DEPARTMENT OF MICROBIOLOGY

University of Delhi South Campus
Benito Juarez Road
New Delhi-110021
Phone: 011-24119986, ext: 240
e-mail: microsdc@yahoo.co.in
microsdc@south.du.ac.in

(2012-18)

CONTENTS

DEPARTMENT OF MICROBIOLOGY

YEAR OF ESTABLISHMENT : 1984

DEGREES OFFERED : Post Graduate (M.Sc. Microbiology)
M.Phil. (Biotechnology) in collaboration with other Departments of FIAS
Ph.D. (Microbiology)

INTRODUCTION

The Department of Microbiology runs a full time two year program leading to the award of Master of Science (M.Sc.) degree in Microbiology. The program includes four semesters of course work including a dissertation during which students are provided training to conduct research. The students are offered courses in Microbial Diversity, Microbial Physiology, Virology, Immunology, Enzymology, Environmental Microbiology, Microbial Pathogenicity, Molecular Biology, Microbial Genetics, Recombinant DNA technology, IndustrialMicrobiology and Food Microbiology. These courses cover both theory classes, as well as rigorous practicals. As a part of their curriculum students deliver seminars on various scientific topics. The second year students are attached to different laboratories headed by the faculty members of the department, where they work on projects under the supervision of the faculty member.At the end of their project duration of six months, they submit a thesis and defend their work in an open viva-voce.

The Department of Microbiology has been participating in the M. Phil. course in Biotechnology which was being jointly run by the Departments of Microbiology, Biochemistry, Biophysics and Genetics. The department also enrolls students for a PhD degree in Microbiology. The faculty in the department currently includes three Professors, and two Assistant Professors. Each faculty member manages and runs his/ her laboratory independently where research is carried out in different areas of basic and applied microbiology. The faculty members have had national as well as international collaborations to develop mutually beneficial scientific interactions. This has also helped our laboratories to develop new technologies diversify our areas of research.

The department has two broad areas of research: **'Industrial, Food and Environmental Microbiology'**and **'Molecular Biology and Pathogenesis of Microbial Infections'**. In the broad area of Industrial, food and environmental microbiology, the specific research interests of the department are in the areas of production of industrially important microbial enzymes, biofuels, bioactive compounds and carbohydrates, metagenomics, structure-function analysis and molecular modification of enzymes, lignocellulose biodegradation, ethanol production from lignocellulose, molecular biology of lignin degradation, carbon sequestration using heterotrophs, bioremediation, gene expression and bioprocess engineering. In the broad area of molecular biology and pathogenesis of microbial infections, the specific areas of research interest include molecular epidemiology of emerging water-borne pathogens like *Yersinia enterocolitica* and *E.coli*, and mechanism of antibiotic resistance with special focus on β-lactamase; understanding host pathogen interactions; microbial genomics and proteomics. The research interests also include investigations into the DNA biology of the protozoan parasite *Leishmaniadonovani*(the causative agent of kala-azar); and using Epstein barr virus, KSHV and Hepatitis C virus as models to investigate viral causes of cancers.

FACULTY MEMBERS

Name	Qualification	Designation	E-mail Address
Prof. R.K. Saxena	M.Sc., Ph.D.	Professor Superannuated in Dec. 2015	rksmicro@yahoo.co.in
Prof. T. Satyanarayana	M.Sc., Ph.D.	Professor Superannuated in June 2016	tsnarayana@gmail.com
Prof. R.C. Kuhad	M.Sc., Ph.D.	Professor	kuhad85@gmail.com
Prof. Rani Gupta	M.Sc., Ph.D.	Professor & currently the Head of the Department	rani.gupta@south.du.ac.in
Prof. J.S. Virdi	M.Sc., Ph.D.	Professor	virdi_dusc@rediffmail.com
Prof. Swati Saha	M.Sc., Ph.D.	Professor	ss5gp@yahoo.co.in
Dr. Amita Gupta	M.Sc., Ph.D.	Assistant Professor Moved to Biochemistry in Nov. 2015	ag0907@yahoo.com
Dr. Y.P. Khasa	M.Sc., Ph.D.	Assistant Professor	yogi110@gmail.com
Dr. Rajeev Kaul	M.Sc., Ph.D.	Assistant Professor	rkaul@south.du.ac.in

TECHNICAL STAFF

Name	Qualification	Designation	E-mail Address
Mrs. Meena Singh	Graduation	Senior Technical Assistant	aneemsingh1@yahoo.com
Mr. Mustafa Hussain	Graduation	Technical Assistant	mustafa.hussain955@gmail.com
Mr. Madan Lal	Matric	Lab Assistant	madanlal5561@gmail.com
Mr.Satish Kumar	Higher Secondary	Lab Attendant	satishkanojia_i4u@yahoo.com
Mr. Akhtar Hussain	Graduation	Lab Attendant	akkymov729@gmail.com
Ms. Rajni	Graduation, Diploma in Microsoft office management	Junior Assistant	rajaniap4@gmail.com

Prof. R. C. KUHAD (currently Vice Chancellor of Central University of Haryana, Mahendragarh)

AREA OF RESEARCH: Environmental Microbiology and Biotechnology

RESEARCH ACHIEVEMENTS:

Pioneering contributions have been made in the field of microbial conversion of lignocellulosic materials, using microorganisms and their enzymes(xylanase, laccase, cellulase and pectinase)into value added products.The processes for production of xylanase and laccase have been developed and both have been evaluated in bleaching of paper pulp at pilot scale. Process for bleaching of paper pulp has been filed for patenting. The process for production of a high level alkaline pectinase for application in bioretting of plant fibers has also been developed.After a long effort of more than two decades, a process for bioconversion of wheat straw in nutritionally rich and digestible animal feed by solid-state fermentation has been developed. The fermented feed produced has been evaluated both *in vitro* and *in vivo* conditions. The evaluation of the feed revealed that the fermented feed was able to replace almost 50% of the concentrate and resulted in higher body weight gain. Over the last decade, we have also been concentrating on thebioconversion of plant materials (lignocellulosics) into bioethanol. Among several interventions during the development of the bioethanol production process, the important one is the generation of high concentration sugar syrup. Using the designed process, the sugar concentration in the syrup was improved up to 5 folds. Recently we have successfully produced laccase and pectinase recombinants. Efforts are being made to study application of laccase in producing pharmaceutical compounds following green ways.Prof. Kuhad has guided 22 Ph.D students during his service to the department.

SELECT PUBLICATIONS:

1. Jain, K. K., Kumar, S., Deswal, D., & Kuhad, R. C. (2017). Improved production of thermostable cellulase from *Thermoascus aurantiacus* RCKK by fermentation bioprocessing and its application in the hydrolysis of office waste paper, algal pulp, and biologically treated wheat straw. *Applied Biochemistry and Biotechnology*, 181(2), 784–800.
2. Kumar, S., Jain, K. K., Bhardwaj, K. N., Chakraborty, S., & Kuhad, R. C. (2015). Multiple Genes in a single host: Cost-effective production of bacterial laccase (cotA), pectatelyase (pel), and endoxylanase (xyl) by simultaneous expression and cloning in single vector in *E. coli*. *PloS One*, *10*(12), e0144379.
3. Kumar, S., Jain, K. K., Singh, A., Panda, A. K., & Kuhad, R. C. (2015). Characterization of recombinant pectatelyase refolded from inclusion bodies generated in *E. coli* BL21 (DE3). *Protein Expression and Purification*, *110*, 43-51.
4. Deswal, D., Gupta, R., Nandal, P., & Kuhad, R. C. (2014). Fungal pretreatment improves amenability of lignocellulosic material for its saccharification to sugars. *Carbohydrate Polymers*, *99*, 264-269
5. Shrivastava, B., Jain, K. K., Kalra, A., & Kuhad, R. C. (2014). Bioprocessing of wheat straw into nutritionally rich and digested cattle feed. *Scientific Reports*, *4*, 6360.

Prof. RANI GUPTA

AREA OF RESEARCH: Applied and industrial microbiology

RESEARCH ACHIEVEMENTS:

Prof. Rani Gupta's laboratory has been studying enzymes of industrial importance such as proteases, lipases and amylases. Her lab has identified a novel bifunctional keratinase enzyme from *Bacillus licheniformis,* and characterized it in detail. Its applicability for rapid conversion of chicken feather to feather meal has been documented. It has also been used as an ungual enhancer to prepare an enzyme based formulation for increased drug permeation to nail plate. In addition, biochemical and molecular characterization of keratinases from *Bacillus pumilus* have also been documented. Chitin conjugates of the same have been demonstrated to degrade prion like protein, Sup 35NM under ambient conditions. Molecular characterization of keratinases from *Bacillus* sp. have also been done to establish the effect of pro-sequence on thermostability and substrate specificity of enzyme. Further, a novel keratinase from *Pseudomonas aeruginosa*has also been documented for the first time. Redox mechanism underlying the degradation of recalcitrant proteins has been deciphered. Coupled action of γ-glutamyltranspeptidase-glutathione and keratinase has been shown to effectively degrade feather and Sup 35NM. In addition to the above, novel yeast lipases have been described. Six lipases from *Yarrowialipolytica* have been characterized in detail. Lipase genes from *Trichosporon* sp. have also been isolated, sequenced and characterized for the first time.Prof. Gupta has guided 15 Ph.D students to date.

SELECT PUBLICATIONS:

1. Bindal, S., Sharma, S., Singh, T. P., & Gupta, R. (2017). Evolving transpeptidase and hydrolytic variants of gamma-glutamyl transpeptidase from *Bacillus licheniformis* by targeted mutations of conserved residue Arg109 and their biotechnological relevance. *Journal of Biotechnology, 249*, 82-90.
2. Saini, M., Bindal, S., & Gupta, R. (2017). Heterologous expression of gamma-glutamyl transpeptidase from *Bacillus atrophaeus* GS-16 and its application in the synthesis of gamma-d-glutamyl-l-tryptophan, a known immunomodulatory peptide. *Enzyme and Microbial Technology, 99*, 67-76.
3. Singh, Y., & Gupta, R. (2016). Novel S-enantioselective lipase TALipB from *Trichosporon asahii* MSR54: Heterologous expression, characterization, conformational stability and homology modeling. *Enzyme and Microbial Technology*, *83*, 29-39.
4. Kumari, A., Baronian, K., Kunze, G., & Gupta, R. (2015). Extracellular expression of YlLip11 with a native signal peptide from *Yarrowia lipolytica* MSR80 in three different yeast hosts. *Protein Expression and Purification*, *110*, 138-144.
5. Syal, P., & Gupta, R. (2015). Cloning, expression, and biochemical characterization of an enantioselective lipase, YLIP9, from *Yarrowia lipolytica* MSR80. *Applied Biochemistry and Biotechnology*, *176*(1), 110-124.

Prof. J.S. VIRDI

AREA OF RESEARCH: Microbial genomics and AMR diagnostics

RESEARCH ACHIEVEMENTS:

Yersinia enterocolitica isan important food- & water-borne enteric pathogen. The major objective of Prof. Virdi's research has been to understand public health significance of *Y. enterocolitica* in India, following first outbreak in Tamil Nadu in 1996.Epidemiological studies carried out in Prof. Virdi's laboratory have unequivocally shown presence of this enteric pathogen in India. *Y. enterocolitica* has been detected in wastewater, river water, pork, pigs (reservoir) and diarrheic human patients. All strains from India have been authenticated byWHO *Yersinia* Reference Lab at Pasteur Institute (Paris). Notable among Indian strains are serotypes O: 6,30 and O: 6,30-6,31 which have been reported to be associated with outbreaks of gastroenteritisin other parts of the world. The Indian strains showed unique antibiotic resistance profile, variable expression of β- lactamase and resistance to arsenite. The study of the pathogenicity-related genes showed that Indian strains harbored enterotoxin genes. Molecular characterization using variable number tandem repeats (VNTRs), 16S-23S intergenic spacer region-PCR, repetitive genomic elements (REP/ ERIC)-based genotyping revealed that only two clonal groups of *Y. enterocolitica* were prevalent in India. The distribution of several virulence-associated genes correlated well with the clonal groups rather than the source of isolation. Genomic analysis using VNTRs, multilocus restriction typing (MLRT) & multilocus enzyme electrophoresis (MLEE) revealed that clinical strains of *Y. enterocolitica* originated from environmental strains by genetic change and adaptation. These studies also showed that the Indian and the European strains have been evolving differently. Current work is focused on delineating further genomic differences between clinical and non-clinical strains by suppression subtractive hybridization (SSH) and immune response to the two clonal groups identified. Further work is also focused on understanding molecular epidemiology and evolution of *Yersinia enterocolitica* using mutilocus sequence typing (MLST) and whole genome sequencing.Prof. Virdi has guided 12 Ph.D students to date.

