DEEPIKA MEHTA

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Talented, self-motivated and enthusiastic Microbiologist and Biotechnologist with an exceptional academic background. Well-versed in Microbiology and Biotechnology research methodologies. Possessing experience in project works, paper presentations etc. Deep understanding of research field with focus on delivering scientific solutions.

- Adroit at learning new concepts quickly, working well under pressure and communicating ideas clearly and effectively
- Friendly with an upbeat attitude
- Excellent decision making skills with a positive approach.

CORE COMPETENCIES

- Proven ability to critically appraise scientific information
- Expertise in the retrieval and analysis of relevant scientific literature, and proficiency in presenting a study
- Solid ability of Conceptual thinking, and proficiency in research methodologies

EDUCATION

Degree	**Subject**	**University/Board**	**Year**	**% of marks**
All India Secondary School Examination (**10th**)	English, Hindi, Science, Social Science, Maths	Central Board of Secondary Education	2001-2002	82.4
All India Senior School Certificate Examination (**12th**)	English, Physics, Chemistry, Maths, Biology	Central Board of Secondary Education	2003-2004	85.6
B.Sc	Microbiology	Institute of Home Economics, University of Delhi	2004-2007	75.53
M.Sc	Microbiology	University of Delhi South Campus	2007-2009	72.6
Ph.D	Microbiology	University of Delhi South Campus	2009- 2014	80% (coursework)

RESEARCH PROJECTS

Name of the project: Effect of bile salts on the probiotic potential of *Lactobacillus* spp.

Supervisor: Prof. J. S. Virdi, Department of Microbiology, University of Delhi South Campus

Duration: 2008-2009.

Description of project: The project aimed at selection of potential probiotic strains of *Lactobacillus* spp. on the basis of their tolerance of bile salts and their cholesterol lowering properties. Influence of bile salts on the morphology, growth and cultural characteristics, protein profile of *Lactobacillus* spp was studied. Minimum inhibitory concentration (MIC) values and tolerance to the two bile salts: sodium taurocholate and sodium tauroglycocholate for *Lactobacillus* spp was investigated. Further, bile salt hydrolase activity and bile salt deconjugating ability of *Lactobacillus* spp. was determined along with the detection of the *bsh* gene. Finally, cholesterol removal ability of *Lactobacillus* spp. in the presence and absence of bile salt was studied *in vitro*, which served as a basis for selection a potent probiotic organism.

Name of the project: Cloning, expression, characterization and applications of thermostable amylases of *Geobacillus thermoleovorans*

Supervisor: Prof. T. Satyanarayana, Department of Microbiology, University of Delhi South campus

Duration: 2010-2014.

Description of project: *Geobacillus thermoleovorans*, isolated from Waimangu hot water spring (New Zealand), is an extreme thermophilic bacterium that produces multiple amylases. These amylases were over produced by recombinant approach. All these enzymes were biochemically and biophysically characterized and were found to possess novel properties. *Gt-amyI* encodes an acidic, thermostable and raw starch hydrolyzing α-amylase of 59 kDa. Gt-amyI is Ca^{2+}-independent at the concentration used in industrial starch saccharification, and hydrolyzes raw corn and wheat starches efficiently, and thus, is useful in starch saccharification at the industrial sub-gelatinization temperatures. The binding of Gt-amyI to raw starch can be attributed to the presence of a putative SBD (starch binding domain) at its C-terminus. Ca^{2+} inhibited Gt-amyI at concentrations higher than 100 ppm, which stimulates most amylases. Mixed-type inhibition of Gt-amyI occurs because of two kinds of Ca^{2+}

binding sites. Primary Ca^{2+} binding sites are not located in the catalytic site, and therefore, not inhibitory at lower (<100 ppm) Ca^{2+} concentrations. While the secondary Ca^{2+} binding sites are inhibitory because these are also involved in enzyme catalysis (Asp 268 and Glu 298).

Gt-amyII (1,542 bp) encodes thermostable, Ca^{2+}-independent and raw starch hydrolyzing α-amylase. The starch hydrolysis is facilitated following the adsorption of the enzyme to starch at the C-terminal domain, as confirmed by the truncation analysis. Langmuir–Hinshelwood kinetic analysis in terms of equilibrium parameter (K_R) suggested that the adsorption of Gt-amyII to corn starch is more favourable than that of Gt-amyII-T. Phylogenetic analysis confirmed that starch binding region of Gt-amyII is, in fact, the non-catalytic domain C, and not the typical SBD of CBM families.

