



## CURRICULUM VITAE

- 1. Name:** Dr. Rajeeva Gaur  
**2. Father's Name:** Late Shri P.N. Gaur  
**3. Mother's Name:** Smt Dayal Gaur  
**4. Date of Birth:** 01 - 07- 1962  
**5. Designation:** Professor  
**6. Address:** Department of Microbiology  
Dr. Ram Manohar Lohia Avadh University, Faizabad, U.P.  
224001, India  
Email: [rajeevagaur@rediffmail.com](mailto:rajeevagaur@rediffmail.com)  
Mobile no. 9956754873

### 7. Academic and Professional Qualification:

Degree	Institution	Subjects	Year	Division
H.Sc	U.P. Board	Hindi, English, Math, Science, Biology	1976	II
I. Sc.	U.P. Board	Hindi, English, Physics, Chemistry, Biology	1978	I
B.Sc.	D.D.U. Gorakhpur University, Gorakhpur	Zoology, Chemistry, Botany	1981	I
M. Sc.	G. B. Pant University of Agriculture and Technology, Pantnagar	Microbiology	1984	I
Ph. D.	Banaras Hindu University, Varanasi.	Microbiology	1992	-

- 8. M. Sc. Thesis topic:** Amylase production by Mesophilic and Thermophilic fungi.  
**9. Ph. D. Thesis topic:** Ecological impact of soil Solarization on Microorganisms.  
**10. Fellowship awarded:**
  - ❖ National scholarship during M. Sc.
  - ❖ Research Associate (1985-1986) from Indian Veterinary Research Institute, Izatnagar, Bareilly, U.P., India.
  - ❖ JRF and SRF-CSIR during Ph. D. (1987-1991) entitled "Improved Recovery of Enzymes (Cellulase, Amylase & Protease) by Biotechnological means during**11. Research specialization:** Applied and Industrial Microbiology, Agricultural and Environmental Microbiology, Food Microbiology  
**12. Books Published:** 06 Books (03 Edited)  
**13. Book chapters in national and international books:** 25  
**14. Ph. D. Guided:** 10  
**15. Ph. D. Enrolled:** 02  
**16. Projects (Completed/Ongoing):** 04 Completed  
**17. Seminars/Symposium:** More than 30 seminars  
**18. Refresher and Oriented courses:** 01 Oriented and 02 Refresher courses  
**19. Guest and Invited Lecturers Delivered:** More than 100 Lectures

**20. Consultancy services to industries:** Provided consultancy services to Distilleries and Agriculture and food industries

**21. Professional Qualification:**

Position Held	Duration	Institution	Nature of Work done
Assistant Manager, R& D and Q. C.	March 1992-26 January 1994	Saraya Distillery, Sardarnagar, Gorakhpur, U. P.	Research in fermentation yeast and effluent distillery industry (Permanent)
Lecturer	27 January 1994 - 26 January 1998	Deptt. of Microbiology, Dr. R. M. L. Avadh University, Faizabad (U.P.)	P.G. Teaching & Research (Permanent)
Senior Lecturer	27 <sup>th</sup> Jan 1998-26 <sup>th</sup> Jan 2003	Deptt. of Microbiology, Dr. R. M. L. Avadh University, Faizabad (U.P.)	P.G. Teaching & Research (Permanent)
Reader	27 <sup>th</sup> January 2003-26 <sup>th</sup> January 2006	Deptt. of Microbiology, Dr. R. M. L. Avadh University, Faizabad (U.P.)	P.G. Teaching and Research (Permanent)
Associate Professor	27 <sup>th</sup> January 2006-26 <sup>th</sup> January 2009	Deptt. of Microbiology, Dr. R. M. L. Avadh University, Faizabad (U.P.)	P.G. Teaching and Research (Permanent)
Professor	27 <sup>th</sup> January 2009 to till date	Deptt. of Microbiology, Dr. R. M. L. Avadh University, Faizabad (U.P.)	P.G. Teaching and Research (Permanent)

**22. Publication Status**

**Research Publications:** Sixty Eight (69)  
**(National & International)**  
**Total citation:** 665  
**H index:** 13  
**I index:** 18

**23. Research Publications (In National & International Journals):**

1. Satendra Pratap Singh, Om Prakash Sharma and Rajeeva Gaur(2019) Endophytic Actinomycetes as a Micromanager in Chickpea: Case Study of Effectiveness Against *Sclerotia rolfssi*. Journal of Indian Research(ISSN:2321-4155) Volume 4, October-December-2019,24-40
2. Ranjan Singh, **Rajeeva Gaur** et al (2019) Origin and Remediation of Melanoidin Contamination in Water Sources. *International Journal of Current Microbiology and Applied Sciences* ISSN: 2319-7706 **Volume 8 Number 02 (2019)**
3. Ranjan Singh, Rajeeva Gaur, Prabhash K. Pandey, Farrukh Jamal, Laxmi K. Pandey, Sangram Singh, Harish K. Kewat, Soni Tiwari, Pritha Biswas and Manogya K. Gaur(2018). A Noval Media Optimized for Production of Pullulan in Flask Type Fermentation System *International Journal of Current Microbiology and Applied Sciences* ISSN: 2319-7706 Volume 7 Number 04(2018)
4. Soni Tiwari, Pooja Pathak, **Rajeeva Gaur** (2017). Sugarcane Baggase Agro-waste Material used for renewable cellulose production from Streptococcus and *Bacillus* sp. Research Journal of Microbiology. 12:255-265. **IF-0.52**
5. Tiwari S., Chauhan R. K., Singh R., Shukla R. and Gaur R. Integrated Effect of Rhizobium and Azotobacter cultures on the Leguminous crop Black Gram ( *Vigna mungo*) **Advances in Crop Science and Technology** Volume 5, Year 2017

6. Ranjan Singh, **Rajeeva Gaur**, Shikha Bansal, Farrukh Jamal, Prabhash K. Pandey, Soni Tiwari, Surendra Sarsaiya, Saket Mishra, Neelesh Chaturvedi, D. P. Singh, Manogya K. Gaur and Father G. Vazhan Arasu (2017). Production of Pullulan from a high yielding strain of *Aureobasidium pullulans* in non-stirred flask-type fermentation system. Journal of Microbiology and Biotechnology research. 7(1):26-32.
7. **Rajeeva Gaur**, Anurag Singh, Soni Tiwari (2017) "A noval strain of Bacterium, *Arthrobactor* sp. use for decolorization Melanoidin of distillery effluent " Indian Journal of Agriculture and allied science. pp 2455-9709 Volume: 3, No.: 4.
8. Singh SP and **Gaur R** (2016). Evaluation of antagonistic and plant growth promoting activities of chitinolytic endophytic actinomycetes associated with medical plants against sclerotium rolfsii in chick pea. Journal of Applied Microbiology. **I.F-0.2, Citation-01**
9. Singh SP and **Gaur R** (2016). Endophytic streptomyces spp. Underscore induction of defence regulation genes and confers resistance against sclerotium rolfsii in chicken pea. Biological control. **I.F-0.2, Citation-01**
10. Singh R, **Gaur R**, Bansal S, Biswas P, Pandey PK, Jamal F, Tiwari S and MK Gaur (2016). Production of Pullulan from a high yielding strain of *Aureobasidium pullulans* isolated from Jabalpur Region of Madhya Pradesh in Central India. Journal of Chemical and Pharmaceutical Research. 8(8):126-132. **I.F-0.2, Citation-01**
11. Singh SP, Gupta Rupali, Gaur R and Srivastava AK (2015). Antagonistic actinomycetes mediated resistance in solanum lycopersicon mill against rhizoctonia solani Kuhn. The National Academy of Science. **I.F-0.2, Citation-01**
12. Sanjay Kumar, Sangeeta Lal, Rajeeva Gaur and Ratna Sahay (2015). Interaction effect of AM fungi and heavy metals( Cd and Ni) on the growth and yield of mint species (*M. piperita* and *M. arvensis*) Journal of Basic and Applied Mycology. ISSN: 0972-7167 Volume 11(I & II)
13. Singh SP, Gupta Rupali, Gaur R and Srivastava AK (2015). Streptomyces spp. Alleviate Rhizoctonia solani-mediated oxidative stress in Solanum lycopersico. Annals of Applied Biology. **I.F-0.2, Citation-01**
14. **Singh R**, Gaur R, Bansal S, Biswas P, Pandey PK, Jamal F, Tiwari S and Gaur MK (2015). *Aureobasidium pullulans* - An Industrially Important Pullulan Producing Black Yeast. International Journal of Current Microbiology and Applied Sciences. 4(10):605-622. (Review) **I.F-2.937, Citation-01**
15. Singh R, Gaur R, Gaur MK, Pandey PK and Jamal F (2015). Antimicrobial activity of a thermotolerant *Aureobasidium pullulans* strain isolated from Faizabad region of Uttar Pradesh in India. International Journal of Current Microbiology and Applied Sciences. 4(3):740-744. **I.F-2.937, Citation-02**
16. **Gaur R**, Tiwari S and Singh S (2015). Production and Characterization of Thermotolerant-Organic Solvent Resistant Acidic Protease by *Pseudomonas aeruginosa* RGSS-09 Isolated from Dairy Sludge. Asian Journal of Biochemistry. 10 (2): 52-66. **I.F-1.17, Citation-01, H-index-9**
17. **Gaur R** and Tiwari S (2015). Isolation, production, purification and characterization of an organic-solvent-thermostable alkalophilic cellulase from *Bacillus vallismortis* RG-07. BMC Biotechnology. 15:19 DOI 10.1186/s12896-015-0129-9 **IF-2.452, Citation-17**
18. **Gaur R**, Tiwari S, Rai P and Srivastava V (2015). Isolation, production and characterization of thermotolerant xylanase from solvent tolerant *Bacillus vallismortis* RSPP-15. International Journal of Polymer Science. Article ID 986324. Volume 2015: 1-10. <http://dx.doi.org/10.1155/2015/986324>. **IF-1.0**
19. Tiwari S, Shukla N, Mishra P and **Gaur R** (2014). Enhanced production and characterization of a solvent stable amylase from solvent tolerant *Bacillus tequilensis* RG-01: thermostable and surfactant resistant. The Scientific World Journal. Volume 2014: 1-10. **I.F-1.55, Citation-04**
20. **Gaur R**, Tiwari S and Sharma A (2014). Isolation and Characterization of Thermotolerant Alkaline Serine Protease of *Bacillus* sp. P-02. American Journal of Food Technology. 9(5): 246-256. **I.F-0.52, H-index-17**

