Department of Science & Technology
(Government of Gujarat)

GBRC NEWS

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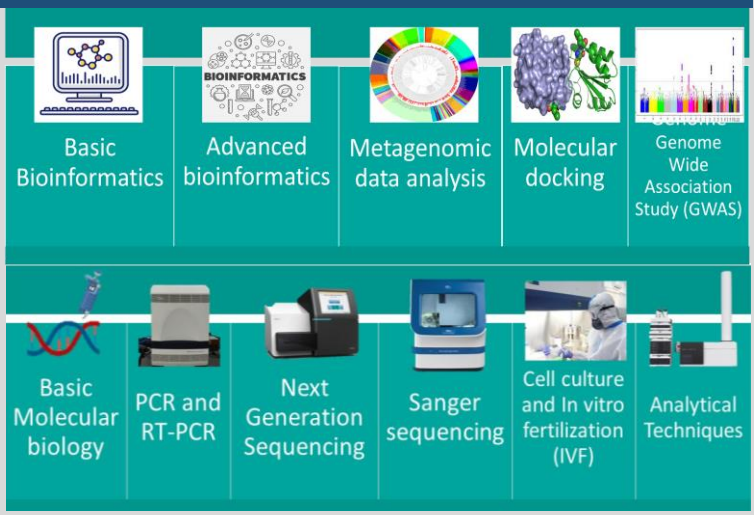
March, 2023

KAUSHALYA TRAINING PROGRAM FOR SKILL DEVELOPMENT IN BIOTECHNOLOGY

***KAUSHALYA (K**nowledge **A**dvancement **U**sing **S**kills **on H**igh-end **A**pplied **L**ifetechnolog**Y for A**spirants)* is an initiative by GBRC and sponsored by Gujarat State Biotechnology Mission (GSBTM) to help in developing biotechnological skills of the researchers, academicians and other stakeholders. The program's aim is to provide learners extensive and specialized practical knowledge for the development of their functional skill set in biotechnology and related fields. Total 30 trainings has been planned under the program on the different advance tools and technologies in the subject area of Biotechnology.



DETAILS OF THE TRAINING PROGRAMS CONDUCTED

GLIMPSE OF TRAINING

CONTENTS

INVITED TALKS DELIVERED BY GBRC TEAM

- Dr. Madhvi Joshi, Joint Director delivered a lecture on "Molecular methods to investigate AMR: Tools to study one health ecosystems" at One-day Symposium on "One Health" held at Department of Biosciences, Veer Narmad South Gujarat University, Surat on 28th January 2023 under the aegis of the G20 2023 Activities and UGC-SAP-DRS-II project.

- Dr. Madhvi Joshi delivered a talk entitled "AMR: Transmission Dynamics in Different Value Chains." at International Symposium on Environmental Dimensions of Antimicrobial Resistance (AMR) and COVID-19 for One Health in Asia-2023 on 28th march, 2023.

- Dr. Niraj Kumar Singh delivered a talk on GSBTM sponsored seminar entitled "Recent Advancement in Biomedical Technologies" at Navjivan Science College, Dahod on 10th March 2023.

- Dr. Bhumika Prajapati, Scientist-B delivered a lecture on "Molecular biology in healthcare system" at Nobel University Junagadh in workshop of molecular biology and bioinformatics on 3rd February.

ARRIVAL & DEPARTURE

GBRC would like to extend a hearty Welcome of the new members to family

- Mr. Krunal Patel
- Mr. Sahil Kapoor
- Mr. Kumal Khatri
- Ms. Amisha Kushwaha
- Ms. Deepika Panda
- Ms. Minal Bhure
- Mr. Gufran Siddiqui
- Mr. Nikhil Mehra
- Ms. Bhoomi Italiya
- Ms. Twinkle Patel
- Ms. Aditi Dubey
- Ms. Kashish Gupta
- Ms. Malaika Baddela
- Ms. Shreya Sharma
- Ms. Harshita Sharma
- Ms. Dhara Raval
- Mr. RameshChaudhary
- Ms. Urmi Vyas
- Ms. Jill Mahendra Gada
- Ms. Janki Pandya
- Mr. Mitul Mali
- Mr. Harshal Purohit