SELECT PUBLICATIONS:

1. Singh, N.S., Singhal, N., and Virdi, J.S. (2018). Genetic environment of $bla_{\text{TEM-1}}$, $bla_{\text{CTX-M-15}}$, $bla_{\text{CMY-42}}$ and characterization of integrons of *Escherichia coli* isolated from an Indian urban aquatic environment. *Frontiers in Microbiology,* 9, 382.
2. Kaushik, M., Kumar, S., Kapoor, R.K., Virdi, J.S., and Gulati, P. (2017). Integrons in Enterobacteriaceae: diversity, distribution and epidemiology. *International Journal of Antimicrobial Agents.* 51, 167-176.
3. Bajaj, P., Singh, N.S., and Virdi, J.S. (2016). *Escherichia coli*β-lactamases: What really matters.*Frontiers in Microbiology,*7, 417.
4. Bajaj, P., Kanaujia, P.K., Singh, N.S., Sharma, S., Kumar, S., and Virdi, J.S. (2016). Quinolone co-resistance in ESBL- or AmpC-producing *Escherichia coli* from an Indian urban aquatic environment and their public health implications. *Environmental Science and Pollution Research,* 23, 1954-9.
5. Singhal, N., Kumar, M., Kanaujia, P.K., and Virdi, J.S. (2015). MALDI-TOF mass spectrometry: an emerging technology for microbial identification and diagnosis. *Frontiers in Microbiology* 6, 791.

Prof. SWATI SAHA

AREA OF RESEARCH: Molecular microbiology of protozoans

RESEARCH ACHIEVEMENTS:

Eukaryotic DNA replication involves the licensing and activation of multiple origins. Origins are licensed by the assembly of pre-replication complexes (pre-RCs) in G1 phase, by the ordered loading of multiple proteins. At G1/S, pre-RCs are transformed into pre-initiation complexes, and in S phase DNA synthesis commences. The components of pre-RCs are conserved from yeast to mammals, with the basic mechanisms of DNA replication being similar. However, based on the annotated genome sequences while the replication machinery of trypanosomatid nuclear DNA appears to largely resemble that of higher eukaryotes, several key players are absent. The long term goal of the lab is to use the orthologs of known replication proteins to fish out the *Leishmania* specific players, which may serve as sites for therapeutic interventions. The three proteins we have initially focused on are ORC1, MCM4, and PCNA. The genes for these proteins have been cloned, antibodies raised to the recombinant proteins, and their expression patterns in *Leishmania* analyzed at different stages of the organism's life cycle as well as cell cycle. We have demonstrated the existence of replication factories in *Leishmania*, and shown that PCNA can be used as a marker for these replication factories. We are also actively engaged in investigating the role of various histone modifications in *Leishmania* biology. We have begun with targeting histone acetylations, which have been shown to regulate replication, transcription and repair in higher eukaryotes. The work from our lab has identified three histone acetyltransferases targeting histone H4 and their roles in modulating the parasite's cellular processes have been deciphered. Prof. Saha has guided 5 Ph.D students to date.

SELECT PUBLICATIONS:

1. Chandra U, Yadav A, Kumar D, Saha S (2017).Cell cycle stage-specific transcriptional activation of cyclins mediated by HAT2-dependent H4K10 acetylation of promoters in *Leishmania donovani*. *PLoS Pathog.* Sep 22;13(9):e1006615
2. Yadav, A., Chandra, U., & Saha, S. (2016). Histone acetyltransferase HAT4 modulates navigation across G2/M and re-entry into G1 in *Leishmania donovani*. *Scientific Reports, 6*, 27510.
3. Goswami, K., Arora, J., & Saha, S. (2015). Characterization of the MCM homohexamer from the thermoacidophilic euryarchaeon *Picrophilus torridus*. *Scientific Reports*, *5*:9057.
4. Kumar, D., & Saha, S. (2015). HAT3-mediated acetylation of PCNA precedes PCNA monoubiquitination following exposure to UV radiation in *Leishmania donovani*. *Nucleic Acids Research*, *43*(11), 5423-5441.
5. Arora, J., Goswami, K., & Saha, S. (2014). Characterization of the replication initiator Orc1/Cdc6 from the Archaeon *Picrophilus torridus*. *Journal of Bacteriology*, *196*(2), 276-286.

Dr. YOGENDER PAL KHASA

AREA OF RESEARCH: Bioprocess Engineering and Industrial Biotechnology

RESEARCH ACHIEVEMENTS:

Dr. Khasa's laboratory is focused on the large scale production of various proteins of therapeutic importance for clinical applications. The genes encoding asparaginase, scFvs, hTNF-α, hG-CSF, hGM-CSF, hIL-3, hIL-7 and streptokinase have been cloned and expressed in two heterologous systems: *E. coli* and *Pichia pastoris*. Expression studies using different signal sequences and fusion partners resulted in the soluble expression of these proteins. Expression in *Pichia* permitted scale- up in a 5L bioreactor under optimized parameters that helped in achieving upto 300 g/L cell biomass (WCW). The large scale recovery of these biomolecules has been established with their subsequent testing for biological activity using cell culture experiments. The indigenous production process of ULP1 protease has been successfully developed to reduce the overall manufacturing cost of recombinant proteins in soluble form.The bioprocess optimization of therapeutically important recombinant proteins such as streptokinase, hIL-3 and hIL-7 was carried out using the 5L bioreactor, where gram level production of these molecules has been obtained. As long-term goal, we are working towards a comprehensive technology development for these proteins for commercial applications. Dr. Khasa has guided 2 Ph.D students to date.

SELECT PUBLICATIONS:

1. Dagar VK, Adivitiya, and Khasa YP (2018) "Combined effect of gene dosage and process optimization strategies on high-level production of recombinant human Interleukin-3 (hIL-3) in *Pichia pastoris* fed-batch culture" *International Journal of Biological Macromolecules,*108:999-1009.
2. Adivitiya, and Khasa YP (2017) "The evolution of recombinant thrombolytics: Current status and future directions." *Bioengineered*8(4):331-358.
3. Dagar, V. K., Adivitiya, Devi, N., & Khasa, Y. P. (2016). Bioprocess development for extracellular production of recombinant human interleukin-3 (hIL-3) in *Pichia pastoris*. *Journal of Indusrial Microbiology and Biotechnology, 43*(10), 1373-1386.
4. Devi, N., Adivitiya, & Khasa, Y. P. (2016). A combinatorial approach of N-terminus blocking and codon optimization strategies to enhance the soluble expression of recombinant hIL-7 in *E. coli* fed-batch culture. *Applied Microbiology and Biotechnology, 100*(23), 9979-9994.
5. Adivitiya, Dagar, V. K., Devi, N., & Khasa, Y. P. (2016). High level production of active streptokinase in *Pichia pastoris* fed-batch culture. *International Journal of Biological Macromolecules, 83*, 50-60.

Dr. RAJEEV KAUL

AREA OF RESEARCH: Tumor Virology

RESEARCH ACHIEVEMENTS:

Our lab is presently working to study biology of cancers mediated by viruses. Tumor viruses have provided relatively simple genetic systems, which can be manipulated for understanding the molecular mechanisms of the cellular transformation process. A growing body of information in the tumor virology field provides several prospects for rationally targeted therapies. However, further research is needed to better understand the multiple mechanisms utilized by these viruses in cancer progression in order to develop therapeutic strategies. The major focus of our lab is to investigate virus host interactions using various tools including cell culture system and mice models. Primarily, we study two human tumor associated viruses, one Epstein Barr Virus (EBV) and other Hepatitis C Virus (HCV). In particular, we are using genetic, genomic, proteomic and biochemical approaches to identify viral pathways involved in these cellular events to develop mechanistic models for transformation by viruses. Tumor associated viruses provide a unique opportunity to understand the role played by viral proteins in transformation and to identify pathways critical for tumorigenesis and metastasis. A clear understanding of the pathways most critically involved in tumor formation and progression and the consequences of altered cell behavior in the tissue micro-environments will provide nuggets of information which will help us in formulating better therapeutic approaches. It is likely that a combination of therapeutic agents targeting multiple signal transduction pathways will be needed for maximum therapeutic benefits. Our lab is presently working to study biology of cancers mediated by viruses. Tumor viruses have provided relatively simple genetic systems, which can be manipulated for understanding the molecular mechanisms of the cellular transformation process. A growing body of information in the tumor virology field provides several prospects for rationally targeted therapies. However, further research is needed to better understand the multiple mechanisms utilized by these viruses in cancer progression in order to develop therapeutic strategies. In particular, we are using genetic, genomic, proteomic and biochemical approaches to identify viral pathways involved in these cellular events to develop mechanistic models for transformation by viruses. Dr. Kaul has guided 2 Ph.D students to date.

SELECT PUBLICATIONS:

1. Khera L., Paul C., & Kaul R. (2018). Hepatitis C Virus mediated metastasis in hepatocellular carcinoma as a therapeutic target for cancer management. *Current Drug Metabolism* Vol 19
2. Khera L., Paul C., & Kaul R. (2017). Hepatitis C Virus E1 protein promotes cell migration and invasion by modulating cellular metastasis suppressor Nm23-H1. *Virology,* 506:110-120.
3. Gandhi, J., Khera, L., Gaur, N., Paul, C., & Kaul, R. (2017). Role of modulator of inflammation cyclooxygenase-2 in gammaherpesvirus mediated tumorigenesis. *Frontiers in Microbiology,* 8, 538.
4. Gandhi, J., Gaur, N., Khera, L., Kaul, R., & Robertson, E. S. (2015). COX-2 induces lytic reactivation of EBV through PGE2 by modulating the EP receptor signaling pathway. *Virology*, 484, 1-14.
5. Gaur, N., Gandhi, J., Robertson, E. S., Verma, S. C., & Kaul, R. (2015). Epstein–Barr virus latent antigens EBNA3C and EBNA1 modulate epithelial to mesenchymal transition of cancer cells associated with tumor metastasis. *Tumor Biology*, *36*(4), 3051-3060.

Prof. R.K.SAXENA (Superannuated in Dec. 2015)

AREA OF RESEARCH: Applied and Industrial Microbiology

RESEARCH ACHIEVEMENTS:

Dr. R. K. Saxena, Professor of Microbiology Department, is an industrial microbiologist and fermentation technologist. He has been working in the field of Microbiology for almost thirty nine years and has developed expertise in the fields of industrial production of enzymes, biofuels, sugar alcohols, diols etc. Besides this he has an expertise in the field of microbial physiology, biochemistry and regulation, biomining and membrane regulation and their respective utilities. Dr. Saxena has developed many technologies of industrial enzymes, like lipases (for detergent & leather industries), proteases (rennets {for cheese industry)} and alkaline proteases {for dehairing of skins and hides for leather industry}), amylases (textile industry), tannases (tea industry), asparaginases (pharmaceutical industries), nitrilases (textile industry), laccases (pulp & paper industry) and chitinases (for animal feed) etc. He has expertise in both aerobic and anaerobic fermentation processes which are used in the production on industrially important organic acids such as succinic, citric, shikimic and lactic acid. He has worked and developed the process for the production of xylitol &erythritol (a zero calorie sweetener), which finds its use as sugar substitute and in the treatment of dental caries. Recently, Dr Saxena has developed technology of bacterial cellulose production which finds applications in various industrial sectors including medical where this can be used in making artificial skin, wound dressingsetc.

Dr. Saxena has had collaborations with national industries like TATA, Reliance, Aditya Birla Group, and Ranbaxy. Dr. Saxena has completed more than twenty three research projects financially supported both from Government (DBT, DST, CSIR, DAE, MNRE, ICMR and MFPI) and industries like TATA, Reliance and Maharishi Ayurveda Products (MAP). Till date, Dr. Saxena has published more than 167 research papers in peer reviewed journals. For his contributions to the field several awards have been conferred on him. Prof. Saxena has guided 26 Ph.D students during his service to the department.

SELECT PUBLICATIONS:

1. Saran, S., Mukherjee, S., Dalal, J., & Saxena, R. K. (2015). High production of erythritol from *Candida sorbosivorans* SSE-24 and its inhibitory effect on biofilm formation of *Streptococcus mutans*. *Bioresource Technology*, *198*, 31-38.
2. Kumar, V., Jahan, F., Kameswaran, K., Mahajan, R. V., & Saxena, R. K. (2014). Eco-friendly methodology for efficient synthesis and scale-up of 2-ethylhexyl-p-methoxycinnamate using *Rhizopusoryzae* lipase and its biological evaluation. *Journal of Industrial Microbiology & Biotechnology*, *41*(6), 907-912.
3. Mahajan, R. V., Kumar, V., Rajendran, V., Saran, S., Ghosh, P. C., & Saxena, R. K. (2014). Purification and characterization of a novel and robust L-asparaginase having low-glutaminase activity from *Bacillus licheniformis*: *in vitro* evaluation of anti-cancerous properties. *PloS One*, *9*(6), e99037.
4. Yadav, S., Rawat, G., Tripathi, P., & Saxena, R. K. (2014). Dual substrate strategy to enhance butanol production using high cell inoculum and its efficient recovery by pervaporation. *Bioresource Technology*, *152*, 377-383.
5. Mahajan, R. V., Saran, S., Saxena, R. K., & Srivastava, A. K. (2013). A rapid, efficient and sensitive plate assay for detection and screening of l-asparaginase-producing microorganisms. *FEMS Microbiology Letters*, *341*(2), 122-126.

