

GBRC NEWS

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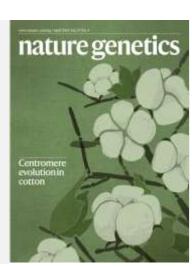
GBRC FEATURED IN NATURE GENETICS FOR CONTRIBUTION TO GENOMEINDIA PROJECT

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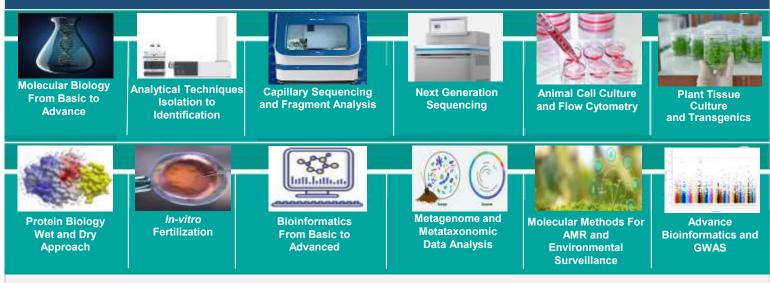
Mapping genetic diversity with the GenomeIndia project

Gujarat Biotechnology Research Centre (GBRC) has been featured in a recent commentary in Nature Genetics for its contribution to the nationally significant GenomeIndia Project. GenomeIndia, a pioneering initiative funded by the Department of Biotechnology (DBT), Ministry of Science and Technology, India is a landmark collaborative effort involving 20 premier academic and research institutions across the country. GBRC has been designated as a key sample collection hub. The primary objective of GenomeIndia is to build a comprehensive catalogue of genetic variations that reflect the unique diversity of the Indian population. The analysis of the sequencing data will provide a pathway towards affordable genomics-based diagnostic tools and precision medicine tailored to Indian population.





KAUSHALYA TRAINING PROGRAM FOR SKILL DEVELOPMENT IN BIOTECHNOLOGY 2025-26



KAUSHALYA (Knowledge Advancement Ushering Skills on High-end Applied Lifetechnology For Aspirants) is an innovative initiative by GBRC, aims to bridge the gap between theoretical learning and practical application by providing hands-on training in cutting-edge biotechnology fields to aspiring stakeholders. In this regard, GBRC has developed 12 training modules with 99 hrs training session held monthly in collaboration with partner institute. GBRC successfully completed all training modules for the year 2024–25, receiving encouraging feedbacks, and proudly launched the initiative for 2025–26. One of the primary goals of this training is to establish an extension research centre. Another important objective of the training program is to provide support and opportunities to students and researchers from remote areas. Moreover, the training program focus on generating networking opportunities with industries, research centres, and organizations outside the state to establish strong connections with industry leaders, research centres, and organizations to foster knowledge exchange, collaborative projects, and technological advancements.

In the year 2024-25 GBRC successfully completed 12 training modules held monthly under the *KAUSHALYA* program. The trainings has helped for skill development for more than 180 human resources. Through a series of specialized training sessions, participants have had the opportunity to explore into subjects such as Molecular biology: From Basic to Advance, Bioinformatics: From Basic to Advanced, 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, Unveiling Protein Biology: Wet & Dry Lab Approach, GWAS in Animals and Plants.

TRAININGS COMPLETED IN KAUSHALYA (JANUARY-MARCH 2024-25)



Glimpse of Metagenomic and Metataxonomic Data Analysis Training

Glimpse of Environmental Surveillance Using Molecular Methods Training













Glimpse of Genome-Wide Association Studies in Animals and Plants Training









GBRC IN MEDIA



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समीक्षा के लिए परिषद महानगर संवाददाता. व मत्स्य विज्ञान पश् विश्वविद्यालय के उपकलपति डॉ. नितिन

पाटिल ने कहा कि किसानों की आवश्यकताओं को ध्यान में रखकर अनुसंधान करने से अधिक लाभ मिलेगा. प्राथमिकता और दिशा तय करने के संबंध संचालक शिक्षण डॉ. शिरीष उपाध्ये, सीजी जोशी प्रमुखता से उपस्थित थे.

में समीक्षा की गई. डॉ. पाटिल ने कहा कि पशु विज्ञान, मतस्य विज्ञान व दुग्ध तकनीकी ज्ञान तीनों संकाय किसानों से सीधे तौर पर जुड़े हुई हैं. यही वजह है कि किसानों की जरूरत क्या है, उसी के आधार पर अनुसंधान की दिशा में कार्य किया जाना चाहिए, इससे समाज को प्रगति की दिशा में अग्रसर किया जा सकता है. इस अवसर पर वर्षभर के उल्लेखनीय

अधिष्ठाता मतस्य विज्ञान डॉ. सचिन बॉडे, अधिष्ठाता दुग्ध **उंत्रज्ञान** डॉ. प्रशांत फुले कृषि वासनिक विश्वविद्यालय राहरी के संचालक संशोधन डॉ. बीएस शिकें, राष्ट्रीय डेयरी विकास बोर्ड के महाव्यवस्थापक डॉ. संजय गोगनी, संयुक्त पशु खाद्य निर्माता संगठन वे माफसु की 11वीं संशोधन परिषद में संशोधन पर आधारित सिफारशी पुस्तक मुंबई के डॉ. आरएस मसली, गुजरात बोल रहे थे. परिषद में संशोधन की का भी विमोचन किया गया. कार्यक्रम में जैवतंत्रज्ञान संशोधन केंद्र के संचालक डॉ.

> Nagpur Plus Edition Feb 16, 2025 Page No. 5

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vigyan dhara

Government of Gujarat's Commitment to Public Health:

Gujarat Biotechnology Research Centre's Role in One Health Initiatives

- Dr. Madhvi Joshi

Scientist 'D' & Joint Director, Gujarat Biotechnology Research Centre

Gujarat Biotechnology Research Centre (GBRC) is proud to share that our pioneering work in One Health has been featured in "Vigyan Dhara", the official newsletter of the Office of the Principal Scientific Advisor (PSA) to the Government of India. This recognition highlights GBRC's critical contributions to One Health through genomic surveillance, rapid diagnostics, and collaborative public health research that bridges human, animal, and environmental health.

