 1932, the work of Emerson and Arnold gave the concept of photosystems. The experiment opened the concept of coordinated action of chlorophylls to generate electron. In 1957, the classical Emerson's Red drop and enhancement effect came into existence. The enhancement effect was different in different photosynthetic organisms, and was determined by the accessory pigments. Bessel Kok discovered P700 (reaction centre of PS-I) in 1956-57, and in 1959 he showed the two-light effect. However, his experiments of 1957 failed to explain the existence of two photosystems. Later on, in 1962 the two photosystems were discovered by Dawson.

Session III (14:15 to 15:45)



20. Dr. Shashi Kumar Rhode (Metabolic Engineering (Biofuels and Industrial Biotechnology) International Centre for Genetic Engineering and Biotechnology, New Delhi) delivered lecture on the topic '**Synthetic Biology of Photosynthetic Organisms to Produce Value Added Products**'.

The talk started with how Dr Rhode's lab using RNAi approach silenced the barrier gene of algal cell wall so that it can sustain life in more than 10% CO₂. Carbon fixation is a limiting factor in algae and Rubisco has low affinity for CO₂. To

overcome these problems Dr Rhode's lab introduced CO₂ fixing LCIA and LCIB transporters which enhances biomass and lipid productivity in these algae. Further, Dr Rhode's group is also working to produce artemisinin in edible plants that can be used in the treatment of malaria by oral delivery because human digestive enzymes are incapable of breaking down glycosidic bond in plant cell wall. The overall aim of the work done in Dr. Rhodes lab is to produce cost effective drugs (artemisinin production in edible plant) using synthetic biology approach.

Session IV (16:00 to 17:30)



21. Dr. Anagh A Sahasrabuddhe of Department of Pathology University of Michigan, Ann Arbor MI 48109, USA, spoke on 'Rational Designing of Bifunctional Protein Degradation Drugs'.

Dr. Sahasrabuddhe started his talk by explaining the role of ubiquitin-mediated control of protein degradation. Ubiquitin ligase synthesizes polyubiquitin chains on target proteins that ultimately are degraded in proteasome. Further, Dr. Sahasrabuddhe talked about proteolysis-targeting chimeras (PROTAC) drugs where small molecules are designed that contain groups that bind to ubiquitin ligase at one end and target protein at the other end. He also talked about the challenges for PROTAC discovery like sometimes ternary complex is formed but target protein does not get ubiquitinated or ubiquitination is done at the wrong site. Dr. Sahasrabuddhe further talked about the PROTAC drugs which are in clinical trial such as Androgen receptor degrader which is in 2nd phase of trial. The talk was concluded with the future requirements for more efficient PROTACs like finding out novel mechanism that can increase the scope and can reduce resistance potential.

Day 7

Session I (10.30-12.00)



22. Prof. Ena Ray Banerjee of Immunology and Regenerative Medicine Research Laboratory, Department of Zoology, University of Calcutta, Kolkata, West Bengal, spoke on the topic entitled 'Functional Food and Immunity'.

In her talk she talked about functional component present in various natural products including plants as well as animal sources. The efficacy of herbal and conventional medicines was also compared in terms of cost, side effects, mode of action and healing properties. Prof. Banerjee also emphasized on the bioactive component present in various plants and different plants part. She discussed about the bio active component present in rice (Gamma oryzanol), maize (maysin), soy (isoflavones), ficus (flavonoids, anthocyanin and coumarins), barley (dietary fibers, β glucan) etc and also their benefits. She also summarized the role of active components of animal origin such as amino acids, omega-3, omega-6, vitamins and minerals obtained from fishes. The session was completed by brief discussion in which Prof. Banerjee answered the queries raised by different participants.

Session II (12.15-13.45)



23. Prof. Mirza Hasanuzzaman of Department of Agronomy, Sher-e-Bangla Agricultural University, Dhaka-1207, Bangladesh, spoke on 'Biostimulants for Enhancing Plant Abiotic Stress Tolerance'.

In his lecture Prof. Mirza talked that biostimulants are a group of substances or microorganisms, whose have a positive impact to enhance plant growth, availability of nutrient, and improvement of stress tolerance in crop plants. He also talked about the origin of biostimulants and told

that most of biostimulants are exogenous compound(s) or microorganisms, which can be applied in plant or root zone (rhizosphere) to improve nutrient uptake, plant growth, crop quality and abiotic stress tolerance. Biostimulants such as humic and fulvic acids, seaweed extracts, protein hydrolysates; mixture of oligopeptides, polypeptides and amino acids, N-containing compounds; glycine betaines, polyamines, and non-protein amino acids, chitosan, inorganic compounds; trace elements (selenium, Se; and silicon, Si), beneficial fungi; mycorrhizal fungi and Trichoderma, and beneficial bacteria; plant growth-promoting rhizobacteria (PGPR) are currently in use for crop production. He showed the various results where biostimulants not only resulted in better plant growth and development but also provided better tolerance to various stresses. Prof. Mirza concluded his lecture by emphasizing that biostimulants could be an excellent and viable alternative, which are capable to enhance the growth of plants, improve the nutrient uptake, increase tolerance to biotic and abiotic stresses, and expand crop quality traits along with a good yield.

Session III (14.15-15.45) & Session IV (16:00 to 17:30)



24. Dr. Mitashree Mitra of School of Studies in Anthropology, Pt. Ravishankar Shukla University, Raipur, Chhattisgarh, was there to evaluate Seminar Presentation of the participants.

In this session, seminars of 15 participants were held out of which of the topics were Aquatic Mammals; Biosensors; Parasite fauna of fresh water; Fishes of Manipur and Assam; Flight Adaptation, etc. After observing the seminars by Prof Mitra, participants were given proper guidance and suggestions.

Day 8

Session I (10.30-12.00)



25. Dr. Manoj Prasad of **National Institute of Plant Genome Research, Aruna Asaf Ali Marg, New Delhi**, spoke on '**Feeding the Ten Billion: A Genomics Perspective**'.

He began with the food and nutritional values of crops for ensuring the basic needs of the growing population which is going to be a challenging task as human population is racing towards 10 billion by the year 2050. He also explained the effects of climate change that decrease in total arable land, and reduction in yields as biotic and abiotic factors pose a significant threat to agriculture. He had also narrated that biotechnology holds the key to expedite the genetic improvement process of existing crops. He mentioned the advancement and improvement of genomics technologies in the recent years that has improved the precision of crop yield. He also explained the Next-generation sequencing, coupled with structural and functional genomics that has assisted in decoding complex genomes, and identification of precise targets for genetic manipulation. He had described different functional genomics approaches, including over-expression, knock-out, knock-down, gene- and genome-editing, the notable outcomes of genomics-enabled crop improvement projects like Bt cotton, Bt brinjal, FlavrSavr tomato, Golden Rice, etc. He mentioned the progress to develop climate-resilient and high-yielding crops for release to the farmers.

Session II (12.15-13.45)



26. Prof. Rizwan Hasan Khan of **Interdisciplinary Biotechnology Unit, Aligarh Muslim University, Aligarh, Uttar Pradesh**, delivered lecture on '**Journey of Amyloid Induction to Inhibition**'.

He began with the deposition of Amyloid, fibrous, extracellular, highly organized cross-beta sheet protein, in different organs and tissues and that causes variety of disorders such as Alzheimer's

and Parkinson's disease. He also explained that electrostatic interactions play a key role in amyloid formation, discovered by his research team. He briefly discovered the protein aggregation, induced by sodium dodecyl sulphate (SDS), an anionic surfactant that mimics several features of biological membranes; the helical propensity that increases as TFE and HFIP concentrations rise; the creation of a structured intermediate state that precedes the commencement of the aggregation process, according to evidence from far-UV circular dichroism, intrinsic fluorescence, ANS, and ThT fluorescence; the interactions and interplay between the rosin surfactant QRMAE and albumins in the initial electrostatic and subsequent hydrophobic contacts, which play a key role in the creation of hydrophobic interactions-driven amorphous aggregate. He explained the effects of various vitamins such as A, B12, C, K in therapeutics of neurodegenerative disease and he also elaborately described the effects of Vitamin K3 and B1 against amyloid-induced neurotoxicity to generate nontoxic aggregates. He also described the effect of tannic acid, warfarin, cysteine as a amyloid inhibitor of model proteins and the use of Capromycin, Thionamide antibiotics, L-Dopa (an anti-parkinson drug) to have anti-aggregation property. He mentioned the effect of two novel designed pentapeptides on amyloid growth of human insulin using combined biophysical, microscopic, cell viability and computational approaches. He had also described the mechanism of interaction of cholic acid (CA), a primary bile acid, with human insulin and A β -42 and found CA to be effective in inhibiting amyloid formation; gallic acid, that inhibits metal-induced aggregation by chelating the metal ions in the solvent and thereby inhibiting the aggregation of human lysozyme and hence these strategies can be used to cure the neurodegenerative studies.