Prof. T. SATYANARAYANA (Superannuated in June 2016)

AREA OF RESEARCH: Applied and Industrial Microbiology

RESEARCH ACHIEVEMENTS:

Dr. T. Satyanarayana, Professor of Microbiology Department, is an industrial microbiologist and environmental microbiologist. As part of his research, an ideal starch saccharification process has been developed by using thermostable α-amylase, amylopullulanase and glucoamylase of *Geobacillusthermoleovorans* and *Thermomucorindicae-seudaticae*. The genes encoding various starch hydrolyzing enzymes have been cloned, characterized and found useful in starch saccharification and bread making. Additionally, xylanolytic enzymes of*Geobacillusthermoleovorans*, *G. thermodenitrificans* and *Bacillus halodurans* have been produced and characterized, and the genes encoding the enzymes have been cloned and expressed. They have been useful in hydrolyzing xylan component of agro-residues and in pulp bleaching. A metagenomicxylanase has also been cloned and expressed similarly. Phytases of the unconventional yeast *Pichiaanomala* and thermophilicmould*Sporotrichum thermophile* have been produced and characterized. The phytases are useful as food and feed additives in poultry and aquaculture, dephytinizing soymilk, wheat flour and seed cakes, and in promoting plant growth. The genes encoding phytases have been cloned, expressed and characterized.

Prof. Satyanarayana has also investigated enzymes involved in carbon sequestration. Carbonic anhydrase of *Bacillus pumilus* and *Bacillus halodurans* have been produced, characterized and shown to be useful in carbon sequestration. The genes encoding the enzyme have been cloned and sequenced. A novel psychrotolerant strain of *Bacillus* was isolated from a soil sample collected from Leh and described as *Bacillus lehensis* sp. nov. This is a source of cold tolerant alkaline protease which is useful as a detergent additive, in silk fibre degumming and silver recovery from used x-ray films. Prof. Satyanarayana has guided 30 Ph.D students during his service to the department.

SELECT PUBLICATIONS:

1. Faridi, S., & Satyanarayana, T. (2016). Novel alkalistable alpha-carbonic anhydrase from the polyextremophilic bacterium bacillus halodurans: characteristics and applicability in flue gas CO sequestration. *Environmental Science and Pollution Research, 23*(15), 15236-15249.
2. Kumari, A., Satyanarayana, T., & Singh, B. (2016). Mixed substrate fermentation for enhanced phytase production by thermophilic mould *Sporotrichum thermophile* and its application in beneficiation of poultry feed. *Applied Biochemistry and Biotechnology*, *178*, 197-210.
3. Mehta, D., & Satyanarayana, T. (2015). Structural elements of thermostability in the maltogenic amylase of *Geobacillus thermoleovorans*. *International Journal of Biological Macromolecules*, *79*, 570-576.
4. Nisha, M., & Satyanarayana, T. (2015). The role of N1 domain on the activity, stability, substrate specificity and raw starch binding of amylopullulanase of the extreme thermophile *Geobacillus thermoleovorans*. *Applied Microbiology and Biotechnology*, *99*(13), 5461-5474.
5. Mehta, D., & Satyanarayana, T. (2014). Domain C of thermostable α-amylase of *Geobacillus thermoleovorans* mediates raw starch adsorption. *Applied Microbiology and Biotechnology*, *98*(10), 4503-4519.

RESEARCH PROJECTS (2012-2018):

Title	Faculty	Year of sanction	Grant (in lakhs)	Funding Agency
Resistance-genes-array based rapid detection of antimicrobial resistance and algorithm driven therapy	Prof. J.S.Virdi	2017	12.90	BIRAC-DBT
Engineering *Pichia pastoris* to address catabolite repression and methanol usage for AOX-1 guided expression	Prof. Rani Gupta	2017	49.54	DBT
Understanding the molecular basis of *peste-des-petits* ruminants virus mediated host immune modulation for development of next generation vaccine	Dr. Rajeev Kaul	2017	58.00	ICAR
Investigation of the roles of GNAT-family histone acetyltransferases Elp3a and Elp3b in the protozoan *Leishmania donovani*	Prof. Swati Saha	2016	67.82	DBT
Investigating DNA replication protein Cdc45 in *Leishmania*	Prof. Swati Saha	2015	49.50	DST
Molecular Surveillance of animal viral pathogens prevalent in Leh-Ladakh region	Dr. Rajeev Kaul	2015	9.83	DRDO
Genome wide survey of lipases from *Yarrowia lipolytica*: cloning, expression,biochemical characterization and applications	Prof. Rani Gupta	2014	44.43	DBT
Production of recombinant….. phytase of *Sporotrichum thermophile*	Prof. Tulasi Satyanarayana	2013	23.25	DBT
Diversity of carboxidotrophic……actinobacteria in Manipur	Prof. Tulasi Satyanarayana	2013	30.65	DBT
Development of seaweed biorefinery and pilot demonstration of Bioethanol production	Prof. R.C. Kuhad	2013	34.47	DBT
Development of pretreatment strategies and bioprocess for improved production of cellulolytic enzymes and ethanol from crop byproduct for demonstration at pilot plant	Prof. R.C. Kuhad	2013	148.47	MNRE
Optimization of cellulase production from *Thermoascus aurantiacus* RCK 2011, a thermophilic fungus and its application in cellulose hydrolysis	Prof. R.C. Kuhad	2013	10.51	UGC

Production of recombinant….. phytase of *Sporotrichum thermophile*	Prof. Tulasi Satyanarayana	2013	23.25	DBT
Bioprocess development of recombinant therapeutics in *Pichia pastoris*:Human Interleukin-3 (hIL-3) as a model system	Dr. Y. P. Khasa	2013	51.59	DBT
Cloning and expression of cell-bound phytaseencoding gene of *P. anomala* in *Pichia pastoris*	Prof. Tulasi Satyanarayana	2012	13.27	UGC
Production, characterization and applicability of acidic amylase of *Bacillus acidicola* TSAS 1	Prof. Tulasi Satyanarayana	2012	33.31	DST
Joint Indo-Finland RFBR - Butanol from sustainable sources	Prof. R.K.Saxena	2012	34.12	DST
Joint Indo-Russian enzymatic transformation of Fucodians as a base for drug design, structural and functional investigations from Indian and Russian seaweeds	Prof. R.K.Saxena	2012	22.00	DST
Hepatitis C Virus & expression of cox-2	Dr. Rajeev Kaul	2012	55.00	DBT
Viral metagenomics	Dr. Rajeev Kaul	2012	40.00	DST
Generations of EBV transformed LCLs of diverse origin	Dr. Rajeev Kaul	2012	14.00	UGC
Functional characterization of histone acetyltransferases HAT2 and HAT3 in the protozoan parasite *Leishmania donovani*	Prof. Swati Saha	2012	62.00	DBT
Functional characterization of histone acetylases HAT4 in *Leishmania donovani*	Prof. Swati Saha	2012	27.00	CSIR
Bioprocess optimization of human granulocyte macrophage colony Stimulating Factor (hGM-CSF) expression in *Escherichia coli*	Dr. Y.P.Khasa	2012	25.00	DST
Bioprocess optimization of scFv production against hGM-CSF in methylotrophic yeast, *Pichia pastoris*	Dr. Y.P.Khasa	2012	8.45	UGC
Comparative genomics of β-lactamase genes including *in-silico* analysis to identify sequences for β-lactamase inhibitors	Prof. J.S.Virdi	2012	35.00	ICMR
Utilization of peptidomimetics to design small molecules from a novel P1 peptide, their interaction with beta amyloid oligomers by *in-silico* and *in-vitro* approaches, and its efficiency in clearing beta amyloid load by *ex vivo* model of Alzheimer's disease	Prof. Rani Gupta	2012	22.00	DBT-BIRAC
Characterization of the DNA replication proteins Cdc6/ORC1 and MCM in the	Prof. Swati Saha	2011	39.00	DST

archaeon *Picrophilus torridus*				
Cloning expression and bioprocess optimization of recombinant human interleukin-7 (hIL-7) in methylotrophic yeast *Pichia Pastoris*	Dr.Y.P.Khasa	2011	30.50	DBT
Mechanism of EBV latency control by inflammation	Dr. Rajeev Kaul	2011	40.00	DBT
Enzymatic synthesis of Theanine: A nutraceutical using microbialγ-glutamyl transpeptidase	Prof. Rani Gupta	2010	23.00	MoFPI
Keratinase from *Bacillus pumilus* for degradation of recalcitrant proteins: Process optimization and Biochemical	Prof. Rani Gupta	2010	29.00	DBT
Biochemical and molecular characterization of and enantioselective lipase from *Trichosporan ashaii* MSR-54	Prof. Rani Gupta	2010	21.83	CSIR

EXTERNAL FUNDING SOURCES FOR RESEARCH AND GRANT AMOUNT

Name of the funding Agencies:	**Total sanctioned (in lakhs)**
Department of Biotechnology (DBT)	524.81
Department of Science and Technology (DST)	242.93
University Grant Commission (UGC)	46.23
Council of Scientific and Industrial Research *(CSIR)*	48.83
Ministry of Food Processing Industries (*MoFPI)*	23.00
Indian Council of Medical Research (*ICMR)*	35.00
Indian Council of Agricultural Research (*ICAR)*	58.00
Ministry of New and Renewable Energy *(*MNRE*)*	148.47
Defence Research and Development Organization	9.83
UGC-SAP	66.75
DU-DST PURSE grant	200.00
TOTAL	1403.85

PUBLICATIONS (2012 ONWARDS):

2018

Singh, N.S., Singhal, N., and Virdi, J.S. (2018). Genetic environment of *bla*$_{TEM-1}$, *bla*$_{CTX-M-15}$, *bla*$_{CMY-42}$ and characterization of integrons of *Escherichia coli* isolated from an Indian urban aquatic environment. *Frontiers in Microbiology,* 9, 382.

Dagar VK, Adivitiya, and Khasa YP (2018) "Combined effect of gene dosage and process optimization strategies on high-level production of recombinant human Interleukin-3 (hIL-3) in *Pichia pastoris* fed-batch culture" *International Journal of Biological Macromolecules,*108:999-1009.

Khera L., Paul C., & Kaul R. (2018). Hepatitis C Virus mediated metastasis in hepatocellular carcinoma as a therapeutic target for cancer management. *Current Drug Metabolism* Vol 19

2017

Kaushik, M., Kumar, S., Kapoor, R.K., Virdi, J.S., and Gulati, P. (2017).Integrons in Enterobacteriaceae: diversity, distribution and epidemiology. *International Journal of Antimicrobial Agents*. 51, 167-176.

Chandra U, Yadav A, Kumar D, Saha S (2017).Cell cycle stage-specific transcriptional activation of cyclins mediated by HAT2-dependent H4K10 acetylation of promoters in *Leishmania donovani*. *PLoS Pathog.* Sep 22;13(9):e1006615

Khera L., Paul C., & Kaul R. (2017). Hepatitis C Virus E1 protein promotes cell migration and invasion by modulating cellular metastasis suppressor Nm23-H1. *Virology,* 506:110-120.

Bindal, S., & Gupta, R. (2017). Hyperproduction of gamma-glutamyl transpeptidase from *Bacillus licheniformis* ER15 in the presence of high salt concentration. *Preparative Biochemistry and Biotechnology, 47*(2), 163-172.

Jain, K. K., Kumar, S., Deswal, D., & Kuhad, R. C. (2017). Improved production of thermostable cellulase from *Thermoascus aurantiacus* RCKK by fermentation bioprocessing and its application in the hydrolysis of office waste paper, algal pulp, and biologically treated wheat straw. *Applied Biochemistry and Biotechnology*, 181(2), 784–800.

Malhotra, S., Singh, S., Rana, N., Tomar, S., Bhatnagar, P., Gupta, M., Kuhad R.C. & Richards, N. G. J. (2017). Chemoenzymatic synthesis, nanotization and anti-Aspergillus activity of optically enriched fluconazole analogues. *Antimicrobial Agents and Chemotherapy*, 61 (8) 273.

Bindal, S., Sharma, S., Singh, T. P., & Gupta, R. (2017). Evolving transpeptidase and hydrolytic variants of gamma-glutamyl transpeptidase from *Bacillus licheniformis* by targeted mutations of

conserved residue Arg109 and their biotechnological relevance. *Journal of Biotechnology, 249*, 82-90.

Dagar, V. K., Adivitiya, & Khasa, Y. P. (2017). High-level expression and efficient refolding of therapeutically important recombinant human Interleukin-3 (hIL-3) in *E. coli*. *Protein Expression and Purification, 131*, 51-59.

Gandhi, J., Khera, L., Gaur, N., Paul, C., & Kaul, R. (2017). Role of modulator of inflammation cyclooxygenase-2 in gammaherpesvirus mediated tumorigenesis. *Frontiers in Microbiology, 8*, 538.

Kumari, S., Pal, R. K., Gupta, R., & Goel, M. (2017). High resolution X-ray diffraction dataset for *Bacillus licheniformis* gamma glutamyl transpeptidase-acivicin complex: SUMO-tag renders high expression and solubility. *Protein Journal, 36*(1), 7-16.

Saini, M., Bindal, S., & Gupta, R. (2017). Heterologous expression of gamma-glutamyl transpeptidase from *Bacillus atrophaeus* GS-16 and its application in the synthesis of gamma-d-glutamyl-l-tryptophan, a known immunomodulatory peptide. *Enzyme and Microbial Technology, 99*, 67-76.

Syal, P., Verma, V. V., & Gupta, R. (2017). Targeted mutations and MD simulations of a methanol-stable lipase YLIP9 from *Yarrowia lipolytica* MSR80 to develop a biodiesel enzyme. *International Journal of Biological Macromolecules, 104*(Pt A), 78-88.