GBRC wishes best for the future of the bright minds who had left

- Ms. Kopal Kapoor
- Mr. Tixit Sagpariya
- Ms. Devanshi Gajjar
- Ms. Nisha Yadav
- Ms. Bhumika Patel
- Dr. Arivudainambi Seenichamy
- Mr. Rakeshpal Ramnivas Bhagat
- Mr. Kumal Khatri
- Ms. Durga Apparao Bethala
- Ms. Roshani Mishra

Science, my lad, is made up of mistakes, but they are mistakes which it is useful to make, because they lead little by little to the truth.

-Jules Verne

RECENT PUBLICATIONS

TAXONOMIC AND FUNCTIONAL METAGENOMICS PROFILING OF TUWA AND UNNAI HOT SPRINGS MICROBIAL COMMUNITIES

Authors: Disha Vora, Satyamitra Shekh, Madhvi Joshi, Amrutlal Patel, Chaitanya G Joshi
Journal: Ecological genetics and genomics
Impact factor: 2.3

Present study focuses on metagenomic sequencing of two hot springs from Gujarat, India namely Tuwa and Unnai through both, culturable and culture independent approach. Sequence analysis from both the water reservoirs depicted higher species richness and diversity based on various diversity indices. The microbial community structure at both the hot springs was distinct and dependent on physicochemical factors like temperature, pH, mineral content etc. Enrichment by cultivation before metagenome sequencing revealed the abundance of Firmicutes (up to 96%) representing cultivable organisms in hotsprings. The bacterial phyla Firmicutes, Proteobacteria, Bacteroidetes, Thermotogae, Deinococcus-Thermus, and Chloroflexi dominate the thermoalkaline spring at Unnai and Tuwa in different proportion. Economically important microorganisms belonging to genera Thermus, Brevibacillus, Anoxybacillus, Bacillus, Pseudomonas, and Geobacillus were prevalent in hot springs. The analysis of functional potential by KEGG revealed pathways for metabolism of carbohydrates, amino acids, vitamins, cofactors and xenobiotics. Annotation with Carbohydrate Active EnZymes (CAZy) revealed the presence of four major classes of enzymes: glycosyl transferase, glycoside hydrolase, polysaccharide lyase and carbohydrate-binding modules. The study provides insight into the microbial community structure and their untapped functional potential for various biotechnological and environmental applications..

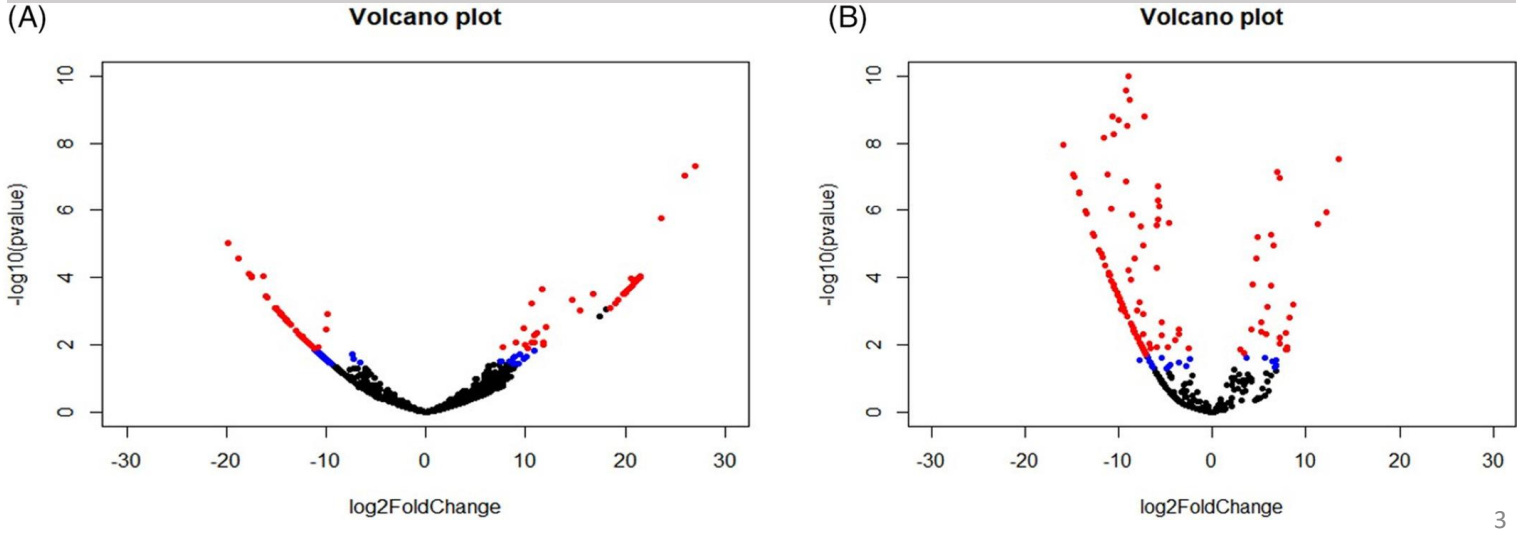
BIOINFORMATICS ANALYSIS OF miRNA AND ITS ASSOCIATED GENES TO IDENTIFY POTENTIAL BIOMARKERS OF ORAL SUBMUCOUS FIBROSIS AND ORAL MALIGNANCY