21. Tiwari S and **Gaur R** (2014). Decolorization of distillery spentwash (Melanoidin) by Immobilized Consortium (Bacterium and Yeast) Cell: Entrapped into Sodium Alginate Bead. *Journal of Environmental Science and Technology*. 7(3): 137-153. **I.F-0.66, Citation-01, H-index-10**
22. Tiwari S, **Gaur R** and Singh A (2014). Distillery Spentwash Decolorization by a novel Consortium of *Pediococcus acidilactici* and *Candida tropicalis* under Static Condition. *Pakistan Journal of Biological Sciences*. 17(6):780-791. **I.F-0.73, Citation-01, H-index-26**
23. Singh N, Verma T and **Gaur R** (2013). Detoxification of hexavalent chromium by an indigenous facultative anaerobic *Bacillus cereus* strain isolated from tannery effluent. *African Journal of Biotechnology*. 12(10):1091-1103. **I.F-0.9, Citation-08, H-index-56**
24. Kumar S, Srivastava S and **Gaur R** (2013). Increasing Antibiotic Resistance in Microbial Consortium and Human Health Hazards by Heavy Metals Exposure. *International Journal of Biomedical and Healthcare Science*. 3(1): 45-50. **I.F-0**
25. Prabhujji SK, Gaur R, Tripathi A, Srivastava GK and Srivastava R (2013). Fungistatic effect of *Saccharomyces cerevisiae*, isolated from toddy of *Borassus flabellifer*, on certain fish pathogenic water moulds. *Medicinal Plants-International Journal of Phytomedicines and Related Industries*. 5(3): 135-138. **I.F-0.28**
26. Yadav SK, Bisht D, Singh R, **Gaur R** and Darmwal NS (2013). Development of Bioprocess for Improved Production of Alkaline Protease by Mutant Strain of *Aspergillus flavus* in Solid State Fermentation using Agricultural Wastes. *The Internet Journal of Microbiology*. 12(1):1-8. **I.F-0.24**
27. Tiwari S, Rai P, Yadav SK and **Gaur R** (2012). A novel thermotolerant *Pediococcus acidilactici* B-25 strain for color, COD, and BOD reduction of distillery effluent for end use. *Environmental Science and Pollution Research*. 20: 4046-4058. **I.F-2.76, Citation-06, H-index-59**.
28. Singh R, Gaur R, Tiwari S and Gaur MK (2012). Production of Pullulan by a thermotolerant *Aurebasidium Pullulans* strain in nonstirred fed batch fermentation process. *Brazilian Journal of Microbiology*. 43(3):1042-1050. **I.F-0.96, Citation-11, H-index-38**
29. Rai P, Tiwari S and **Gaur R** (2012). Optimization of Process parameters for cellulase production by novel thermotolerant yeast. *Bioresources*. 7(4):5401-5414. **I.F-1.3, Citation-03, H-index-36**
30. Tiwari S, **Gaur R** and Singh R (2012). Decolorization of a recalcitrant organic compound (Melanoidin) by a novel thermotolerant yeast, *Candida tropicalis* RG-9. *BMC Biotechnology*. 12: 30. doi:10.1186/1472-6750-12-30. **I.F-2.452, Citation-09, H-index-54**
31. Kumar S and **Gaur R** (2012). Golden standards of molecular microbiological techniques for accessing microbial diversity in cadmium polluted soil *vis a vis* human health. *International Journal of Environmental Research and Development*. (2)2: 123-128.
32. Kumar S, **Gaur R**, Verma SK and Sahay R (2012). Isolation, Characterization and Assessing Survival of Bacteria in Stress Developed by Simulated Cadmium and Lead Contamination in Soil. *Developmental Microbiology and Molecular Biology*. 3(1): 1-7.
33. Tiwari S, **Gaur R**, Rai P and Tripathy A (2012). Decolorization of Distillery Effluent by Thermotolerant *Bacillus subtilis*. *American Journal of Applied Sciences*. 9(6):798-806. **I.F-0.79, Citation-07**
34. Singh R, **Gaur R**, Jamal F and Gaur MK (2011). A novel fermentor system optimized for continuous production of Pullulan. *African Journal of Biotechnology*. 10(48):9839-9846. **I.F-0.9, Citation-01, H-index-56**
35. Jain PK, Gupta VK, Misra AK, Gaur R, Bajpai V and Issar S (2010). Current status of *Fusarium* infection in human and animal. *Asian Journal of Animal and Veterinary Advances*. 1-25. **I.F-0.49**
36. Gupta VK, Jain PK, Misra AK, Gaur R and Gaur RK (2010). Comparative molecular analysis of *Fusarium solani* isolates by RFLP and RAPD. *Microbiology*. 79(6):772-776. (Experimental articles) **I.F-0.796, Citation-05**
37. **Gaur R**, Singh R, Gupta M and Gaur MK (2010). *Aureobasidium pullulans*, an economically important polymorphic yeast with special reference to pullulan. *African Journal of Biotechnology*. 9(47): 7989-7997. **I.F-0.9, Citation-30, H-index-56**
38. **Gaur R** and Singh R (2010). Optimization of physico-chemical and nutritional parameters for pullulan production by a mutant of thermotolerant *Aureobasidium pullulans* in fed batch fermentation process. *African Journal of Biotechnology*. 9(43): 7322-7330. **I.F-0.9, Citation-01, H-index-56**

39. Gaur R, Singh R, Tiwari S, Yadav SK and Darmwal NS (2010). Optimization of Physico-Chemical and Nutritional Parameters for a novel pullulan producing fungus, *Eurotium chevalieri*. Journal of Applied Microbiology. 109: 1035-1043. **I.F-2.156, Citation-08, H-index-115**
40. Gupta VK, Misra AK, Gaur R, Pandey R and Chauhan UK (2009). Studies of genetic polymorphism in the isolates of *Fusarium solani*. Australian Journal of Crop Science. 3(2): 101-106. **I.F-1.02, Citation-21**
41. Gupta VK, Gaur R, Yadav SK and Darmwal NS (2009). Optimization of Xylanase Production from Free and Immobilized Cells of *Fusarium solani* F7. BioResources. 4(3):932-945. **I.F-1.334, Citation-12, H-index-36**
42. Yadava LP, Gupta VK, Pati R, Gaur R (2008). Post harvest degreening, storage and quality of sweet orange (*Citrus sinensis* Osbeck.) as influenced by ethephon and carbendazim. Asian Journal of Biological Science. 3(1):184-186. **I.F-0/NAAS rating- 3.21, H-index-18**
43. Sharan A, Shikha, Darmwal NS and Gaur R (2008) *Xanthomonas compestris*, a novel stress tolerant, phosphate solubilizing bacterial strain from saline-alkali soils. World Journal of Microbiology and Biotechnology 24: 753-759. **I.F-1.532, Citation-25, H-index-57**
44. Gupta VK, Gaur R, Gautam N, Kumar P, Yadav IJ and Darmwal NS (2008). Optimization of Xylanase Production from *Fusarium solani* F7. American Journal of Food Technology. 4(1):20-29. **I.F-0.52, Citation-36, H-index-17**
45. Asthana AK and Gaur R (2005). Decolorization of Molasses Melanoidin by *Pseudomonas* sp. Asian Journal of Microbiology, Biotechnology and Environmental Science. 7(3): 409-410.
46. M.K. Gaur, Ajit Kumar, Rajeeva Gaur, N.S. Darmwal(2004). Growth suppression of *Streptococcus* sp. By some strains of *Saccharomyces cerevisiae* during ethanol fermentation. Volume-11 No 1.
47. Gaur R, Pandey R and Kumar A (2003). Inhibitory effect of essential oil of *Achyranthus aspera* against phytopathogenesis. Science and Culture.70 (3-4):165-166.
48. Kumar A, Gaur R and Srivastava AK (2003). Pullulan production by a thermotolerant strain of *Aureobasidium pullulans*. Indian Journal of Applied and Pure Biology 18 (2).
49. Gaur R, Kumar A and Srivastava AK (2003). Effect of different sugar concentrations and pH on pullulan by *Aureobasidium pullulans*. Indian Journal of Applied and Pure Biology 18(1):77-79.
50. Singh S, Gaur R, Agarwal SK and Darmwal NS (2002). Partitioning and properties of alkaline protease from *Bacillus* in aqueous biphasic system. Indian Journal of Microbiology. 42(4): 343-345. **I.F-1.143, H-index-25**
51. Asthana AK, Mishra SK, Ramchandra and Gaur R (2001) Treatment of colour and BOD of anaerobically treated distillery effluent by aerobic bacterial strains. Indian Journal of Environmental Protection. 12:1070-1072. **I.F-0.18, Citation-03, H-index-13**
52. Gaur R, Darmwal NS, Gaur MK, Pandey R and Mehrotra N (1999). Effect of incubation periods and temperature on cellulase and free amino acid production by *Trichoderma harzianum*, a biocontrol fungus against *Rhizoctonia solani*. Acta Botanica Indica. 27:205-207.
53. Gaur R, Darmwal NS, Gaur MK, Singh A, Pandey R and Mehrotra N (1999). Effect of soil solarization on the reduction of *Pythium ultimum* and damping-off of *Linum usitatissimum*. Acta Botanica Indica. 27(1): 31-33.
54. Mehrotra S, Pandey P, Gaur R and Darmwal NS (1999). The production of Alkaline Protease by *Bacillus* sp. isolate. Bioresource Technology. 67: 201-203. **I.F-4.917, Citation-109, H-index-193**
55. Soni J, Gaur R and Darmwal NS (1998). Population dynamics of antibiotic producing *Actinomyces* from Avadh Soils of U.P., India. Hindustan Antibiotic Bulletin. Vol.40.
56. Pandey R, Mehrotra N, Gaur R and Darmwal NS (1998). Effect of some essential oils on microorganisms. Hindustan Antibiotic Bulletin. 40:59-61.
57. Gaur R, Pandey AK and Arora DK (1993). A comparative study of the production of Amylase from *Humicola* and *Paecilomyces species*. Bioresource Technology, 46:213 -216. **I.F-4.917, Citation-03, H-index-193**
58. Bachlil VN and Gaur R (1990). Effect of Broiling Meat Patties on the viability of some Food Poisoning Bacteria. IAVMI, Proceedings of X Annual Conference, 23-25. Nov. 1989.
59. Gaur R (1990). *Croton bonplandianum*, A New Host of *Alternaria alternata*. Indian Phytopathology, 43(1):123. **I.F-0, Citation-01**

60. **Gaur R**, Pandey L and Dubey RC (1990). *Linum usstitiseium*, A New Host of *Pythium ultimum*. Indian Phytopathology. 43(3): 475. **I.F-0, Citation-01**
61. **Gaur R**, Mishra S and Dubey RC (1990). Cellulase Activity at Different Sites in Two Fungal sp. *Trichoderma harzianum* and *Penicillium rubrum*. Acta Botanica Indica. Vol. 18.
62. Mishra S and **Gaur R** (1989). Some Important Medicinal Plants of Munger, Bihar. Advance Biology Research 7 (1): 13-16.
63. **Gaur R**, Yadav J and Pandey L (1989). Thermostability of extracellular Protease enzyme Produced by *Spicaria fusispora*, a thermophilic fungus. Hindustan Antibiotic Bulletin. 31(1-2): 36-37. **I.F-0, Citation-09, H-index-8**
64. **Gaur R**, Pandey L and Dubey RC (1989). A New Record of *Macrophomina phaseolina* on *Uraria pitca* from India. Acta Botanica Indica. 17: 132.
65. **Gaur R** and Pandey L (1988). Effect of Streptomycin on Extracellular Protease Production by *Fusarium oxysporum*. Hindustan Antibiotic Bulletin. 30(3-4):85-86. **I.F-0, Citation-2**
66. **Gaur R**, Pandey A.K and Arora DK (1988). Effect of Streptomycin on Cellulase Production by *T. viride*. Hindustan Antibiotics Bulletin. 30(3-4).
67. **Gaur R** and Pandey L (1988). Thermostability of Amylase Enzyme produced by Thermophilic *Humicola sp.* Science and Culture. 54(7): 234.
68. **Gaur R**, Deepa K and Arora DK (1987). Improved Recovery of Amylase by The Mutant of *Aspergillus niger*. Journal of Biology and Research. 7(1). **I.F-1.06**
69. Murthy TRK and **Gaur R** (1987). Effect of Incorporation of Tween 80 and magnesium chloride on the recovery of Coliforms in VRB medium from fresh, refrigerated and frozen minced Buffalo meats. International Journal of Food Microbiology, 4:341-346. **I.F-3.445, Citation: 7, H-index- 142**

#### **Books (Text book/Edited book/Monograph):**

1. Gupta V.K., Sharma G.D., Tuohy M.G., **Gaur R.** (2016). The Handbook of Microbial Bioresources. CABI 745 Atlantic Avenue 8th Floor Boston, MA 02111 USA.
2. Tiwari S.P., Sharma R. and **Gaur R** (2013). Recent Advances in Microbiology Volume 2, Nova Science Publishers, Inc. (New York).
3. **Gaur R.**, Mehrotra S. and Pandey R.R. (2012). Microbial Applications. I.K. International Publishing House Pvt. Ltd (New Delhi).
4. Ameta K.L., Gupta V.K. and **Gaur R.** (2011). The Biochemistry of Chalcones, Chalcones: synthesis and biological evaluation. Lap Lambert Academic Publishing GmbH & Co. KG (Germany).
5. **Gaur R.**, Tiwari S. and Singh R. (2011). Microbial toxins structure and their type. Lap Lambert Academic Publishing GmbH & Co. KG (Germany).
6. **Gaur R.** (2007). Detoxification of industrial effluents with special reference to bioreactor design and microbial consortium. University Publication, New Delhi, 11005, India.