Session III (14.15-15.45) & Session IV(16.00-17.30)



27. Prof. Aditi Poddar of School of Studies in Life Science, Pt. Ravishankar Shukla University, Raipur, Chhattisgarh, was there to evaluate Seminar Presentation of the participants.

The 1st seminar was started at 2:26 pm by Dr. Chanchal Chaturvedi on the topic “Plant Diseases”. The 2nd seminar was started at 2:46 pm by Vinita Sahu on the topic “Plant Transformation Technology Agrobacterium Mediated Gene Transfer”. The 3rd seminar was started at 3:04 pm by Dr. Shweta Agniwanshi on the topic “Estuary”. The 4th seminar was started at 3:32 pm by Mr. Atul Trivedi on the topic “Physiological Response to O₂ Deficient Stress (Hypoxia)”. The 5th seminar was started at 3:50 pm by Priya Dewangan on the topic “Food Poisoning”. The 6th seminar was started at 4:09 pm by Uma Gupta on the topic “Protein Synthesis”. The 7th seminar was started at 4:29 pm by Dr. Archana Masram on the topic “Vaccines”. The 8th seminar was started at 4:56 pm by Dr. Bhupendra Kumar on the topic “Feeding Biology of Mexican Beetles on Parthenium Weed in Different Eco Climatic Region of Nepal”. The 9th seminar was started at 5:06 pm by Dr. Pallavi Sinha on the topic “Conversion Of Biowaste to Bioenergy: A Two Stage Process of Dark Fermentative H₂ Production Followed by Methane Production”. The 10th seminar was started at 5:23 pm by Dr. Ajit Singh on the topic “Role of 14-3-3 B Protein On Ovarian Folliculogenesis Steroidogenesis and Its Correlation in the Pathogenesis of PCOS in Mice”. The 11th seminar was started at 5:38 pm by Dr. Swati Tiwari on the topic “Genetically Modified Crops”. The 12th seminar was started at 5:51 pm by Dr. Indu Soni on the topic “Mushroom Cultivation”. The 13th seminar was started at 6:05 pm by Dr. Svetlana Nagal on the topic “Microbial Interaction”.

Day 9

Session I (10.30-12.00)



28. Dr. Raman Parekh of **CSIR-IMTECH, Chandigarh**, spoke on ‘**Role of Microbes in Human Health**’.

He began by explaining that how to Microbes have made an extraordinary contribution to the pharmaceutical, health, and agriculture sector. He had also described the impact of microbes in the pharmaceutical industry and their role in human health for modern drug discovery. He concluded with the future prospects in this field.

Session II (12.15-13.45)



29. Prof. Tapan Kumar Nailwal of Department of Biotechnology, Kumaun University, Nainital, Uttarakhand, spoke on 'Micropagation: The Revolutionary Technology that Saves Time, Money and Nature for Humans'.

He began with a brief introduction of Plant tissue culture techniques and also explained callus culture, organ culture, single cell culture and suspension culture methodology. He had also described the necessity of micropropagation for conservation of endangered and rare plant species and their role in biodiversity. He concluded with the future prospects in this field

Session III (14.15-15.45)



30. Prof. S.B. Virulkar of Department of Plant Molecular Biology & Biotechnology, Indira Gandhi Agriculture University Raipur, Chhattisgarh, delivered lecture on 'Complexity of Character: Molecular Biology Aspects'.

He gave two examples i.e. Sickle cell Anemia and Hypertrichosis to explain that any phenotypic characters of animal/ plant/microorganisms are depends on different factors not only on the particular gene expression. We could not get authentic results through genes sequencing for phenotypic character unless we will not study the all factors that are involved. We must be take care the study of molecular biology of the system. In eukaryotic system gene expression is complex procedure. DNA transcribed into mRNA and translated in proteins and expresses themselves for those different transcriptional, translational factors, and enzymes are involved and all these factors and enzymes are the products of different genes. All these are interconnected with each other and this is the complexity of the system. If transcription factors are not express in significant amount the expression of the genes may hinder and may show different phenotypic characters.

Most of the traits of economic importance are the developmental traits and are independent on the other traits, and expresses at a system level. The characters emerge as a result of of gene regulatory networks involving nodes, edges, metabolic interactions, epigenetic interactions at different organizational level starting from within cell, tissue and higher level. The gene expression is noisy, is the variation in gene expression under seemingly uniform conditions.

Session IV(16.00-17.30)



31. Prof. S.K. Jadhav of School of Studies in Biotechnology, Pt. Ravishankar Shukla University, Raipur, Chhattisgarh, was there to assess Project Presentation of the participants.

The list of participants along with their group and presented topics are listed below:

Group No.	NAME	TITLE OF THE PRESENTATION
1.	Ms Renu Verma	Analysis of population structure of Aedes mosquito and Dengue virus serotype using complete genome from Southern parts of West Bengal, India
	Dr. Arpita Rakshit	
	Mrs. Rajeshwari Verma	
2.	Dr. M. Shomorendra Singh	Nutrient profiling of indigenous fishes of Loktak Lake in Manipur, a high altitude lake with organic funa.
	Dr. Renu Solanki	
	Dr. Shailly Anand	
3.	Dr. Shweta Singh Agniwanshi	Studies on Hematological, Hormonal and Biochemical changes in Clarias batrachus maintained in total darkness and light.
	Mr Atul Trivedi	
	Ms Priya Dewangan	
4.	Ms Uma Gupta	Evaluation of haemolymph of Parthenium beetle Zygogramma biocolorata Pallister(Coleoptera Chrysomelidae) for antimicrobial peptides
	Dr. Archana Masram	
	Dr. Bhupendra Kumar	
5.	Ms Pallavi Sinha	Studies on role of 14-3-3 proteins in the ovary of Parkes strain mice in normal and pathophysiological condition
	Dr. Ajit Singh	

Day 10

Session I (10.30-12.00)



32. Prof. Pawan Kumar Dhar of School of Biotechnology, Jawaharlal Nehru University, New Delhi, spoke on 'Synthetic Biology: Fundamental Concepts to Applications'.

He started with his presentation. He began with a brief introduction to the synthetic biology fundamental concepts to applications and explained how Reductionism has been the key scientific approach in biology. After that he explained biological engineering and rational design and controlled contribution of biological components leading to application. And described the genetic movement with compare to electric circuit movement. He also explained importance and limitation of synthetic biology and establishment problem of synthetic biology in India and what the solution can be was briefly explained. Lecture was so interesting, informative and knowledgeable. After lecture session many participants asked many questions. Prof. Dhar clearly answered the questions raised by the participants.

Session II (12.15-13.45)



33. Dr. Bhupal Govinda Shrestha of Department of Biotechnology Kathmandu University, Dhulikhel, Nepal, spoke on 'Merger of Ayurveda and Biotechnology for Study of Anticancer Activity of Medicinal Plants of Nepal'.

Initially, he introduced his country Nepal there are 7 states in Nepal so, Nepal is a geographical different area so many biodiversity are found in this area because of this many medicinal plants are found in hilly area. Then after Nepal introduction they talked tools and techniques of biotechnology like carbon dioxide incubator, Deep freezer, Centrifuge machine, Laminar air flow, shaking incubator, Vertical autoclave, hot air oven, culture media, tissue culture ware how to use these in the laboratory. Also Discussed about how

cancer is caused, types of cancer, cancer causing factors and cancer control medicine. And also discussed biotechnology techniques, southern blotting technique, northern blotting technique, immunofluorescence. Thereafter, he told about many anticancerous medicinal plants and its abstracts.