Authors: Ezhuthachan Mithu Mohanan, Dhwani Jhala, Chandramani B. More, Amrutlal K. Patel, Chaitanya Joshi

Journal: Cancer reports

Impact factor: 1.62

The aim of the present study is to evaluate common upregulated and downregulated miRNAs in oral submucous fibrosis (OSMF) and oral malignancy (OM) patients that can be used as diagnostic biomarkers, and to find out their interactions with target genes to establish associated networks in cancer pathways. Differential expression of miRNA was found in different tissues, connected with cancer pathways. From analysis of Hub genes, HRAS, STAT3, TP53, MYC, PTEN, CTNNB1, CCND1, JUN, VEGFA, KRAS were found associated with downregulated miRNA and VEGFA, TP53, MDM2, PTEN, MYC, ERBB2, CDKN1A, HSP90AA1, CCND1, AKTI were found associated with upregulated miRNA. The gene enrichment analysis of these hub genes were associated with cell communication, metabolic process, cell proliferation, and cellular component organization. The hub genes identified in this study were found to have a significant impact on tumor growth and carcinogenesis. Also, the enrichment of these genes has revealed that the genes are associated with cellular communication, metabolic processes and various biological regulation. These deregulated miRNAs can be used to make a panel of biomarkers to diagnose oral cancer from blood even before its onset.



RECENT PUBLICATIONS

DIVERSITY AND DISTRIBUTION OF B-LACTAMASE GENES CIRCULATING IN INDIAN ISOLATES OF MULTIDRUG-RESISTANT *Klebsiella pneumoniae*

Authors: Suraj Shukla, Siddhi Desai, Ashutosh Bagchi, Pushpendra Singh ,Madhvi Joshi, Chaitanya Joshi, Jyoti Patankar, Geeti Maheshwari, Ekadashi Rajni, Manali Shah and Devarshi Gajjar