Gt-amyIII (1767 bps) encodes a dimeric thermostable maltogenic amylase. The recombinant monomeric and dimeric forms of maltogenic amylase are of 72.5 and 145 kDa, which are active optimally at 80 °C and pH 5.0 – 9.0. Thermostability of Gt-MamyIII was experimentally attributed to two factors: salt bridges and dimerization. The role of buried and networked salt bridges arising out of 4% sequence difference from ThMA (*Thermus* maltogenic amylase) in the thermostabilization of monomeric Gt-MamyIII was confirmed by site-directed mutagenesis and double mutant cycle. Dimerization also increases $t_{1/2}$ of Gt-MamyIII from 8.2 h to 12.63 h at 90 °C and mediates in its enthalpy-driven conformational thermostabilization. Furthermore, dimerization regulates preferential substrate binding of the enzyme. This has been confirmed by molecular docking of β-cyclodextrin to Gt-MamyIII that indicated the requirement of homodimer formation by the interaction of a few N-terminal residues of chain A with the catalytic residues of $(\alpha/\beta)_8$ barrel of chain B and vice-versa for stable cyclodextrin binding. The dimeric Gt-MamyIII shows transglycosylation while the truncated form does not because of the lack of extra sugar-binding space formed due to dimerization.

WORK EXPERIENCE

- 1 Aug 2014 – 19 Dec 2014 : Assistant Professor (Ad-hoc) , Gargi College, University of Delhi, New Delhi.
- 5 Jan 2015 – 19 Jan 2015: Guest lecturer, Gargi College, University of Delhi, New Delhi.
- 20 Jan 2015 – 31 Mar 2015: Assistant Professor (Ad-hoc), Gargi College, University of Delhi, New Delhi.
- 4 Apr 2015 – 24 Apr 2015: Guest lecturer, Gargi College, University of Delhi, New Delhi.
- Mentored a project entitled 'To study the culturable bacterial diversity of extreme environments by molecular methods' under the Star College Scheme, DBT at Gargi College (2014).

TECHNIQUES LEARNT

- ***Microbiology:*** Preparation of culture media (complex, enriched, enrichment), Staining (simple, negative, capsule, spore and gram's staining), Microscopy (scanning electron microscopy, fluorescence microscopy, compound microscopy), Isolation and maintainence of bacteria, bacteriophages, fungi and algae , Effect of different physiological conditions on growth of microorganisms, Production of metabolites (ethanol, enzymes, amino acids, antibiotics and organic acids) by microorganisms and their quantitative estimation, streaking, pour plate technique, spread plate technique, IMViC series of tests, Triple sugar Iron agar test, Kirby bauer's disc diffusion method, Growth kinetics bacteria and fungi, Isolation and purification of plant virus (local lesion technique), plaque assay.

- ***Enzyme and protein purification:*** Ultrafiltration (Millipore), acetone and ammonium sulfate precipitation, dialysis, polyacrylamide gel electrophoresis (BioRad), SDS-PAGE and native PAGE, chromatographic techniques like [Manual and by Fast-protein liquid chromatographic (FPLC)] ion-exchange chromatography, hydrophobic

interaction chromatography, gel filtration chromatography, Ni-NTA affinity chromatography, enzyme adsorption kinetics.

- ✓ ***Protein Structure:*** Secondary structure determination by circular dichroism spectroscopy, Thermal CD spectroscopy, Tertiary structure determination by Fluorescence spectroscopy.

- ✓ ***Molecular biology techniques:*** Isolation of plasmid DNA and genomic DNA, Agarose gel electrophoresis, Restriction Digestion and Ligation of plasmid DNA, PCR (Gradient PCR, RPAD, colony PCR, Real time PCR), PCR-based site-directed mutagenesis, Transformation of bacterial and eukaryotic cells (*E. coli, Bacillus subtilis* and *Pichia pastoris*), Electroporation, Replica plating.

- ✓ **Other biochemical techniques:** Quantitative and qualitative analysis of proteins, sugars and lipids, enzyme kinetics and thermodynamics, thermal inactivation kinetics of enzymes and proteins.

- ✓ ***Bioinformatics:*** Database searching (NCBI, DDBJ, PDB, RefSeq, Genome, Science Direct, PubMed etc), Data retrieval, all forms of BLAST, ClustalX, Swiss Model, ExPasy server tools, Molecular docking, Homology modeling, phylogenetic analysis, ESTScan, GeneRunner, InterPro Scan, SMART, Prosite databases, Windows Vista / XP, MS Office, Adobe Illustrator, Adobe photoshop.

- ✓ ***Immunology:*** Blood group typing, Immunoelectrophoresis, Total Leucocyte Count and Differential Leucocyte Count, Immnuodiffusion in gels (radial immunodiffusion, double immunodiffusion), Quantitiative determination of antibodies by precipitin reactions, Sandwich ELISA and dot ELISA.

- ✓ ***Management:*** Basic laboratory management, grant writing, budget writing, mentoring and training students in laboratory techniques.