2016

Adivitiya, Dagar, V. K., Devi, N., & Khasa, Y. P. (2016).High level production of active streptokinase in *Pichia pastoris* fed-batch culture.*International Journal of Biological Macromolecules, 83*, 50-60.

Bajaj, P., Kanaujia, P. K., Singh, N. S., Sharma, S., Kumar, S., & Virdi, J. S. (2016). Quinolone co-resistance in ESBL- or AmpC-producing *Escherichia coli* from an Indian urban aquatic environment & their public health implications.*Environmental Science and Pollution Research, 23*, 1954-1959.

Bajaj, P., Singh, N. S., & Virdi, J. S. (2016).*Escherichia coli* beta-Lactamases: what really matters.*Frontiers in Microbiology*, *7*, 417.

Baliyan, A., Sital, S., Tiwari, U., Gupta, R., & Sharma, E. K. (2016). Long period fiber grating based sensor for the detection of triacylglycerides. *BiosensBioelectron*, *79*, 693-700.

Bhardwaj, K. N., Jain, K. K., Kumar, S., & Kuhad, R. C. (2016). Microbiological analyses of traditional alcoholic beverage (chhang) and its starter (balma) prepared by bhotiya tribe of UttarakhandIndia. *Indian Journal of Microbiology, 56*, 28-34.

Bindal, S., & Gupta, R. (2016). Thermo- and salt-tolerant chitosan cross-linked gamma-glutamyl transpeptidase from *Bacillus licheniformis* ER15. *International Journal of Biological Macromolecules, 91*, 544-553.

Dagar, V. K., Adivitiya, Devi, N., & Khasa, Y. P. (2016). Bioprocess development for extracellular production of recombinant human interleukin-3 (hIL-3) in *Pichia pastoris*. *Journal of Indusrial Microbiology and Biotechnology, 43*(10), 1373-1386.

Devi, N., Adivitiya, & Khasa, Y. P. (2016). A combinatorial approach of N-terminus blocking and codon optimization strategies to enhance the soluble expression of recombinant hIL-7 in *E. coli* fed-batch culture. *Applied Microbiology and Biotechnology, 100*(23), 9979-9994.

Faridi, S., & Satyanarayana, T. (2016). Novel alkalistable alpha-carbonic anhydrase from the polyextremophilic bacterium bacillus halodurans: characteristics and applicability in flue gas CO sequestration. *Environmental Science and Pollution Research, 23*(15), 15236-15249.

Kumari, A., Satyanarayana, T., & Singh, B. (2016). Mixed substrate fermentation for enhanced phytase production by thermophilic mould *Sporotrichum thermophile* and its application in beneficiation of poultry feed. *Applied Biochemistry and Biotechnology*, *178*, 197-210.

Nisha, M., & Satyanarayana, T. (2016).Characteristics, protein engineering and applications of microbial thermostable pullulanases and pullulan hydrolases. *Applied Microbiology and Biotechnology*, *100*(13), 5661-5679.

Parashar, D., & Satyanarayana, T. (2016). A chimeric α-amylase engineered from *Bacillus acidicola* and *Geobacillus thermoleovorans* with improved thermostability and catalytic efficiency. *Journal of Industrial Microbiology & Biotechnology*, *43*(4), 473-484.

Ranjan, B., & Satyanarayana, T. (2016). Recombinant HAP phytase of the thermophilic mold*Sporotrichum thermophile*: Expression of the codon-optimized phytase gene in *Pichia pastoris* and applications. *Molecular Biotechnology*, *58*(2), 137-147.

Singh, B., Poças-Fonseca, M. J., Johri, B. N., & Satyanarayana, T. (2016). Thermophilic molds: Biology and applications. *Critical Reviews in Microbiology*, *42*(6), 985-1006.

Singh, Y., Gupta, N., Verma, V. V., Goel, M., & Gupta, R. (2016). Selective disruption of disulphide bonds lowered activation energy and improved catalytic efficiency in TALipB from *Trichosporon asahii* MSR54: MD simulations revealed flexible lid and extended substrate binding area in the mutant. *Biochemical and Biophysical Research Communications*, *472*(1), 223-230.

Singh, Y., & Gupta, R. (2016). Novel S-enantioselective lipase TALipB from *Trichosporon asahii* MSR54: Heterologous expression, characterization, conformational stability and homology modeling. *Enzyme and Microbial Technology*, *83*, 29-39.

Singhal, N., Kumar, M., & Virdi, J. S. (2016). MALDI-TOF MS in clinical parasitology: applications, constraints and prospects. *Parasitology, 143*(12), 1491-1500.

Singhal, N., Kumar, M., & Virdi, J. S. (2016).Resistance to amoxicillin-clavulanate and its relation to virulence-related factors in *Yersinia enterocolitica* biovar 1A. *Indian Journal of Medical Microbiology*, *34*(1), 85.

Yadav, A., Chandra, U., & Saha, S. (2016). Histone acetyltransferase HAT4 modulates navigation across G2/M and re-entry into G1 in *Leishmania donovani*. *Scientific Reports, 6*, 27510.

2015

Bajaj, P., Singh, N. S., Kanaujia, P. K., & Virdi, J. S. (2015). Distribution and molecular characterization of genes encoding CTX-M and AmpC β-lactamases in *Escherichia coli* isolated from an Indian urban aquatic environment. *Science of The Total Environment*, *505*, 350-356.

Gandhi, J., Gaur, N., Khera, L., Kaul, R., & Robertson, E. S. (2015). COX-2 induces lytic reactivation of EBV through PGE2 by modulating the EP receptor signaling pathway. *Virology*, *484*, 1-14.

Gaur, N., Gandhi, J., Robertson, E. S., Verma, S. C., & Kaul, R. (2015). Epstein–Barr virus latent antigens EBNA3C and EBNA1 modulate epithelial to mesenchymal transition of cancer cells associated with tumor metastasis. *Tumor Biology*, *36*(4), 3051-3060.

Goswami, K., Arora, J., & Saha, S. (2015). Characterization of the MCM homohexamer from the thermoacidophilic euryarchaeon *Picrophilus torridus*. *Scientific Reports*, *5*.

Gupta, R., Kumari, A., Syal, P., & Singh, Y. (2015). Molecular and functional diversity of yeast and fungal lipases: their role in biotechnology and cellular physiology. *Progress in Lipid Research*, *57*, 40-54.

Gupta, V., Gulati, P., Bhagat, N., Dhar, M. S., & Virdi, J. S. (2015). Detection of *Yersinia enterocolitica* in food: an overview. *European Journal of Clinical Microbiology & Infectious Diseases*, *34*(4), 641-650.

Jain, I., Kumar, V., & Satyanarayana, T. (2015). Xylooligosaccharides: an economical prebiotic from agroresidues and their health benefits. *Indian Journal of Experimental Biology*, *53*, 131-142.

Jain, K. K., Dey, T. B., Kumar, S., & Kuhad, R. C. (2015). Production of thermostable hydrolases (cellulases and xylanase) from *Thermoascusaurantiacus* RCKK: a potential fungus. *Bioprocess and Biosystems Engineering*, *38*(4), 787-796.

Joshi, S., & Satyanarayana, T. (2015). Bioprocess for efficient production of recombinant *Pichia anomala* phytase and its applicability in dephytinizing chick feed and whole wheat flat Indian breads. *Journal of Industrial Microbiology & Biotechnology*, *42*(10), 1389-1400.

Joshi, S., & Satyanarayana, T. (2015).Characteristics and applicability of phytase of the yeast *Pichia anomala* in synthesizing haloperoxidase. *Applied Biochemistry and Biotechnology*, *176*(5), 1351-1369.

Joshi, S., & Satyanarayana, T. (2015).*In vitro* engineering of microbial enzymes with multifarious applications: prospects and perspectives. *Bioresource Technology*, *176*, 273-283.

Kanaujia, P. K., Bajaj, P., Kumar, S., Singhal, N., & Virdi, J. S. (2015). Proteomic analysis of *Yersinia enterocolitica* biovar 1A under iron-rich and iron-poor conditions indicates existence of efficiently regulated mechanisms of iron homeostasis. *Journal of Proteomics*, *124*, 39-49.

Kanaujia, P. K., Bajaj, P., & Virdi, J. S. (2015).Analysis of iron acquisition and storage-related genes in clinical and non-clinical strains of *Yersinia enterocolitica* biovar 1A. *APMIS*, *123*(10), 858-866.

Kumar, D., & Saha, S. (2015). HAT3-mediated acetylation of PCNA precedes PCNA monoubiquitination following exposure to UV radiation in *Leishmania donovani*. *Nucleic Acids Research*, *43*(11), 5423-5441.

Kumar, S., Jain, K. K., Bhardwaj, K. N., Chakraborty, S., & Kuhad, R. C. (2015). Multiple Genes in a single host: Cost-effective production of bacterial laccase (cotA), pectatelyase (pel), and endoxylanase (xyl) by simultaneous expression and cloning in single vector in *E. coli*. *PloS One*, *10*(12), e0144379.

Kumar, S., Jain, K. K., Singh, A., Panda, A. K., & Kuhad, R. C. (2015). Characterization of recombinant pectatelyase refolded from inclusion bodies generated in *E. coli* BL21 (DE3). *Protein Expression and Purification*, *110*, 43-51.

Kumar, V., & Satyanarayana, T. (2015). Generation of xylooligosaccharides from microwave irradiated agroresidues using recombinant thermo-alkali-stable endoxylanase of the polyextremophilic bacterium *Bacillus halodurans* expressed in *Pichia pastoris*. *Bioresource Technology*, *179*, 382-389.

Kumari, A., Baronian, K., Kunze, G., & Gupta, R. (2015).Extracellular expression of YlLip11 with a native signal peptide from *Yarrowia lipolytica* MSR80 in three different yeast hosts. *Protein Expression and Purification*, *110*, 138-144.

Kumari, A., & Gupta, R. (2015). Functional characterisation of novel enantioselective lipase TALipA from *Trichosporon asahii* MSR54: sequence comparison revealed new signature sequence AXSXG among yeast lipases. *Applied Biochemistry and Biotechnology*, *175*(1), 360-371.

Kumari, A., & Gupta, R. (2015). Functional characterization of a novel aspartic acid rich lipase, TALipC, from *Trichosporon asahii* MSR54: solvent-dependent enantio inversion during esterification of 1-phenylethanol. *Biotechnology Letters*, *37*(1), 121-130.

Mehta, D., & Satyanarayana, T. (2015).Structural elements of thermostability in the maltogenic amylase of *Geobacillus thermoleovorans*. *International Journal of Biological Macromolecules*, *79*, 570-576.

Nisha, M., & Satyanarayana, T. (2015).Characteristics of thermostable amylopullulanase of *Geobacillus thermoleovorans* and its truncated variants. *International Journal of Biological Macromolecules*, *76*, 279-291.

Nisha, M., & Satyanarayana, T. (2015).The role of N1 domain on the activity, stability, substrate specificity and raw starch binding of amylopullulanase of the extreme thermophile *Geobacillus thermoleovorans*. *Applied Microbiology and Biotechnology*, *99*(13), 5461-5474.

Ranjan, B., Singh, B., & Satyanarayana, T. (2015).Characteristics of recombinant phytase (rSt-Phy) of the thermophilic mold*Sporotrichum thermophile* and its applicability in dephytinizing foods. *Applied Biochemistry and Biotechnology*, *177*(8), 1753-1766.

Saran, S., Mukherjee, S., Dalal, J., & Saxena, R. K. (2015).High production of erythritol from *Candida sorbosivorans* SSE-24 and its inhibitory effect on biofilm formation of *Streptococcus mutans*. *Bioresource Technology*, *198*, 31-38.

Shivlata, L., & Satyanarayana, T. (2016). Thermophilic and alkaliphilic Actinobacteria: biology and potential applications. *Actinobacteria in Special and Extreme Habitats: Diversity, Function Roles and Environmental Adaptations*, 8.

Singh, B., & Satyanarayana, T. (2015). Fungal phytases: characteristics and amelioration of nutritional quality and growth of non-ruminants. *Journal of Animal Physiology and Animal Nutrition*, *99*(4), 646-660.

Singhal, N., Kumar, M., Kanaujia, P. K., & Virdi, J. S. (2015). MALDI-TOF mass spectrometry: an emerging technology for microbial identification and diagnosis. *Frontiers in Microbiology*, *6*, 791.

Syal, P., & Gupta, R. (2015).Cloning, expression, and biochemical characterization of an enantioselective lipase, YLIP9, from *Yarrowia lipolytica* MSR80. *Applied Biochemistry and Biotechnology*, *176*(1), 110-124.

Tripathi, P., Rawat, G., Yadav, S., & Saxena, R. K. (2015). Shikimic acid, a base compound for the formulation of swine/avian flu drug: statistical optimization, fed-batch and scale up studies along with its application as an antibacterial agent. *Antonie Van Leeuwenhoek*, *107*(2), 419-431.

Verma, V. V., Gupta, R., & Goel, M. (2015).Phylogenetic and evolutionary analysis of functional divergence among gamma glutamyl transpeptidase (GGT) subfamilies. *Biology Direct*, *10*(1), 49.

2014

Arora, J., Goswami, K., & Saha, S. (2014). Characterization of the replication initiator Orc1/Cdc6 from the Archaeon *Picrophilus torridus*. *Journal of Bacteriology*, *196*(2), 276-286.