RECENT PUBLICATIONS

WHOLE GENOME SEQUENCING REVEALED HIGH OCCURRENCE OF ANTIMICROBIAL RESISTANCE GENES IN BACTERIA ISOLATED FROM POULTRY MANURE

Authors: Animesh Tripathi, Anjali Jaiswal, Dinesh Kumar, Ramesh Pandit, Damer Blake, Fiona Tomley, Madhvi Joshi, Chaitanya G Joshi, Suresh Kumar Dubey

Journal: International Journal of Antimicrobial Agents (Volume 65, 107452)

Impact factor: 4.9

Global demand for food has driven expansion and intensification of livestock production, particularly in developing nations where antibiotic use is often routine. Waste from poultry production, including manure, is commonly utilized as fertilizers in agroecosystems, risking environmental contamination with potentially zoonotic bacteria and antimicrobial resistance genes (ARGs). Here, 33 bacterial isolates were recovered from broiler (n=17) and layer (n=16) chicken manure by aerobic culture using Luria Bertani agar. Antimicrobial susceptibility testing (AST) by disc diffusion revealed all isolates were resistant to a minimum of three antibiotics, with resistance to ampicillin, co-trimoxazole, fluoroquinolones, tetracyclines, streptomycin, rifampicin and/or chloramphenicol detected. MALDI-ToF and 16S rRNA sequencing were used to identify and compare a subset of antibiotic-resistant isolates (n=13). Stutzerimonas sp. and Acinetobacter sp. were the common genera observed in this study. Genome sequencing of each selected isolate revealed carriage of multiple ARGs capable of conferring resistance to many antimicrobials commonly employed in poultry production and human medicine, including tetracyclines, quinolones, macrolides, sulfonamide and cephalosporins. Comparison of whole genome sequence assemblies and phenotypic assays were used to assess capacity for biofilm formation, heavy metal tolerance and virulence. The high occurrence of ARGs in studied bacterial isolates confirms that poultry manure could act as a source of genetic material that could be transferred to commensal microbiota and opportunistic pathogens of humans. Understanding the complex resistome interplay between humans, animals, and the environment requires a One Health approach, with implications for agricultural settings and public health.

RUMINAL MICROBIAL RESPONSES TO *MORINGA OLEIFERA* FEED IN LACTATING GOATS (CAPRA HIRCUS): A METAGENOMIC EXPLORATION

Authors: Chitra Nehra, Vemula Harshini, Nitin Shukla, Priyank Chavda, Minal Bhure, Kaksha Savaliya, Sonal Patil, Tejas Shah, Ramesh Pandit, Niteen V Patil, Ashutosh K Patel, Subhash Kachhawaha, Ram N Kumawat, Madhvi Joshi, Chaitanya Joshi

Journal: New Biotechnology (Volume 86, 87-96)

Impact factor: 4.5

The purpose of the current study was to explore the effects of *Moringa oleifera* feed on the taxonomy and function of the rumen microbial community, and further to evaluate its impact on milk yield and body weight in lactating goats. Nineteen goats were divided into moringa leaf diet (ML; n=10) and masoor straw (MS; n=9) groups. Rumen solid and liquid fraction samples were processed for metagenomic shotgun sequencing and further analyzed. The pairwise comparison between two groups showed a significant increase (p-value- <0.01) in milk yield of the ML goats after the 4th fortnight interval onwards. The metagenomic analysis revealed *Bacteroidetes* and *Firmicutes* are the most abundant phyla. The ML group exhibited a reduction in microbial diversity, with an increase in *Prevetolla* and *Bacteroidales* populations which are positively associated with carbohydrate, protein, and VFA metabolism, and an increased proportions of *Treponema* sp., *Ruminococcus* sp., *Ruminobacter amylophilus*, and *Aeromonas*, indicating improved cellulose and nitrogen metabolism. KEGG analysis revealed significant changes in microbial gene pool and metabolic pathways, particularly in carbohydrate metabolism, propanoate metabolism, and fatty acid synthesis genes. These microbial and functional shifts are correlated with improvements in milk yield, growth rates, and potentially reduced methane emissions. This study highlighted the potential benefits of feeding moringa in the animal production system

UNDERSTANDING ANTIMICROBIAL RESISTANCE IN *CAMPYLOBACTER* ISOLATES FROM POULTRY ENVIRONMENTS IN GUJARAT, INDIA

Authors: Sadik Dantroliya, Monica Chavan, Ramesh Pandit, Chinmayi Joshi, Fiona Tomley, Damer Blake, Richard Stabler, Chaitanya Joshi, Madhvi Joshi

Journal: Applied Food Research (Volume 5, 100740)

Impact factor: 4.5

Campylobacter is a pathogen responsible for human gastroenteritis which requires antimicrobial treatments which further highlighting the risk posed by antimicrobial resistance (AMR) to food safety and public health. The current investigation examines the physical and genetic traits of AMR in *Campylobacter* species found in the caeca of chickens. Samples were collected from chicken farms and live chicken retail outlets across eight major cities in Gujarat, India. Selective culture from 750 samples found 21 of 250 samples from farms (8.4%) and 56 of 500 samples from outlets (11.2%) contained *Campylobacter* spp., confirmed by multiplex PCR and Sanger sequencing. Campylobacter coli was most common, detected in 56 samples (7.5%), with *Campylobacter jejuni* detected in 21 samples (2.8%). As per phenotypic assay, all the isolates were resistant to antibiotics ampicillin/sulbactam, followed by azithromycin (94.44%). Genomes were sequenced and eleven isolates were found to be hosted fluoroquinolone and tetracycline resistance genes. Macrolide resistance genes, such as macB, were found in 94.4% of genomes. The results of the current research highlight a high occurrence of ARG carriage in C. jejuni and C. coli, suggesting that resistance to macrolides, quinolones, and tetracyclines is common. The genotype-phenotype concordance observed was 76.39% whereas, remaining discordance (23.61%) observed was due to the six AMR genes, of which two genes were found truncated length while the remaining genes had complete lengths but had mutations.

UNVEILING HOST-GENETIC DRIVERS OF CAECAL MICROBIAL COMMUNITIES IN CHICKENS THROUGH GENOME WIDE ASSOCIATION STUDIES

Authors: Ankit T Hinsu, Xiaoxia Dai, Christos Dadousis, Melanie Claire Hay, Bruno Fossil, Matteo Crotta, Ramesh Pandit, Javier Guitian, Fiona Tomley, Prakash G Koringa, Chaitanya Joshi, Damer Blake, Androniki Psifidi

Journal: Frontiers in Microbiomes (Volume 4, 1539923)

Impact factor: 4.0

Enteric microbiota plays a crucial role in the health and productivity of poultry, including influences on nutrient absorption, immune function, and pathogen resistance. In this study, authors conducted a genomewide association study (GWAS) to identify host genetic variants associated with selected bacterial genera found in chickens. From the same individual chickens, high-density 600K SNP Affymetrix DNA arrays for genotyping, alongside 16S rRNA gene sequencing to profile caecal microbiota was done. A commercial broiler line (Cobb400, n = 300) and an indigenous (Kadaknath, n = 300) chicken breed from India were investigated, allowing for a comprehensive cross-ecotype analysis. Analysis identified several host-genetic markers and candidate genes associated with the presence and abundance of specific bacterial genera with known pathogenic or commensal roles, and with specific caecal Enterotypes. Whole genome sequencing data were then used to further investigate candidate regions around significantly associated variants from the high-density DNA array. Markers nearby the genes coding for classical complement activation component C1q, ephrin receptors, and other immunity and inflammatory responses as well as genes coding for products associated with vitamin and co-factor metabolism were found. The results underscore the impact that host genetics has on the regulation of the gut microbiota and highlights potential pathways through which host genetic variation influences host-bacterial crosstalk and potentially modulates microbial community structure. These findings contribute to the growing understanding of the genetic basis of host-microbiota interactions and offer new avenues for improving poultry health and productivity through selective breeding strategies targeting the microbiome.