HONORS/AWARDS

- ✓ Foreign travel grant awarded by CSIR in 2013
- ✓ Achieved rank second in M.Sc. Microbiology, 2009 at University level
- ✓ **Qualified Junior Research Fellowship-National Eligibility Test (JRF-NET) conducted by Council of Scientific and Industrial Research (CSIR), December 2008.**
- ✓ Awarded All-India Post-Graduate Scholarship during M. Sc. Microbiology (2007-2008)
- ✓ Awarded All-India Post-Graduate Scholarship during M. Sc. Microbiology (2008-2009).
- ✓ Ranked 8th at the University level (University of Delhi) in B.Sc Microbiology.
- ✓ Special Merit Certificates for distinction in:
- ✓ Immunology, Recombinant DNA technology, Plant Pathology, Applied Microbiology, and Medical Microbiology during session 2006-07.
- ✓ Microbial Genetics & Molecular Biology and Algae & Fungi during session 2005-06.
- ✓ History and Scope of Microbiology, Bacteriology and Biostatistics & Introduction to computers during session 2004-05.
- ✓ Merit certificate for standing 2nd in batch (2004-2005).
- ✓ Delhi Hindi Academy Certificate of Merit for achieving 88% in Hindi (CBSE 10th) in 2001-2002.
- ✓ Certificate of Merit in academic years 2002-2003, 2000-2001, 1999-2000, and 1998-1999.

OTHER ACHIEVEMENTS/MEMBERSHIPS

- ✓ Assistant Editor and reviewer for the Journal 'Indian Journal of Microbiology and related research' since Oct 2014.
- ✓ Active reviewer for the Journal 'African Journal of Microbiology'.
- ✓ Lifetime member AMI (Association of Microbiologists of India) since 2012.
- ✓ Member ASM (American Society of Microbiology) [2012-13].

RESEARCH ARTICLES/BOOK CHAPTERS

- ✓ Satyanarayana, T., Sharma, A., **Mehta, D.**, Puri, A.K., Kumar, V., Nisha, M. and Joshi, S. (2012). Biotechnological application of biocatalysts from Firmicutes *Bacillus* and *Geobacillus* species. In: Satyanarayana T, Johri BN, Prakash A (eds) 'Microorganisms in Sustainable Agriculture and Biotechnology'. Springer, Netherlands, pp. 343-379.

- ✓ **Mehta, D.** and Satyanarayana, T. (2012). Diversity of hot environments and thermophilic microbes. In: Satyanarayana T, Littlechild J, Kawarabayasi Y (eds) 'Thermophilic Microorganisms in Environmental and Industrial Biotechnology' Springer, Netherlands, pp 3-60.

- ✓ **Mehta, D.** and Satyanarayana, T. (2013) Biochemical and molecular characteristics of recombinant acidic and thermostable raw starch hydrolyzing α-amylase from an extreme thermophile *Geobacillus thermoleovorans.* Journal of Molecular Catalysis B. Enzymatic, 85–86: 229–238. [**Impact factor 2.823**]

- ✓ **Mehta, D.** and Satyanarayana, T. (2013) Dimerization mediates thermo-adaptation, substrate affinity and transglycosylation in a highly thermostable maltogenic amylase of *Geobacillus thermoleovorans*. PloS One. 8(9): 1-13. [**Impact factor 3.73**]

- ✓ **Mehta, D.** and Satyanarayana, T. (2014) Domain C of thermostable α-amylase of *Geobacillus thermoleovorans* mediates raw starch adsorption. Applied Microbiology Biotechnology. 98: 4503–4519. [**Impact factor 3.689**]

- ✓ **Mehta, D.** and Satyanarayana, T. (2015) Structural elements of thermostability in the maltogenic amylase of *Geobacillus thermoleovorans*. International Journal of Biological Macromolecules. 79: 570-576. **[Impact factor 2.858]**

SEMINARS/CONFERENCES/EVENTS

- ✓ Poster presentation entitled 'Raw-starch degrading thermostable α-amylase of *Geobacillus thermoleovorans'* at Asian Congress on Biotechnology 2013, December 15-19, 2013 at India Habitat Center, New Delhi, India.

- ✓ Poster presentation entitled 'Dimerization-mediated thermoadaptation, substrate preference switch and transglycosylation in a highly thermostable maltogenic α-amylase of *Geobacillus thermoleovorans'* at Thermophiles 2013 - 12th International Meeting at the University of Regensburg , September 08 - 13, 2013.

- ✓ Participation in ASM (American Society for Microbiology) 'Virtual workshop on Scientific Writing and Publishing' (22 nov 2012), at Kalinga Institute of technology, Bhubaneswar, Odisha.

- ✓ Poster presentation entitled 'Characterisation of recombinant acidic and thermostable α-amylase from an extreme thermophile *Geobacillus thermoleovorans* and testing its applicability in raw-starch hydrolysis' in 53rd Annual Conference of Association of Microbiologists of India (Nov 2012), Kalinga Institute of Technology, Bhubaneswar, Odisha, India.

- ✓ Poster presentation entitled 'Cloning and expression of Ca^{2+} -independent and thermostable α-amylase from *Geobacillus thermoleovorans* NP54' in International Conference on Microorganisms in Environment Management and Biotechnology (July 2011), Barkatullah University, Bhopal, Madhya Pradesh, India.

- ✓ Participation in Seminar and training on Spectral Confocal LASER Scanning Microscopy (2011), organized at University of Delhi South Campus, by Leica and Labindia.

- ✓ Participated in 47th Annual Conference of AMI (Association of Microbiologists of India) held on 18-20th November 2008 at Department of Zoology, North Campus, New Delhi.

Contact Information:

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