Bhaduri, A., Misra, R., Maji, A., Bhetaria, P. J., Mishra, S., Arora, G., Singh, L. K., Dhasmana, N., Dubey, N., Virdi, J.S.& Singh, Y. (2014). *Mycobacterium tuberculosis* cyclophilin A uses novel signal sequence for secretion and mimics eukaryotic cyclophilins for interaction with host protein repertoire. *PloS One*, *9*(2), e88090.

Bindal, S., & Gupta, R. (2014).L-Theanine synthesis using γ-glutamyl transpeptidase from *Bacillus licheniformis* ER-15. *Journal of Agricultural and Food Chemistry*, *62*(37), 9151-9159.

Dabral, P., Khera, L., & Kaul, R. (2014). Host proteins associated with Hepatitis C virus encoded NS4A. *VirusDisease*, *25*(4), 493-496.

Deswal, D., Gupta, R., Nandal, P., & Kuhad, R. C. (2014). Fungal pretreatment improves amenability of lignocellulosic material for its saccharification to sugars. *Carbohydrate Polymers*, *99*, 264-269.

Dhar, M. S., & Virdi, J. S. (2014). Strategies used by *Yersinia enterocolitica* to evade killing by the host: thinking beyond Yops. *Microbes and Infection*, *16*(2), 87-95.

Jain, I., Kumar, V., & Satyanarayana, T. (2014).Applicability of recombinant β-xylosidase from the extremely thermophilic bacterium *Geobacillus thermodenitrificans* in synthesizing alkylxylosides. *Bioresource Technology*, *170*, 462-469.

Joshi, S., & Satyanarayana, T. (2014).Optimization of heterologous expression of the phytase (PPHY) of *Pichia anomala* in *P. pastoris* and its applicability in fractionating allergenic glycinin from soy protein. *Journal of Industrial Microbiology & Biotechnology*, *41*(6), 977-987.

Kumar, V., Jahan, F., Kameswaran, K., Mahajan, R. V., & Saxena, R. K. (2014).Eco-friendly methodology for efficient synthesis and scale-up of 2-ethylhexyl-p-methoxycinnamate using *Rhizopusoryzae* lipase and its biological evaluation. *Journal of Industrial Microbiology & Biotechnology*, *41*(6), 907-912.

Kumar, V., & Satyanarayana, T. (2014).Production of thermo-alkali-stable xylanase by a novel polyextremophilic*Bacillushalodurans* TSEV1 in cane molasses medium and its applicability in making whole wheat bread. *Bioprocess and Biosystems Engineering*, *37*(6), 1043-1053.

Kumar, V., Yadav, S., Jahan, F., & Saxena, R. K. (2014).Organic synthesis of maize starch-based polymer using *Rhizopusoryzae* lipase, scale up, and its characterization. *Preparative Biochemistry and Biotechnology*, *44*(4), 321-331.

Kumari, A., & Gupta, R. (2014).Novel strategy of using methyl esters as slow release methanol source during lipase expression by mut+ *Pichia pastoris* X33. *PloS One*, *9*(8), e104272.

Mahajan, R. V., Kumar, V., Rajendran, V., Saran, S., Ghosh, P. C., & Saxena, R. K. (2014). Purification and characterization of a novel and robust L-asparaginase having low-glutaminase activity from *Bacillus licheniformis*: *in vitro* evaluation of anti-cancerous properties. *PloS One*, *9*(6), e99037.

Mehta, D., & Satyanarayana, T. (2014). Domain C of thermostable α-amylase of *Geobacillus thermoleovorans* mediates raw starch adsorption. *Applied Microbiology and Biotechnology*, *98*(10), 4503-4519.

Nimesh, H., Sur, S., Sinha, D., Yadav, P., Anand, P., Bajaj, P., Virdi, J.S. & Tandon, V. (2014). Synthesis and biological evaluation of novel bisbenzimidazoles as Escherichia coli topoisomerase IA inhibitors and potential antibacterial agents. *Journal of Medicinal Chemistry*, *57*(12), 5238-5257.

Nisha, M., & Satyanarayana, T. (2014).Characterization and multiple applications of a highly thermostable and Ca2+-independent amylopullulanase of the extreme thermophile *Geobacillus thermoleovorans*. *Applied Biochemistry and Biotechnology*, *174*(7), 2594-2615.

Raghuwanshi, S., Misra, S., & Saxena, R. K. (2014).Treatment of wheat straw using tannase and white-rot fungus to improve feed utilization by ruminants. *Journal of Animal Science and Biotechnology*, *5*(1), 13.

Rastogi, N., Nagpal, N., Alam, H., Pandey, S., Gautam, L., Sinha, M., Shin, K., Manzoor, K., Virdi, J.S., Kaur, P., Sharma, S., & Singh, T.P. (2014). Preparation and antimicrobial action of three tryptic digested functional molecules of bovine lactoferrin. *PloS One*, *9*(3), e90011.

Sharma, A., Thakur, V. V., Shrivastava, A., Jain, R. K., Mathur, R. M., Gupta, R., & Kuhad, R. C. (2014). Xylanase and laccase based enzymatic kraft pulp bleaching reduces adsorbable organic halogen (AOX) in bleach effluents: A pilot scale study. *Bioresource Technology*, *169*, 96-102.

Sharma, S., Sharma, K. K., & Kuhad, R. C. (2014).An efficient and economical method for extraction of DNA amenable to biotechnological manipulations, from diverse soils and sediments. *Journal of Applied Microbiology*, *116*(4), 923-933.

Shrivastava, B., Jain, K. K., Kalra, A., & Kuhad, R. C. (2014). Bioprocessing of wheat straw into nutritionally rich and digested cattle feed. *Scientific Reports*, *4*, 6360.

Singh, D., Sharma, K. K., Dhar, M. S., & Virdi, J. S. (2014). Molecular modeling and docking of novel laccase from multiple serotype of *Yersinia enterocolitica* suggests differential and multiple substrate binding. *Biochemical and Biophysical Research Communications*, *449*(1), 157-162.

Singhal, N., Kumar, M., & Virdi, J. S. (2014).Molecular analysis of β-lactamase genes to understand their differential expression in strains of *Yersinia enterocolitica* biotype 1A. *Scientific Reports*, *4*, 5270.

Srivastava, A., Singhal, N., Goel, M., Virdi, J. S., & Kumar, M. (2014). CBMAR: a comprehensive β-lactamase molecular annotation resource. *Database*, *2014*, bau111.

Srivastava, A., Singhal, N., Goel, M., Virdi, J. S., & Kumar, M. (2014).Identification of family specific fingerprints in β-lactamase families. *The Scientific World Journal*, *2014*, 980572.

Yadav, S., Rawat, G., Tripathi, P., & Saxena, R. K. (2014).Dual substrate strategy to enhance butanol production using high cell inoculum and its efficient recovery by pervaporation. *Bioresource Technology*, *152*, 377-383.

2013

Anand, A., Kumar, V., & Satyanarayana, T. (2013).Characteristics of thermostable endoxylanase and β-xylosidase of the extremely thermophilic bacterium Geobacillus thermodenitrificans TSAA1 and its applicability in generating xylooligosaccharides and xylose from agro-residues. *Extremophiles*, *17*(3), 357-366.

Chandna, P., Mallik, S., & Kuhad, R. C. (2013). Assessment of bacterial diversity in agricultural by-product compost by sequencing of cultivated isolates and amplified rDNA restriction analysis. *Applied Microbiology and Biotechnology*, *97*(15), 6991-7003.

Chandna, P., Mayilraj, S., & Kuhad, R. C. (2013).*Bacillus paraflexus* sp. nov., isolated from compost. *International Journal of Systematic and Evolutionary Microbiology*, *63*(12), 4735-4743.

Chandna, P., Nain, L., Singh, S., & Kuhad, R. C. (2013). Assessment of bacterial diversity during composting of agricultural byproducts. *BMC Microbiology*, *13*(1), 99.

Dhar, M. S., Gupta, V., & Virdi, J. S. (2013).Detection, distribution and characterization of novel superoxide dismutases from *Yersinia enterocolitica* biovar 1A. *PloS One*, *8*(5), e63919.

Dhar, M. S., Kumar, P., & Virdi, J. S. (2013).Exogenous phage recombinase-independent inactivation of chromosomal genes in *Yersinia enterocolitica*. *Journal of Microbiological Methods*, *95*(2), 102-106.

Dhar, M. S., & Virdi, J. S. (2013). Interaction of *Yersinia enterocolitica* biovar 1A with cultured cells *in vitro* does not reflect the two previously identified clonal groups. *Journal of Medical Microbiology*, *62*(12), 1807-1814.

Gupta, R., Rajput, R., Sharma, R., & Gupta, N. (2013).Biotechnological applications and prospective market of microbial keratinases. *Applied Microbiology and Biotechnology*, *97*(23), 9931-9940.

Gupta, R., Sharma, R., & Beg, Q. K. (2013). Revisiting microbial keratinases: next generation proteases for sustainable biotechnology. *Critical Reviews in Biotechnology*, *33*(2), 216-228.

Joshi, S., & Satyanarayana, T. (2013).Characteristics and applications of a recombinant alkaline serine protease from a novel bacterium *Bacillus lehensis*. *Bioresource Technology*, *131*, 76-85.

Khasa, Y. P., Khushoo, A., & Mukherjee, K. J. (2013).Enhancing toxic protein expression in *Escherichia coli* fed-batch culture using kinetic parameters: Human granulocyte-macrophage colony-stimulating factor as a model system. *Journal of Bioscience and Bioengineering*, *115*(3), 291-297.

Kumar, S., Gupta, R., Kumar, G., Sahoo, D., & Kuhad, R. C. (2013).Bioethanol production from *Gracilariaverrucosa*, a red alga, in a biorefinery approach. *Bioresource Technology*, *135*, 150-156.

Kumar, V., & Satyanarayana, T. (2013).Biochemical and thermodynamic characteristics of thermo-alkali-stable xylanase from a novel polyextremophilic*Bacillus halodurans* TSEV1. *Extremophiles*, *17*(5), 797-808.

Kumar, V., Syal, P., & Satyanarayana, T. (2013).Highly thermo–halo–alkali-stable β-1, 4-endoxylanase from a novel polyextremophilic strain of *Bacillus halodurans*. *Bioprocess and Biosystems Engineering*, *36*(5), 555-565.

Kumari, A., & Gupta, R. (2013). Phenylalanine to leucine point mutation in oxyanion hole improved catalytic efficiency of Lip12 from *Yarrowia lipolytica*. *Enzyme and Microbial Technology*, *53*(6), 386-390.

Mahajan, R. V., Saran, S., Saxena, R. K., & Srivastava, A. K. (2013). A rapid, efficient and sensitive plate assay for detection and screening of l-asparaginase-producing microorganisms. *FEMS Microbiology Letters*, *341*(2), 122-126.

Mehta, D., & Satyanarayana, T. (2013). Dimerization mediates thermo-adaptation, substrate affinity and transglycosylation in a highly thermostable maltogenic amylase of *Geobacillus thermoleovorans*. *PloS One*, *8*(9), e73612.

Misra, S., Raghuwanshi, S., & Saxena, R. K. (2013).Statistical approach to study the interactive effects of process parameters for enhanced xylitol production by *Candida tropicalis* and its potential for the synthesis of xylitol monoesters. *Food Science and Technology International 19*(6), 535-548.

Misra, S., Raghuwanshi, S., & Saxena, R. K. (2013).Evaluation of corncob hemicellulosic hydrolysate for xylitol production by adapted strain of *Candida tropicalis*. *Carbohydrate Polymers*, *92*(2), 1596-1601.

Nandal, P., Ravella, S. R., & Kuhad, R. C. (2013). Laccase production by *Coriolopsiscaperata* RCK2011: optimization under solid state fermentation by Taguchi DOE methodology. *Scientific Reports*, *3*, 1386.

Nisha, M., & Satyanarayana, T. (2013).Characterization of recombinant amylopullulanase (gt-apu) and truncated amylopullulanase (gt-apuT) of the extreme thermophile *Geobacillus thermoleovorans* NP33 and their action in starch saccharification. *Applied Microbiology and Biotechnology*, *97*(14), 6279-6292.

Rajput, R., & Gupta, R. (2013). Thermostable keratinase from *Bacillus pumilus* KS12: Production, chitin crosslinking and degradation of Sup35NM aggregates. *Bioresource Technology*, *133*, 118-126.

Rajput, R., Verma, V. V., Chaudhary, V., & Gupta, R. (2013). A hydrolytic γ-glutamyl transpeptidase from thermo-acidophilic archaeon *Picrophilus torridus*: binding pocket mutagenesis and transpeptidation. *Extremophiles*, *17*(1), 29-41.

Rawat, G., Tripathi, P., Jahan, F., & Saxena, R. K. (2013). A natural isolate producing shikimic acid: isolation, identification, and culture condition optimization. *Applied Biochemistry and Biotechnology*, *169*(8), 2290-2302.

Rawat, G., Tripathi, P., & Saxena, R. K. (2013).Expanding horizons of shikimic acid. *Applied Microbiology and Biotechnology*, *97*(10), 4277-4287.

Rawat, G., Tripathi, P., Yadav, S., & Saxena, R. K. (2013).An interactive study of influential parameters for shikimic acid production using statistical approach, scale up and its inhibitory action on different lipases. *Bioresource Technology*, *144*, 675-679.