#### **Book Chapters (National & International):**

1. Tiwari S., **Gaur R.** (2019).The application of microbial enzymes in distillery spent wash decolorization, In: Microbial Treatment Strategies for Waste Management (Ed. Tripathi M.), OMICS Int., Heathrow, UK, ISBN No. 978-1-63278-079-9.
2. **Gaur R.**, Singh A., Tripathi A. (2019). Microbial Environment of Food. In Food safety and Human health, editors Ram Lakhan Singh and Sukantamondal. Elsevier Singapore pp 180-218.
3. Tiwari S., Tripathi A. and **Gaur R.** (2016). Bioremediation of Plant Refuges and Xenobiotics. In: Principles and Applications of Environmental Biotechnology for a Sustainable Future, editors Ram Lakhan Singh. Springer Singapore. pp 85-142.
4. **Gaur R.**, Singh A., Tripathi A., Singh R. (2016) Bioreactors. In: Principles and Applications of Environmental Biotechnology for a Sustainable Future, editors Ram Lakhan Singh. Springer Singapore. pp 233-272
5. Shukla R., Tiwari S. and **Gaur R.**(2016) Development of a Suitable Biocides by using Essential Oils for Controlling *Fusarium oxysporum* and *Rhizoctonia solani* causing Wilt disease and Damping off Disease in Mahima Foundation. pp 321-327

6. Gupta V.K., Tuohy M.G. and **Gaur R.** (2013). Methods for high-quality DNA extraction from fungi. In: Laboratory Protocols in Fungal Biology, editors Vijai Kumar Gupta, Maria G. Tuohy, Manimaran Ayyachamy, Kevin M. Turner, Anthonia O'Donovan. Springer New York. pp 403-406. **Citation-02**
7. Rai P., Tiwari S. and **Gaur R.** (2013). Microbial status of cellulases and xylanases for human welfare. In: Recent Advances in Microbiology Volume 2, editors S.P. Tiwari, Rajesh Sharma and Rajeeva Gaur. Nova Science Publishers, Inc. New York, pp 325-358.
8. **Gaur R.**, Tiwari S., Gaur M. K. and Singh R. (2013). Potentials of Methanogens in Natural Ecosystems. In: Recent Advances in Microbiology Volume 2, editors S.P. Tiwari, Rajesh Sharma and Rajeeva Gaur. Nova Science Publishers, Inc. New York, pp.243-282.
9. Tripathi A., **Gaur R.** and Gaur M. (2012). Current prospective of microbial contamination of fermentation industry. In: Recent Advances in Microbiology Volume 1, editors S.P. Tiwari, Rajesh Sharma and Rahul Kunwar Sharma. Nova Science Publishers, Inc. New York, pp.407-420.
10. Bhargava A., Gupta V. K., Singh A. K. and **Gaur R.** (2012) Microbes for Heavy Metal Remediation. In: Microbial Applications, editors **R. Gaur**, S. Mehrotra & R. R. Pandey. I. K. International Publishing House Pvt. Ltd.
11. Singh A. K., Bhargava A. and **Gaur R.** (2012) Role of bioinformatics in Microbial Studies. In: Microbial Applications, editors **R. Gaur**, S. Mehrotra & R. R. Pandey. I. K. International Publishing House Pvt. Ltd.
12. Gupta V. K., Gupta A., Yadav S. K., Singh R. and **Gaur R.** (2012) Bacterial Protease inhibitors. In: Microbial Applications, editors **R. Gaur**, S. Mehrotra & R. R. Pandey. I. K. International Publishing House Pvt. Ltd.
13. Singh R., **Gaur R.** and Pandey R.R. (2012) Biology, Distribution and Utility of *Aureobasidium pullulans*. In: Microbial Applications, editors **R. Gaur**, S. Mehrotra & R. R. Pandey. I. K. International Publishing House Pvt. Ltd.
14. **Gaur R.**, Yadav J, Singh R. and Tiwari S. (2012) Microbial Toxins: Source and Effects. In: *Microbial Toxins and Toxigenic Microbes*, editors Vidya Dhar Pandey and Santosh Kumar Singh. Studium Press LLC.
15. Asthana A. K., **Gaur R.** and Singh R. (2012) Microbial Degradation of sulphide in Aerobic and Anaerobic Conditions. In: Microbial Applications, editors **R. Gaur**, S. Mehrotra & R. R. Pandey. I. K. International Publishing House Pvt. Ltd.
16. Gupta V. K., Kumari S., Gupta A. and **Gaur R.** (2012) Microorganism for improving productivity and quality in Horticultural crops. In: Microbial Applications, editors Rajeeva Gaur, S. Mehrotra & R. R. Pandey. I. K. International Publishing House Pvt. Ltd.
17. Yadav J. and **Gaur R.** (2012) Microbes and microbial toxins in biological warfare. In: Microbial Toxins and Toxigenic Microbes edited by Vidya Dhar Pandey and Santosh Kumar Singh. Studium Press LLC.
18. Gupta V. K., Gupta A., Yadav S. K., Singh R. and **Gaur R.** (2012) Bacterial Protease inhibitors. In: Microbial Applications, editors **R. Gaur**, S. Mehrotra & R. R. Pandey. I. K. International Publishing House Pvt. Ltd.
19. Gaur M.K., **Gaur R.**, Shika and Darmwal N.S. (2004) Effect of Distillery Effluent on Soil Microorganism. In: Biological Diversity: Current Trends, editors S.P. Gautam, Y.K. Bansal and A.K. Pandey. Shree Publishers and Distributors New Delhi.
20. **Gaur R.**, Mehrotra S., Gaur M.K., Kumar A. and Srivastava A.K. (2004) *Aureobasidium pullulans*: A Potential Fungus for Industrial Exploitation with special reference to Pullulan production. In: Biological Diversity: Current Trends. editors S.P. Gautam, Y.K. Bansal and A.K. Pandey. Shree Publishers and Distributor New Delhi.
21. Daramwal N.S. and **Gaur R.** (2003). Single Cell Protein. In: Environmental Microbiology and Biotechnology, editors D.P. Singh and S.K. Dwivedi. New Age International (P) Ltd, Publishers New Delhi.
22. **Gaur R.**, Daramwal N.S. and Pandey R. (2003) Biodeterioration of Industrial and Food Products. In: Environmental Microbiology and Biotechnology, editors D.P. Singh and S.K. Dwivedi. New Age International (P) Ltd, Publishers, New Delhi.

23. Bisaria P. Darmwal N.S. **Gaur R.** and Chandra D. (2000). Solid state fermentation for Alkaline Protease production by *Bacillus sp.* *Critical Rev. Biotech.* Ed. Maheshwari, P. and Dubey, R.C. 49-53.
24. **Gaur R.** Darmwal N.S. Gaur M.K. and Chandra D. (2000). Effect of Tween-80 (Polyoxyethylene Sorbitan Monooleate) on free amino acids production by *Humicola gresia*, a thermotolerant fungus. *Critical Rev. Biotech.* Ed., Maheshwari, P. and Dubey, R.C. 61 – 63.
25. Dubey R.C. Pandey L. **Gaur R.** and Dwivedi R. S. (1992). Studies on Some Aspects of Microbial Activity in Soil for “Microbial Activity” in *Himalaya* (ed. R. D Khulbe). pp. 53-82.

## **Expertise and capabilities**

### **1. Scientific capabilities**

- Editorial Board in the various national and international journals
- Reviewer of research & scientific literatures in various international journals
  - a. Journal of biomolecular structure and dynamics-Antibiotics potentiating potential of catharanthine against superbug *Pseudomonas aeruginosa*
  - b. Microbiology open-broad-range pH/temperature-stable cellulase from a novel hydrocarbon contaminated mangrove soil bacterium, *Bacillus licheniformis* VVA21
  - c. Jordon journal of Biological sciences- biological and enzymatic activity of *Aureobasidium pullulans* isolate
- Consultant in various fermentation industries of UP and India.

### **2. Administrative capabilities**

- Assistant proctor/proctor for more than 5 years
  - Hostel warden
  - Coordinator in various exams
  - Coordinator-M.Ed. course
  - 10-11 Months as officially Principal, Manuch Girls PG collage, Faizabad in additional duties.
  - Head of the Department for 6 years (2 terms)
  - Academic advisor in IET, Dr. RML Avadh University Faizabad
  - Examination superintendents (more than 10 times)
  - Member Executive counselee of the University for Several Year
  - Members Board of studies in various Universities like Bundelkhand University, VBS Purvanchal University, Shakuntala Mishra Rehabilitation University, Lucknow, CSJ Kanpur University
  - Delivered more than 400 Guest lecturers in various universities, colleges and other Departments
  - Member IQAC committee of the University
  - Production and distribution of fresh culture of plant growth promoting bacteria viz. *Azotobacter*, *Rhizobium*, PSB, *Bacillus*, *Trichoderma*, *Bevarria*, *Xanthomonas*, *Arthobacter* etc to Farmers.
  - Social work for popularization of agriculture, food and industrial microbial applications for sustainable amount public health and hygiene and production.
    - a. Starting a new course of M.Sc. medial microbiology and public health and hygiene in the Department, collaborations with the Dept. of Biochemistry.
    - b. Establishing a food and agriculture products testing laboratory in the Department with collaboration of UP Govt.
3. Established a PGPR Collection/centre in the department for the benefit of local farmer of Faizabad and nearby districts.
  4. Developed novel fermentor models for continuous production of pullulan, a microbial polysaccharide and decolorization of distillery effluents.
  5. Before joining the University, served an ethanol fermentation industries in the capacity of Assistant/Manger R&D, and quality control for about 2 years.



6. Guided more than 100 M. Sc. Microbial students dissertations
7. Signed MOU with several industries and institute for scientific and technical research activities, skill development and placement of employment of the students. More than 80 students have been worked in various industries of India through my recommendations alone.
8. I have expertise in industrial fermentations, effluent treatment, bagasse production technology, fermentor design and architecture, microbial enzymes, polysaccharide production. Food agriculture, industrial and Environmental microbiology. The published papers and projects justify the credentials of this.
9. I have written several popular articles in different magazines and news radio talks, press conferences etc.

#### 10. Members of the scientific and social committees

- Association of microbiology of India
- Association of biochemistry of India
- Member of the editorial board

#### Research support from various sources:

##### Completed projects:

Title of the project	Year of start and Completion	Amount Sanctioned (lakhs)	Name of sponsoring organization
Development of Thermotolerant Microbial Consortium for effective Decolourization of Distillery Effluent	September 2010-September 2013	7,25,746.00	UPCST, Lucknow (U.P.)
Improvement of strain for increased production of Pullulans (an exopolysaccharide) by <i>Aureobasidium Pullulans</i>	April 2007 – March 2010	8,20000	UCG, New Delhi
Continuous Decolorization of distillery effluent (Molasses Melanoidin) by Consortium of Bacterial and Yeast strains	28 August 2015 to till 28 August 2018	12,31,000	UCG, New Delhi
Exploitation of Commercially Available Essential Oil for the Formulation of Non-Hazardous Biocides	28 August 2015 to till 28 August 2017	6,40,000	UPCST, Lucknow (U.P.)

#### Thesis supervised for award of Ph. D. degree

1. 2003, **Ashish Kumar Ashthana**: Microbial degradation of sulfide and production of biogas from distillery effluent.
2. 2009, **Vijay Kumar Gupta**: Molecular characterization of *Fussarium* wilts pathogen of Guava using RAPD and microsatellite marker.
3. 2010, **Ranjan Singh**: **Improvement of strain of *Aurebasidium pullulans* for increase production**
4. 2011, **Ashutosh Tripathi**: Development of *Saccharomyces cerevisiae* mutant resistant to temperature and ethanol with special reference to suppression of acidophilic bacterial contaminants for higher ethanol production.
5. 2011, **Soni Tiwari**: Decolorization of distillery effluent by bacterial and yeast consortium.
6. 2011, **Neha Singh**: Bioremediation of chromium contaminated tannery waste by hydrogen

facultative anaerobic bacteria.

7. 2011, **Sanjay Kumar**: Impact of long term lead and cadmium contamination on microbial diversity of soil and synchronized effect of phytoremediation.
8. 2013, **Priyanka Rai**: Saccharification of sugarcane bagasse by microbial cellulases and xylanase for ethanol production.

### **Currently Registered Ph.D. Students**

1. **Anurag Singh**: Continuous decolorization of distillery effluent(Molasses Melanoidin) by indigenous microbial consortia, Registered on dated 4 January 2018
2. **Renu Shukla**: Formulation of a non-hazardous biocide using essential oils for controlling *Rhizoctonia solani* and *Sclerotium rolfsii*, Registered on dated 4 June 2019

### **Invited lectures**

1. Recourse person in National seminar on topic “Indian biodiversity: under serious threat” organized by kisan post graduate college bahraich(U.P.), on 11 January 2020.
2. Invited lecture on “*Fermentation/Technique for different fermented products*” in Govt. Fruit Preservation Centre, Faizabad on 25<sup>th</sup> March 2019.
3. Invited lecture on “*Food Spoilage and Preservation*” in Govt. Fruit Preservation Centre, Faizabad on 22<sup>th</sup> March 2019.
4. Invited lecture on “*Fermentation/Technique for different fermented products*” in Govt. Fruit Preservation Centre, Faizabad on 15<sup>th</sup> November 2018.
5. Invited lecture on “*Food Spoilage and Preservation*” in Govt. Fruit Preservation Centre, Faizabad on 15<sup>th</sup> October 2018.
6. Invited lecture on “*Fermentation/Technique for different fermented products*” in Govt. Fruit Preservation Centre, Faizabad on 25<sup>th</sup> October 2017.
7. Invited lecture on “*Food Spoilage and Preservation*” in Govt. Fruit Preservation Centre, Faizabad on 11<sup>th</sup> October 2017.
8. Invited lecture on “*Microbial Intoxification of Food*” to M.Sc. Students in Dept. of Botany & Microbiology Gurukul Kangari University Haridwar-249404 on 15<sup>th</sup> Nov. 2009.
9. Invited lecture on “*Bioremediation of Metal from Ores*” in Biotechnology Programme, Dr. R. M. L. Avadh University, Faizabad-224001, India on 20<sup>th</sup> March 2009.
10. Invited lecture on “*Role of Microorganisms for Public Health and Hygiene*”, in Surya Gramodyog Vikas Samiti (a voluntary organization in the service of humanity & Environment) Sari, Faizabad (U.P.) on 2<sup>nd</sup> February, 2009.
11. Invited lecture on “*Food Spoilage and Preservation*” in Govt. Fruit Preservation Centre, Faizabad on 28<sup>th</sup> December 2008.
12. Invited lecture on “*Microbial Contaminants of Fermentation Industry in Current Perspective*” to M.Sc. Students in Dept. of Botany & Microbiology Gurukul Kangari University, Haridwar-249404, India on 9<sup>th</sup> November 2008.
13. Invited lecture on “*Soil Health and Microorganisms*” in the Workshop organized by Avadh Gromodyog sansthan, Sari, Faizabad (U.P.) on 4<sup>th</sup> May, 2008.
14. Invited lecture on “*Production of Single Cell Protein*” in Biotechnology Programme, Dr. R.M.L. Avadh University, Faizabad-224001, India on 25<sup>th</sup> February 2008.
15. Invited lecture on “*Bioremediation of Xenobiotic Compound*” for M.Sc. Students (2<sup>nd</sup> Semester) of Environmental Microbiology in School for Environmental Science, B.B.A.U. (a Central University), Lucknow-226025, India on 8<sup>th</sup> April 2007.
16. Invited lecture on “P.G.P.R. for *Floriculture*” in a Seminar organized by Surya Gramodyog Vikas Samiti (a Voluntary organization in the service of Humanity & Environment), Faizabad, (U.P.) on 17<sup>th</sup> August 2007.
17. Invited lecture on “*Role of Lactic acid Bacteria in Food Processing and Preservation*” in Govt. Fruit Preservation Centre, Faizabad on 14<sup>th</sup> January 2007.
18. Invited lecture on “*Probiotic Foods*” in Govt. Fruit Preservation Centre, Faizabad on 26<sup>th</sup> December 2006.