GENOME BASED BIOPROSPECTING OF 101 FACULTATIVE RUMEN BACTERIAL ISOLATES THROUGH COMPREHENSIVE GENOME ANALYSIS

Authors: Minal Bhure, Kaksha Savaliya, Sonal Patil, Chitra Nehra, Ramesh Pandit, Tejas Shah, Niteen V Patil, Ashutosh K Patel, Subhash Kachhawaha, Ram N Kumawat, Madhvi Joshi, Chaitanya G Joshi

Journal: Molecular Biology Reports (Volume 52, 265)

Impact factor: 2.6

In present study, authors isolated, characterized and performed whole genome analysis of 101 facultative anaerobic bacteria from rumen. All assembled genomes were of high quality, i.e. completeness 100% (only seven were between 92 and 99.5%) and only two had contamination > 5%. We identified 9,542 sequences of Carbohydrate-Active Enzymes (CAZymes). Over 8,136 of these CAZymes were full-length sequences, with 2,048 harbouring signal peptides also. Xylan (n = 634), pectin (n = 604), and starch (n = 312) degrading enzyme sequences were dominant. Several isolates also harbour secondary metabolite biosynthesis gene clusters for various metabolites, including fengycin, lichenysin, bacillibactins, bacilysin etc. All the isolates have metabolic versatility, encompassing pathways such as carbohydrate, amino acid, lipid, and vitamin and cofactor metabolism. Intriguingly, lipoic acid metabolism was absent in most of these facultative bacterial isolates. This comprehensive study sheds light on the genetic potential of culturable facultative rumen bacteria, emphasizing their pivotal roles in carbohydrate degradation, secondary metabolite production, and metabolic diversity. These findings hold promise for enhancing ruminant nutrition, advancing ecofriendly biomass conversion, and bolstering bioprospecting of industrially important biocules production.

IN VITRO ERADICATION OF ENDOPHYTIC BACTERIA TO ENHANCE MICROPROPOGATION OF L49 GUAVA (PSIDIUM GUAJAVA L.)

Authors: Poonam Patel, Fenil Patel, Chaitanya Joshi, Madhvi Joshi

Journal: Applied Fruit Science (Volume 67, 72)

Impact factor: 1.2

Guava (Psidium guajava L.) is a globally important fruit species, and the development of effective micropropagation protocols for elite guava varieties is crucial for large-scale clonal propagation. However, endophytic bacterial contamination remains a significant challenge in guava micropropagation. This study aimed to detect and eliminate bacterial endophytes from nodal explants of L49 guava variety using in vitro approach. Explants were collected from three different sources: Fruit Research Station, Dehgam (D), Forest Research Range, Basan (B), and nursery-grown plants (N) which showed varying contamination rates of 95%, 50%, and 15%, respectively. The explants also exhibited higher browning (80%) and lower response rates (10%). After twenty days of culture inoculation, six bacterial endophytes were identified through 16S rRNA sequencing: Pseudomonas oryzihabitans, P. taiwanesis, P. qingdaonensis, Methylobacterium dankookense, M. radiotolerans, and Sphingophyxis soli. Antibiotic susceptibility testing identified eight effective antibiotics (tetracyclines, aminoglycosides, and fluoroquinolones), with gentamicin exhibiting the largest inhibition zones (3.5 cm). Gentamicin at concentrations of 300 ppm and 400 ppm completely eliminated contamination, significantly outperforming the control (100% contamination), 100 ppm (65%), and 200 ppm (45%) concentrations. Based on these results gentamicin (300 ppm) was selected for culture medium supplementation to control contamination effectively without any adverse effects on leaf and shoot growth of explants. This study is the first to report the successful *in vitro* eradication of endophytic bacteria in L49 guava, thereby improving micropropagation protocols by addressing a critical contamination issue.

MICROBIAL ADAPTATION IN HUMAN MILK: UNRAVELING THE EFFECTS OF GESTATIONAL AGE AND LACTATION STAGE AMONG INDIAN MOTHERS

Authors: Anil Hanumantharaju, Somashekhar Nimbalkar, Chaitanya Joshi, Anju Kunjadiya, Axil Patel, Dipen Patel, Krutarth Raval, Satyamitra Shekh, Priyanka Dalwadi, Reshma Pujara

Journal: Journal of Neonatology (DOI:10.1177/09732179241308404)

Impact factor: 0.25

Human milk once considered sterile is a habitat for a diverse microbiome. Breast milk is vital in the formation of the newborn microbiome and affects various health outcomes. Its microbiota is influenced by mode of delivery, geographic location, mastitis, diet, obesity, and gestational age and lactation stage. Knowledge of region-wise data regarding human milk microbiome is the need of an hour. The aim of this study was to isolate and characterize breast milk microbiome and to know the effect of gestational age and lactation stage on it. A prospective longitudinal study included 30 mothers, of whom 10 were of gestational age < 32 weeks, 10 between 32 and 36 6/7 weeks, and the remaining 10 above 37 weeks of gestation at the time of delivery. Milk samples were collected and analyzed for microbiome at three different time points, that is, colostrum, transition milk (7-9 days), and mature milk (after 14 days). Among the bacterial colony isolated the majority of colonies (229/242) identified belonged to 4 phyla- Firmicutes 119 (51.97%), Proteobacteria 48 (20.96%), Bacillota 41 (17.9%), and Actinobacteria 21 (9.17%). Bacterial diversity increased with gestational age and lactation stage and the proportion of Actinobacteria and Bacillota increased significantly with lactation stage (P value -.039), showing that preterm mother's milk has a lesser quantity of beneficial bacteria. This study provided the insight into effect of gestational age and lactation stage on breast milk microbiome. The diversity of milk microbiome increases with lactation and gestational age; however, the preterm mother's milk lacks sufficient beneficial bacteria.