Journal: Antibiotics

Impact factor: 4.639

Klebsiella pneumoniae (Kp) has gained prominence in the last two decades due to its global spread as a multidrug-resistant (MDR) pathogen. Further, carbapenem-resistant Kp are emerging at an alarming rate. The objective of this study was (1) to evaluate the prevalence of β-lactamases, especially carbapenemases, in Kp isolates from India, and (2) determine the most prevalent sequence type (ST) and plasmids, and their association with β-lactamases. Clinical samples of K. pneumoniae (n = 65) were collected from various pathology labs, and drug susceptibility and minimum inhibitory concentrations (MIC) were detected. Whole genome sequencing (WGS) was performed for n = 22 resistant isolates, including multidrug-resistant (MDR) (n = 4), extensively drug-resistant (XDR) (n = 15), and pandrug-resistant (PDR) (n = 3) categories, and genomic analysis was performed using various bioinformatics tools. Additional Indian MDRKp genomes (n = 187) were retrieved using the Pathosystems Resource Integration Center (PATRIC) database. Detection of β-lactamase genes, location (on chromosome or plasmid), plasmid replicons, and ST of genomes was carried out using CARD, mlplasmids, PlasmidFinder, and PubMLST, respectively. All data were analyzed and summarized using the iTOL tool. ST231 was highest, followed by ST147, ST2096, and ST14, among Indian isolates. blaampH was detected as the most prevalent gene, followed by blaCTX-M-15 and blaTEM-1. Among carbapenemase genes, blaOXA-232 was prevalent and associated with ST231, ST2096, and ST14, which was followed by blaNDM-5, which was observed to be prevalent in ST147, ST395, and ST437. ST231 genomes were most commonly found to carry Col440I and ColKP3 plasmids. ST16 carried mainly ColKP3, and Col (BS512) was abundantly present in ST147 genomes. One Kp isolate with a novel MLST profile was identified, which carried blaCTX-M-15, blaOXA-1, and blaTEM-1. ST16 and ST14 are mostly dual-producers of carbapenem and ESBL genes and could be emerging high-risk clones in India

RESISTOME PROFILING REVEALS TRANSMISSION DYNAMICS OF ANTIMICROBIAL RESISTANCE GENES FROM POULTRY LITTER TO SOIL AND PLANT

Authors: Animesh Tripathi, Dinesh Kumar, Priyank Chavda, Dalipsinh Rathore, Ramesh Pandit, Damer Blake, Fiona Tomley, Madhvi Joshi, Chaitanya G Joshi and Suresh Kumar Dubey

Journal: Environmental Pollution, Elsevier

Impact factor: 9.988

This research paper is the outcome of the collaboration between GBRC and IIT-BHU. This research is belong to the transmission of antimicrobial resistance genes (ARGs), being used in intensification of poultry production systems. Transmission of ARGs through food chains is an emerging threat. In the present paper transmission of ARGs from chicken (broiler and layer) litter to soil and *Sorghum bicolor* (L.) Moench plants based on field and pot experiments. The results demonstrate ARGs transmission from poultry litter to plant systems under field as well as experimental pot conditions. The most common ARGs could be tracked for transmission from litter to soil to plants were identified as detected were cmx, ErmX, ErmF, lnuB, TEM-98 and TEM-99, while common microorganisms included *Escherichia coli, Staphylococcus aureus, Enterococcus faecium, Pseudomonas aeruginosa*, and *Vibrio cholerae*. Using next generation sequencing and digital PCR assays we detected ARGs transmitted from poultry litter in both the roots and stems of *S. bicolor* (L.) Moench plants. Poultry litter is frequently used as a fertilizer because of its high nitrogen content; our studies show that ARGs can transmit from litter to plants and illustrates the risks posed to the environment by antimicrobial treatment of poultry. This knowledge is useful for formulating intervention strategies that can reduce or prevent ARGs transmission from one value chain to another, improving understanding of impacts on human and environmental health. The research outcome will help in further understanding the transmission and risks posed by ARGs from poultry to environmental and human/animal health.

RECENT PUBLICATIONS

EVALUATION OF THE GROWTH-INDUCING EFFICACY OF VARIOUS BACILLUS SPECIES ON THE SALT-STRESSED TOMATO (*LYCOPERSICON ESCULENTUM* MILL.)

Authors: Anil Patani, Dharmendra Prajapati, Daoud Ali, Haresh Kalasariya, Virendra Kumar Yadav, Jigna Tank, Snehal Bagatharia, Madhvi Joshi and Ashish Patel

