

Annual Report (session 2022-2023)
Research and IPR cell
Ram Lal Anand College, University of Delhi

As the colleges reopened in Feb 2022 after a lockdown of almost 2 years, Research and IPR cell was on its toes throughout the year to make up for the time lost, and worked extensively to enhance the teaching learning process through the conduct of research projects and internships and to create an innovative ecosystem in the college.

The First call of the college research grant (CRG), initiated in 2019-2020 saw wide participation from at least 5 departments of the college and resulted in granting of 7 proposals. Due to the disruption caused by the COVID-19 pandemic, the projects were granted time extensions twice. Project work was successfully carried out and completed by all the PIs in Dec 2022.

The outcomes of these CRG projects are very encouraging and enthused faculty members and students to get involved in research and helped in creating an innovative ecosystem in the college. The salient outcomes are listed below:

1. Training of more than 50 students, who learned to design a research study, devise methodology, learned to implement the methodology, complete the study, compile and analyse results, write a project report, draw inferences, and plan further study. A number of students also learned scientific writing and communicating the findings in the form of publications and presentations.
2. A total of 5 research articles were published in international journals of repute by the investigators with students as co-authors.
3. A total of 11 papers were presented at international conferences.
4. Seven dissertations were submitted by the students working under these projects.

Below is a summary of the significant outcomes from each of the projects:

1. **Isolation and screening of plastic degrading bacteria from soil collected from different landfill sites of Delhi (sanction letter No. CRG/RLA/01/2019).**

PI: Dr. Sunila Hooda

Eleven students were trained under the project. The research resulted in one international publication and one international Poster presentation.

Publication:

Poorvi Saini, Ananya Grewall and Sunila Hooda (2022) *Insilico* approach for identification of polyethylene terephthalate hydrolase (PETase)-like enzymes, *Bioremediation Journal*, DOI: [10.1080/10889868.2022.2054931](https://doi.org/10.1080/10889868.2022.2054931)

Conference presentation:

Saini, P., Grewall, A. and Hooda, S. (2021). In-Silico Approach for Identification of Potential Plastic Degrading Bacteria, International Conference, The World Microbe Forum 2021, organized online by ASM and FEMS from 20-24 June, 2021.

Grant received: Rs. 50,000/-

Source: College Research Grant provided by Ram Lal Anand college

Student participants

S. No.	Name	Course	Batch	Contact no.
1	Swati Mishra	BSc (H) Microbiology	2021-2024	8303162868
2	Ashutosh Singh	BSc (H) Microbiology	2021-2024	9653059377
3	Sakshi Verma	BSc (H) Microbiology	2021-2024	8882470380
4	Rishav kalita	BSc (H) Microbiology	2021-2024	8135802370
5	Arihanta Sharma	BSc (H) Microbiology	2020-2023	9968618712
6	Menal Jain	BSc (H) Microbiology	2020-2023	7827586508
7	R Jyotirmay Lakshmi Shruti	BSc (H) Microbiology	2020-2023	9958981686
8	Surbhi Singh	BSc (H) Microbiology	2018-2021	9451574123
9	Neha Verma	BSc (H) Microbiology	2018-2021	8052894948
10	Ananya Grewall	BSc (H) Microbiology	2018-2021	9878022839
11	Poorvi Saini	BSc (H) Microbiology	2018-2021	9650683279

2. Activity of natural products and macroalga *Cladophora Glomerata* as biosorbent for primary treatment of wastewater treatment produced from laboratories. (sanction letter No. CRG/RLA/02/2019)

PI: Dr. Shalini Swami

A total of ten students were trained under the project.

Major finding of the Projects:

The Hydroxyl group (OH) in cellulose and pectin enhances the biosorption activity. It binds the dye (crystal violet, methylene blue, and safranin) excellently, which was observed by the change in initial OD and color of the crystal violet dye solution after incubation with biosorbent. This study has depicted that jackfruit, peanut husk, and pineapple peel (natural products) can be good biosorbents. It is a novel approach using fruits and vegetable peels to remove chemical dyes from laboratory waste-water. It is an innovative approach of significance that is cost-effective, reliable, and biodegradable and does not have toxic effects on water bodies.

Grant received: Rs. 50,000/-

Source: College Research Grant provided by Ram Lal Anand college

Student participants

<u>S.No.</u>	<u>Students Name</u>	<u>Course</u>	<u>Batch</u>
<u>1.</u>	Fardeen Shahansha	B.Sc. Hons. Microbiology	2018-2021