He told over 1600 species of medicinal and aromatic plants occur in Nepal, rich in rare Himalayan herbs. Most of the research involving medicinal plants is limited to taxonomical studies phytochemical screening antimicrobial activities. After discussion many participants asked many questions. He clearly answered those questions and satisfied every participant.

Session III (14.15-15.45) & Session IV (16.00-17.30)



34. Prof. Zenu Jha of Department of Plant Molecular Biology & Biotechnology, Indira Gandhi Agriculture University, Raipur, Chhattisgarh, was there to assess Project Presentation of the participants.

The list of participants along with their group and presented topics are listed below:

Group No.	NAME	TITLE OF THE PRESENTATION
6.	Mr. Omprakash Meravi	Application of positive impact of invasive plant species <i>Lantana camara</i> as antifungal activity and mosquito repellent
	Dr. Kritika Namdev	
	Mr. Manoj Kumar	
7.	Mr. Rajeev Panigrahi	Role of growth factors of <i>Tinospora carifolia</i> in lymphocyte culture
	Mr. Tuneer Khelkar	
	Dr. Chanchal Chaturvedi	
8.	Dr. Swati Tiwari	Mushroom cultivation: Nutritional, medicinal and Economic profitable value
	Dr. Indu Soni	
9.	Ms Alka Ekka	Investigating the therapeutic application of microbial Exopolysaccharide
	Ms Vinita Sahu	
	Dr. Swetlana Nagal	

Day 11

Session I (10.30-12.00)



35. Prof. T. Srinivasu of Department of Botany, Rashtrasant Tukadoji Maharaj Nagpur University, Nagpur, Maharashtra, spoke on 'Authentic Identification of Medicinal Plants by nrDNA Sequencing Technique'.

He began with a brief introduction of medicinal plant and herbal drugs and cosmetics. India contributes 3500 crores to internal market. The major problem faced by industries are cheap raw material, lack of knowledge among cultivator, correct identification of herb and quality assurance therefore a system to diagnose quality and efficiency is required. Various techniques like PCR, gene sequencing, isolation of DNA and amplification of ITS nr DNA is available.

In eukaryotes two internal transcription occur 1. Small unit (18s rRNA) 2. Large (28+5.8s rRNA). DNA is generally isolated through CTAB method but it requires fresh and uninfected leaves for medicinal plant CTAB method is not prescribed due to phytochemicals like alkaloids, tannin resin etc. therefore Khanuja method is prescribed. Post isolation DNA purification is performed and is amplified using PCR (only ribosomal DNA is used). Now purified and amplified product is sent for DNA sequencing which is further used for computational analysis (chromatogram). BLAST (Basic Local Alignment Search Tool) is performed of sequence which provides information about base pair thus giving further information regarding quality and other character of plant gene.

Session II (12.15-13.45)



36. Prof. Satish Kumar Awasthi of Chemical Biology Laboratory, Department of Chemistry, Delhi University, New Delhi, spoke on 'Recent Advances in Malaria Chemotherapy'.

Malaria is a mosquito-borne infectious disease that affects humans and other animals. Malaria remains a scourge of

humanity; affecting hundreds of millions of people and causing ~440,000 deaths each year. Basic symptoms include fever, tiredness, vomiting and headaches. Generally, 10 to 15 days are required for symptoms to appear. It is caused by plasmodium group which is carried by *anopheles* mosquitoes. The bite introduces parasite to human blood and is traveled to liver where they mature and reproduce.

P. falciparum, *P. vivax*, *P. ovale*, *P. malariae* are known to cause disease in human beings while *P. knowlesi* are known to be less lethal. Blood films are general test for microscopic examination. It generally works in two lifecycles therefore till now vaccination is not available to malaria. Malaria parasites spread by successively infecting two types of hosts: female *Anopheles* mosquitoes and humans. In humans sporozoites reach human liver cells, when the liver cells rupture, the merozoites are released into the bloodstream where they rapidly invade the red blood cells. These blood-stage parasites replicate asexually – rapidly attaining a high parasite burden and destroying each red blood cell they infect, leading to the clinical symptoms of malaria.

Malaria drug discovery is a challenging and difficult task due to the unavailability of the vaccine and lack of newer drugs. The most potent artemisinin and its derivatives, widely used in combination therapies for curing malaria worldwide are also now falling to resistance in some parts of the world. Thus, to combat malaria, new drugs possessing high therapeutic value, minimal toxicity, rapid efficacy and low cost are urgently needed.

Session III (14.15-15.45)



37. Prof. Piyush Pandey of Department of Microbiology, Assam University, Silchar, Assam, delivered lecture on the topic entitled '**Plant Microbiome, its Composition and Interactions for Better Plant Health**'.

He began with the relationship between Global Food production and World Population, Target 2050. He defined Microbiome as Second genome of plants. He explained the details of plant microbiome community and its significant role in physiology and growth of plants,

plant productivity regulation, and plant health regulation in different stressed environment as well as soil health. He also described that the plant microbiomes are usually dynamic and depends on several intrinsic and extrinsic factors, such as stage of plant growth, stress, exudate, plant variety, soil type and other environmental factors. He explained Core Microbiome and Satellite Microbiome and its sustainability in the agroecosystems. He had discussed briefly that the plant microbiome is a theatre of continuous interaction between different components at metabolic, physiological, and genetic level, which has co-evolved with respective host plants. He had also mentioned the difference in the rhizosphere microbiome community from cadmium co-contaminated soil. He had also described the plant microbiome succession at phylum level and best practices for engineering microbiomes. He described the endophytic bacteria of black rice and also explained Host specific endophytic microbiome diversity and associated functions in the varieties of scented black rice at young and mature stage of plant development.

Session IV (16.00-17.30)



38. Prof R.C. Dubey of Department of Botany and Microbiology, Gurukula Kangri University, Haridwar, Uttaranchal, spoke on the topic entitled ‘**Medicinal Properties of River Ganga Water**’.

He began with the holy fact of worshipping the Nature in India and Worshipping the Sun/Rivers. He beautifully explained Nadi Stuti Shukta and also mentioned the Rivers in Rig Veda. He described that the Ganga River is the perennial river of the Indian subcontinent covering about the one fourth area of the country. River Ganga is considered as one of the most pious National Rivers of the world since the ancient time due to its self-cleansing property and has been worshiped as the Goddess Ganga. Ganga has several synonyms in *Sanskrit* literature viz., *Jāhnavi*, *Tripathgā*, *Vishnupagā*, *Devasari*, etc. Surprisingly, Ganga water does not putrefy even after long period of storage. Further, he mentioned that Ganga water has also been used for remedial purposes.

Most religious beliefs involve some ceremonial use of 'holy' water. He described that Ganga covers 2510 km and more than 30 cities are located beside Ganga. Medicinal properties of Ganga river water, antibacterial activity of Ganga river water from an unknown source, but no significant work has been done. He also explained the cause of Long queue for salvation beside Ganga in Varanasi – Manikarnika Ghat. He also mentioned the cure from different microbial as well as bacterial diseases after bath in Ganges water. He has also mentioned about different bacteriophages of Pathogenic bacteria from Ganga river water and medicinal properties of Ganga river water. He said that it is reported in different scientific journals, that the presence of Vibriophages, pathogens of Vibrio cholerae from Ganga river water from Kolkata, West Bengal, India, Sulmonellatyphae Bacteriophages from Ganga river water from Haridwar, India, pneumonae phages from Ganga river water from Rishikesh, India. He also explained the cross-infectivity of Phages against pathogenic Bacteria and host specificity in pre monsoon, monsoon and post monsoon season. He explained in detail about the antimicrobial activity of compounds isolated from Ganga river water from Rishikesh, antibacterial property of compounds isolated from Ganga river water from Haridwar, India, and also described the treatment of multi drug resistant Bacteria from Ganges River.