POTATO STARCH BIOPLASTIC FILMS REINFORCED WITH ORGANIC AND INORGANIC FILLERS: A SUSTAINABLE PACKAGING ALTERNATIVE

Authors: Avani Thakkar, Bhakti Patel, Santosh Kumar Sahu, Virendra Kumar Yadav, Rajat Patel, Dipak Kumar Sahoo, Madhvi Joshi, Ashish Patel

Journal: International Journal of Biological Macromolecules (Volume 306, 141630)

Impact factor: 7.7

The bioplastics have increased the demand against synthetic plastics for their non-toxic properties. This study focused on the effects of organic filler (charcoal), inorganic metal filler (aluminium metal powder), and inorganic salt filler (calcium sulfate) on potato starch-based bioplastic films. CH-F (charcoal containing-film), AMP-F (aluminium metal powder containing-film), and CS-F (calcium sulfate containing-film) were produced and analyzed mechanical (tensile strength, elongation at break) physical (thickness and density), thermal (TGA and DSC) and biodegradation properties of bioplastic. The various properties analysis results revealed the highest tensile strength of 29.91 MPa, moisture content of 6.79 %, and moisture absorption of 60.59 %, was observed in AMP-F. The FTIR spectra of the O-H, N-H, C-H, and C-C groups present in the bioplastic can enhance the tensile strength of the bioplastic. The bioplastic film surface morphology (SEM) showed cracks, voids, and small granules, indicating weak bonding and incomplete gelatinization. The maximum WVTR observed in CS-F of 43×10⁻³ g day⁻¹ m⁻². The soil burial test was used for the analysis of biodegradability of bioplastic, in which AMP-F degraded more than 105 days and CH-F completely degraded in 60 days. The results revealed that CH-F, AMP-F, and CS-F have effectively enhanced potato starch-based bioplastic characteristics and can serve as a bioplastic alternative to petroleum-based plastics in food applications.

DESIGN AND EVALUATION OF POTENT MULTIEPITOPE BROAD SPECTRUM DNA AND PROTEIN VACCINE CANDIDATES AGAINST LEPTOSPIROSIS

Authors: Anita Chauhan, Dhwani Jhala, Ritik Thumar, Kopal Kapoor, Aneri Joshi, Devanshi Gajjar, Sriram Seshadri, Satyamitra Shekh, Chaitanya Joshi, Amrutlal Patel

Journal: Microbial Pathogenesis (Volume 202, 107418)

Impact factor: 3.3

Leptospirosis is a widespread zoonotic disease with no approved vaccine, which provides broad range protection. In this study, we have focused on LruC protein from the outer membrane of *Leptospira* spp for vaccine development due to its immunogenicity and conservancy. We have identified total 13 conserved Bcell, CTL, and HTL epitopes from 22 different pathogenic Leptospira species and serovars, which were linked with 4 linkers and 3 adjuvants (HBHA, CTB, TLR4) to design 36 multiepitope vaccine constructs to study the effect of different components on vaccine effectiveness. The antigenicity, immunogenicity, and non-allergenicity of the constructs were confirmed through computational analyses. Physico-chemical properties, secondary structure, and tertiary models of the vaccine constructs were predicted and validated. Molecular docking studies were conducted with Toll-like receptors (TLR2, TLR4) and MHC molecules (MHC-I, MHC-II) to assess binding affinity, identifying three top vaccine candidates (HBHA-construct 6, CTBconstruct 9, and TLR4-construct 12) for further investigation. Further, these candidates were successfully cloned into pVAX1 and pET30a vectors to prepare DNA and protein vaccines, respectively. These multiepitope vaccines were tested in mice models to assess its immunogenicity. ELISA results showed significant IgG responses, particularly in protein vaccines. Flow cytometry revealed increased IFN-y producing CD4+ and CD8+ T cells, especially in the TLR4-adjuvanted vaccine groups. The microscopic agglutination test further confirmed the specificity of the antibody response to *Leptospira* serovars. This study demonstrates the potential of these multiepitope vaccine constructs in eliciting immune response.

COMPREHENSIVE ANALYSIS OF EXTENSIVE DRUG-RESISTANT SALMONELLA TYPHI IN GUJARAT REGION, INDIA: GENOMIC FINDINGS AND PROSPECTIVE ALTERNATIVE THERAPY

Authors: Sadanand Akshay, Heli Upadhyaya, Nitin Shukla, Rohit Bhattacharjee, Sunilkumar Das, Urmi Vyas, Priyank Chavda, Nimesh Patel, Dixsha Jamkhandi, Pritesh Sabara, Neeta Khandelwal, Sumeeta Soni, Kamlesh Upadhyaya, Jayesh Katira, Geeti Maheshwari, Madhvi Joshi, Devarshi Gajjar, Chaitanya Joshi

Journal: Microbiology Spectrum

Impact factor: 3.7

Antimicrobial resistance (AMR) in *Salmonella typhi* (*S. typhi*) is a serious health issue that can complicate typhoid fever treatment and increase fatality rates. The National Centre for Disease Control, Government of India established a National Antimicrobial Surveillance Network to detect AMR in high-priority infections, including *S. Typhi* throughout geographical areas of India, and to understand AMR dissemination and possible treatment options. The Gujarat State Biotechnology Mission, Government of Gujarat, India, has funded the "Network Program on Antimicrobial Resistance, Superbugs, and One Health" to track antibiotic resistance patterns in the Gujarat region. Given the enormity of the AMR problem in *S. Typhi*, in Gujarat, this study evaluated the antibiotic resistance patterns of *S. Typhi* isolates from the Ahmedabad and Vadodara regions of Gujarat, India, were used to determine the mechanism underlying antibiotic resistance and develop combination treatments to combat the extensive drug-resistant isolates.