Sharma, A., & Satyanarayana, T. (2013).Characteristics of a high maltose-forming, acid-stable, and Ca2+-independent α-amylase of the acidophilic *Bacillus acidicola*. *Applied Biochemistry and Biotechnology*, *171*(8), 2053-2064.

Sharma, A., & Satyanarayana, T. (2013).Structural and biochemical features of acidic α-amylase of Bacillus acidicola. *International Journal of Biological Macromolecules*, *61*, 416-423.

Sharma, A., & Satyanarayana, T. (2013).Comparative genomics of *Bacillus* species and its relevance in industrial microbiology. *Genomics Insights*, *6*, 25.

Sharma, K. K., Shrivastava, B., Sastry, V. R. B., Sehgal, N., & Kuhad, R. C. (2013). Middle-redox potential laccase from *Ganoderma* sp.: its application in improvement of feed for monogastric animals. *Scientific Reports*, *3*, 1299.

Tripathi, P., Rawat, G., Yadav, S., & Saxena, R. K. (2013). Fermentative production of shikimic acid: a paradigm shift of production concept from plant route to microbial route. *Bioprocess and Biosystems Engineering*, *36*(11), 1665-1673.

Verma, D., Anand, A., & Satyanarayana, T. (2013). Thermostable and alkalistable endoxylanase of the extremely thermophilic bacterium *Geobacillus thermodenitrificans* TSAA1: cloning, expression, characteristics and its applicability in generating xylooligosaccharides and fermentable sugars. *Applied Biochemistry and Biotechnology*, *170*(1), 119-130.

Verma, D., Kawarabayasi, Y., Miyazaki, K., & Satyanarayana, T. (2013). Cloning, expression and characteristics of a novel alkalistable and thermostable xylanase encoding gene (Mxyl) retrieved from compost-soil metagenome. *PLoS One*, *8*(1), e52459.

Verma, D., & Satyanarayana, T. (2013). Production of cellulase-free xylanase by the recombinant *Bacillus subtilis* and its applicability in paper pulp bleaching. *Biotechnology Progress*, *29*(6), 1441-1447.

Kumar, V., Verma, D., & Satyanarayana, T. (2013). Extremophilic bacterial xylanases: production, characteristics and applications. *Current Biotechnology, 2*(4), 380-399.

2012

Anand, P., & Saxena, R. K. (2012).A novel thin-layer chromatography method to screen 1, 3-propanediol producers. *Journal of Industrial Microbiology & Biotechnology*, *39*(11), 1713-1718.

Anand, P., & Saxena, R. K. (2012). A comparative study of solvent-assisted pretreatment of biodiesel derived crude glycerol on growth and 1, 3-propanediol production from *Citrobacter freundii*. *New Biotechnology*, *29*(2), 199-205.

Deswal, D., Gupta, R., & Kuhad, R. C. (2012).Enhanced exoglucanase production by brown rot fungus *Fomitopsis* sp. RCK2010 and its application for cellulose saccharification. *Applied Biochemistry and Biotechnology*, *168*(7), 2004-2016.

Deswal, D., Sharma, A., Gupta, R., & Kuhad, R. C. (2012). Application of lignocellulolytic enzymes produced under solid state cultivation conditions. *Bioresource Technology*, *115*, 249-254.

Diwaniyan, S., Sharma, K. K., & Kuhad, R. C. (2012). Laccase from an alkalitolerantbasidiomycetes*Crinipellis* sp. RCK-1: Production optimization by response surface methodology. *Journal of Basic Microbiology*, *52*(4), 397-407.

Gupta, R., Kumar, S., Gomes, J., & Kuhad, R. C. (2012).Kinetic study of batch and fed-batch enzymatic saccharification of pretreated substrate and subsequent fermentation to ethanol. *Biotechnology for Biofuels*, *5*(1), 16.

Jahan, F., Kumar, V., Rawat, G., & Saxena, R. K. (2012). Production of microbial cellulose by a bacterium isolated from fruit. *Applied Biochemistry and Biotechnology*, *167*(5), 1157-1171.

Kuhad, R. C. (2012). Microbes and their role in sustainable development. *Indian Journal of Microbiology*, *52*(2), 309-313.

Kumar, D., Kumar, D., & Saha, S. (2012). A highly basic sequence at the N-terminal region is essential for targeting the DNA replication protein ORC1 to the nucleus in *Leishmania donovani*. *Microbiology*, *158*(7), 1775-1782.

Kumar, D., Rajanala, K., Minocha, N., & Saha, S. (2012). Histone H4 lysine 14 acetylation in *Leishmania donovani* is mediated by the MYST-family protein HAT4. *Microbiology*, *158*(2), 328-337.

Kumar, P., & Virdi, J. S. (2012).Identification and distribution of putative virulence genes in clinical strains of *Yersinia enterocolitica* biovar 1A by suppression subtractive hybridization. *Journal of Applied Microbiology*, *113*(5), 1263-1272.

Kumari, A., & Gupta, R. (2012).Extracellular expression and characterization of thermostable lipases, LIP8, LIP14 and LIP18, from *Yarrowia lipolytica*. *Biotechnology Letters*, *34*(9), 1733-1739.

Kumari, A., Verma, V. V., & Gupta, R. (2012).Comparative biochemical characterization and *in silico* analysis of novel lipases Lip11 and Lip12 with Lip2 from *Yarrowia lipolytica*. *World Journal of Microbiology and Biotechnology*, *28*(11), 3103-3111.

Mahajan, R. V., Saran, S., Kameswaran, K., Kumar, V., & Saxena, R. K. (2012). Efficient production of L-asparaginase from *Bacillus licheniformis* with low-glutaminase activity: optimization, scale up and acrylamide degradation studies. *Bioresource Technology*, *125*, 11-16.

Mallik, S., Virdi, J. S., & Johri, A. K. (2012).Proteomic analysis of arsenite–mediated multiple antibiotic resistance in *Yersinia enterocolitica* biovar 1A. *Journal of Basic Microbiology*, *52*(3), 306-313.

Misra, S., Raghuwanshi, S., Gupta, P., Dutt, K., & Saxena, R. K. (2012). Fermentation behaviour of osmophilic yeast *Candida tropicalis* isolated from the nectar of *Hibiscus rosasinensis* flowers for xylitol production. *Antonie van Leeuwenhoek*, *101*(2), 393-402.

Misra, S., Raghuwanshi, S., Gupta, P., & Saxena, R. K. (2012). Examine growth inhibition pattern and lactic acid production in *Streptococcus mutans* using different concentrations of xylitol produced from *Candida tropicalis* by fermentation. *Anaerobe*, *18*(3), 273-279.

Misra, S., Raghuwanshi, S., & Saxena, R. K. (2012).Fermentation behaviour of an osmotolerant yeast *D. hansenii* for Xylitol production. *Biotechnology Progress*, *28*(6), 1457-1465.

Murty, N. A. R., Tiwary, E., Sharma, R., Nair, N., & Gupta, R. (2012).γ-Glutamyl transpeptidase from *Bacillus pumilus* KS 12: decoupling autoprocessing from catalysis and molecular characterization of N-terminal region. *Enzyme and Microbial Technology*, *50*(3), 159-164.

Rajput, R., Tiwary, E., Sharma, R., & Gupta, R. (2012). Swapping of pro-sequences between keratinases of *Bacillus licheniformis* and *Bacillus pumilus*: altered substrate specificity and thermostability. *Enzyme and Microbial Technology*, *51*(3), 131-138.

Sharma, A., Kawarabayasi, Y., & Satyanarayana, T. (2012). Acidophilic bacteria and archaea: acid stable biocatalysts and their potential applications. *Extremophiles*, *16*(1), 1-19.

Sharma, A., & Satyanarayana, T. (2012).Production of acid-stable and high-maltose-forming α-amylase of *Bacillus acidicola* by solid-state fermentation and immobilized cells and its applicability in baking. *Applied Biochemistry and Biotechnology*, *168*(5), 1025-1034.

Sharma, A., & Satyanarayana, T. (2012). Cloning and expression of acidstable, high maltose-forming, Ca2+-independent α-amylase from an acidophile*Bacillus acidicola* and its applicability in starch hydrolysis. *Extremophiles*, *16*(3), 515-522.

Sharma, K. K., Shrivastava, B., Nandal, P., Sehgal, N., Sastry, V. R. B., Kalra, A., & Kuhad, R. C. (2012). Nutritional and toxicological assessment of white-rot fermented animal feed. *Indian Journal of Microbiology*, *52*(2), 185-190.

Shrivastava, B., Nandal, P., Sharma, A., Jain, K. K., Khasa, Y. P., Das, T. K.& Kuhad, R. C. (2012). Solid state bioconversion of wheat straw into digestible and nutritive ruminant feed by *Ganoderma* sp. rckk02. *Bioresource Technology*, *107*, 347-351.

Verma, D., & Satyanarayana, T. (2012).Cloning, expression and applicability of thermo-alkali-stable xylanase of *Geobacillus thermoleovorans* in generating xylooligosaccharides from agro-residues. *Bioresource Technology*, *107*, 333-338.

Verma, D., & Satyanarayana, T. (2012). Molecular approaches for ameliorating microbial xylanases. *Bioresource Technology*, *117*, 360-367.

EDITED BOOKS (2012 ONWARDS):

2013

Biotechnology for environmental management and resource recovery.R. C. Kuhad & A. Singh (Eds.). Germany: Springer Verlag. (ISBN 978-81-322-0876-1).

Thermophilic Microbes in Environmental and Industrial Biotechnology. T. Satyanarayana, J. Littlechild & Y. J. Kawarabayasi (Eds.). Netherland: Springer. (ISBN 978-94-007-5899-5).

2012

Microorganisms in Environmental Management. T. Satyanarayana, B. N. Johri & A. Prakash (Eds.). Netherlands: Springer. (ISBN 978-94-007-2229-3).

Microorganisms in Sustainable Agriculture and Biotechnology. T. Satyanarayana. B. N. Johri & A. Prakash (Eds.). Netherlands: Springer. (ISBN 978-94-007-2214-9).

BOOK CHAPTERS (2012 ONWARDS):

2017

Joshi, S. & Satyanarayana, T. (2017). Phytase of the unconventional yeast *Pichia anomala*: Production and applicationsIn T. Satyanarayana & G. Kunze (Eds.), *Yeast diversity in human welfare*(pp.371-383). New Delhi: Springer.

Choudhary, V., Vohra, A., Madan, A. & Satyanarayana, T. (2017). Probiotic yeasts in human welfareIn T. Satyanarayana & G. Kunze (Eds.), *Yeast diversity in human welfare*(pp.115-136).New Delhi: Springer.

Adivitiya, Dagar, V. K., & Khasa, Y. P. (2017). Yeast expression systems: Current status and future prospects. In T. Satyanarayana & G. Kunze (Eds.), *Yeast diversity in human welfare*(pp.215-250). New Delhi: Springer

Babbal, Adivitiya, & Khasa, Y. P. (2017).Microbes as biocontrol agents. In V. Kumar, M. Kumar, S. Sharma & R. Prasad (Eds.), *Probiotics and plant health* (pp.507-552*)*. New Delhi: Springer.

2016

Verma, D., & Satyanarayana, T. (2016). Retrieval of xylanase genes from environmental metagenomes by metagenomic approaches. In S. Hameed & Z. Fatima (Eds.), *Biotechnology: Progress and applications* (pp. 19-34). New Delhi: Daya Publishing House.

Singh, B., & Satyanarayana, T. (2016).Potential biotechnological applications of thermophilic moulds. In S.K. Deshmukh, J.K. Misra, J.P. Tewari, &T.Papp (Eds.)*Fungi: Applications and management strategies* (pp. 220-244). London: CRC Press.

2015

Saxena, R. K., Saran, S., Isar, J., &Kaushik, R. (2015). Current status of microbial production, enzymatic regulation and applications of succinic acid. In A. Pandey (Eds.), *Industrial biotechnology and bioengineering, Vol. VB: Production, isolation and purification of industrial products*. USA: Elsevier.

Singh, B., & Satyanarayana, T. (2015).Ubiquitous occurrence of thermophilic moulds in various substrates. In J. K. Mishra, J. P. Tewari, S. K. Deshmukh& C. Vagvolgyi (Eds.), *Fungi from different substrates* (pp. 201-216). Boca Raton, USA: CRC Press.

Faridi, S., & Satyanarayana, T. (2015).Prospects in biomimetic carbon sequestration. In M. Goel, M. Sudhakar& R. V. Shahi (Eds.), *Carbon capture, storage and utilization* (pp. 167-187). New Delhi: TERI Press.

Verma, D., & Satyanarayana, T. (2015). Novel alkalistable and thermostable xylanase-encoding gene (Mxyl) retrieved from compost-soil metagenome. In K. E. Nelson (ed.), *Encyclopedia of metagenomics* (pp. 548-559).New Delhi: Springer.

Faridi, S., & Satyanarayana, T. (2015).Bioconversion of industrial CO2 emissions into utilizable products.In R. Chandra (Eds.), *Environmental waste management* (pp. 111-156). Boca Raton, USA: CRC Press.