19. Invited lecture on " *Plant Growth Promoting Bacteria and ....Sustainable Agriculture*" for M.Sc. Students of Batch-2006 in School of Environmental Sciences B.B.A.U. (a Central University), Lucknow-226025, India

### **Conference and Symposium Attended:**

1. Speaker on paper entitled "effect of Mentha and Neem oils for controlling *R. solani* integration with *T. harizarum*" in National seminar on Noval Drug Delivery system of Phytochemical Formulations in Lifestyle Disorders" from organized by Bhavdiya Institute of Pharmaceutical Science and Research on 1<sup>st</sup> February 2020.
2. Oral Presentation of paper entitled "*Formulation of a biocide for effective control of Rhizoctonia solani and sclerotium rolfsii*" in 22<sup>nd</sup> international conference of international Academy of Physical Science on **Emerging trends in physical Sciences** from April 13-15, 2018 organized by Faculty of Science, Dr. R M L Avadh University Faizabad, U.P.
3. Oral presentation of paper entitled "*Consortium development for decolorization of distillery effluent by using the immobilized bioreactor system*" in 38<sup>th</sup> National conference of academy of environmental biology on **Current issue of environmental health, climate change and its management** from October 3-4, 2018 organized by department of environmental Science, Dr. R M L Avadh University Faizabad, U.P.
4. Keynote speaker on Topic Microbial Detoxification of industrial effluent in National seminar on Climate Change and Environment Threat to Public Health & Sustainable Agriculture organized by Sunbean College for Women, Varanasi on 30-31 August, 2014.
5. Invited lecture on **Emerging Trend in Life Sciences** at Jhunjhunwala P.G. College, Dwarakapuri, Faizabad on January 31, 2014.
6. Invited Speaker: Topic "*Decolorization of Distillery and Paper Industries Effluent by the Consortium of Microorganism*" in International Conference on **Environment Technology and Sustainable Development: Challenges & Remedies** organized by Department of Environmental Sciences B.B.A.U. University (a Central University) Lucknow India from 21<sup>th</sup>-23<sup>th</sup> February 2014.
7. Oral Presentation on "*Microbial Prospects of University Industry Interaction for Improvement in Research and Development*" in National Work shop **Innovation and Technology Transfer to Industries: Role of Universities**, organized by Centre for Industry Institute Partnership Program B.B.A.U. Lucknow-226025 from 10-11<sup>th</sup> March 2014.
8. Participation in National Seminar on **Intellectual Property Rights: Significance and Protection Process** organized by Dr. R. M. L. Avadh University, Faizabad and C.S.T., U.P. on 13<sup>th</sup> December, 2013.
9. Participated as an Expert in the meeting for preparation of Biotechnology Glossary( Eng-Hindi) at Dept. of Microbiology, R.M.L. Awadh University, Faizabad U.P. organized by the Commission(CSTT,M/0 HRD, Government of India(Dept. of Higher Education) Government of India from September 2-5<sup>th</sup> 2013( four days).
10. Oral presentation on "*Production of Bioethanol by Saccharomyces cerevisiar*" in **Pharmaceutical use in Human Health and Prosperity** organized by M.G. P.G. College, Biotechnology and Molecular Biology Centre, Gorakhpur, U.P. and Society for Conservation

- and Resources Development of Medicinal Plants(SMP), New Delhi. From August 24-25, 2013.
11. Oral presentation on “*Assessment of Water Quality of River Saryu in Ayodhya*” in the Workshop on **Emerging Challenges in Portability of Drinking Water in Tarai Region of Eastern U.P.** organized by the Biotechnology and Molecular Biology Centre, M.G. Postgraduate College, Gorakhpur on 11-12 October, 2012.
  12. Poster Presentation entitled “*Biological control.....Rhizoctonia solani*” in the International Conference on **Mycology and Plant Pathology Biotechnological Approach** at Centre of Advanced Study in Botany, B.H.U., Varanasi-221005 from 27 to 29 February 2012.
  13. Invited lecture on “*A Novel Fermentor System for Continuous Production of Pullulan by Aureobasidium Pullulan*” in the Symposium **Prospects and Perspectives in Biochemistry** organized by the Department of Biochemistry, Punjab University, Chandigarh from 10-11 February 2012.
  14. Oral Presentation in the National Seminar on **Reactive Oxygen species: Role in Animal and Plant Biology** held in the Department of Biochemistry, Lucknow University, Lucknow from December 23-24, 2011.
  15. Invited lecture on “*Pullulan Production by Thermotolerant Aureobasidium Pullulans*” in the National Symposium on **Biodiversity Status and Conservation Strategies with Special Reference to North-East India**, held on 17-18 March, 2011 at the Department of Life Sciences, Manipur University Canchipur.
  16. Delivered a Plenary lecture on “*Microbial indicators of Soil Health*” in Indian Phytopathological Society (Eastern Zone) national Symposium on **Plant Protection Strategies in Organic Agriculture** organized by Dept. of life Sciences, Manipur University, Imphal from 29-30 October 2010.
  17. Paper Presented on “*Characterization of Fusarium Wilt Pathogens of Psidium Guajava L. using Microsatellite and Virulence Marker*” in National Seminar-2009 **Biotechnology and Microbiology in Human Welfare: the Indian Scenario** organized by Dept. of Science , Faculty of Arts, Science and Commerce, Mody Institute of Technology and Science Lakshmanagarh, Sikar (Raj) India from 26-27th September,2009.
  18. Paper Presented in the International Symposium on **Environmental Pollution Ecology and Human Health** on “*Improved Decolourization of Distillery Effluent by Using Mix. Culture of Thermotolerant Bacteria and Yeasts*” organized by Dept. of Zoology, S.V. University, Tirupati, India in collaboration with United States Environmental Protection agency, RTP, NC,USA & Savannah State University, Savannah, GA,USA & Division of Pharmacology and Toxicology, DRDE, Gwalior, India from 25-26<sup>th</sup> July 2009.
  19. Participated and presented a session in 76<sup>th</sup> meeting of Society of Biological Chemists of India at Department of Biochemistry, Sri Venkateswara University, Tirupati from 25-27<sup>th</sup> November 2007.
  20. Paper Presented on “*Conservation of Microorganism*” in the National Seminar on **Sustainable Eco-Survival** for 21<sup>st</sup> Century, organized by Department of Botany. Sri Agrasen Kanya Autonomous P.G. College, Varanasi (U.P.) on Janury 12<sup>th</sup>, 2003.
  21. Successful completion of 55<sup>th</sup> Orientation Programme Course been duly relieved from the Academic Staff College, University of Allahabad on 30<sup>th</sup> November 2000.
  22. Participation in Orientation Refresher Course of Industrial Microbiology under UGC Vocational Programme organized by this Centre from 15<sup>th</sup> to 30<sup>th</sup> March 1995.

## **Conference and Workshop organized/Awards:**

- Convener in Workshop on “Gene cloning & its expression to produce genetically Modified organism” from 23<sup>rd</sup>-25<sup>th</sup> October, 2017 organized at Department of Microbiology, Dr. R.M.L. Avadh University in association with Cytogen Research & Development, Lucknow(U.P.), India
- Convener in 7 days workshop organized at Department of Microbiology Dr. R. L. Avadh University Ayodhya in Collaboration with Cytogene Research & Development, Lucknow from 03-09 September 2019.
- Convening and Hosting in the International webinar on”*Understanding Immunity against SARS-Cov2*” organized by Department of Microbiology, Dr. R.M.L. Avadh University
- Convening and Hosting in the International webinar on”*Covid-19 Evolution and Therapeutic*” organized by Department of Microbiology, Dr. R.M.L. Avadh University
- Convening and Hosting in the International webinar on”*Covid-19 Pandemic Opportunities and Challenges*” organized by Department of Microbiology, Dr. R.M.L. Avadh University
- Certificate of Appreciation Awarded to Prof. Rajeeva Gaur, Department of Microbiology, Dr. R.M.L. Avadh University by V.C. Avadh University Manoj Dixit in 03/03/2020 for outstanding contribution in the field of Academics.

**Dr. Rajeeva Gaur**  
**Professor**  
**Dept. of Microbiology**

To,

Date: 04.08.2020

**Head of Department/Coordinators/Director I.E.T.**

Dr. Rammanohar Lohia Avadh University,

Ayodhya

**Subject: Regarding information of the faculties on format attached.**

**Dear All,**

As per the discussion with Hon'ble Vice Chancellor regarding display of complete profile of all the faculty members working on Regular/Contract/Guest faculty posts in various regular and self finance courses running in your department is to be displayed on university website.

You are therefore, requested to send detail bio-data and information of all faculties working in your department on the format attached herewith along with related documents. The work is urgent and time bound. Please ensure that hard copy of bio data and the information on the format with annexure should reach the office of Director, IQAC and soft copy of the same in pdf format on email-**iqac@rmlau.ac.in** latest by **10-08-2020**.

You are also requested to assign a coordinator in respective department for this work and send the details of the coordinator on following format.

Name of the Department	Name of Coordinator	Email Address of Coordinator	Mobile No. of Coordinator



**Director  
IQAC**

## Proforma for Faculty Profile

S.No	Department	Name of the Teacher	Designation	D.O.B	Post Type (Regular / Contract / Guest)	Date of Joining in this University	Total Teaching Experience	Professional Experience	Research Experience	Total Publication till Date	Publication During Last 05 Years	Project/Patent/ Awards During Last 05 Years	E-Contents Developed During Last 02 Years
1.	Microbiology	Dr. Rajeeva Gaur	Professor	01/07/1962	Regular	21/01/1994	29 years	2 Year	30 years	100 (Annexure-I)	24 (Annexure-II)	4 Projects (Annexure-III)	M.Sc. 3 <sup>rd</sup> Sem. Paper 303, E-Content (ppt) of Lecture-1 and Lecture-2
2.													
3.													
4.													
5.													
6.													
7.													
8.													
9.													
10.													

**Note:**

1. Please attach evidence of each of the field mention above.
2. Please provide complete Bio-Data in hard copy in the office of the IQAC by 10-08-2020 and soft copy of Bio-Data and evidences in pdf format on email-[iqac@rmlau.ac.in](mailto:iqac@rmlau.ac.in) . Please write your name and department in subject field of email.