Day 12

Session I (10.30-12.00)



39. Dr. Gopal Krishna Joshi of Department of Biotechnology, HNB Garhwal University, Srinagar, Jammu & Kashmir, spoke on 'Metagenomics: An Introduction and Recent Advances'.

He spoke about all sort of advances made in the metagenomics studies, various types of sequence search tools, sequence libraries, etc. He also provided knowledge about applications of metagenomics in various fields of biological sciences and in betterment of human population. Vote of thanks was given by one of the participants.

Session II (12.15-13.45)



40. Dr. Amit Dubey of Intellectual Property Rights Cell, Chhattisgarh Council of Science & Technology, Raipur, Chhattisgarh, spoke on 'Intellectual Property Rights'.

He spoke about various kinds of IPs, innovations, process of filing patents, outcomes of getting patents, types of patents, and how his agency is helpful to a common people in filling patents. At the end, vote of thanks was given by one of the participants.

Session III (14.15-15.45)



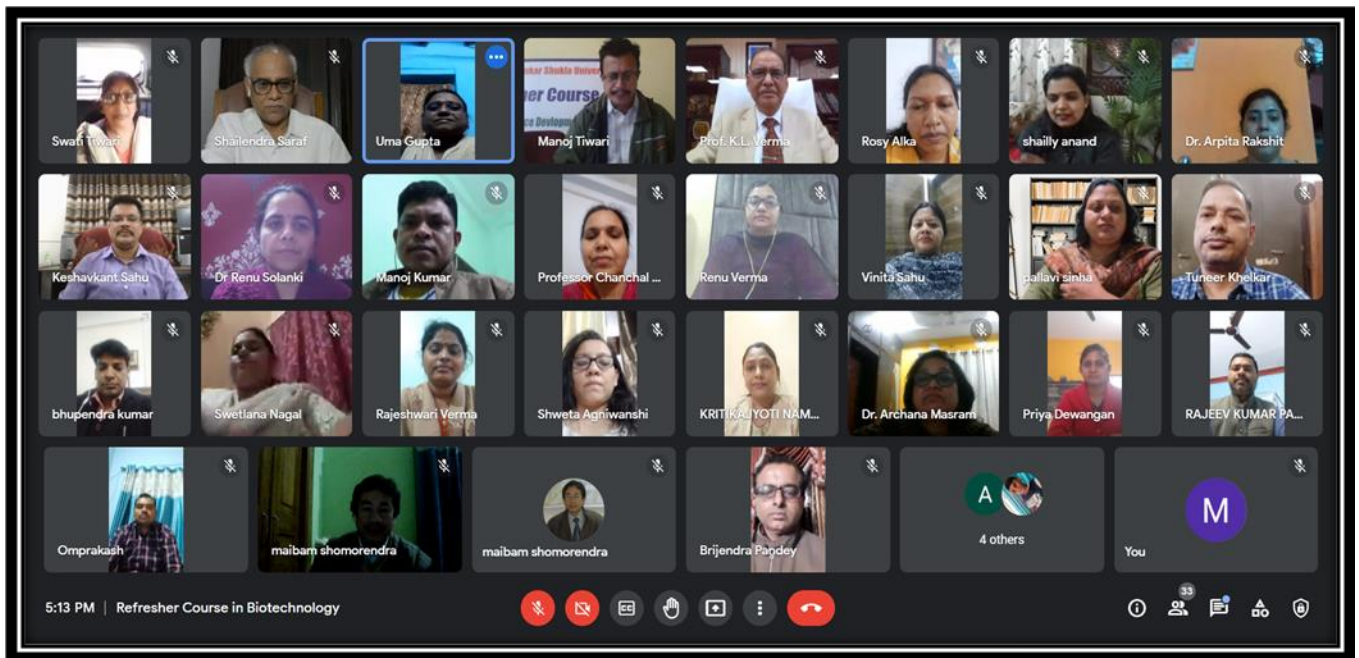
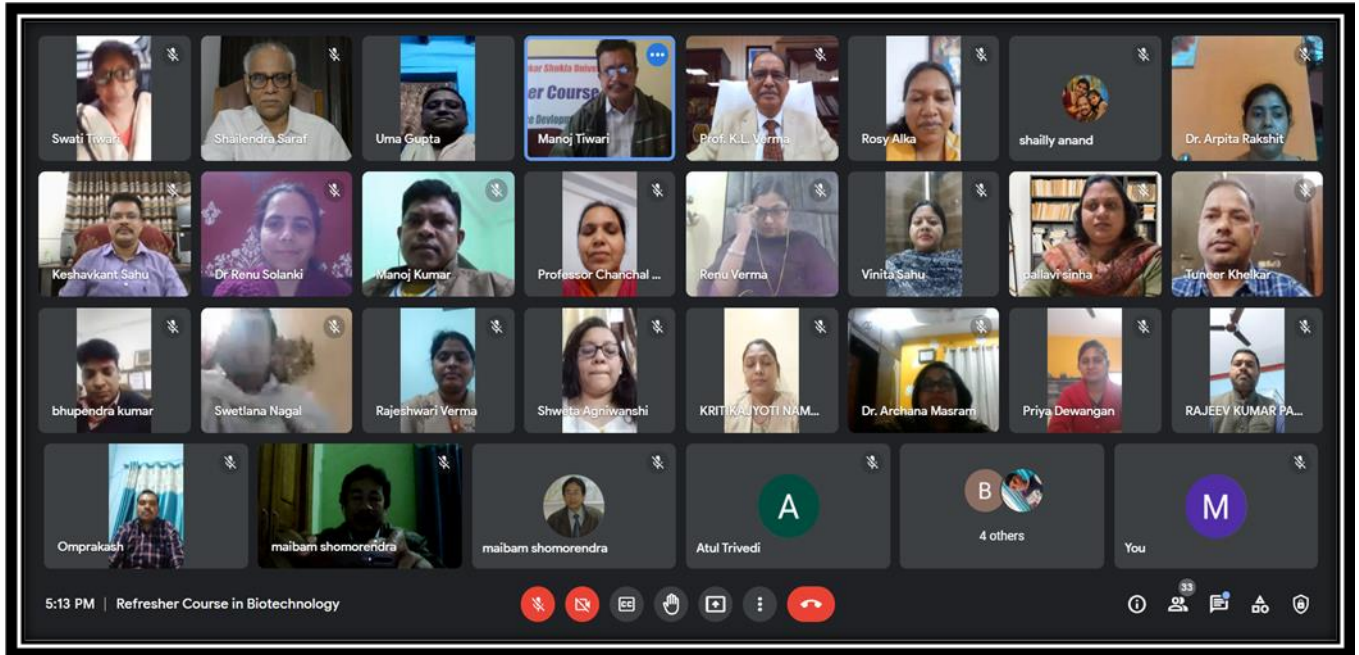
40. Dr. A.M. Deshmukh of Department of Microbiology, Dr B A Marathwada University, Aurangabad, Maharashtra, delivered lecture on the topic entitled 'Frontiers in Bio-fertilizers and Bio-pesticides'.

He spoke in detailed about what exactly the biofertilizers and biopesticides are? How theses will be produced in the laboratory and in commercial scale? He also spoke about the processes of their applications in the fields. How these two are beneficial over the chemical fertilizers and pesticides were also discussed.

Session IV (16.00-17.30) - Valedictory Function

In this function, **Prof K L Verma**, Hon'ble Vice-Chancellor of Pt. Ravishankar Shukla University, Raipur, was the **Chief Guest**, **Prof Shailendra Saraf**, Director, HRDC, Pt. Ravishankar Shukla University, Raipur, was the **Chairperson**, and **Prof Keshav Kant Sahu**, Head, School of Studies in Biotechnology, Pt. Ravishankar Shukla University,

Raipur, was present as **Course Coordinator**. Initially, Prof Keshav Kant Sahu was given the overall report of this refresher course. Thereafter, opportunity was given to the participants for providing their feedback and were then shared their wonderful experiences, and some of them suggested organizing refresher course on pure subject like Microbiology also. Honorable VC Prof. K. L. Verma Sir blessed all the participants with his valuable words and congratulated all for completing online refresher course successfully. In the last, Prof Shailendra Saraf Sir was given vote of thanks to the guests and everyone for their participation.