Shrivastava, B., Jain, K. K., Kumar, R., Prusty, S., Kumar, S., Chakraborty, S., Chaudhary, H. S., Puniya, M., & Kuhad, R. C. (2015). 'Omics' approaches to understand and manipulate rumen microbial function. In A. K. Puniya, R. Singh, & D.N. Kamra (Eds.), *Rumen microbiology: From evolution to revolution* (pp. 213-220). New Delhi: Springer India.

2014

Dey, T. B., Rathore, I. S., Kuhad, R. C. (2014). Solid-state fermentation for microbial production of potent antioxidant phenolics from cereals: An emerging biotechnology. In R. C. Sobti, P. Sharma & S. Puri (Eds.), *Emerging trends in microbial Biotechnology* (pp. 11-34). Delhi: Narendra Publishing House.

Singh, A., Hamme, J. D. V., Kuhad R. C., Parmar N., & Ward, O. P. (2014).Subsurface petroleum microbiology. In N. Parmar& A. Singh (Eds.), *Geomicrobiology and biogeochemistry: Soil biology*. Germmany: Springer Verlag.

Kaur, P., Joshi, S., & Satyanarayana, T. (2014).*Psychrophilic and psychrotolerant mycelial fungi* (pp. 112-122).Kavaka.

Rohatgi, B., & Satyanarayana, T. (2014).*Extremophilic fungal chitinases: Properties and perspectives* (pp. 78-86). Kavaka.

Arora, H., Singh, B., & Satyanarayana, T. (2014).*Potential biotechnological applications of phytases from thermophilic moulds* (pp. 69-77).Kavaka.

Singh, B., & Satyanarayana, T. (2014).*Thermophilic fungi: Their ecology and biocatalysis*(pp. 37-41). Kavaka.

Singh, B., Kumari, A., & Satyanarayana, T. (2014).Applicability of microbial phytases in plant growth promotion and development.In K. Ramasamy& K. Kumar (Eds.), *Plant-microbe interactions* (pp. 71-85). New Delhi: New India Publishing Agency.

Singh, D., Narang, E., Chutani, P., Kumar, A., Sharma, K.K., Dhar, M., and Virdi JS (2014).Isolation, characterization, and production of bacterial laccase from *Bacillus* sp.In Microbial Diversity and Biotechnology in Food Security (Eds. R.N. Kharwar, R.S. Upadhyay, N.K. Dubey and Raghuvanshi R).Springer, pp.439-450.

Singhal, N., Sharma, S., Singh, N. S., Bajaj, P., & Virdi, J. S. (2014). Characteristics of β-lactamases and their genes in *Yersinia enterocolitica* isolated from India. In R. Lawrence & E. Jayakumar (Eds.), *Antimicrobial resistance: A cause for global concern* (pp. 37-49). New Delhi: Narosa Publishing House.

2013

Sharma, A., Shrivastava, A., Sharma, S., Gupta, R., & Kuhad, R. C. (2013).Microbial pectinases and their applications.In R. C. Kuhad & A. Singh (Eds.), *Biotechnology of*

environmental management and resource recovery (pp. 107-124). Germany: Springer Verlag.

Shukla P., Nigam V., Gupta R., Kuhad R. C., & Singh A. (2013). Sustainable enzyme technology for environment: Biosensors for monitoring of pollutants and toxic compounds. In R. C. Kuhad & A. Singh (Eds.), *Biotechnology of environmental management and resource recovery*. Germany: Springer Verlag. (pp. 69-76).

Gupta, R., Bhardwaj, K. N., Choudhary, C., Chandna, P., Jain, K. K., Kaur, A., Kumar, S., Shrivastava, B., Ninawe, S., Singh, A., & Kuhad, R. C. (2013). Biofuels: The environment friendly energy carriers. In R. C. Kuhad & A. Singh (Eds.), *Biotechnology of environmental management and resource recovery* (pp. 125-150). Germany: Springer Verlag.

Gupta, R., Mehta, G., Deswal, D., Sharma, S., Jain, K. K., Devi, N., Khasa, Y. P., & Kuhad, R. C. (2013).Cellulases and their biotechnogical applications.In R. C. Kuhad & A. Singh (Eds.), *Biotechnology of environmental management and resource recovery* (pp. 89-106). Germany: Springer Verlag.

Kaur, P., Vohra, A., & Satyanarayana, T. (2013).Laboratory and industrial bioreactors for submerged fermentations. In *Fermentation processes engineering in the food industry* (pp. 165-179). Boca Raton, USA: CRC Press

Kumar, S., Dagar, V. K., Khasa, Y. P., & Kuhad, R. C. (2013).Genetically modified microorganisms (GMOs) for bioremediation. In R. C. Kuhad & A. Singh (Eds.)*Biotechnology for environmental management and resource recovery* (pp. 191-218).Germany: Springer Verlag

Gupta, R., Tiwary, E., Sharma, R., Rajput, R., & Nair, N. (2013). Microbial keratinases: Diversity and applications. In T. Satyanarayana, J. Littlechild & Y. Kawarabayasi (Eds.), *Thermophilic microbes in environmental and industrial biotechnology* (pp. 881-904.Springer.

Kumar, S., Satyanarayana, T., & Annapurna, K. (2013).Bioinoculant technology.In A. Kumar, A. Pareek& S. M. Gupta (Eds.), *Biotechnology in medicine and agriculture: Principles and practices* (pp. 586-609). New Delhi: I. K. International Publishing House Pvt. Ltd.

Satyanarayana, T. (2013).Applicability of phytase of the yeast *Pichia anomala* in ameliorating growth of poultry birds and fishes by managing anti-nutrient phytic acid. In M. V. Deshpande & J. Ruiz-Herrera (Eds.), *Biotechnology beyond borders* (pp. 365-374). Pune: CSIR-NCL.

2012

Singh, B., & Satyanarayana, T. (2012).Thermophilic fungal phytases. In N. S. Atri, R. C. Gupta, M. I. S. Saggao, & V. K. Singhal (Eds.), *Biodiversity evaluation: Botanical perspective* (pp. 95-110). Dehradun, India: Bishen Singh Mahendrapal Singh.

Satyanarayana, T. (2012).*Biotechnological applications of thermostable biocatalysts of thermophilic bacteria* (pp. 28-31).BRSI News Letter.

Kuhad, R. C., Gupta, R., & Khasa, Y. P. (2012).Microbial decolorization of colored industrial effluents.In T. Satyanarayana, B. N. Johri, & A. Prakash (Eds.), *Microorganisms in environmental management* (pp. 787-813). New Delhi: Springer.

Virdi, J. S., Kumar, P., Mallik, S., Bhagat, N., & Gulati, P. (2012).Insights into the genetic relationships between environmental and clinical strains of *Yersinia enterocolitica* biovar 1A.In T. Satyanarayana, B. N. Johri & A. Prakash (Eds.), *Microorganisms in environmental management* (pp. 61-81). New Delhi: Springer.

AWARDS AND DISTINCTIONS:

Prof. R.C. Kuhad

Fellow, National Academy of Sciences, India (FNASc) 2016

Fellow, National Academy of Agricultural Sciences (FNAAS), 2014

Fellow, Biotech Research Society of India (FBRS), 2014

AMI Platinum Jubilee Life Time Achievement Felicitation Award, 2014

Prof. J.S. Virdi

DBT-BIRAC Ideathon Awardin the area of Antimicrobial Resistance diagnostics (2016)

BIRAC (DBT)-Nesta (UK) Discovery Awardfor developing a point of care test (POCT) for rapid detection of Antimicrobial Resistance (2016)

Invitrogen Science Hero Best Lab Mentor (University Level) Award(2016)

Dr. Rajeev Kaul

Indo-US Raman Research Fellowship Awarded by UGC, 2013

Prof. T Satyanarayana

President of the Association of Microbiologists of India, 2015-16.

President of the Mycological Society of India for the year 2014-2015.

Malaviya Memorial award by Biotech Research Society, 2014.

Fellow, Indian Academy of Microbiological Sciences (FAMSc), 2014

Fellow, Andhra Pradesh Academy of Sciences, 2014

Ph.D. THESES COMPLETED IN LAST 5 YEARS:

S.No.	Year	Name	Thesis titled
1.	2012	Pinki Anand	Microbial production of 1,3-propandediol: Process optimization, scale up, purification, characterization and potential industrial applications
2.	2012	Adarsh K. Puri	Carbonsequestration using heterotrophic bacteria
3.	2012	Bharti Rohatgi	Exochitinase of the thermophilic mould *Myceliophthora thermophila*
4.	2012	Rishi Gupta	Bioconversion of plant residues into ethanol
5.	2012	Pradeep Kumar	Genomic differences between clinical and non-clinical strains of *Yersinia enterocolitica* isolated from India
6.	2013	Shailendra Raghuwanshi	Tannase from *Penicillium charlesii*: Process optimization, purification, characterization, scale up and industrial applications
7.	2013	Swati Mishra	Development and optimization of a fermentative process for xylitol production from *Candida tropicalis*: scaleup, purification and applications
8.	2013	Vinod Kumar	*Rhizopus oryzae* lipase: process optimization, purification, characterization, scale up and its comparative evaluation with other microbial lipases for industrially important reactions
9.	2013	Archana Sharma	Production, characterization and applications of acid-stable α-amylase of *Bacillus acidicola*
10.	2013	Digvijay Verma	Retrieval of thermo-alkali-stable xylanase gene through metagenomic approach.
11.	2013	Vikash Kumar	Xylanase of *Bacillus halodurans*
12.	2013	Bhuvanesh Srivastava	Bioconversion of wheat straw into animal feed by solid state fermentation
13.	2013	Richa Sharma	Keratinases from *Pseudomonas aeruginosa* KS-1: Characterization and degradation of prion protein Sup 35NM
14.	2013	Asani Bhaduri	Molecular and biochemical studies on secretory proteins of mycobacteria
15.	2013	Mahesh S. Dhar	Interaction of strains of two clonal groups of *Yersinia enterocolitica* with cultured cells *in vitro*
16.	2013	Neha Minocha	*Leishmania donovani* MCM4: Characterization of expression and interaction with PCNA
17.	2014	Abha Sharma	Enhancing laccase production from *Ganoderma lucidium* RCK2011 and its applications
18.	2014	Deepa Deswal	Cellulase from brown-rot fungus *Fomitopsis* sp. RCK2010 and its application in hydrolysis of lignocellulosic materials for ethanol production
19.	2014	Preeti Nandal	Bioprocessing for inoculum and laccase production from *Coriolopsis caperata* RCK2011 and their applications

20.	2014	Sonia Sharma	Unravelling microbial diversity and xylanolytic gene(s) from soils and compost through metagenomic approach
21.	2014	Deepika Mehta	Cloning, expression, characterization and application of α-amylases of *Geobacillus thermoleovorans*
22.	2014	Rinky Rajput	Biochemical and molecular characterization of keratinase from *Bacillus pumilus* KS12: Degradation of surrogate prion protein Sup35NM
23.	2014	Devanand Kumar	Identification and characterization of histone acetylases in the protozoan *Leishmania donovani*
24.	2014	V. Balaji	Expression patterns induced by stress in *Mycobacterium tuberculosis*: a genome-wide analysis focusing on toxin antitoxin loci
25.	2014	Firdaus Jahan	Bacterial cellulose: Production, properties, scale up and industrial applications
26.	2014	Garima Rawat	Production of shikimic acid from *Citrobacter freundii* KC466031 - a base compound to formulate drug against swine/avian flu: process optimization, downstream processing, scale up and its industrial applications
27.	2014	Priyanka Tripathi	Shikimic acid- a key ingredient for the formulation of the drug Tamiflu: process optimization, purification, characterization, scale up and its potential applications
28.	2014	Richi V. Mahajan	Production of L-asparaginase with low-glutaminase activity from *Bacillus licheniformis*: Process optimization, purification, characterization, scale up and its evaluation as a potent anti-cancerous molecule using liposomal technology
29.	2014	Sweta Yadav	Biobutanol: A second generation biofuel from *Clostridium acetobutylicum* KF158795, its process optimization, purification and applications
30.	2015	Nisha M	Characterization and applications of native and recombinant thermostable amylopullulanase of *Geobacillus thermoleovorans*
31.	2015	Swati Joshi	Phytase of the yeast*Pichia anomala*: Cloning and expression in *Pichia pastoris*
32.	2015	Piyush Chandna	Diversity of culturable and non-culturable bacteria from compost
33.	2015	Kavish Kumar Jain	Enhanced cellulase production from a thermophilic mold *Thermoascus aurantiacus* RCKK and its applications
34.	2015	Arti Kumari	Biochemical and molecular characterization of enantioselective lipases from *Trichosporon asahii* MSR54: their role in biofilm formation
35.	2015	Pawan Kumar Kanaujia	Detection and analysis of iron-acquisition genes and proteins in *Yersinia enterocolitica* biovar 1A
36.	2015	Priyanka Bajaj	Understanding clonal diversity and molecular mechanisms of β-lactamase mediated antibiotic resistance among *Escherichia coli* strains isolated from

			an Indian urban aquatic environment
37.	2016	Jasmine Arora	Characterization of the DNA replication protein Orc1/Cdc6 in the archaeon *Picrophilus torridus*
38.	2016	Kasturi Goswami	Characterization of MCM helicase from *Picrophilus torridus*
39.	2016	Jaya Gandhi	Mechanism of Epstein-Barr virus and Kaposi's sarcoma-associated herpes virus:Lytic regulation by modulator of inflammation cyclo-oxygenase
40.	2016	Vikas Kumar	Bioprocess optimization of recombinant human Interleukin-3 (hIL-3) in *Escherichia coli* and methylotrophic yeast *Pichia pastoris*
41.	2016	K. Karthikeya	Nitrilase from *Rhodococcus pyridinivorans* : process optimization, scale up, characterization, immobilization and industrial applications
42.	2017	Sandeep Kumar	Cloning, expression and applications of bacterial pectinase and laccase
43.	2017	Deepak Parashar	Bioprocess development and applications of the recombinant acidstable α-amylase of the bacterium *Bacillus acidicola* TSAS1
44.	2017	Shazia Faridi	Characteristics and applications of the native and recombinant α-carbonic anhydrase of the polyextremophilic bacterium *Bacillus halodurans* TSLV1
45.	2017	Himadri Bose	Production, characteristics and applications of γ-carbonic anhydrase of the polyextremophilic bacterium *Aeribacillus pallidus* TSHB1
46.	2017	L. Shivlata	Production and characteristics of saccharogenic alpha-amylase of the actinobacterium *Streptomyces badius* DB-1
47.	2017	Lohit Khera	Role of cellular metastasis suppressor Nm23-H1 in Hepatitis C Virus (HCV) Envelope(E1) protein-mediated tumorigenesis
48.	2017	Nirmala Devi	Bioprocess optimization of recombinant human Interleukin-7 (hIL-7) in *Escherichia coli* and methylotrophic yeast *Pichia pastoris*