WHOLE GENOME ANALYSIS OF ENDOPHYTIC STRAIN PM1 REVEALS PROMISING PLANT GROWTH-PROMOTING MECHANISMS IN POMEGRANATE

Authors: Poonam Patel, Fenil Patel, Chaitanya Joshi, Madhvi Joshi

Journal: Genetic Engineering and Biotechnology (Volume 23, 100486)

Impact factor: 3.6

The plant ecosystem harbours diverse symbiotic microorganisms with plant growth promoting and biocontrol activities. The gram- negative endophytic bacterium PM1 strain, isolated from the nodal region of pomegranate. The *Brucella* sp. strain PM1 was studied through whole-genome sequencing, functional annotation, and plant growth-promoting trait (PGPT) gene analysis. Phylogenetic tree analysis and 16S rDNA sequencing confirmed its classification within genus Brucella. The assembled genome size showed 5,200,895 bp with a G + C content of 56.4%. The average nucleotide identity (ANI) analysis revealed a 97.62% similarity between PM1 and B. anthropi ATCC 49188T, a type strain derived from human clinical specimens, indicating a close relationship with Brucella anthropi. Functional annotation identified 2,945 PGPT-related genes, including 32% linked to direct effects (phytohormone signal production, biofertilization, and bioremediation processes) and 67% to indirect effects (plant colonization, biocontrol, and competitive exclusion). KEGG analysis revealed genes involved in nitrogen metabolism, phosphate solubilization, siderophore production, hormone biosynthesis (gibberellin, cytokinin, auxin), root colonization, and stress mitigation. Virulence factor database (VFDB) data showed the absence of complete virulence gene assemblies, indicating limited pathogenic potential. Furthermore, secondary metabolite analysis predicted the potential production of ochrobactin compounds, potent siderophores that are important traits associated with PGPTs. The complete genome analysis of *Brucella* sp. PM1 provides new insights into plant-bacteria interactions, laying a foundation for advanced post-genomic studies, and facilitating the development of bio-effective strategies like biofertilizers or biocontrol agents for sustainable improvement in crop yields.

CHARACTERIZING THE HUMAN MILK MICROBIOTA OF INDIAN MOTHERS: PROSPECTS FOR PROBIOTIC DISCOVERIES AND ANTIMICROBIAL PEPTIDES

Authors: Anil Hanumantharaju, Somashekhar M Nimbalkar, Chaitanya Joshi, Anju Kunjadiya, Axil Patel, Reshma Pujara, Krutarth Raval, Satyamitra Shekh, Priyanka Dalwadi, Dipen V Patel

Journal: International Journal of Pediatrics (Volume 228, 106658)

Impact factor: 1.3

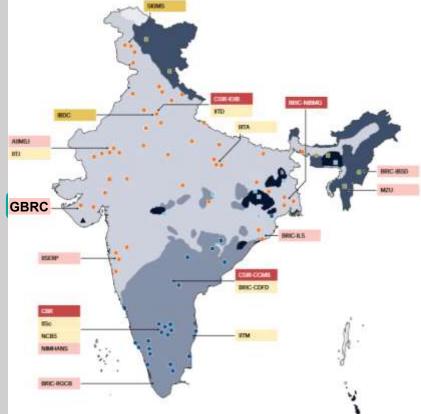
The human milk microbiome is vital in the formation of newborn microbiome and affects various health outcomes. Probiotics prevent severe necrotizing enterocolitis in neonates, but uncertainty about their safety is the obstacle to their use. Probiotic organisms and antimicrobial peptides derived from probiotic strains in human milk can offer safer options. To determine the probiotics properties in the human breastmilk microbiome and their potential antimicrobial activity. A prospective longitudinal study included 30 mothers, of whom 10 were of gestational age < 32 weeks, 10 between 32 and 36 6/7 weeks, and the remaining 10 above 37 weeks of gestation at the time of delivery. Milk samples were collected and analyzed for microbiome at three different time points, that is, colostrum, transition milk (7-9 days), and mature milk (after 14 days). The microbiome isolated was tested for probiotic and antimicrobial properties.

MAPPING GENETIC DIVERSITY WITH THE GENOME INDIA PROJECT

Authors: Chandrika Bhattacharyya, Krithika Subramaniana, Bharathram Uppili, Nidhan K.Biswas, Shweta Ramdas, Karthik Bharadwaj Tallapaka, Prathima Arvind, Khader Valli Rupanagudi, Arindam Maitra. Tulasi Nagabandi, Tiyasha De, Kuldeep Singh, Praveen Sharma, Nanaocha Sharma, Sunil K Raghav, Punit Prasad, EV Soniya, Abdul Jaleel, Shijulal Nelson Sathi, Madhvi Joshi, Chaitanya Joshi, Mayurika Lahiri, Santosh Dixit, LS Shashidhara, GBRO Nachimuthu Senthil Kumar, H Lalhruaitluanga, Lalnundanga, Venkataram Shivakumar. Ganesan Venkatasubramanian, Naren P Rao, Mohd Ashrafc Ganie, Imtiyaz Ahmad Wani, Ganganath Jha, Ashwin Dalal, Murali Dharan Bashyam, Pritish Kumar Varadwaj, Sanjeev BS, Yogesh Simmhan, Chirag Jain, Durai Sundar, Ishaan Gupta, Pankaj Yadav, Himanshu Sinha, Manikandan Narayanan, Karthik Raman, Raghu Padiniat. Radhakrishnan Sabarinathan, Genome India Consortium, Yadati Narahari, Vijayalakshmi Ravindranath, Kumarasamy Thangaraj, Divya Tej, Sowpati, Mohammed Faruq, Analabha Basu, Bratati Kahali

Journal: Nature Genetics (Volume 57, 767-773)

Impact factor: 31.8



The rich ethnolinguistic and sociocultural differences existing in India offers a unique opportunity to study human diversity. With the whole genomes of 10,000 healthy and unrelated Indians from 83 populations, the Genome India project captures the genetic diversity of one of the highly underrepresented populations in the global genomics landscape.

OUTREACH, COLLABORATION, AND KNOWLEDGE DISSEMINATION

INVITED TALKS DELIVERED BY GBRC TEAM

- Dr. Madhvi Joshi (Joint Director) delivered a lecture on "The Legacy of Indian Scientists: Shaping the World of Science" at Indian Institute of Teacher Education (IITE), Gandhinagar, during the 35th Teachers' Training Program on "Empowering Science Teachers with NEP 2020" on January 17th, 2025.
- Dr. Niraj Kumar Singh (Joint Director) delivered an expert lecture on "Next Generation Sequencing Technology" with the Malaviya Mission Teacher's Training Centre (MMTTC), Indian Institute of Teacher Education on February 22nd, 2025.
- Dr. Darshan Dharajiya (Scientist B) delivered an expert lecture on "Advanced Techniques in Plant Tissue Culture" at GSBTM Sponsored "Two-Day Workshop on Entrepreneurship in Plant Tissue Culture: Exploring Opportunities and Innovations" at Mehsana Urban Institute of Sciences, Ganpat University, Gujarat on January 25th, 2025.
- Dr. Madhvi Joshi (Joint Director) delivered a lecture on "Role of Emerging Technologies for Early Diagnosis of Infectious Pathogens from PCR to NGS" during the event ASICON 2025 organized by AIDS Society of India (ASI) on February 21st, 2025.
- Dr. Amrut Patel (Joint Director) delivered a talk on "Genomic Analysis to Understand Neurological Diseases: From Diagnostics to Medicine" at International Conference on Central Nervous System Disorders at NIPER-Ahmedabad on February 17th, 2025.
- Dr. Fenil Patel (Scientist-B) visited Parul University, Vadodara during Hands-on Workshop on "Advancements in *In Vitro* Regeneration and Transformation Techniques in Plant Biotechnology" and delivered an expert talk on "Recent Advances of Transgenic Plants" on March 18th, 2025.