Journal: Frontiers in Plant Science

Impact factor: 6.627

Plants are affected by salt stress in a variety of ways, including water deficiency, ion toxicity, nutrient imbalance, and oxidative stress, all of which can cause cellular damage or plant death. Halotolerant plant growth-promoting rhizobacteria (PGPR) could be a viable alternative for tomato plants growing in arid and semi-arid environments. The aim of this research was to isolate halotolerant plant growth promoting Bacillus sp. to promote tomato (*Lycopersicon esculentum* Mill.) growth and salt stress resistance. 107 PGPR strains were isolated from the rhizospheres of 'Kesudo' (Butea monosperma Lam.), 'Kawaria' (*Cassia tora* L.), and 'Arjun' (*Terminalia arjuna* Roxb.) plants to test their plant growth promoting abilities, including indole-3-acetic acid, phosphate solubilization, siderophore production, and ACC deaminase activity. Five bacterial strains (*Bacillus pumilus* (NCT4), *Bacillus firmus* (NCT1), *Bacillus licheniformis* (LCT4), *Bacillus cereus* (LAT3), and *Bacillus safensis* (LBM4)) were chosen for 16S rRNA on the basis of PGPR traits. Compared to PGPR untreated plants, tomato plants developed from PGPR-treated seeds had considerably increased germination percentage, seedling growth, plant height, dry weight, and leaf area. As comparison to PGPR non-inoculated plants, salt-stressed tomato plants treated with PGPR strains had higher levels of total soluble sugar, proline, and chlorophyll as well as higher levels of SOD, CAT, APX, and GR activity. PGPR-inoculated salt-stressed tomato plants had lower MDA, sodium, and chloride levels than non-inoculated plants. In addition, magnesium, calcium, potassium, phosphorus, and iron levels were higher in PGPR treated plants when subjected to salt stress. These results indicate that halotolerant PGPR strains can increase tomato productivity and tolerance to salt stress by removing salt stress's negative effects on plant growth.

EXPLORING BACTERIOME DIVERSITY OF CORAL GONIOPORA SP. AND FAVIA FAVUS FROM THE GULF OF KUTCH, GUJARAT

Authors: Zarna Z. Patel, Dinesh Kumar, Apurvasinh Puvar, Himanshu Joshi, Chaitanya Joshi, Devayani R. Tipre, Madhvi Joshi

Journal: Journal of Sea Research
Impact factor: 2.15

Coral reefs are keystone ecosystems, and the ecological success of coral reefs depends on coral-algal symbiosis and healthy coral-bacterial interactions. However, the bacteriome diversity associated with different coral species in the Gulf of Kutch, Gujarat, remains largely unexplored. In this study, we compared the bacteriome diversity of reef-building corals *Goniopora* (*G. columna, G. lobata, G. stutchburyi*) and *Favia (F. favus*) collected from the two islands viz. Poshitra (PO) and Pirotan (PI) in the Gulf of Kutch, Gujarat, using metagenomic sequencing of 16S rRNA gene and amplicon sequence variants (ASVs) based multivariate analysis. Heat map and network analyses were performed to explore coral bacteriome co-occurrence patterns, revealing 77 and 33 co-occurring bacterial genera associated with *Goniopora sp*. and *F. favus* corals, respectively. Co-occurring bacterial genera play a potential role in biogeochemical cycles like carbon, nitrogen, sulfur, nutrient metabolism, host detoxification, and association with dinoflagellates of the family *Symbiodiniaceae*. The majority of the bacterial genera present were frequently found in the corals, where some are predicted to play a significant role in coral resilience and have medicinal and biotechnological applications. These results indicate that the coral type, species difference, and location, in conjunction with environmental niche, play key roles in coral-bacteriome interaction. The present study can also serve as a baseline and pave the way for the conservation and transplantation of coral species in the Gulf of Kutch.

STAFF WELFARE CLUB ACTIVITY

Annual Awards

Best presentation in PRABODH

Dr. Ishan Raval
Scientist-B

Best Extramural Project

Dr. Ramesh Pandit
Scientist-B

Publication with Highest Impact Factor

First Prize

Tasnim Travadi, SRF

Second Prize

Dinesh Kumar, SRF

Third Prize

Sadik Dantroliya, SRF

AWARDS FOR THE BEST

BEST MONTHLY PRESENTATION JANUARY-2023

Kartik Deopujari (JRF)

BEST QUESTION IN PRABODH- JANUARY 2023

Sonal Patil (JRF)