**Director  
IQAC**





## Annexure-1(TOTAL PUBLICATION=100)

### Research Publications (In National & International Journals):

1. Satendra Pratap Singh, Om Prakash Sharma and Rajeeva Gaur(2019) Endophytic Actinomycetes as a Micromanager in Chickpea: Case Study of Effectiveness Against *Sclerotium rolfsii*. Journal of Indian Research(ISSN:2321-4155) Volume 4, October-December-2019,24-40
2. Ranjan Singh, **Rajeeva Gaur** et al (2019) Origin and Remediation of Melanoidin Contamination in Water Sources. *International Journal of Current Microbiology and Applied Sciences* **ISSN: 2319-7706 Volume 8 Number 02 (2019)**
3. Ranjan Singh, Rajeeva Gaur, Prabhash K. Pandey, Farrukh Jamal, Laxmi K. Pandey, Sangram Singh, Harish K. Kewat, Soni Tiwari, Pritha Biswas and Manogya K. Gaur(2018). A Noval Media Optimized for Production of Pullulan in Flask Type Fermentation System *International Journal of Current Microbiology and Applied Sciences* **ISSN: 2319-7706 Volume 7 Number 04(2018)**
4. Soni Tiwari, Pooja Pathak, **Rajeeva Gaur** (2017). Sugarcane Baggase Agro-waste Material used for renewable cellulose production from Streptococcus and *Bacillus* sp. Research Journal of Microbiology. 12:255-265. **IF-0.52**
5. Tiwari S., Chauhan R. K., Singh R., Shukla R. and Gaur R. Integrated Effect of Rhizobium and Azotobacter cultures on the Leguminous crop Black Gram ( *Vigna mungo*) **Advances in Crop Science and Technology** Volume 5, Year 2017
6. Ranjan Singh, **Rajeeva Gaur**, Shikha Bansal, Farrukh Jamal, Prabhash K. Pandey, Soni Tiwari, Surendra Sarsaiya, Saket Mishra, Neelesh Chaturvedi, D. P. Singh, Manogya K. Gaur and Father G. Vazhan Arasu (2017). Production of Pullulan from a high yielding strain of *Aureobasidium pullulans* in non-stirred flask-type fermentation system. Journal of Microbiology and Biotechnology research. 7(1):26-32.
7. **Rajeeva Gaur**, Anurag Singh, Soni Tiwari (2017) “A noval strain of Bacterium, *Arthrobacter* sp. use for decolorization Melanoidin of distillery effluent” Indian Journal of Agriculture and allied science. pp 2455-9709 Volume: 3, No.: 4.
8. Singh SP and **Gaur R** (2016). Evaluation of antagonistic and plant growth promoting activities of chitinolytic endophytic actinomycetes associated with medical plants against sclerotium rolfsii in chick pea. Journal of Applied Microbiology. **I.F-0.2, Citation-01**
9. Singh SP and **Gaur R** (2016). Endophytic streptomyces spp. Underscore induction of defence regulation genes and confers resistance against sclerotium rolfsii in chicken pea. Biological control. **I.F-0.2, Citation-01**
10. Singh R, **Gaur R**, Bansal S, Biswas P, Pandey PK, Jamal F, Tiwari S and MK Gaur (2016). Production of Pullulan from a high yielding strain of *Aureobasidium pullulans* isolated from Jabalpur Region of Madhya Pradesh in Central India. Journal of Chemical and Pharmaceutical Research. 8(8):126-132. **I.F-0.2, Citation-01**
11. Singh SP, Gupta Rupali, Gaur R and Srivastava AK (2015). Antagonistic actinomycetes mediated resistance in solanum lycopersicon mill against rhizoctonia solani Kuhn. The National Academy of Science. **I.F-0.2, Citation-01**
12. Sanjay Kumar, Sangeeta Lal, Rajeeva Gaur and Ratna Sahay (2015). Interaction effect of AM fungi and heavy metals( Cd and Ni) on the growth and yield of mint species (M. piperita and M. arvensis) Journal of Basic and Applied Mycology. ISSN: 0972-7167 Volume 11(I & II)
13. Singh SP, Gupta Rupali, Gaur R and Srivastava AK (2015). Streptomyces spp. Alleviate Rhizoctonia solani-mediated oxidative stress in Solanum lycopersico. Annals of Applied Biology. **I.F-0.2, Citation-01**

14. **Singh R**, Gaur R, Bansal S, Biswas P, Pandey PK, Jamal F, Tiwari S and Gaur MK (2015). *Aureobasidium pullulans* - An Industrially Important Pullulan Producing Black Yeast. International Journal of Current Microbiology and Applied Sciences. 4(10):605-622. (Review) **I.F-2.937, Citation-01**
15. Singh R, Gaur R, Gaur MK, Pandey PK and Jamal F (2015). Antimicrobial activity of a thermotolerant *Aureobasidium pullulans* strain isolated from Faizabad region of Uttar Pradesh in India. International Journal of Current Microbiology and Applied Sciences. 4(3):740-744. **I.F-2.937, Citation-02**
16. **Gaur R**, Tiwari S and Singh S (2015). Production and Characterization of Thermotolerant-Organic Solvent Resistant Acidic Protease by *Pseudomonas aeruginosa* RGSS-09 Isolated from Dairy Sludge. Asian Journal of Biochemistry. 10 (2): 52-66. **I.F-1.17, Citation-01, H-index-9**
17. **Gaur R** and Tiwari S (2015). Isolation, production, purification and characterization of an organic-solvent-thermostable alkalophilic cellulase from *Bacillus vallismortis* RG-07. BMC Biotechnology. 15:19 DOI 10.1186/s12896-015-0129-9 **IF-2.452, Citation-17**
18. **Gaur R**, Tiwari S, Rai P and Srivastava V (2015). Isolation, production and characterization of thermotolerant xylanase from solvent tolerant *Bacillus vallismortis* RSPP-15. International Journal of Polymer Science. Article ID 986324. Volume 2015: 1-10. <http://dx.doi.org/10.1155/2015/986324>. **IF-1.0**
19. Tiwari S, Shukla N, Mishra P and **Gaur R** (2014). Enhanced production and characterization of a solvent stable amylase from solvent tolerant *Bacillus tequilensis* RG-01: thermostable and surfactant resistant. The Scientific World Journal. Volume 2014: 1-10. **I.F-1.55, Citation-04**
20. **Gaur R**, Tiwari S and Sharma A (2014). Isolation and Characterization of Thermotolerant Alkaline Serine Protease of *Bacillus* sp. P-02. American Journal of Food Technology. 9(5): 246-256. **I.F-0.52, H-index-17**
21. Tiwari S and **Gaur R** (2014). Decolorization of distillery spentwash (Melanoidin) by Immobilized Consortium (Bacterium and Yeast) Cell: Entrapped into Sodium Alginate Bead. Journal of Environmental Science and Technology. 7(3): 137-153. **I.F-0.66, Citation-01, H-index-10**
22. Tiwari S, **Gaur R** and Singh A (2014). Distillery Spentwash Decolorization by a novel Consortium of *Pediococcus acidilactici* and *Candida tropicalis* under Static Condition. Pakistan Journal of Biological Sciences. 17(6):780-791. **I.F-0.73, Citation-01, H-index-26**
23. Singh N, Verma T and **Gaur R** (2013). Detoxification of hexavalent chromium by an indigenous facultative anaerobic *Bacillus cereus* strain isolated from tannery effluent. African Journal of Biotechnology. 12(10):1091-1103. **I.F-0.9, Citation-08, H-index-56**
24. Kumar S, Srivastava S and **Gaur R** (2013). Increasing Antibiotic Resistance in Microbial Consortium and Human Health Hazards by Heavy Metals Exposure. International Journal of Biomedical and Healthcare Science. 3(1): 45-50. **I.F-0**
25. Prabhuj SK, Gaur R, Tripathi A, Srivastava GK and Srivastava R (2013). Fungistatic effect of *Saccharomyces cerevisiae*, isolated from toddy of *Borassus flabellifer*, on certain fish pathogenic water moulds. Medicinal Plants-International Journal of Phytomedicines and Related Industries. 5(3): 135-138. **I.F-0.28**
26. Yadav SK, Bisht D, Singh R, **Gaur R** and Darmwal NS (2013). Development of Bioprocess for Improved Production of Alkaline Protease by Mutant Strain of *Aspergillus flavus* in Solid State Fermentation using Agricultural Wastes. The Internet Journal of Microbiology. 12(1):1-8. **I.F-0.24**

27. Tiwari S, Rai P, Yadav SK and **Gaur R** (2012). A novel thermotolerant *Pediococcus acidilactici* B-25 strain for color, COD, and BOD reduction of distillery effluent for end use. Environmental Science and Pollution Research. 20: 4046-4058. **I.F-2.76, Citation-06, H-index-59.**
28. Singh R, Gaur R, Tiwari S and Gaur MK (2012). Production of Pullulan by a thermotolerant *Aurebasidium Pullulans* strain in nonstirred fed batch fermentation process. Brazilian Journal of Microbiology. 43(3):1042-1050. **I.F-0.96, Citation-11, H-index-38**
29. Rai P, Tiwari S and **Gaur R** (2012). Optimization of Process parameters for cellulase production by novel thermotolerant yeast. Bioresources. 7(4):5401-5414. **I.F-1.3, Citation-03, H-index-36**
30. Tiwari S, **Gaur R** and Singh R (2012). Decolorization of a recalcitrant organic compound (Melanoidin) by a novel thermotolerant yeast, *Candida tropicalis* RG-9. BMC Biotechnology. 12: 30. doi:10.1186/1472-6750-12-30. **I.F-2.452, Citation-09, H-index-54**
31. Kumar S and **Gaur R** (2012). Golden standards of molecular microbiological techniques for accessing microbial diversity in cadmium polluted soil *vis a vis* human health. International Journal of Environmental Research and Development. (2)2: 123-128.
32. Kumar S, **Gaur R**, Verma SK and Sahay R (2012). Isolation, Characterization and Assessing Survival of Bacteria in Stress Developed by Simulated Cadmium and Lead Contamination in Soil. Developmental Microbiology and Molecular Biology. 3(1): 1-7.
33. Tiwari S, **Gaur R**, Rai P and Tripathy A (2012). Decolorization of Distillery Effluent by Thermotolerant *Bacillus subtilis*. American Journal of Applied Sciences. 9(6):798-806. **I.F-0.79, Citation-07**
34. Singh R, **Gaur R**, Jamal F and Gaur MK (2011). A novel fermentor system optimized for continuous production of Pullulan. African Journal of Biotechnology. 10(48):9839-9846. **I.F-0.9, Citation-01, H-index-56**
35. Jain PK, Gupta VK, Misra AK, Gaur R, Bajpai V and Issar S (2010). Current status of *Fusarium* infection in human and animal. Asian Journal of Animal and Veterinary Advances. 1-25. **I.F-0.49**
36. Gupta VK, Jain PK, Misra AK, Gaur R and Gaur RK (2010). Comparative molecular analysis of *Fusarium solani* isolates by RFLP and RAPD. Microbiology. 79(6):772-776. (Experimental articles) **I.F-0.796, Citation-05**
37. **Gaur R**, Singh R, Gupta M and Gaur MK (2010). *Aureobasidium pullulans*, an economically important polymorphic yeast with special reference to pullulan. African Journal of Biotechnology. 9(47): 7989-7997. **I.F-0.9, Citation-30, H-index-56**
38. **Gaur R** and Singh R (2010). Optimization of physico-chemical and nutritional parameters for pullulan production by a mutant of thermotolerant *Aureobasidium pullulans* in fed batch fermentation process. African Journal of Biotechnology. 9(43): 7322-7330. **I.F-0.9, Citation-01, H-index-56**
39. **Gaur R**, Singh R, Tiwari S, Yadav SK and Daramwal NS (2010). Optimization of Physico-Chemical and Nutritional Parameters for a novel pullulan producing fungus, *Eurotium chevalieri*. Journal of Applied Microbiology. 109: 1035-1043. **I.F-2.156, Citation-08, H-index-115**
40. Gupta VK, Misra AK, Gaur R, Pandey R and Chauhan UK (2009). Studies of genetic polymorphism in the isolates of *Fusarium solani*. Australian Journal of Crop Science. 3(2): 101-106. **I.F-1.02, Citation-21**
41. Gupta VK, **Gaur R**, Yadav SK and Darmwal NS (2009). Optimization of Xylanase Production from Free and Immobilized Cells of *Fusarium solani* F7. BioResources. 4(3):932-945. **I.F-1.334, Citation-12, H-index-36**