MOU's

JANUARY 27TH, 2025



With Indian Institute of Information Technology Vadodara

FEBRUARY 6TH, 2025



With GEER Foundation Gandhinagar

MARCH 07TH, 2025



With Sher-e-Kashmir University of Agricultural Sciences and Technology of Jammu, Chatha

MARCH 12TH, 2025



With GMERS Medical College Gandhinagar

MARCH 14TH, 2025

With Queen Mary University of London



CONFERENCE PARTICIPATIONS

PAPER PRESENTED IN THE INDIAN SOCIETY OF HUMAN GENETICS (ISHG 2025)

The 49th Annual Meeting of the ISHG was organized by the Department of Human Genetics, National Institute of Mental Health and Neurosciences (NIMHANS), Bangalore during January 20th-22nd, 2025. Ms. Kashish Gupta (JRF), presented a poster at this conference titled "Identification of Molecular Biomarkers for Improved Tumor and Non-Tumor Demarcation in Oral Squamous Cell Carcinoma". Ms. Shreya Johnson (JRF), also presented an e-poster on "Assessment of Genetic Variants in Rheumatoid Arthritis Patients in Relation to Rheumatoid Factor and Anti-CCP biomarkers."

INTERNATIONAL CONFERENCE ON CENTRAL NERVOUS SYSTEM DISORDERS: FROM MECHANISMS TO MEDICINE

International Conference on Central Nervous System Disorders: From Mechanisms to Medicine (ICCNS-2M 2025) was held at NIPER-Ahmedabad on February 17th, 2025. Prof. Chaitanya Joshi (Director) and the scientists of GBRC attended the conference and along with Dr. Madhvi Joshi (Joint Director) chaired the sessions. Joint Director, Dr. Amrut Patel delivered a talk on "Genomic Analysis to Understand Neurological Diseases: From Diagnostics to Medicine".



CAPACITY BUILDING

TRAINING ON ENVIRONMENTAL SURVEILLANCE OF AVIAN INFLUENZA VIRUS (AIV)

Dr. Bhumika Prajapati, (Scientist-B) and Mr. Sadik Dantroliya (SRF) attended a three-day hands-on training program on "Environmental Surveillance of Avian Influenza Virus (AIV) at the BSL-3 containment lab of the National Institute of High Security Animal Diseases (NIHSAD), Bhopal, from March 3rd -5th, 2025.



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.

JANUARY-2025

INVITED GUEST



Dr. Gauri Misra

Scientist-I & Head

National Institute of Biologicals

Noida, Uttar Pradesh, India

Topic: Advancing molecular diagnostics: Regulatory insights and research perspectives

PRESENTATION FROM GBRC MEMBER



Mr. Vikas Patidar

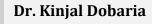
TA

Article: Targeting senescence induced by age or chemotherapy with a polyphenol-rich natural extract improves longevity and healthspan in

mice

Journal Name: Nature Aging

Impact Factor: 17



TA

Article: Time-series sewage metagenomics distinguishes seasonal, human-derived and environmental microbial communities potentially

allowing source-attributed surveillance

Journal Name: Nature Communication

Impact Factor: 14.9

FEBRUARY-2025

INVITED GUEST



Dr. Datta Madamwar

Scientific Advisor, P.D. Patel Institute of Applied Sciences

Charotar University of Science and Technology

CHARUSAT Campus Changa, Gujarat, India

Topic: Characterization and therapeutic applications of cyanobacterial phycobiliproteins

PRABODH

PRESENTATION FROM GBRC MEMBER



Dr. Roselin Neihsial

RA

Article: Bacterial communities and volatile organic compounds in

traditional fermented salt-free bamboo shoots

Journal Name: Food Bioscience

Impact Factor: 4.8

MARCH-2025

INVITED GUEST



Dr. R. S. Masali General Manager Godrej Agrovet Ltd. Pune, India

Topic: Godrej Agrovet Ltd. introduction, policies and research innovations

PRESENTATION FROM GBRC MEMBER



Ms. Dhruvi Bhat JRF

Article: Computational investigations of potential inhibitors of monkeypox virus envelope protein E8 through molecular docking and molecular dynamics simulations

morecular dynamics simulations

Journal Name: Scientific Reports

Impact Factor: 3.8

ARRIVAL & DEPARTURE

ARRIVAL & DEL ARTORE					
GBRC welcome to the new members	GBRC wishes best for the future of the bright minds who had left GBRC				
Ms. Rakshanda Valanju	Ms. Mansi Patel	Ms. Bhavika Sisodiya			
Mr. Vyankatesh Bagul	Ms. Krina Patel	Ms. Meha Bhatt			
Ms. Prarthana Dave	Ms. Nandini Vasa	Mr. Vyankatesh Bagul			
	Ms. Saloni Malik	Mr. Aman Tripathi			
	Dr. Mayank Darji	Dr. Jitendra Mehar			

STAFF WELFARE CLUB ACTIVITIES

The main objective of the Staff Welfare Club is to establish, promote, subsidize, encourage, provide, maintain, organize, undertake, manage, equip, develop, recondition, operate, conduct and run activities such as music, dance, sports, social welfare, carry out scientific and technical, other than political activities.