NUMBER OF STUDENTS RECEIVING JRF/SRF/RA SINCE 2012: 30

Name of Research fellow	Year of enrolment	Duration of fellowship	Type of the fellowship	Granting agency
Ms. Adivitya	2012-13	5 years	JRF	CSIR
Ms. Catherine Skyongzin Paul	2012-13	5 years	JRF	CSIR
Ms. Tanvi Kalra	2012-13	5 years	JRF	UGC
Ms. Udita	2012-13	5 years	JRF	UGC
Mr. N. Somendro Singh	2012-13	5 years	JRF	ICMR
Dr. Neelja Singhal	2012-13	3 years	RA	DST
Mr. Deepak Parashar	2012-13	3 years	JRF	DBT
Mr. K. Karthikeya	2012-13	5 years	JRF	CSIR
Mr. Richi Mahajan	2012-13	5 years	JRF	CSIR
Mr. Sandeep Kumar	2012-13	5 years	JRF	ICMR
Mr. Amandeep Kaur	2012-13	5 years	JRF	DBT
Ms. Aarti Yadav	2013-14	5 years	JRF	ICMR
Ms. Poonam	2013-14	5 years	JRF	CSIR
Ms. Shruti Bindal	2013-14	5 years	INSPIRE-JRF	DST
Mr. Himadri Bose	2013-14	5 years	JRF	DBT
Ms. L. Shivlata	2013-14	5 years	JRF	DBT
Ms. Shazia Faridi	2013-14	5 years	RA	ICMR
Mr. Subhojit Chakraborty	2013-14	5 years	JRF	CSIR
Ms. Shilpa Rohra	2014-15	5 years	JRF	UGC
Ms. Nivedita Gaur	2014-15	3 years	JRF	UGC
Mr. Yogesh Singh	2014-15	5 years	JRF	ICMR
Mr. Devanand Kumar	2014-15	5 years	RA	DBT
Mr. Gaurav Kumar	2014-15	5 years	JRF	CSIR
Dr. Jyotsana Dalal	2014-15	5 years	RA	UGC
Ms. Meenu Saini	2015-16	5 years	JRF	ICMR
Ms. Babbal	2015-16	5 years	JRF	CSIR

Ms. Varshni Sharma	2015-16	5 years	INSPIRE	DST
Ms. Ashima Dua	2015-16	5 years	JRF	CSIR
Ms. Jyoti Pal	2015-16	3 years	JRF	DBT
Mr. Yogesh Kumar	2015-16	5 years	JRF	CSIR

AWARDS RECEIVED BY STUDENTS:

Babbal: Best poster award during National conference (BESCON-2017) on Biological Engineering in 21st century, held at NSIT, New Delhi, India from September 8-9, 2017 titled "High level soluble expression of recombinant hTNF-alpha in fed batch culture of *E.coli*".

Adivitiya: Dr. Rana Memorial Best Poster Award during 57th annual conference of Association of Microbiologists of India, Guwahati University, Guwahati, (Assam) (Nov, 2016)

Adivitiya: First prize in Poster Presentation under "Indigenous Science and Technology", Young Scientists' Conclave as part of the India International Science Festival (2016)

Catherine Paul: Best poster Award at National Science Day, University of Delhi South Campus, Feb 2017

Nivedita Gaur: Best oral paper presentation at Molecular Virology Meeting at Translational Health Sciences and Technology Institute (THSTI), 2017

Udita Chandra: Best poster Award at National Science Day, University of Delhi South Campus, Feb 2016

Lohit Khera and Catherine Paul: Poster Award at VIROCON-2016, the 25th annual conference of Indian Virological Society, organized by IIHR Bengaluru from 8-10 Dec, 2016

Catherine Paul and Lohit Khera: Poster Award presented at 57th Annual conference of Association of Microbiologists in India, organized by Department of Botany, Guwahati University, Assam, India on Nov 24-27, 2016

Meenu Saini: Best Poster Presentation Award, OMICS International, 7TH Indo-global Summit and Expo on Food and Beverages (Oct 2015), New Delhi

Shruti Bindal: Best Oral Presentation Award, OMICS International, 7th International Summit and Expo on Food and Beverages (Oct 2015), New Delhi

Arti Kumari: Bursary Award, BIOTRANS (Jul 2013), Manchester, England

Jaya Gandhi: PGIMER Young Scientist Award in Medical Virology in VIROCON-2012 organized by Indian Virological Society at IVRI Mukteswar from 8-10 Nov, 2012.

ALUMNI:

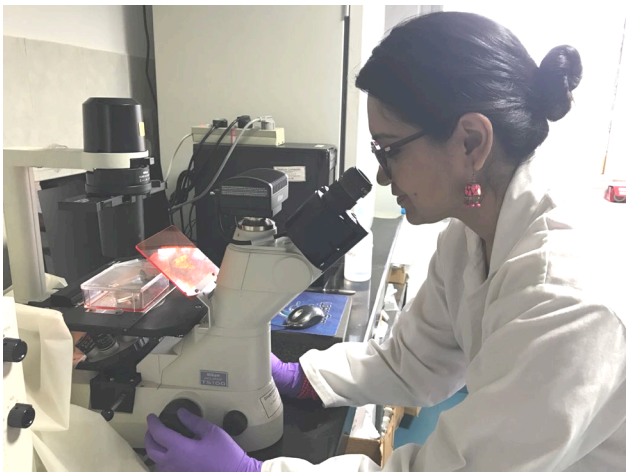
Name	Current position
Dr. Rekha Gupta	Associate Professor, Gargi College, Delhi University
Dr. Kavita Vasdev	Associate Professor, Gargi College Delhi University
Dr. Prerna Diwan	Associate Professor in RLA College Delhi University
Dr. Kusum R. Gupta	Associate Professor, RLA College Delhi University
Dr. Vandana Gupta	Associate Professor, RLA College Delhi University
Dr. A. Archana	Associate Professor, SSN College Delhi University
Dr. Sunita Aggarwal	Associate Professor, IHE College Delhi University
Dr. Nitika Nagpal	Assistant Professor, IHE College Delhi University
Dr. Ashima Vohra	Associate Professor, IHE College Delhi University
Dr. Arti Nigam	Associate Professor, IHE College Delhi University
Dr. Purnima Anand	Assistant Professor, BCAS College Delhi University
Dr. Ruchi Gulati	Assistant Professor, BCAS College Delhi University
Dr. Sapna Das Bradoo	Associate Professor, University of Oklahoma, USA
Dr. Indrajit Sinha	Scientist, Acenzia Inc., Ontario, Canada
Dr. Itender Singh	Assistant Professor, Washington University, USA
Dr. Pooja Phogat	Vice President, Kinapse, Gurgaon, Haryana
Dr. Paresh Gigras	Scientist, Novartis, Singapore
Dr. Mukesh Kapoor	Scientist E, CFTRI, Mysore, India
Dr. Sachin Sharma	Welcome Trust-DBT India Alliance Delhi
Dr. Deepak Nihalini	Research assistant Professor, Univ. of Penn, USA
Dr. Rajeev K. Kapoor	Assistant Professor, Department of Microbiology, MDU, Rohtak, Haryana
Dr. K. K. Sharma	Assistant Professor, Department of Microbiology, MDU, Rohtak, Haryana
Dr. Bijender Singh	Assistant Professor, Department of Microbiology, MDU, Rohtak, Haryana
Dr. Pooja Gulati	Assistant Professor, Department of Microbiology, MDU, Rohtak, Haryana
Dr. Parwinder Kaur	Assistant Professor, SSN College Delhi University
Dr. Namita Gupta	Scientist, Technology board, DST, Delhi

Dr. Neeru Bhagat	Assistant Professor, Gargi College Delhi University
Dr. Vikash Kumar	Postdoc Fellow, Univ. of Umea, Sweden
Dr. Diwakar Kumar	Assistant Professor, Central Univ. Of Assam, Silchar
Dr. Neha Minocha	Assistant Professor, BCAS College Delhi University
Dr. Bhuvnesh Srivastava	Panacea Biotech. Delhi
Dr. Richa Sharma	Assistant Professor, IHE College Delhi University
Dr. Devanand Kumar	Premas Biotech, Manesar, Haryana
Dr. Jasmine Arora	Apac Biotech, Gurgaon, Haryana
Dr. Digvijay Verma	Assistant Professor, BBAU, Lucknow, UP
Dr. Kasturi Goswami	Smart Analyst, Gurgaon, Haryana
Dr. Priyanka Bajaj	Postdoc fellow, SCMM, JNU, New Delhi
Dr. Deepika Mehta	CPCB, Delhi
Dr. Mahesh S. Dhar	Assistant Professor, Amity University, Noida, UP
Dr. Sarita Mallik	Assistant Professor, K. S. Vishvavidalya, Gujarat
Dr. Swati Joshi	Assistant Professor, Central Univ. Of Gujarat, Gandhinagar
Dr. Deepak Parashar	Premas Biotech, Manesar, Haryana
Dr. SwetaYadav	Assistant Professor, SSN College Delhi University
Dr. Vikas Kumar	Premas Biotech, Manesar, Haryana
Dr. Lohit Khera	Postdoc. Fellow, Weizmann Institute, Israel

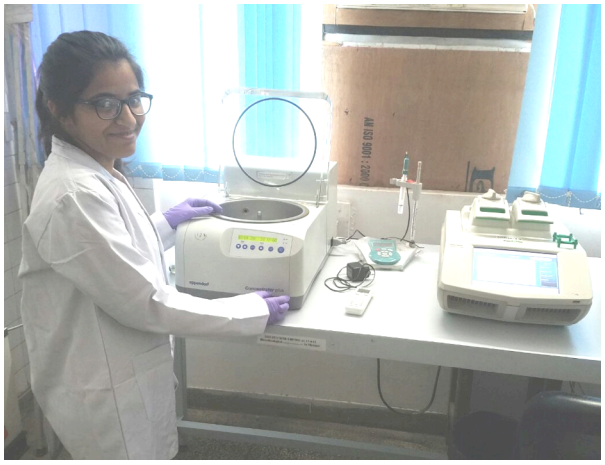
FERMENTATION FACILITY

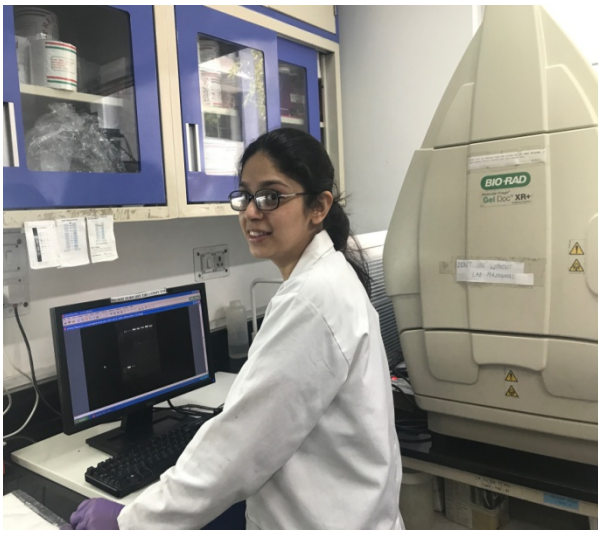
IMAGING FACILITY

VIROLOGY FACILITY



RESEARCH FACILITIES





DEPARTMENT FACULTY AND STAFF

UGC-SAP SYMPOSIUM

Prof. Pawan Dhar, JNU, New Delhi

Prof. Umesh Varshney, IISc. Bangalore

Prof. Anirban Basu, NBRC, Manesar

Prof. S.V. Alavandi, CIBA, Chennai

VISIT TO NATIONAL DAIRY RESEARCH INSTITUTE

WINNING THE CAMPUS CRICKET TROPHY

VISIT TO JAIPUR AND UDAIPUR

DEPARTMENTAL SPORTS DAY

TEACHER'S DAY

YOGA DAY

SYMPOSIUM

SPORTS DAY