42. Yadava LP, Gupta VK, Pati R, Gaur R (2008). Post harvest degreening, storage and quality of sweet orange (*Citrus sinensis Osbeck.*) as influenced by ethephon and carbendazim. Asian Journal of Biological Science. 3(1):184-186. **I.F-0/NAAS rating- 3.21, H-index-18**
43. Sharan A, Shikha, Darmwal NS and **Gaur R** (2008) *Xanthomonas compestris*, a novel stress tolerant, phosphate solubilizing bacterial strain from saline-alkali soils. World Journal of Microbiology and Biotechnology 24: 753-759. **I.F-1.532, Citation-25, H-index-57**
44. Gupta VK, **Gaur R**, Gautam N, Kumar P, Yadav IJ and Darmwal NS (2008). Optimization of Xylanase Production from *Fusarium solani* F7. American Journal of Food Technology. 4(1):20-29. **I.F-0.52, Citation-36, H-index-17**
45. Asthana AK and **Gaur R** (2005). Decolorization of Molasses Melanoidin by *Pseudomonas* sp. Asian Journal of Microbiology, Biotechnology and Environmental Science. 7(3): 409-410.
46. M.K. Gaur, Ajit Kumar, Rajeeva Gaur, N.S. Darmwal(2004). Growth suppression of *Streptococcus* sp. By some strains of *Saccharomyces cerevisiae* during ethanol fermentation. Volume-11 No 1.
47. **Gaur R**, Pandey R and Kumar A (2003). Inhibitory effect of essential oil of *Achyranthus aspera* against phytopathogenesis. Science and Culture.70 (3-4):165-166.
48. Kumar A, **Gaur R** and Srivastava AK (2003). Pullulan production by a thermotolerant strain of *Aureobasidium pullulans*. Indian Journal of Applied and Pure Biology 18 (2).
49. **Gaur R**, Kumar A and Srivastava AK (2003). Effect of different sugar concentrations and pH on pullulan by *Aureobasidium pullulans*. Indian Journal of Applied and Pure Biology 18(1):77-79.
50. Singh S, **Gaur R**, Agarwal SK and Darmwal NS (2002). Partitioning and properties of alkaline protease from *Bacillus* in aqueous biphasic system. Indian Journal of Microbiology. 42(4): 343-345. **I.F-1.143, H-index-25**
51. Asthana AK, Mishra SK, Ramchandra and **Gaur R** (2001) Treatment of colour and BOD of anaerobically treated distillery effluent by aerobic bacterial strains. Indian Journal of Environmental Protection. 12:1070-1072. **I.F-0.18, Citation-03, H-index-13**
52. **Gaur R**, Darmwal NS, Gaur MK, Pandey R and Mehrotra N (1999). Effect of incubation periods and temperature on cellulase and free amino acid production by *Trichoderma harzianum*, a biocontrol fungus against *Rhizoctonia solani*. Acta Botanica Indica. 27:205-207.
53. **Gaur R**, Darmwal NS, Gaur MK, Singh A, Pandey R and Mehrotra N (1999). Effect of soil solarization on the reduction of *Pythium ultimum* and damping-off of *Linum usitatissimum*. Acta Botanica Indica. 27(1): 31-33.
54. Mehrotra S, Pandey P, **Gaur R** and Darmwal NS (1999). The production of Alkaline Protease by *Bacillus* sp. isolate. Bioresource Technology. 67: 201-203. **I.F-4.917, Citation-109, H-index-193**
55. Soni J, **Gaur R** and Darmwal NS (1998). Population dynamics of antibiotic producing *Actinomycetes* from Avadh Soils of U.P., India. Hindustan Antibiotic Bulletin. Vol.40.
56. Pandey R, Mehrotra N, **Gaur R** and Darmwal NS (1998). Effect of some essential oils on microorganisms. Hindustan Antibiotic Bulletin. 40:59-61.
57. **Gaur R**, Pandey AK and Arora DK (1993). A comparative study of the production of Amylase from *Humicola* and *Paecilomyces species*. Bioresource Technology, 46:213 -216. **I.F-4.917, Citation-03, H-index-193**
58. Bachlil VN and **Gaur R** (1990). Effect of Broiling Meat Patties on the viability of some Food Poisoning Bacteria. IAVMI, Proceedings of X Annual Conference, 23-25. Nov. 1989.
59. **Gaur R** (1990). *Croton bonplandianum*, A New Host of *Alternaria alternata*. Indian Phytopathology, 43(1):123. **I.F-0, Citation-01**

60. **Gaur R**, Pandey L and Dubey RC (1990). *Linum usitatissimum*, A New Host of *Pythium ultimum*. Indian Phytopathology. 43(3): 475. **I.F-0, Citation-01**
61. **Gaur R**, Mishra S and Dubey RC (1990). Cellulase Activity at Different Sites in Two Fungal sp. *Trichoderma harzianum* and *Penicillium rubrum*. Acta Botanica Indica. Vol. 18.
62. Mishra S and **Gaur R** (1989). Some Important Medicinal Plants of Munger, Bihar. Advance Biology Research 7 (1): 13-16.
63. **Gaur R**, Yadav J and Pandey L (1989). Thermostability of extracellular Protease enzyme Produced by *Spicaria fusispora*, a thermophilic fungus. Hindustan Antibiotic Bulletin. 31(1-2): 36-37. **I.F-0, Citation-09, H-index-8**
64. **Gaur R**, Pandey L and Dubey RC (1989). A New Record of *Macrophomina phaseolina* on *Uraria pitca* from India. Acta Botanica Indica. 17: 132.
65. **Gaur R** and Pandey L (1988). Effect of Streptomycin on Extracellular Protease Production by *Fusarium oxysporum*. Hindustan Antibiotic Bulletin. 30(3-4):85-86. **I.F-0, Citation-2**
66. **Gaur R**, Pandey A.K and Arora DK (1988). Effect of Streptomycin on Cellulase Production by *T. viride*. Hindustan Antibiotics Bulletin. 30(3-4).
67. **Gaur R** and Pandey L (1988). Thermostability of Amylase Enzyme produced by Thermophilic *Humicola sp.* Science and Culture. 54(7): 234.
68. **Gaur R**, Deepa K and Arora DK (1987). Improved Recovery of Amylase by The Mutant of *Aspergillus niger*. Journal of Biology and Research. 7(1). **I.F-1.06**
69. Murthy TRK and **Gaur R** (1987). Effect of Incorporation of Tween 80 and magnesium chloride on the recovery of Coliforms in VRB medium from fresh, refrigerated and frozen minced Buffalo meats. International Journal of Food Microbiology, 4:341-346. **I.F-3.445, Citation: 7, H-index-142**

**Books (Text book/Edited book/Monograph):**

1. Gupta V.K., Sharma G.D., Tuohy M.G., **Gaur R**. (2016). The Handbook of Microbial Bioresources. CABI 745 Atlantic Avenue 8th Floor Boston, MA 02111 USA.
2. Tiwari S.P., Sharma R. and **Gaur R** (2013). Recent Advances in Microbiology Volume 2, Nova Science Publishers, Inc. (New York).
3. **Gaur R**, Mehrotra S. and Pandey R.R. (2012). Microbial Applications. I.K. International Publishing House Pvt. Ltd (New Delhi).
4. Ameta K.L., Gupta V.K. and **Gaur R**. (2011). The Biochemistry of Chalcones, Chalcones: synthesis and biological evaluation. Lap Lambert Academic Publishing GmbH & Co. KG (Germany).
5. **Gaur R**, Tiwari S. and Singh R. (2011). Microbial toxins structure and their type. Lap Lambert Academic Publishing GmbH & Co. KG (Germany).
6. **Gaur R**. (2007). Detoxification of industrial effluents with special reference to bioreactor design and microbial consortium. University Publication, New Delhi, 11005, India.

**Book Chapters (National & International):**

1. Tiwari S., **Gaur R**. (2019). The application of microbial enzymes in distillery spent wash decolorization, In: Microbial Treatment Strategies for Waste Management (Ed. Tripathi M.), OMICS Int., Heathrow, UK, ISBN No. 978-1-63278-079-9.
2. **Gaur R**, Singh A., Tripathi A. (2019). Microbial Environment of Food. In Food safety and Human health, editors Ram Lakhani Singh and Sukantamondal. Elsevier Singapore pp 180-218.

3. Tiwari S., Tripathi A. and **Gaur R.** (2016). Bioremediation of Plant Refuges and Xenobiotics. In: Principles and Applications of Environmental Biotechnology for a Sustainable Future, editors Ram Lakhan Singh. Springer Singapore. pp 85-142.
4. **Gaur R.**, Singh A., Tripathi A., Singh R. (2016) Bioreactors. In: Principles and Applications of Environmental Biotechnology for a Sustainable Future, editors Ram Lakhan Singh. Springer Singapore. pp 233-272
5. Shukla R., Tiwari S. and **Gaur R.**(2016) Development of a Suitable Biocides by using Essential Oils for Controlling *Fusarium oxysporum* and *Rhizoctonia solani* causing Wilt disease and Damping off Disease in Mahima Foundation. pp 321-327
6. Gupta V.K., Tuohy M.G. and **Gaur R.** (2013). Methods for high-quality DNA extraction from fungi. In: Laboratory Protocols in Fungal Biology, editors Vijai Kumar Gupta, Maria G. Tuohy, Manimaran Ayyachamy, Kevin M. Turner, Anthonia O'Donovan. Springer New York. pp 403-406. **Citation-02**
7. Rai P., Tiwari S. and **Gaur R.** (2013). Microbial status of cellulases and xylanases for human welfare. In: Recent Advances in Microbiology Volume 2, editors S.P. Tiwari, Rajesh Sharma and Rajeeva Gaur. Nova Science Publishers, Inc. New York, pp 325-358.
8. **Gaur R.**, Tiwari S., Gaur M. K. and Singh R. (2013). Potentials of Methanogens in Natural Ecosystems. In: Recent Advances in Microbiology Volume 2, editors S.P. Tiwari, Rajesh Sharma and Rajeeva Gaur. Nova Science Publishers, Inc. New York, pp.243-282.
9. Tripathi A., **Gaur R.** and Gaur M. (2012). Current prospective of microbial contamination of fermentation industry. In: Recent Advances in Microbiology Volume 1, editors S.P. Tiwari, Rajesh Sharma and Rahul Kunwar Sharma. Nova Science Publishers, Inc. New York, pp.407-420.
10. Bhargava A., Gupta V. K., Singh A. K. and **Gaur R.** (2012) Microbes for Heavy Metal Remediation. In: Microbial Applications, editors **R. Gaur**, S. Mehrotra & R. R. Pandey. I. K. International Publishing House Pvt. Ltd.
11. Singh A. K., Bhargava A. and **Gaur R.** (2012) Role of bioinformatics in Microbial Studies. In: Microbial Applications, editors **R. Gaur**, S. Mehrotra & R. R. Pandey. I. K. International Publishing House Pvt. Ltd.
12. Gupta V. K., Gupta A., Yadav S. K., Singh R. and **Gaur R.** (2012) Bacterial Protease inhibitors. In: Microbial Applications, editors **R. Gaur**, S. Mehrotra & R. R. Pandey. I. K. International Publishing House Pvt. Ltd.
13. Singh R., **Gaur R.** and Pandey R.R. (2012) Biology, Distribution and Utility of *Aureobasidium pullulans*. In: Microbial Applications, editors **R. Gaur**, S. Mehrotra & R. R. Pandey. I. K. International Publishing House Pvt. Ltd.
14. **Gaur R.**, Yadav J, Singh R. and Tiwari S. (2012) Microbial Toxins: Source and Effects. In: *Microbial Toxins and Toxigenic Microbes*, editors Vidya Dhar Pandey and Santosh Kumar Singh. Studium Press LLC.
15. Asthana A. K., **Gaur R.** and Singh R. (2012) Microbial Degradation of sulphide in Aerobic and Anaerobic Conditions. In: Microbial Applications, editors **R. Gaur**, S. Mehrotra & R. R. Pandey. I. K. International Publishing House Pvt. Ltd.
16. Gupta V. K., Kumari S., Gupta A. and **Gaur R.** (2012) Microorganism for improving productivity and quality in Horticultural crops. In: Microbial Applications, editors Rajeeva Gaur, S. Mehrotra & R. R. Pandey. I. K. International Publishing House Pvt. Ltd.
17. Yadav J. and **Gaur R.** (2012) Microbes and microbial toxins in biological warfare. In: Microbial Toxins and Toxigenic Microbes edited by Vidya Dhar Pandey and Santosh Kumar Singh. Studium Press LLC.

18. Gupta V. K., Gupta A., Yadav S. K., Singh R. and **Gaur R.** (2012) Bacterial Protease inhibitors. In: Microbial Applications, editors **R. Gaur**, S. Mehrotra & R. R. Pandey. I. K. International Publishing House Pvt. Ltd.
19. Gaur M.K., **Gaur R.**, Shika and Darmwal N.S. (2004) Effect of Distillery Effluent on Soil Microorganism. In: Biological Diversity: Current Trends, editors S.P. Gautam, Y.K. Bansal and A.K. Pandey. Shree Publishers and Distributors New Delhi.
20. **Gaur R.**, Mehrotra S., Gaur M.K., Kumar A. and Srivastava A.K. (2004) *Aureobasidium pullulans*: A Potential Fungus for Industrial Exploitation with special reference to Pullulan production. In: Biological Diversity: Current Trends. editors S.P. Gautam, Y.K. Bansal and A.K. Pandey. Shree Publishers and Distributor New Delhi.
21. Daramwal N.S. and **Gaur R.** (2003). Single Cell Protein. In: Environmental Microbiology and Biotechnology, editors D.P. Singh and S.K. Dwivedi. New Age International (P) Ltd, Publishers New Delhi.
22. **Gaur R.**, Daramwal N.S. and Pandey R. (2003) Biodeterioration of Industrial and Food Products. In: Environmental Microbiology and Biotechnology, editors D.P. Singh and S.K. Dwivedi. New Age International (P) Ltd, Publishers, New Delhi.
23. Bisaria P. Darmwal N.S. **Gaur R.** and Chandra D. (2000). Solid state fermentation for Alkaline Protease production by *Bacillus sp.* *Critical Rev. Biotech.* Ed. Maheshwari, P. and Dubey, R.C. 49-53.
24. **Gaur R.** Darmwal N.S. Gaur M.K. and Chandra D. (2000). Effect of Tween-80 (Polyoxyethylene Sorbitan Monooleate) on free amino acids production by *Humicola gresia*, a thermotolerant fungus. *Critical Rev. Biotech.* Ed., Maheshwari, P. and Dubey, R.C. 61 – 63.
25. Dubey R.C. Pandey L. **Gaur R.** and Dwivedi R. S. (1992). Studies on Some Aspects of Microbial Activity in Soil for “Microbial Activity” in *Himalaya* (ed. R. D Khulbe). pp. 53-82.