JANUARY-2025

BEST MONTHLY PRESENTATION AWARD



Ms. Shreya Johnson JRF

AWARD FOR BEST QUESTION IN PRABODH



Dr. Kinjal Dobariya TA

EMPLOYEE OF THE MONTH AWARD



Mr. Vikas Patidar TA



BEST CUBICLE AWARD Molecular Biology Lab

In chargesDr. Hemang Brahmbhatt,
Scientist

Dr. Anitaba Chauhan, RA Ms. Janvi Raval, SRF



FEBRUARY-2025

BEST MONTHLY PRESENTATION AWARD



Dr. Anitaba Chauhan RA

AWARD FOR BEST QUESTION IN PRABODH



Dr. Manoj Sharma, RA Ms. Urvi Budhbhatti, SRF

EMPLOYEE OF THE MONTH AWARD



Ms. Zarna Patel RA



BEST CUBICLE AWARD

Anaerobic Culture Facility In charges

Dr. Krishna Bharwad, Scientist

Ms. Harsha Poddar, JRF Ms. Siddhi Kumari, JRF



STAFF WELFARE CLUB ACTIVITIES

MARCH-2025

BEST MONTHLY PRESENTATION AWARD



Ms. Jinal Thakor RA

AWARD FOR BEST QUESTION IN PRABODH



Ms. Purva Gohil SRF

EMPLOYEE OF THE MONTH AWARD



Ms. Urvi Budhbhatti SRF



BEST CUBICLE AWARD

Hot Area In charges

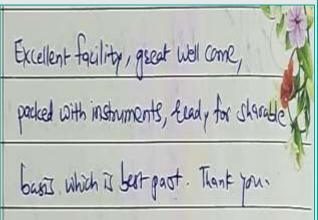
Dr. Pritesh Sabara, Scientist

Mr. Parth Pandit, JRF

Mr. Parth Pareekh, JRF

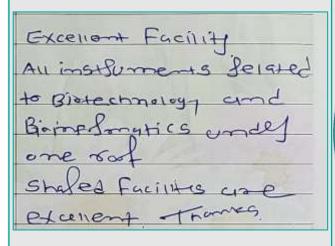


VISIT BY DIGNITARIES AND TESTIMONIALS





Dr. Vallabh Mulay Manager Pharmanza Herbal Pvt. Ltd Dharmaj, Gujarat, India





Dr. Siddarth Modi Assistant Manager Pharmanza Herbal Pvt. Ltd Dharmaj, Gujarat, India

Unique initiative, scientifically vibrant atmosphere and huge societal contributing through culting edge reseach @GBRC!
Privilety of to visit!



Dr. Shrinivas Savale CEO AIC-LMCP Foundation Ahmedabad, Gujarat, India

GBRC has excellent facilitation in Brotechendogy. It has a vibratet and collaboratione audience lad by excellent vision of its leadership.

The Sest with to Town GBRC



Prof. Devika Madalli Director Information and Library Network (INFLIBNET) Centre Gandhinagar, Gujarat, India

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Prof. Shiv Kant Shukla
Dean
Kaushalya- The Skill University
Ahmedabad, Gujarat, India

extende Beeing the intrasturature of &BRC



Raushan Singh Founder & CEO Light- Hope Diagnostics, Inc. USA

it was facilities available of GBRC at Stident ark so control team of BBRC are great and lowing such experience Instrument labore excellent. It was comoring experience.

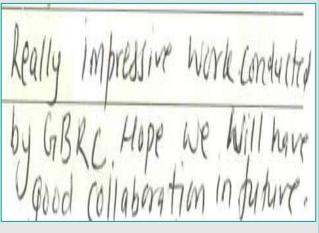


Mr. Girish Patel Managing Director Alpgiri Seed Sciences Private Limited Gandhinagar, Gujarat, India

It heally a nice experience
visiting GBRC. The Centre is
equipped with Sophusticated laborate
fairlifies. Laboranagement & Work
flow seems excellent and the
Scients & are envilled with
Scientified ideas:



Dr. Dev Raj Joshi Associate Professor Central Department of Microbiology Tribhuvan University Kathmandu, Nepal



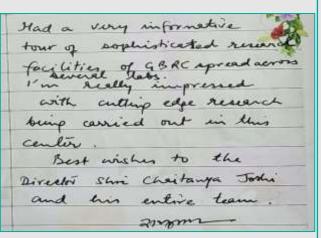


Dr. Tista Prasai Joshi Senior Scientist Nepal Academy of Science and Technology (NAST) Khumaltar, Lalitpur, Nepal

is impleing and in anothing age research in Biotelles Brown bell - I fields.

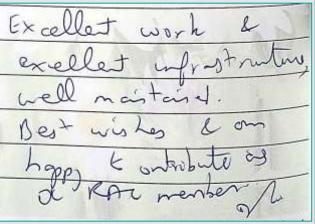


Prof. Himanshu Pandya Co- Chairman NITI Aayog (Govt. of India) India



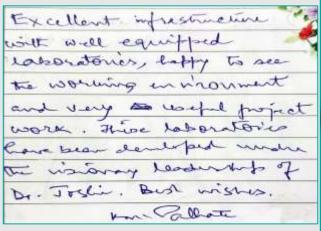


Shri Rajkumar. IAS (Retd.)
Former Chief Secretary
(Govt. of Gujarat)
Gujarat, India



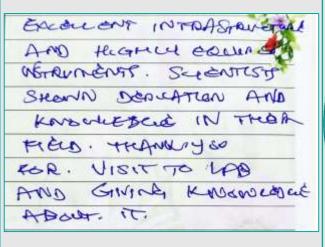


Prof. D. Sundar
Director and Biocon Chair
Institute of Bioinformatics and
Applied Biotechnology (IBAB)
Bengaluru, Karnataka, India





Prof. K. M. L. Pathak DDG, Former Vice Chancellor Pandit Deen Dayal Upadhyaya Pashu Chikitsa Vigyan Vishwavidyalaya Mathura, Uttar Pradesh, India





Dr. Ankur Zalawadia Dean GMERS Medical College Gandhinagar, Gujarat, India

Inaugurated the training serion today and event around the facility. Wondarful team to equipment has been assembled here at GBRC to propel ayaret much higher in this domain best wishes to the entire team.



Shri Vishal Gupta, IAS
Dy. Municipal Commissioner
Municipal Corporation
Ahmedabad, Gujarat, India

excellent facility about yenomic bioinformabile The Institute cotting needs of the government through testing the required comples and in real sense, problem based issue solver.



Prof. Swarnalata Saraf University Institute of Pharmacy Pt. Ravishankar Shukla University Raipur, Chandigarh, India

I wonted Biotea. Dept.

I found excellent equipment here
In my view just Drem Big
and work Hard. with this
facility you can do everything
which dream.

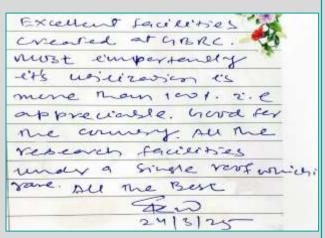


Dr. Maliheh Safavi
Head and Associate Professor
Dept. of Biotechnology
Iranian Research Organization for
Science and Technology
Tehran, Iran

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Dr. Niteen V. Patil
Hon'ble Vice Chancellor
Maharashtra Animal & Fishery
Sciences University
Nagpur, Maharashtra, India





Dr. Sunil Kumar
Principal Scientist
ICAR-Indian Agricultural Statistics
Research Institute
New Delhi, India

VISIT BY COLLEGES/ ACADEMIC INSTITUTES

Total Institutes Visited

lacksquare

Faculties Visited

36

Students Visited

367

Nagpur University, Nagpur, Maharashtra, India

Gujarat National

Law University,

Gandhinagar

Gujarat, India

Darshan University, Rajkot, Gujarat, India

Marwadi University, Rajkot, Gujarat India

Sardar Patel University, Anand, Gujarat, India Metas Adventist International School, Surat, Gujarat, India