EMPLOYEE OF THE MONTH - JANUARY 2023

Zarna Patel (SRF)

BEST MONTHLY PRESENTATION FEBRUARY-2023

Meha Bhatt (JRF)

Anitaba Chauhan (JRF)

BEST QUESTION IN PRABODH- FEBRUARY-2023

Harshita Sharma (JRF)

EMPLOYEE OF THE MONTH – FEBRUARY-2023

Bhavya Nanavati (JRF)

BEST MONTHLY PRESENTATION- MARCH-2023

Dr. Sahil Kapoor (RA)

BEST QUESTION IN PRABODH- MARCH-2023

Jill Gada (PA-II)

EMPLOYEE OF THE MONTH – MARCH-2023

Dr. Harshini Vemula (RA)

BEST CUBICLE AWARD

JANUARY 2023
Electrophoresis Laboratory

FEBRUARY 2023
Fermentation Laboratory

MARCH 2023
NGS Laboratory

PRABODH

GBRC is conducting "PRABODH" (Promoting Research Awareness in Biotechnology for Development of Human Resource) to accelerate the research work and to develop research-oriented thought processes in staff.

INVITED GUESTS FOR PRABODH LECTURES

Expert (16/1/2023)

Prof. Ramasamy Paulmurugan,

Professor, Department of Radiology,

Stanford University, United States

Topic: "Biomimetric Microbubbles- A Novel Delivery Platform For Cancer Immunotherapy And Imaging."

Expert (16/1/2023)

Swami Nikhileshwarananda,

Adhyaksha, Shri Ramakrishna Ashram, Rajkot

Topic: "Science and Spirituality"

Expert (17/02/2023)

Prof. Shailendra Saraf,

Director, NIPER, Ahmedabad

Topic: "An Interactive Session on Pharmaceutical Research"

Expert (17/03/2023)

Dr. Mahavir Singh,

Faculty and Senior Scientist,

University of Louisville School

of Medicine, USA

Topic: "Neuro-inflammation and Diabetic Retinopathy: A Unifying Concept "

PRABODH Lectures by GBRC Members

Article: Enhancing nutritional niche and host defenses by modifying the gut microbiome.

Journal: Molecular Systems Biology

Impact factor: 12.74

Dr. Arivudainambi Seenichamy
Project Scientist-III, GBRC

Article: Gut Microbiome ADP-ribosyltransferases are widespread phage - encoded fitness factors

Journal: : Cell Host & Microbe

Impact factor: 31.32

Ms. Purva Gohil
Junior Research Fellow , GBRC

Article: Highly potent multivalent VHH antibodies against Chikungunya isolated from an alpaca naïve phage display library.

Journal: Journal of Nanobiotechnology

Impact factor: 9.464

Ms. Maitri Trivedi
Research Associates, GBRC

Article: Metabolic flexibility of aerobic methanotrophs under anoxic conditions in Arctic lake sediments.

Journal: Journal of Nanobiotechnology

Impact factor: 9.464

Dr. Pranitha Pandit
Project Scientist-I, GBRC

Article: Glucosidase inhibitor, Nimbidiol ameliorates renal fibrosis and dysfunction in type-1 diabetes.
Journal: : Scientific Reports
Impact factor: 4.996

Ms. Janvi Raval, Senior Research Fellow, GBRC

GUEST LECTURES

Expert (21/3/2023)

Dr. Sindura Ganapathi

Visiting PSA Fellow,

Office of the Principal Scientific

Advisor, Govt. of India

Topic: "Preparedness for emerging diseases: Role of science and technology"

AWARDS AND ACHIEVEMENTS

Dr. Dalipsingh Rathore, Technical Assistant, GBRC received first prize for the poster presentation entitled as "Environmental Surveillance of SARS-CoV-2 using Digital PCR in Wastewater samples of Gandhinagar City during Omicron wave" in the conference Young Scientist Conference (YSC), part of the 8th India International Science Festival (IISF), held from 21st to 24th January, 2023, at the Maulana Azad National Institute of Technology (MANIT), Bhopal, India.