## Annexure-2(PUBLICATION IN LAST 5 YEARS=24)

### Research Publications (In National & International Journals):

1. Satendra Pratap Singh, Om Prakash Sharma and Rajeeva Gaur(2019) Endophytic Actinomycetes as a Micromanager in Chickpea: Case Study of Effectiveness Against *Sclerotia rolfssii*. Journal of Indian Research(ISSN:2321-4155) Volume 4, October-December-2019,24-40
2. Ranjan Singh, **Rajeeva Gaur** et al (2019) Origin and Remediation of Melanoidin Contamination in Water Sources. *International Journal of Current Microbiology and Applied Sciences* **ISSN: 2319-7706 Volume 8 Number 02 (2019)**
3. Ranjan Singh, Rajeeva Gaur, Prabhash K. Pandey, Farrukh Jamal, Laxmi K. Pandey, Sangram Singh, Harish K. Kewat, Soni Tiwari, Pritha Biswas and Manogya K. Gaur(2018). A Noval Media Optimized for Production of Pullulan in Flask Type Fermentation System *International Journal of Current Microbiology and Applied Sciences* **ISSN: 2319-7706 Volume 7 Number 04(2018)**
4. Soni Tiwari, Pooja Pathak, **Rajeeva Gaur** (2017). Sugarcane Baggase Agro-waste Material used for renewable cellulose production from Streptococcus and *Bacillus* sp. *Research Journal of Microbiology*. 12:255-265. **IF-0.52**
5. Tiwari S., Chauhan R. K., Singh R., Shukla R. and Gaur R. Integrated Effect of Rhizobium and Azotobacter cultures on the Leguminous crop Black Gram ( *Vigna mungo*) **Advances in Crop Science and Technology** Volume 5, Year 2017
6. Ranjan Singh, **Rajeeva Gaur**, Shikha Bansal, Farrukh Jamal, Prabhash K. Pandey, Soni Tiwari, Surendra Sarsaiya, Saket Mishra, Neelesh Chaturvedi, D. P. Singh, Manogya K. Gaur and Father G. Vazhan Arasu (2017). Production of Pullulan from a high yielding strain of *Aureobasidium pullulans* in non-stirred flask-type fermentation system. *Journal of Microbiology and Biotechnology research*. 7(1):26-32.
7. **Rajeeva Gaur**, Anurag Singh, Soni Tiwari (2017) “A noval strain of Bacterium, *Arthrobacter* sp. use for decolorization Melanoidin of distillery effluent ” *Indian Journal of Agriculture and allied science*. pp 2455-9709 Volume: 3, No.: 4.
8. Singh SP and **Gaur R** (2016). Evaluation of antagonistic and plant growth promoting activities of chitinolytic endophytic actinomycetes associated with medical plants against sclerotium rolfssii in chick pea. *Journal of Applied Microbiology*. **IF-0.2, Citation-01**
9. Singh SP and **Gaur R** (2016). Endophytic streptomycetes spp. Underscore induction of defence regulation genes and confers resistance against sclerotium rolfssii in chicken pea. *Biological control*. **IF-0.2, Citation-01**
10. Singh R, **Gaur R**, Bansal S, Biswas P, Pandey PK, Jamal F, Tiwari S and MK Gaur (2016). Production of Pullulan from a high yielding strain of *Aureobasidium pullulans* isolated from Jabalpur Region of Madhya Pradesh in Central India. *Journal of Chemical and Pharmaceutical Research*. 8(8):126-132. **IF-0.2, Citation-01**
11. Singh SP, Gupta Rupali, Gaur R and Srivastava AK (2015). Antagonistic actinomycetes mediated resistance in solanum lycopersicon mill against rhizoctonia solani Kuhn. *The National Academy of Science*. **IF-0.2, Citation-01**
12. Sanjay Kumar, Sangeeta Lal, Rajeeva Gaur and Ratna Sahay (2015). Interaction effect of AM fungi and heavy metals( Cd and Ni) on the growth and yield of mint species (*M. piperita* and *M. arvensis*) *Journal of Basic and Applied Mycology*. ISSN: 0972-7167 Volume 11(I & II)



13. Singh SP, Gupta Rupali, Gaur R and Srivastava AK (2015). Streptomyces spp. Alleviate Rhizoctonia solani-mediated oxidative stress in Solanum lycopersico. Annals of Applied Biology. **I.F-0.2, Citation-01**
14. **Singh R**, Gaur R, Bansal S, Biswas P, Pandey PK, Jamal F, Tiwari S and Gaur MK (2015). *Aureobasidium pullulans* - An Industrially Important Pullulan Producing Black Yeast. International Journal of Current Microbiology and Applied Sciences. 4(10):605-622. (Review) **I.F-2.937, Citation-01**
15. Singh R, Gaur R, Gaur MK, Pandey PK and Jamal F (2015). Antimicrobial activity of a thermotolerant *Aureobasidium pullulans* strain isolated from Faizabad region of Uttar Pradesh in India. International Journal of Current Microbiology and Applied Sciences. 4(3):740-744. **I.F-2.937, Citation-02**
16. **Gaur R**, Tiwari S and Singh S (2015). Production and Characterization of Thermotolerant-Organic Solvent Resistant Acidic Protease by *Pseudomonas aeruginosa* RGSS-09 Isolated from Dairy Sludge. Asian Journal of Biochemistry. 10 (2): 52-66. **I.F-1.17, Citation-01, H-index-9**
17. **Gaur R** and Tiwari S (2015). Isolation, production, purification and characterization of an organic-solvent-thermostable alkalophilic cellulase from *Bacillus vallismortis* RG-07. BMC Biotechnology. 15:19 DOI 10.1186/s12896-015-0129-9 **IF-2.452, Citation-17**
18. **Gaur R**, Tiwari S, Rai P and Srivastava V (2015). Isolation, production and characterization of thermotolerant xylanase from solvent tolerant *Bacillus vallismortis* RSPP-15. International Journal of Polymer Science. Article ID 986324. Volume 2015: 1-10. <http://dx.doi.org/10.1155/2015/986324>. **IF-1.0**

#### **Books (Text book/Edited book/Monograph):**

1. Gupta V.K., Sharma G.D., Tuohy M.G., **Gaur R**. (2016). The Handbook of Microbial Bioresources. CABI 745 Atlantic Avenue 8th Floor Boston, MA 02111 USA.

#### **Book Chapters (National & International):**

1. Tiwari S., **Gaur R**. (2019). The application of microbial enzymes in distillery spent wash decolorization, In: Microbial Treatment Strategies for Waste Management (Ed. Tripathi M.), OMICS Int., Heathrow, UK, ISBN No. 978-1-63278-079-9.
2. **Gaur R.**, Singh A., Tripathi A. (2019). Microbial Environment of Food. In Food safety and Human health, editors Ram Lakhan Singh and Sukantamondal. Elsevier Singapore pp 180-218.
3. Tiwari S., Tripathi A. and **Gaur R**. (2016). Bioremediation of Plant Refuges and Xenobiotics. In: Principles and Applications of Environmental Biotechnology for a Sustainable Future, editors Ram Lakhan Singh. Springer Singapore. pp 85-142.
4. **Gaur R.**, Singh A., Tripathi A., Singh R. (2016) Bioreactors. In: Principles and Applications of Environmental Biotechnology for a Sustainable Future, editors Ram Lakhan Singh. Springer Singapore. pp 233-272
5. Shukla R., Tiwari S. and **Gaur R.**(2016) Development of a Suitable Biocides by using Essential Oils for Controlling *Fusarium oxysporum* and *Rhizoctonia solani* causing Wilt disease and Damping off Disease in Mahima Foundation. pp 321-327

**Annexure-3(PROJECT=4)****Completed projects:**

<b>Title of the project</b>	<b>Year of start and Completion</b>	<b>Amount Sanctioned (lakhs)</b>	<b>Name of sponsoring organization</b>
Development of Thermotolerant Microbial Consortium for effective Decolourization of Distillery Effluent	<b>September 2010-September 2013</b>	7,25,746.00	UPCST, Lucknow (U.P.)
Improvement of strain for increased production of Pullulans (an exo-polysaccharide) by Aureobasidium Pullulans	<b>April 2007 – March 2010</b>	8,20000	UCG, New Delhi
Continuous Decolorization of distillery effluent (Molasses Melanoidin) by Consortium of Bacterial and Yeast strains	<b>28 August 2015 to till 28 August 2018</b>	12,31,000	UCG, New Delhi
Exploitation of Commercially Available Essential Oil for the Formulation of Non-Hazardous Biocides	<b>28 August 2015 to till 28 August 2017</b>	6,40,000	UPCST, Lucknow (U.P.)

Lecture-I. General Introduction: Components, Microorganisms, substrates, Fermentation process and Fermentor systems. Down Stream processes, Quality control system.

Industrial microbiology deals the use of microorganisms for bulk or commercial production of microbial metabolites of human interest or welfare. These metabolites are alcohols, like ethyl, methyl, propyl or butyl alcohols; Organic aliphatic acids viz. acetic, formic, butyric etc. Like wise amino acids, antibiotics of various structures and actions; Polysaccharides e.g. Dextran, Pullulan, Xanthan, Scleroglucan, Alginate etc. Steroids, alkaloids. Vaccines, hormones (humans & plants), Enzymes and several others, because chemical synthesis of above compounds are costly, ~~the~~ time taking and non-ecofriendly, therefore, all over world, the microbial or bioproduction at commercial level is being produced by several microorganisms with different fermentation process using variety of substrates depending on the availability and feasibility.

Microbial process is ecofriendly, cost effective and productive, as they utilise cheaper carbon and nitrogen sources and convert in valuable substances either through production or through microbial transformations. In microbial transformation the product is converted in the medium by microbial action by using oxidation reduction potential, isomerization, epoxidation process through certain microbial enzymes. This process is facilitated outside the cells, while most of the microbial metabolites are synthesised inside the cells and produced extracellularly in the medium like, ethanol, amino acids, polysaccharides, antibiotics, hormones and several others.

Further, to understand this course well, certain technical terminologies must be clearly understood in this course, like wash, spent wash, wort, scaling up, online monitoring down stream processing etc.

2020-8-2 13:16

(2)

Wash, means, the microbial fermentation is over, as maximum metabolite is produced, and it is ready for down stream processing, while spent wash means, the microbial metabolite is extracted from the fermented medium and the useless waste is now known spent wash. This is always in liquid broth when it is used for liquid medium fermentation known as submerged fermentation. The term wort indicate that the ~~no~~ liquid medium ready for inoculation of microbes or seeding of inoculum into the medium. The term scaling up of a fermentation process. This process optimize the conditions, physiological as well as nutritional from laboratory scale as well as pilot level upto industrial scale. As every step require some correction values. ~~no~~ mainly in temperature and aeration values alongwith pressure system at all the three stages. Therefore, these corrections can be updated for a  $\frac{1}{2}$  microbes nature which are being used for a particular process. Every process depends on the type of fermentation, bioreactor design, nature of microorganisms viz aerobic, facultative anaerobic to anaerobic and psychrophiles, mesophilic to thermotolerant / thermophiles. In general the thermotolerant and aerotolerant or facultative anaerobic nature is ideal for large scale production. The scaling up of a process include several factor like, induced or constitutive nature of metabolites, extracellular to intracellular nature (mostly extracellular nature of metabolites ~~and~~ production is the requirement ~~of~~ for industrial scale), the high substrate concentration and high metabolite tolerant nature must be evaluated during scaling up of a process).

On line monitoring is another important segment of industrial microbiology. In this process, the optimum physico-chemical and nutritional parameters are operated mechanically or computer or manual basis in order to achieve optimum maximum metabolite in minimum time for higher productivity. The productivity is defined as total microbial products obtained 2020-8-2 13:17

The on line monitoring starts from the production of inoculum and from laboratory to large scale production at commercial level and processing of fermentation upto down stream and quality control examination. Therefore, at every stage certain protocols for optimum levels are recommended for achieving higher metabolites. Thus, during on line monitoring, at every stage the aforesaid parameters should be operated manually or computer based operations.

There are other four components of microbial metabolite production at commercial level which every student must know in detail and every component has wide information/evaluation before use at industrial scale.