Gujarat University, Ahemdabad, Gujarat, India

Kadi Sarva, Vishwavidyalaya, Gandhinagar, Gujarat, India Sankalchand Patel University, Visnagar, Gujarat India

VISIT BY COLLEGES/ ACADEMIC INSTITUTES



Metas Adventist International School, Vyara, Surat, Gujarat, India



Gujarat National Law University, Gandhinagar, Gujarat, India



Department of Bioinformatics, Marwadi University, Rajkot, Gujarat, India



Department of Microbiology and Biotechnology, Gujarat University, Ahmedabad, Gujarat, India



Shri Alpesh N Patel Postgraduate Institute of Science and Research, Sardar Patel University, Anand, Gujarat, India



Department of Biochemistry & Forensic Science, Gujarat University, Ahmedabad, Gujarat, India



Government of Gujarat's Commitment to Public Health:

Gujarat Biotechnology Research Centre's Role in One Health Initiatives

- Dr. Madhvi Joshi

Scientist 'D' & Joint Director, Gujarat Biotechnology Research Centre

The Government of Gujarat remains dedicated to addressing emerging health threats, through One Health approach. As part of the Department of Science and Technology (DST), the Gujarat Biotechnology Research Centre (GBRC) has been at the forefront of public health research and innovation. GBRC's contributions span multiple sectors, and integrates human, animal, and environmental health to address critical risks like Antimicrobial Resistance (AMR), zoonotic and environmental diseases, pollutants, underscoring its vital role in supporting the government's efforts to build a robust public health infrastructure.

The Government of Gujarat, through GBRC, has taken proactive steps to combat the global threat of AMR. Under the Network Program on AMR and One Health, GBRC has successfully sequenced over 4,000 bacterial genomes and identified more than 10,000 bacterial isolates using Matrix-Assisted Laser Desorption/lonisation - Time of Flight (MALDI-TOF) technology. This work has enabled the government to track bacterial resistance mechanisms and devise strategies to minimise the impact of superbugs on human Health.

The State Action Plan for Containment of Antimicrobial Resistance (SAPCAR) addresses the misuse and overuse of antimicrobials across sectors such as human health, veterinary care, and the environment. GBRC plays a pivotal role in the implementation of SAPCAR, focusing on enhancing surveillance, improving infection prevention measures, and optimising antimicrobial use. Through the Gujarat State Biotechnology Mission (GSBTM), GBRC has also

launched various AMR research projects aimed at understanding drug-resistant pathogens in different ecosystems.

GBRC's involvement in the One Health Poultry Hub, funded by the Royal Veterinary College and UK Research and Innovation (UKRI), is another testament to the government's dedication to improving health outcomes. This international project, spanning India, Bangladesh, Vietnam, and the UK, has highlighted antibiotic-resistant bacteria in poultry farms and workers. The Government of Gujarat is now focused on developing safer, more sustainable farming practices to reduce the spread of AMR.



Sample Collection at a Poultry Farm

Recognising the importance of environmental surveillance, GBRC organised a workshop on this topic at IIT Gandhinagar, in collaboration with the Office of the Principal Scientific Adviser to the Gol. The discussions were centred on methodologies for detecting emerging pathogens and pollutants, and on improving collaboration across sectors. GBRC continues to

lead environmental monitoring initiatives through its multi-omics approaches by analysing samples from various locations, the centre is generating critical baseline data for the early detection of public health threats.

GBRC participated in the Indian SARS-CoV-2 Genomics Consortium (INSACOG), funded by the Department of Biotechnology and sequenced over 4,000 SARS-CoV-2 genomes, identifying critical variants like 'Delta'. Our wastewater surveillance expertise allowed authorities to detect COVID-19 early, positioning Gujarat as a model for pandemic management.



Environment Sampling for Surveillance

GBRC has also been instrumental in protecting endangered wildlife. After the death of 26 Asiatic lions in the Gir Forest in 2018 due to Canine Distemper Virus (CDV), GBRC initiated a study that revealed significant differences between the CDV genome found in the lions and the strains used in vaccines. This research provided vital insights into vaccine efficacy and has helped the state develop better strategies for protecting endangered species.

The Government of Gujarat, through GBRC, continues to integrate cutting-edge science and foster collaboration across sectors to address health challenges. From tackling AMR and zoonotic diseases to advancing COVID-19 surveillance and environmental monitoring, GBRC plays a pivotal role in shaping the state's public health strategy. By adopting the One Health approach, Gujarat is building a resilient public health system that safeguards the well being of its people, animals, and environment for the future.

UPCOMING TRAININGS (KAUSHALYA 25-26)







Know Your Scientist Vasant Ranchhod Gowariker

25th March, 1933-2nd January, 2015

Vasant Ranchhod Gowariker was a director in the Indian Space Research Organization and also the scientific advisor to the Prime Minister of India from 1991 to 1993. He made valuable contributions to the fields of space research, weather and population and was the first scientist to develop an indigenous weather forecasting model that predicted the monsoon correctly.

Source: https://en.wikipedia.org/wiki/Vasant_R._Gowariker

Contact Information

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Dr. Amrutlal Patel Joint-Director – GBRC

Dr. Niraj Kumar Singh Joint-Director – GBRC

Editorial Team:

Dr. Sonal Sharma (Scientist B- GBRC)













AIIMS











VNSGU

VEER NARMAD SOUTH GUJARAT UNIVERSITY











CONCORD BIOTECH

Biotech for Mankind...



















AHMEDABAD









NAVRACHANA UNIVERSITY







GUJARAT BIOTECHNOLOGY RESEARCH CENTRE

DEPARTMENT OF SCIENCE & TECHNOLOGY GOVERNMENT OF GUJARAT



STATE-OF-ART BIOTECHNOLOGY INSTRUMENT FACILITY

ONE CLICK AWAY



- » NGS Illumina Novaseg 6000
- »Oxford Nanopore Grid ION and Prometh ION
- » NGS Illumina Miseq
- » NGS Ion S5 & S5 Plus
- » NGS lonChef
- »Capillary ABI 3500 Sequencer

- » BD Flow Cytometer & cellsorter
- » Digital PCR
- » Real time PCR
- » PCR + Gel Doc
- » Qubit
- » Lyophilizer

- » HPLC
- » GC-MS
- » LC-MS
- » HPC Server & Param Shavak Server for Bioinformatics (with CLC Genomics and Schrodinger)

GBRC shared lab online booking system:

https://gbrc.org.in