Organizing Team



Prof. K. L. Verma
Vice Chancellor
Pt. RSU, Raipur (C.G.)



Dr. Shailendra Saraf
Director
HRDC, Pt. RSU, Raipur (C.G.)



Prof. Keshav Kant Sahu
S.o.S. in Biotechnology,
Pt. Ravishankar Shukla
University, Raipur (C.G.)



Dr. Arvind Agrawal
Assistant Professor
HRDC, Pt. Ravishankar Shukla
University, Raipur (C.G.)

Multidisciplinary Refresher Course in Biotechnology

(13-28 December 2021)

UGC-Human Resource Development Centre

Pt. Ravishankar Shukla University, Raipur 492 010, Chhattisgarh

Activity Schedule

	Time	Title/ Speaker
13.12.21 (Day – 1)	10.30-12.00	Registration; Inauguration; Induction
	12.15-13.45 (L1)	DNA the Beautiful Molecule of Life Prof Sujoy Kumar Das Gupta Department of Microbiology, Centenary Campus, Bose Institute, Kolkata Email: sujoy@icbose.ac.in
	14:15-15:45 (L2)	Designing and Production of Therapeutic Monoclonal Antibody Dr Rinkoo D Gupta Faculty of Life Sciences and Biotechnology, South Asian University, New Delhi Email: rdgupta@sau.ac.in
	16:00-17:30 (L3)	Application of NGS for Functional Genomics Study Dr Debasis Chakrabarty Biotechnology and Molecular Biology Division, CSIR-National Botanical Research Institute, Lucknow Email: debasis1972@rediffmail.com
14.12.21 (Day – 2)	10.30-12.00 (L4)	Synthetic Biology Advances: Creation of Aliens and Synthetic Life Prof Joseph Selvin Department of Microbiology, Pondicherry University, Puducherry Email: josephselvinss@gmail.com
	12.15-13.45 (L5)	The Evolving Story of CRISPR cas Prof Sujoy Kumar Das Gupta Department of Microbiology, Centenary Campus, Bose Institute, Kolkata Email: sujoy@icbose.ac.in
	14:15-15:45 (L6)	Trichoderma A Potential Biocontrol Tool/Boon for Management of Plant Pathogens Prof Anita S Patil Department of Biotechnology, SGB Amravati University, Amravati Email: anitapatil@sgbau.ac.in
	16:00-17:30 (L7)	The RNA World Prof Biswadip Das Department of Life Science and Biotechnology, Jadavpur University, Kolkata Email: biswadip_das@yahoo.com
15.12.21 (Day – 3)	10.30-12.00 (L8)	Killing Messengers Before They Are Born: A New Paradigm of Gene Regulation Prof Biswadip Das Department of Life Science and Biotechnology, Jadavpur University, Kolkata Email: biswadip_das@yahoo.com
	12.15-13.45 (L9)	Way Out of the Obnoxious Web of Arsenic Stress for Rice Dr Meetu Gupta Department of Biotechnology, Jamia Millia Islamia University, New Delhi Email: meetu_gpt@yahoo.com
	14:15-15:45 (L10)	Design Thinking and Innovation Dr Tanushree Banerjee Department of Biotechnology, Dr. D. Y. Patil Biotechnology and Bioinformatics Institute, Pune Email: tanushree.banerjee@dpu.edu.in

	16:00-17:30 (L11)	Sweet Talkers: The Role of Benign Root Microbiome in Plant Defense and Health Dr Harsh Bais Plant and Soil Science Department, University of Delaware, United States of America Email: bais@dbi.udel.edu
16.12.21 (Day – 4)	10.30-12.00 (L12)	Systems Driven Synthetic Machines for Therapeutics in Infection Model (Part-I) Dr Shailza Singh National Centre for Cell Science, NCCS Complex, Ganeshkhind, Pune Email: singhs@nccs.res.in
	12.15-13.45 (L13)	How Plants Respond to Biotic or Abiotic Stress: The Guard Cells Sense Water Stress and Pathogen Attack to Induce Stomatal Closure Prof A S Raghavendra School of Life Sciences, Department of Plant Sciences, University of Hyderabad, Hyderabad Email: as_raghavendra@yahoo.com
	14:15-15:45	Evaluation of Micro Teaching Dr Arvind Agrawal Human Resource Development Centre, Pt. Ravishankar Shukla University, Raipur Email: dr.arvind02@gmail.com
	16:00-17:30	
17.12.21 (Day – 5)	10.30-12.00 (L14)	Systems Driven Synthetic Machines for Therapeutics in Infection Model (Part-II) Dr Shailza Singh National Centre for Cell Science, NCCS Complex, Ganeshkhind, Pune Email: singhs@nccs.res.in
	12.15-13.45 (MT)	Evaluation of Micro Teaching Dr Arvind Agrawal Human Resource Development Centre, Pt. Ravishankar Shukla University, Raipur Email: dr.arvind02@gmail.com
	14:15-15:45 (MT)	
	16.00-17.30 (L15)	Biotechnological Approaches for Development of Biotic Stress Tolerance in Pigeonpea Dr Dipankar Chakraborti Department of Genetics, University of Calcutta, Kolkata Email: dipankar_12@yahoo.co.in
18.12.21	Holiday	
19.12.21	Holiday	
20.12.21 (Day – 6)	10.30-12.00 (L16)	Regulation of Gene Expression: Linkage Between Metabolism and Epigenetics Prof Madan Mohan Chaturvedi Laboratory for Chromatin Biology, Department of Zoology, University of Delhi, New Delhi Email: mchaturvedi@zoology.du.ac.in
	12.15-13.45 (L17)	Evolution of Z-Scheme: A Visit Through the History Prof P K Mohapatra Department of Botany, Ravenshaw University, Cuttack Email: pradiptamoha@yahoo.com

	14:15-15:45 (L18)	Synthetic Biology of Photosynthetic Organisms to Produce Value Added Products Dr Shashi Kumar Rhode Metabolic Engineering (Biofuels and Industrial Biotechnology), International Centre for Genetic Engineering and Biotechnology, New Delhi Email: skrhode@icgeb.res.in
	16:00-17:30 (L19)	Rational Design of Bifunctional Protein Degradable Drugs Dr Anagh Anant Sahasrabudhe University of Pennsylvania, PA, United States of America Email: anagh@pennmedicine.upenn.edu
21.12.21 (Day – 7)	10.30-12.00 (L20)	Functional Food and Immunity Prof Ena Ray Banerjee Immunology and Regenerative Medicine Research Laboratory, Department of Zoology, University of Calcutta, Kolkata Email: erb@caluniv.ac.in ; enaraybanerjee@gmail.com
	12.15-13.45 (L21)	Biostimulants for Enhancing Plant Abiotic Stress Tolerance Prof Mirza Hasanuzzaman Department of Agronomy, Sher-e-Bangla Agri. University, Dhaka, Bangladesh E-mail: mhzsauag@yahoo.com
	14:15-15:45 (SM)	Evaluation of Seminar Prof Mitashree Mitra School of Studies in Anthropology, Pt. Ravishankar Shukla University, Raipur Email: mitashree.mitra@gmail.com
	16.00-17.30 (SM)	
22.12.21 (Day – 8)	10.30-12.00 (L22)	Feeding the Ten Billion: A Genomics Perspective Dr Manoj Prasad National Institute of Plant Genome Research, Aruna Asaf Ali Marg, New Delhi Email: manoj_prasad@nipgr.ac.in
	12.15-13.45 (L23)	Journey of Amyloid Induction to Inhibition Prof Rizwan Hasan Khan Interdisciplinary Biotechnology Unit, Aligarh Muslim University, Aligarh Email: rizwanhkhani1@gmail.com
	14:15-15:45 (SM)	Evaluation of Seminar Prof Aditi Poddar School of Studies in Life Sciences, Pt. Ravishankar Shukla University, Raipur Email: adinpod@gmail.com
	16.00-17.30 (SM)	
23.12.21 (Day – 9)	10.30-12.00 (L24)	Role of Microbes in Human Health Dr Raman Parkesh CSIR-IMTECH, Chandigarh Email: rparkesh@imtech.res.in
	12.15-13.45 (L25)	Micropropagation: The Revolutionary Technology that Saves Time, Money and Nature for Humans Prof Tapan Kumar Nailwal Department of Biotechnology, Kumaun University, Nainital Email: tapannailwal@gmail.com
	14:15-15:45 (L26)	Complexity of characters – molecular biology aspects Prof S B Verulkar Department of Biotechnology, Indira Gandhi Agriculture University, Raipur Email: satishverulkar@gmail.com
	16:00-17:30 (PP)	Evaluation of Project Presentation Prof S K Jadhav School of Studies in Biotechnology, Pt. Ravishankar Shukla University, Raipur Email: shailesh9862@gmail.com