- (a) Microorganisms: This may bacteria, yeast, filamentous fungi, algae or others, viruses for vaccine product or biocontrol agents of insects or other plant pathogens. This is from laboratory scale as well as large scale production at culture house.
- (b) Vessel substrates required in bulk as well as availability at round the year, easily available at cheaper rate (may be the part of industrial effluent like food, textile, paper & pulp, and dairy industry waste).
- (c) Vessel system: fermentors/bioreactors: This component is very important and has wide diversity in architecture and design, because this is the component where microbes can be cultivated at their desired physico-chemical and nutritional levels by adopting suitable fermentation process required for this aspect. will be discussed in detail.
- (d) Down stream processing: It means extraction and purification of the product. After fermentation the microbial product is extracted by specific method on the basis of the nature of metabolites. A very wide variety of range of methods and instruments used for such work. This will be discussed in the next lecture. For this, mainly chromatographic techniques optical methods of analysis as well as electro-chemical methods will be employed.

essential after the extraction and purification of the products. The products are subjected for quality control microbiological as well as chemical levels before packaging and storage. These segments require instrumentation and standard quality control protocols adopted at international levels. ISI, ISO and other quality marks.

- (a) Microorganism : Microbial component is the heart of any microbial process. Hardly become easier when we know about almost all behaviour of the microorganisms for their metabolite production which can only be possible when we optimize physico-chemical and nutritional parameters like temperature, pH,  $O_2$  requirement, carbon types, and nitrogen requirements (organic & inorganic) concentration levels, micronutrient requirement, Metabolic pathways of biosynthesis of metabolites along with Nature of metabolite, concentration of metabolites etc. Although the requirement and qualities of a microorganism for industrial selection must have following qualities.
- (i) Microbes must tolerate high concentration of substrate and metabolite.
  - (ii) Microbes must have shorter generation time (20-25 minutes) means fast multiplying, this factor checks the microbial contamination also.
  - (iii) Microbes must tolerate small fluctuation of temperature pH,  $O_2$  substrate concentration and metabolite concentration.
  - (iv) Microbes should not produce any toxic metabolites otherwise create hinderance in down stream processing.
  - (v) They must produce metabolites extracellularly.
  - (vi) They must be stable with their genetic make and phage resistant.
  - (vii) Microbial biomass should easily be separated from the fermented broth.
  - (viii) Microbes must use crude form of carbon and nitrogen sources which gives cost effective products.

2020-8-2 13:17

Substrates: Substrate provide carbon, nitrogen and other micronutrients for the growth of microorganisms. Substrate nature for large scale production of microbial metabolite requires certain qualities which are

- (i) substrate must be available round the year without any fluctuation in cost and quality.
- (ii) The storage capability of substrate should be long lasting.
- (iii) substrate must ~~be~~ contain high amount of simple sugar and nitrogen source alongwith miner contents viz Molasses, a by product of sugar industry, have high percentage of sucrose and inorganic nitrogen, sulfur, phosphorus, potassium etc. therefore a good source of microbial nutrients. Likewise starch, cellulose and Hemicellulose are good substrate and can be used after processing by microbial enzymes to convert into glucose. Lactose contents of Dairy or food processing industry may be a good source of simple sugar and nutrients for cultivation of various microbes for their metabolite production.
- (iv) The substrate must be nontoxic or should not contain any toxic metabolites.
- (v) The substrate constituents should not interact with microbial metabolites during production or metabolite processing during down stream processing.
- (vi) Substrate should be high affinity of miscibility in aqueous solution.
- (vii) The complex polysaccharide containing substrate must be treated by microbial cellulases, amylases, xylanases, ligninases, pectinases or other enzymes to get simple sugars, then fermentation of the specific purpose.
- (viii) The state of substrate should itself have capability to protect <sup>from</sup> microbial spoilage for example, Molasses can be preserved ~~for~~ 2020-8-21 13:18 without microbial spoilage in steel tanks.

Lecture 2

Just, after knowing the basic concepts of Industrial Microbiology, the important aspect is the historical background of this paper or subject. In this subject, we generally know the importance of microorganisms for human welfare. The fermentation of foods and their use for human health and hygiene has been explained in Vedas, our oldest civilization of human being, first came in existence on earth ~~in the~~ used to take fermented foods, as these products are known as ~~elixir~~ elixir due to several health benefits of fermented foods which will be discussed in the fermented food products. Thus, the ancient people used to consume alcoholic food products prepared from barley, rice, wheat, sugarcane and fruits. As for the microbiology of these foods and fermentation term was ~~to~~ elaborated by Louis Pasteur, a French microbiologist. He explained first time that fermentation is a microbial process rather than chemical process, because before Pasteur the chemists, Pristley, Cavendish, Lavoisier, Cagniard Swar and Kützing ~~to~~ were explaining that fermentation is purely a chemical process.

The theory of biogenesis, spoilage of food by microbial action and production of various toxic metabolites during fermentation had been explained by Louis Pasteur only. He also explained the concept of pasteurization, and sterilization through his Swan neck flask experiments. His contribution in the area of industrial and food microbiology is appreciable. Further, the discovery of spores of bacteria by F. Cohn added more relevant information regarding the use of proper sterilization process, as spores of bacteria are highly resistant to temperature. Therefore, industrial and other area of microbiology used this concept for appropriate sterilization of media used for commercial production of antibiotics, hormones or any other valuable microbial metabolites.



Scaling up of a fermentation of any microbial metabolite at industrial scale is an important aspect. Any microbes when isolated from natural ecosystem is first optimized at their physico-chemical and nutritional parameters for their optimum growth and metabolite production at laboratory scale i.e. flask culture experiments at different temperature, pH, aeration, carbon nitrogen and mineral sources and their concentrations. However, the general concept of scaling up of a process parameter for optimum growth and metabolite production require optimization at laboratory scale to pilot scale upto industrial scale. At every step there are some correction factors at all the level, in which temperature, aeration and shearing stress are the main which vary greatly from flask to pilot scale upto industrial scale. The laboratory scale optimization for microbial metabolite production require 100 ml to 500 ml only, while pilot scale level varies 200 liters to 2000 liters or little more, and industrial scale contain 20 thousand liter to more than 1 lac liters. In flask culture experiment, aeration and temperature do not hinder and optimization does not require as flask air is sufficient and fermentation in such quantity does not generate exothermic fermentation temperature while in bulk aeration and increase of temperature during fermentation which may increase from 4 to 8°C during fast fermentation process where microbial metabolites are produced within 24 hours. ~~Therefore~~ therefore, the huge amount of air also require along with ~~mass~~ reduction of fermenter temperature. Fermenter the sterile air in huge amount in large capacity fermenter (0.8 - 1.0 lac liter) is difficult to maintain if the process is highly aerobic. Most of the microbial metabolites ~~are~~ being produced by aerobic process at commercial scale.

Every fermentor system require different design and architecture for aeration and temperature control system during scaling up of a microbial metabolite at industrial scale. Some process are highly aerobic require certain design of fermentor to achieve continuous aeration. Therefore, specific design of bioreactor is expected. For example, acetic acid production for ethanol, which is the starting substrate for acetic acid production. This process require huge amount of air continuously for acetic acid production, as it is not true fermentation process, but oxidation of ethanol to acetic acid where ethanol is converted into acetaldehyde to acetaldehyde hydrate to Acetic acid. This process is facilitated by Acetobacter or Citronobacter spp. Moreover, for scaling up we must know the biosynthesis pathways or nature of microbial metabolite i.e primary or secondary metabolite with their extracellular or intracellular nature. The production of microbial metabolite from early exponential phase to late exponential stage or from stationary to death phase should also be evaluated before selection of fermentation types as well as its operation parameters. There are some other factors like stirring and mixing, gas exchange and mass transfer, sterilization of gases and nutritional solution with their size and volume required for the production are essential parameters. Furthermore, type of fermentor process and operational instruments and role of computer in operational process must be explore to run the process economically using minimum input of energy & cost.

During scaling up of a microbial metabolite we must know that which type of fermentation process viz. batch, continuous, fed batch, with or without submerged, i.e solid state or semi solid state or solid substrate approach is required for best microbial metabolite production. Such conditions are ~~are~~ very important for industrial

Scale production. How question arises, that how and why these levels are important?

Most of the fermentation of microbial metabolites are performed in submerged system, which is most feasible to run under almost all types of fermentors starting from its easy transfer through pipe lines, easily sterilization process. Easy to separate biomass and metabolite extraction and also facilitate proper aeration and temperature control during fermentation, as well as easily down stream processing and on line monitoring. The solid state fermentation is little bit difficult to run in bioreactors in order to achieve all the fermentative parameters with proper satisfaction. Although, the specific design of bioreactors are now available to run the process, but are costly over submerged system, as mechanical turning of substrate is required, but there is no option, because the microbes can require only solid state fermenter for better metabolite production. Actually, the requirement of a fermentation process for a microbial growth and metabolite production is based on water activity ( $a_w$ ) or so called moisture level for a growth of microorganism. Generally bacteria require higher water activity (0.90 - 0.99) for growth and microbial metabolite production, most of the yeast also require similar conditions, while filamentous fungi mostly require less water activity than bacteria i.e (0.80 - 0.89). While actinomycetes require less water activity than bacteria and fungi i.e (0.79 - 0.85). Thus, it is water activity which is the main basis for option of submerged to solid state use for fermentation of a metabolite. In solid state, different level of moisture can be maintained. In this process,

The solid porous, non-interactive substrate like wood shavings, wheat straw, and some time synthetic porous substances like polyurethane foam or other self designed matrix of natural and synthetic compounds may be used in solid state fermentation. These solid support substances are not utilised by microorganism as well as not interact with metabolite, but can only absorb microbial nutrients with different moisture levels. Microbes grow well by utilising nutrients absorbed by the support material at specific moisture levels depending on the requirement of microorganism.

The another approach is solid substrate fermentation. How does it differ from solid state fermentation? Only one characteristic differs which is that in solid substrate fermentation, microorganisms utilise support substrate also during their growth and metabolite production, therefore solid support is damaged and you have to maintain time to time, while in solid state, substrate will be as such to free for long term fermentation. If moisture content is too high 75-80%, this process is generally known as semi-soaked state of fermentation. To free this process of solid state specialized bioreactor design will be used as discussed under bioreactor design and architecture.

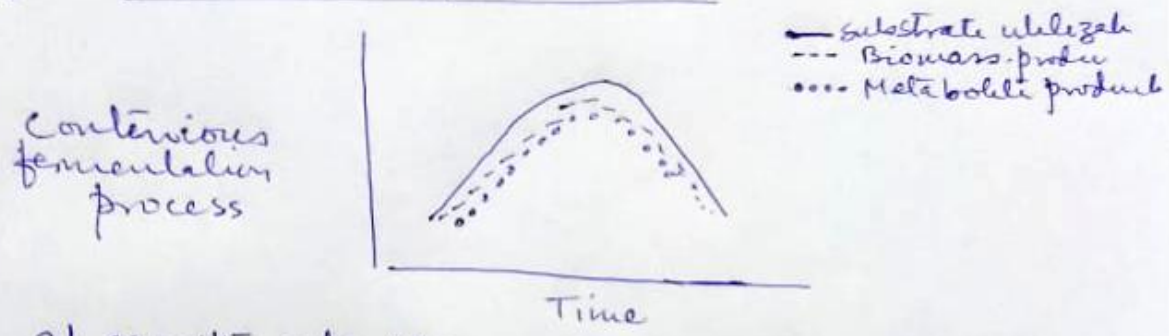
The another parameter is type of fermentation process from batch, fed batch to continuous process. To understand this, or how we could know that the particular microbes require which type of fermentation process, because every process have certain limitations and benefits. There are three parameters, when a microbes will grow in a nutrient medium for a metabolite production. This is evaluated, in the beginning during optimization of parameters for a microbial metabolite production in laboratory scale system.

The parameters are,

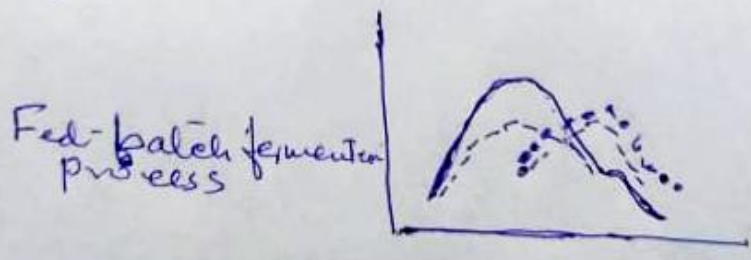
- ① Substrate utilization rate
- ② Biomass production rate
- ③ Metabolite production rate.

These three parameters condition is known as fermentation kinetics. The ~~evolute~~ evaluation of fermentation kinetics of determining the process selection is essential. There are three conditions

- ① If growth means biomass and metabolite production and substrate utilization in same phase of time, then the microbes can be best utilized for a continuous fermentation



- ② If growth rate, (Biomass), biomass and ~~and~~ substrate utilization and metabolite production slightly differs in different phase of time, then this process can be performed under fed batch process. This process is also known as semi continuous process or after modifying the situation, can be performed under continuous system also.



- ③ The third condition, in which microbial metabolites will be produced entirely different phase of time. Therefore, only batch fermentation process will be performed.