VISIT BY COLLEGE/ ACADEMIC INSTITUTES

Visit on 18th January, 2023

Students and faculty members from Dept. of Life Sciences, Parul Institute of Applied Sciences, Parul University, Vadodara visited GBRC.

Visit on 3rd March, 2023

Students and faculty members from PG Department of Biosciences, Sardar Patel University Gujarat visited GBRC.

Visit on 9th March, 2023

Students and faculty members from Shri R.K. Parikh Arts and Science College, Petlad, Gujarat visited GBRC.

Visit on 28th March, 2023

Students and faculty members Department of Biosciences, Indrashil University, Gujarat visited GBRC.

KAUSHALYA TRAINING PROGRAMS SPONSORED BY GSBTM

COMPLETED TRAININGS

No	Training	Date
1	"In Vitro Fertilization" Jointly organized by GBRC and Kamdhenu University, Gandhinagar.	2nd - 6th January, 2023
2	"Basic Bioinformatics" Jointly organized by GBRC and Hemchandracharya North Gujarat University, Patan.	9th -13th January, 2023
3	"Analytical techniques". Jointly organized by GBRC and Gujarat Vidyapeeth, Sadra.	16th - 20th January, 2023
4	"Metagenomic data analysis". Jointly organized by GBRC and Veer Narmad South Gujarat University, Surat.	23rd - 27th January, 2023
5	"Molecular Techniques to Monitor and Investigate AMR". Jointly organized by GBRC and Anand Agricultural University, Anand.	23rd - 27th January, 2023
6	"Flow cytometry and its Applications in Biological, Clinical, Pharmaceutical, Plant and Veterinary Sciences" organized by TETC.	1st – 17th February, 2023
7	"Genome-wide association study" Jointly organized by GBRC and National Dairy Development Board, Anand.	9th – 13th February, 2023
8	"PCR & Real Time PCR" Jointly organized by GBRC and Kamdhenu University, Sardarkrushinagar Campus.	20th – 24th February, 2023
9	"Transgenic Plant Tissue Culture" Jointly organized by GBRC Anand Agricultural University, Anand.	27th February – 3rd March, 2023
10	"Genome Wide Association Studies" Jointly organized by GBRC and National Dairy Development Board, Anand.	13th -17th March, 2023
11	"Transgenic Plant Tissue Culture" Jointly organized by GBRC and Anand Agricultural University, Anand.	20th -24th March, 2023
12	"Molecular Docking" Jointly organized by GBRC and Gujarat Biotechnology University, Gandhiagar.	27th -31st March, 2023

UPCOMING TRAININGS

KAUSHALYA training program (2023-24) is coming up and now extended upto 2 weeks of Hands-on training on more than 10 different modules.

- Bioinformatics: From Basic to Advance
- Molecular Biology: From Basic to Advance
- Capillary Sequencing and Fragment Analysis
- Next Generation Sequencing
- Metagenomic and Data Analysis
- Plant Tissue Culture and Transgenics
- Analytical Techniques: Isolation to Identification
- In vitro Fertilization
- Animal Cell Culture & Flow Cytometry
- Genome-Wide Association Studies
- Docking and Simulation
- Marker Assisted Plant Breeding

Contact Information

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For Shared Lab Facility : https://gbrc.org.in/

GUJARAT BIOTECHNOLOGY RESEARCH CENTRE

DEPARTMENT OF SCIENCE & TECHNOLOGY

GOVERNMENT OF GUJARAT

ANNOUNCES

Shared LAB

Online System

- NGS Illumina NovaSeq 6000
- NGS Illumina MiSeq
- NGS Ion S5 & S5 Plus
- NGS IonChef
- BD Flow Cytometer & Cell sorter
- Capillary ABI 3500 Sequencer
- PCR + Gel Doc
- Nanodrop, Qubit
- Lyophilizer
- HPLC
- GC-MS (Clarus 680/Clarus SQ8C)
- LC-MS
- Digital PCR
- Real time PCR machine
- HPC Server & Param Shavak Server for Bioinformatics (with CLC Genomics)

GBRC shared lab online booking system:

https://gbrc.org.in