24.12.21 (Day – 10)	10.30-12.00 (L27)	Synthetic Biology: Fundamental Concepts to Applications Prof Pawan Kumar Dhar School of Biotechnology, Jawaharlal Nehru University, New Delhi Email: pawandhar@mail.jnu.ac.in
	12.15-13.45 (L28)	Merger of Ayurveda and Biotechnology for Study of Anticancer Activity of Medicinal Plants of Nepal Dr Bhupal Govinda Shrestha Department of Biotechnology, Kathmandu University, Dhulikhel, Nepal Email: bgs@ku.edu.np
	14:15-15:45 (PP)	Evaluation of Project Presentation Prof Zenu Jha Department of Biotechnology, Indira Gandhi Agriculture University, Raipur Email: jhazenu@gmail.com
	16:00-17:30 (PP/TT)	MCQ Based Test Dr Arvind Agrawal Human Resource Development Centre, Pt. Ravishankar Shukla University, Raipur Email: dr.arvind02@gmail.com
27.12.21	Holiday	
27.12.21	Holiday	
27.12.21 (Day – 11)	10.30-12.00 (L29)	Authentic Identification of Medicinal Plants by nrDNA Sequencing Technique Dr T Srinivasu Department of Botany, RTM University, Nagpur Email: dr_srinivasu_t@hotmail.com
	12.15-13.45 (L30)	Recent Advances in Malaria Chemotherapy Prof Satish Kumar Awasthi Chemical Biology Laboratory, Department of Chemistry, Delhi University, Delhi Email: satishpna@gmail.com
	14:15-15:45 (L31)	Plant Microbiomes, its Composition and Interactions for Better Plant Health Prof Piyush Pandey Department of Microbiology, Assam University, Silchar Email: piyushddn@gmail.com
	16.00-17.30 (L32)	Medicinal Properties of River Ganga Water Prof R C Dubey Department of Botany and Microbiology, Gurukula Kangri University, Haridwar Email: profrcdubey@gmail.com
28.12.21 (Day – 12)	10.30-12.00 (L33)	Metagenomics: An Introduction and Recent Advances Dr Gopal Krishna Joshi Department of Biotechnology, HNB Garhwal University, Srinagar Email: gkjoshi@rediffmail.com
	12.15-13.45 (L34)	Intellectual Property Rights Dr Amit Dubey Patent Cell, Chhattisgarh Council of Science and Technology, Raipur Email: amidubey@gmail.com
	14.15-15.45 (L35)	Frontiers in Biofertilizers and Biopesticides Dr A M Deshmukh Department of Microbiology, Dr B A Marathwada University, Aurangabad Email: amdeshmukh1@rediffmail.com
	16:00-17:30	Valedictory & Concluding Session

UGC - HRDC, PRSU, Raipur

Time Table: Refresher Course on Biotechnology

(13/12/2021 to 28/12/2021)

Multidisciplinary Refresher Course in Biotechnology (13-28 December 2021) UGC-Human Resource Development Centre Pt. Ravishankar Shukla University, Raipur 492 010, Chhattisgarh							
Day/ Date	Session -I (10:30 to 12:00)		Session -II (12:15 to 13:45)		Session -III (14:15 to 15:45)		Session -IV (16:00 to 17:30)
Day 01 (13.12.21)	Registration; Inauguration; Induction		Lecture-1 Prof Sujoy Kumar Das Gupta Dept of Microbiology Bose Institute Kolkata, West Bengal		Lecture-2 Dr Rinkoo D Gupta Faculty of Biotechnology South Asian University Chankyapuri, New Delhi		Lecture-3 Dr Debashish Chakrabarty Senior Scientist Biotechnology Division NBRI, Rana Pratap Marg Lucknow, Uttar Pradesh
Day 02 (14.12.21)	Lecture-4 Dr. Joseph Selvin Centre for Micro Biology School of Life Sciences Pondicherry University Puducherry	Tea Break	Lecture-5 Prof Sujoy Kumar Das Gupta Dept of Microbiology Bose Institute Kolkata, West Bengal	Lunch Break	Lecture-6 Prof. Anita S Patil Dept of Biotechnology SGB Amravati University Amravati, Maharashtra	Tea Break	Lecture-7 Prof Biswadip Das Dept of Biotechnology Jadavpur University Jadavpur, West Bengal
Day 03 (15.12.21)	Lecture-8 Prof Biswadip Das Dept of Biotechnology Jadavpur University Jadavpur, West Bengal		Lecture-9 Dr. Meetu Gupta Dept of Biotechnology Jamia Millia Islamia Univ. New Delhi		Lecture-10 Dr Tanushree Banerjee Dept of Biotechnology Dr. D. Y. Patil Biotechnology & Bioinformatics Institute Pune, Maharashtra		Lecture-11 Dr Harsh Bais Delaware Biotechnology Institute University of Delaware Newark, DE 19716, USA
Day 04 (16.12.21)	Lecture-12 Dr Shailza Singh National Centre for Cell Science SB Phule Univ. Campus Pune, Maharashtra		Lecture-13 Prof AS Raghavendra School of Life Sciences Department of Plant Sciences University of Hyderabad Hyderabad, Andhra Pradesh		Micro Teaching Dr Arvind Agrawal HRDC, PRSU Raipur		Micro Teaching Dr Arvind Agrawal HRDC, PRSU Raipur
Day 05 (17.12.21)	Lecture-14 Dr Shailza Singh National Centre for Cell Science SB Phule Univ. Campus Pune, Maharashtra		Micro Teaching Dr Arvind Agrawal HRDC, PRSU Raipur		Micro Teaching Dr Arvind Agrawal HRDC, PRSU Raipur		Lecture-15 Dr Dipankar Chakraborti Department of Genetics University of Calcutta Kolkata, West Bengal
Day 06 (20.12.21)	Lecture-16 Prof MM Chaturvedi Dept of Zoology Delhi University New Delhi		Lecture-17 Prof PK Mohapatra Dept of Botany Ravenshaw University Cuttack, Orissa		Lecture-18 Dr Shashi Kumar Rhode Microbial Engineering Integrative Biology Group International Centre for Genetic Engineering and Biotechnology New Delhi		Lecture-19 Dr Anagh A. Sahasrabudde Department of Pathology University of Michigan Ann Arbor MI 48109, USA

Day/ Date	Session -I (10:30 to 12:00)	Session -II (12:15 to 13:45)	Session -III (14:15 to 15:45)	Session -IV (16:00 to 17:30)
Day 07 (21.12.21)	Lecture-20 Prof Ena Ray Banerjee Department of Zoology University of Calcutta Kolkata, West Bengal	Lecture-21 Prof Mirza Hasanuzzaman Dept of Agronomy Sher-e-Bangla Agri. University Sher-e-Bangla Nagar, Dhaka, Bangladesh	Seminar Prof Mitashree Mitra Anthropology, PRSURaipur	Seminar Prof Mitashree Mitra Anthropology, PRSURaipur
Day 08 (22.12.21)	Lecture-22 Dr Manoj Prasad Staff Scientist VII Plant Molecular Biology Unit National Institute of Plant Genome Research New Delhi	Lecture-23 Prof Rizwan Hasan Khan Interdisciplinary Biotechnology Unit Aligarh Muslim University Aligarh, Uttar Pradesh	Seminar Prof Aditi Poddar Life Sciences, PRSURaipur	Seminar Prof Aditi Poddar Life Sciences, PRSURaipur
Day 09 (23.12.21)	Lecture-24 Dr Raman Parkesh CSIR- IMTECH Chandigarh	Lecture-25 Prof Tapan Kumar Nailwal Department of Biotechnology Kumaun University Nainital, Uttarakhand	Lecture-26 Prof S B Verulkar Department of Biotechnology Indira Gandhi Agriculture University Raipur, Chhattisgarh	Project Presentation Prof SK Jadhav Biotechnology, PRSU Raipur
Day 10 (24.12.21)	Lecture-27 Prof Pawan K. Dhar School of Biotechnology Jawaharlal Nehru University New Delhi	Lecture-28 Dr Bhupal Govinda Shrestha Dept of Biotechnology Kathmandu University Dhulikhel, Nepal	Project Presentation Prof Zenu Jha Biotechnology, IGKVRaipur	Project Presentation Prof Zenu Jha Biotechnology, IGKVRaipur
Day 11 (27.12.21)	Lecture-29 Prof. T. Srinivasu Department of Botany, Rashtrasant Tukadoji Maharaj Nagpur University, Nagpur	Lecture-30 Prof SK Awasthi Department of Chemistry University of Delhi New Delhi	Lecture-31 Prof Piyush Pandey Dept of Microbiology Assam University Silchar, Assam	Test (MCQ)
Day 12 (28.12.20)	Lecture-33 Dr Gopal Krishna Joshi Dept of Biotechnology HNB Garhwal University Srinagar, Garhwal	Lecture-34 Dr Amit Dubey Patent Cell CGCOST Raipur, Chhattisgarh	Lecture-35 Dr AM Deshmukh Dept of Microbiology Dr. BA Marathwada University Aurangabad, Maharashtra	Valedictory & Concluding Session

Refresher Course – Biotechnology
(13.12.2021 to 28.12.2021)
Course Coordinator - Prof. Keshav Kant Sahu
Participants List

S. No.	Name of Participants	Email Address	Mobile Number	Photo	Name of College	Affiliated University
01.	Renu Verma	vrenu0492@gmail.com	9753670492		Dr. Khubchand Baghel Govt. P.G. College, Bhilai-3, (C.G.)	Hemchand Yadav University, Durg, (C.G.)
02.	Dr. Arpita Rakshit	arsajc17@gmail.com	8013267241		Seth Anandram Jaipuria College, Kolkata, (W.B.)	University of Calcutta, Kolkata, (W.B.)
03.	Omprakash Meravi	om000079@gmail.com	9131717715		Govt. Khemraj Laxmichand Arts Commerce and Science College, Bagbahara, (C.G.)	Pt. Ravishankar Shukla University, Raipur, (C.G.)
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05.	Mrs. Rajeshwari Verma	verma8raj@gmail.com	9300331192		Mohan Lal Jain (Mohan Bhaiya) Govt. College, Khursipar, Bhilai, Dist-Durg, (C.G.)	Hemchand Yadav University, Durg, (C.G.)
06.	Alka Ekka	alka_ekka2006@yahoo.com	9827909170		Guru Ghasidas Vishwavidyalaya, Bilaspur, (C.G.)	Guru Ghasidas Vishwavidyalaya, Bilaspur, (C.G.)
07.	Manoj Kumar	manojkumarap18@gmail.com	9479008465		Govt. Indaru Kenwat Girls College, Kanker, (C.G.)	Bastar University, Jagdalpur, (C.G.)
08.	Dr. M. Shomorendra Singh	smaibam90@gmail.com	9862490384		Thambal Marik College, Oinam, Manipur	Manipur University, Imphal, Manipur
09.	Dr. Renu Solanki	renu_slnk@ddu.du.ac.in	9968216861		Deen Dayal Upadhyaya College, New Delhi	University of Delhi, New Delhi
10.	Dr. Shailly Anand	shailly.anand@gmail.com	9899009214		Deen Dayal Upadhyaya College, New Delhi	University of Delhi, New Delhi
11.	Dr. Swetlana Nagal	swetlana.micro81@gmail.com	9174841484		Govt. Mata Karma Girls College, Mahasamund, (C.G.)	Pt. Ravishankar Shukla University, Raipur, (C.G.)
12.	Rajeev Panigrahi	rajeevpanigrahi75@gmail.com	9424282097		Govt. Danteshwari P.G. College, Dantewada, (C.G.)	Shahid Mahendra Karma University, Bastar, Jagdalpur, (C.G.)

S. No.	Name of Participants	Email Address	Mobile Number	Photo	Name of College	Affiliated University
13.	Tuneer Khelkar	tuneerkhelkar@gmail.com	8319708102		Govt. Kaktiya P.G. College, Jagdalpur, (C.G.)	Shahid Mahendra Karma University, Bastar, Jagdalpur, (C.G.)
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15.	Vinita Sahu	vinita2428@gmail.com	9893357139		Govt. D.B. Girls P.G. (Autonomous) College, Raipur, (C.G.)	Pt. Ravishankar Shukla University, Raipur, (C.G.)
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18.	Priya Dewangan	Priya@dbgirls.org	9098580603		Govt. D.B. Girls P.G. (Autonomous) College, Raipur, (C.G.)	Pt. Ravishankar Shukla University, Raipur, (C.G.)
19.	Uma Gupta	Uma@dbgirls.org	9826416342		Govt. D.B. Girls P.G. (Autonomous) College, Raipur, (C.G.)	Pt. Ravishankar Shukla University, Raipur, (C.G.)
20.	Dr. Archana Masram	amg123321@gmail.com	8208348841		L.A.D. and Smt. R.P. College for women, Nagpur, (M.H.)	RTM Nagpur University, Nagpur, (M.H.)
21.	Dr. Bhupendra Kumar	bhupendrakumar@bhu.ac.in	8004326684		Department of Zoology, Banaras Hindu University, Varanasi, (U.P.)	Banaras Hindu University, Varanasi, (U.P.)
22.	Pallavi Sinha	pallavi.sinha10@gmail.com	9919199501		Govt. Nagarjuna P.G. College of Science, Raipur, (C.G.)	Pt. Ravishankar Shukla University, Raipur, (C.G.)
23.	Ajit Singh	ajitrepro@gmail.com	7905775592		Department of Zoology, Banaras Hindu University, Varanasi, (U.P.)	Banaras Hindu University, Varanasi, (U.P.)
24.	Dr. Swati Tiwari	swati.tiwari2604@gmail.com	9827896053		Govt. Shivnath Science College, Rajnandgaon, (C.G.)	Hemchand Yadav University, Durg, (C.G.)
25.	Dr. Indu Soni	indusonibotany@gmail.com	9826188667		B.P.L. Govt. P.G. Collage, Arang, Raipur, (C.G.)	Pt. Ravishankar Shukla University, Raipur, (C.G.)

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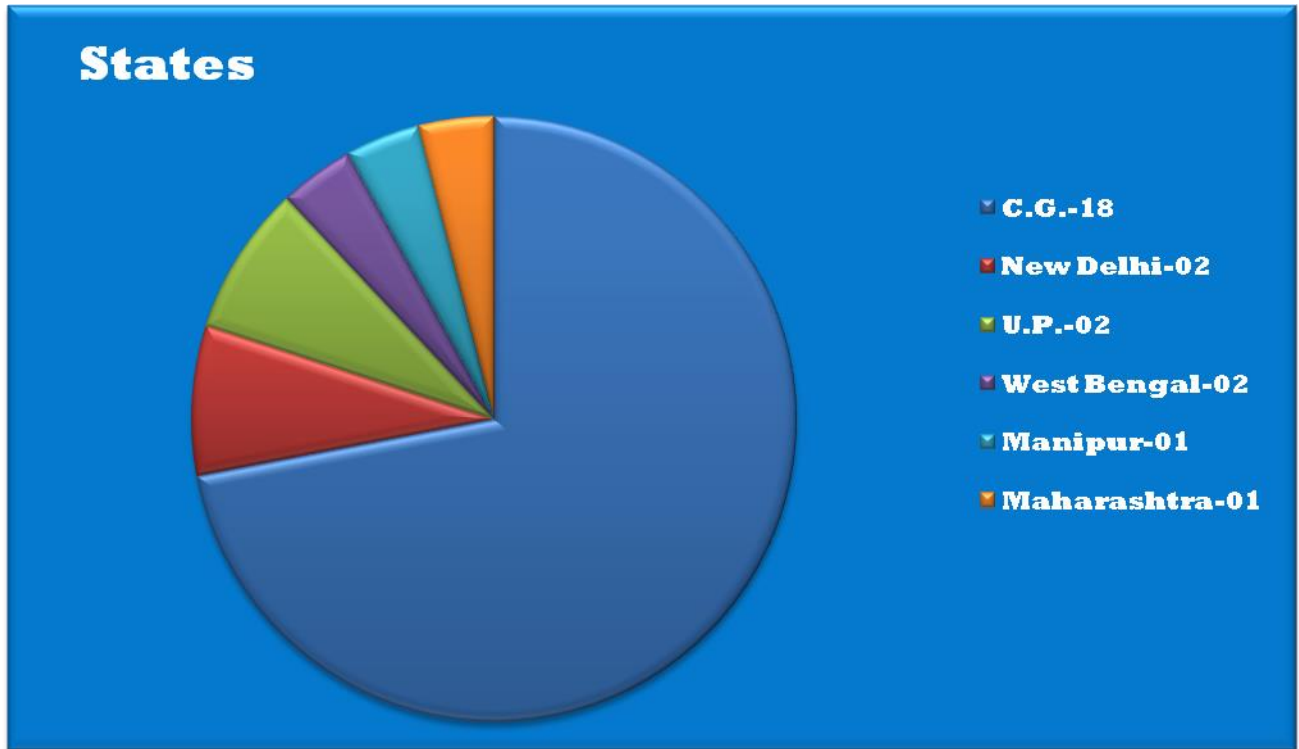
Participants List

Course Coordinator - Prof. Keshav Kant Sahu

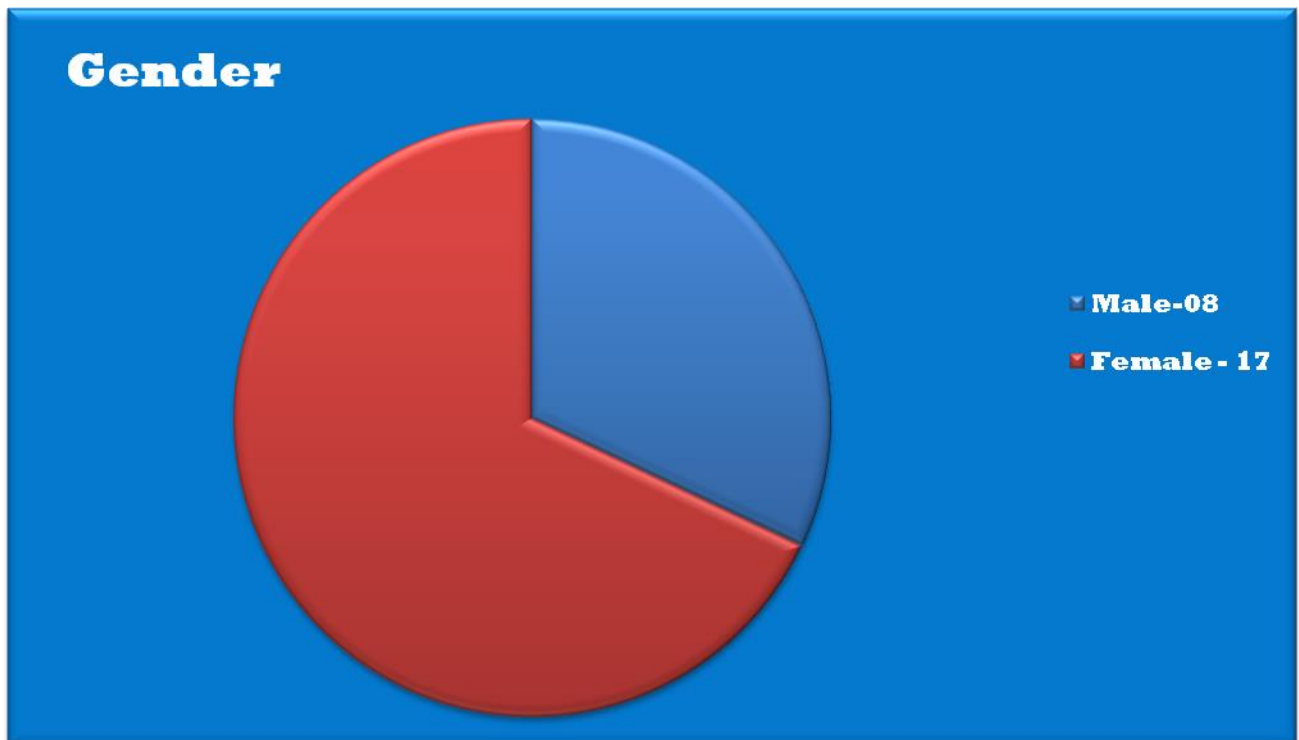
Chairperson and Reporter List

S. No.	Date	Session I and II		Session III and IV	
		Chairperson Session I (10:30 to 12:00)	Reporter Session II (12:15 to 13:45)	Chairperson Session III (14:15 to 15:45)	Reporter Session IV (16:00 to 17:30)
1	13.12.21	Renu Verma	Vinita Sahu	Rajeev Panigrahi	Dr. Renu Solanki
2	14.12.21	Dr. Arpita Rakshit	Dr. Shweta Singh Agniwanshi	Tuneer Khelkar	Dr. Shailly Anand
3	15.12.21	Omprakash Meravi	Atul Trivedi	Dr. Indu Soni	Dr. Svetlana Nagal
4	16.12.21	Dr. Kritika Jyoti Namdeo	Priya Dewangan	Dr. Arpita Rakshit	Manoj Kumar
5	17.12.21	Mrs. Rajeshwari Verma	Uma Gupta	Renu Verma	Dr. Shweta Singh Agniwanshi
6	20.12.21	Alka Ekka	Dr. Bhupendra Kumar	Dr. Chanchal Chaturvedi	Ajit Singh
7	21.12.21	Manoj Kumar	Pallavi Sinha	Vinita Sahu	Dr. Swati Tiwari
8	22.12.21	Rajeev Panigrahi	Tuneer Khelkar	Dr. Shweta Singh Agniwanshi	Mrs. Rajeshwari Verma
9	23.12.21	Dr. M. Shomorendra Singh	Dr. Chanchal Chaturvedi	Atul Trivedi	Alka Ekka
10	24.12.21	Dr. Renu Solanki	Rajeev Panigrahi	Priya Dewangan	Renu Verma
11	27.12.21	Dr. Shailly Anand	Tuneer Khelkar	Uma Gupta	Dr. Arpita Rakshit
12	28.12.21	Dr. Svetlana Nagal	Dr. Indu Soni	Dr. Archana Masram	Omprakash Meravi

State Wise Participants



Gender Wise Participants



Marks and Grading pattern

Assessment Criterion and Marking:

Multiple-choice objective tests:	30
Seminars / participant presentation:	15
Project / survey / others:	20
Micro-teaching / participation:	10
Holistic response:	25
Total:	100

Grading pattern (based on Marks)

A+ :	85 percent and above
A :	70 percent to less than or equal to 84 percent
B :	60 percent to less than or equal to 69 percent
C :	50 percent to less than or equal to 59 percent
F :	Below 49 percent

Those teacher participants who score F grade are required to repeat the program after a gap of one year without financial commitment to UGC-HRDC.

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