<u>2.</u>	Saloni Jain	B.Sc. Hons. Microbiology	<u>2018-2021</u>
<u>3.</u>	<u>Sahil Raina</u>	B.Sc. Hons. Microbiology	<u>2018-2021</u>
<u>4.</u>	<u>Divya Sharma</u>	B.Sc. Hons. Microbiology	<u>2017-2020</u>
<u>5.</u>	<u>Savi</u>	B.Sc. Hons. Microbiology	<u>2017-2020</u>
<u>6.</u>	<u>Himanshi</u>	B.Sc. Hons. Microbiology	<u>2020-2023</u>
<u>7.</u>	<u>Melisha</u>	B.Sc. Hons. Microbiology	<u>2020-2023</u>
<u>8.</u>	<u>Shreyas Bhat</u>	B.Sc. Hons. Microbiology	<u>2020-2023</u>
<u>9.</u>	<u>Deepanjan Sarkar</u>	B.Sc. Hons. Microbiology	<u>2020-2023</u>
<u>10.</u>	<u>Pushkar Raghav</u>	B.Sc. Hons. Microbiology	<u>2020-2023</u>

3. Combating Methicillin resistant *Staphylococcus aureus* (MRSA): A Drug Repurposing Approach” (sanction letter No. CRG/RLA/03/2019)

PI: Vandana Gupta

A total of 13 Students (listed below) were trained under this project directly and indirectly and worked on “**In-silico screening of inhibitors against SARS-CoV-2**”.

The research resulted in **10 international presentations** and **two international publications** and a total of **7 project reports** each equivalent to 6 months' dissertation, as listed below.

Publications:

1. Kapoor, S., Singh, A., & **Gupta, V.** (2022). In silico evaluation of potential intervention against SARS-CoV-2 RNA-dependent RNA polymerase. Physics and chemistry of the earth (2002), 103350. Advance online publication. <https://doi.org/10.1016/j.pce.2022.103350> IF: 3.5
2. Shahanshah MFH, Anvitha D, **Gupta V.** In-silico screening to delineate novel antagonists to SARS-CoV-2 nucleocapsid protein. Phys Chem Earth (2002). 2022 Oct;127:103188. doi: 10.1016/j.pce.2022.103188. IF: 3.5.

Oral presentations in Virtual “International Conference on Covid-19” organized by the Great Zimbabwe University on the 29th - 30th of July 2021

- i. Sharma V, George AJ, **Gupta V.** A Molecular Docking Analysis of Non-Structural Protein 13 of SARS-CoV-2
- ii. Shahanshah MFH, D. Anvitha, **Gupta V.** In-silico Screening to Delineate Novel Antagonist to SARS-CoV-2 Nucleocapsid Protein
- iii. Banerjee S and Gupta V. M Protein of SARS-CoV-2: A Potential Drug Target
- iv. Srivastava T, Kaur SP, **Gupta V.** Identification of SARS-CoV-2 RNA Capping Inhibitors using Computational Molecular Docking Studies Based Virtual Screening: A Drug Repurposing Approach
- v. Kapoor S, Singh A, **Gupta V.** In-silico evaluation of potential intervention against SARS-CoV-2 RNA-dependent RNA Polymerase

- vi. Sehrawat H, Pal S, **Gupta V**. In-silico analysis to discover SARS-CoV-2 Nsp7-8 inhibitors
- vii. Wijewardana C, **Gupta V**. Investigation into potential inhibitors of SARS CoV-2 NSP9 : A molecular docking study
- viii. Bhatia P and **Gupta V**. Computational Identification of SARS-CoV-2 Nsp3 Antagonists.
- ix. Sharma B and **Gupta V**. Virtual screening of approved drugs using SARS-CoV-2 Nsp1 as target
- x. Baranwal P, Shahanshah MFH, **Gupta V**. Potential Antivirals targeting Spike Glycoprotein of SARS-CoV-2

Dissertations:

1. A Molecular Docking Study Targeting MRSA Pbp2a Protein ; **Submitted by Rakshita Yadav**
2. Virtual Screening Of Novel Inhibitors Against Methicillin Resistant Staphylococcus aureus: A Drug Repurposing Approach: **Submitted by Tanisha Garg**
3. A Molecular Docking Study Targeting MRSA Pbp4 Protein: An In-Silico Drug Repurposing Approach: **Submitted by Meet Makwana**
4. Molecular Docking Study Of Protein Cap-F: An In-Silico Drug Repurposing Approach: **Submitted by Madhuri Bhattacharya**
5. A Molecular docking study targeting MRSA Sortase B Protein : An In-silico drug repurposing approach: **Submitted by Bazil Mehdi**
6. A Molecular docking study targeting Klebsiella pneumoniae KPC-2: An in-silico drug repurposing approach: **Submitted by Sandeep Patra**
7. A Molecular Docking Study Targeting Klebsiella pneumonia DNA Gyrase: An In-silico Drug Repurposing Approach: **Submitted by Sumana Saha**

Grant received: Rs. 50,000/-

Source: College Research Grant provided by Ram Lal Anand college

Student participants:

S. No.	Name	Course	Batch	Contact no.
1	Sandeep Patra	BSc (H) Microbiology	2020-2023	9174584668
2	Bazil Mehndi	BSc (H) Microbiology	2020-2023	7982410891
3	Sumana Saha	BSc (H) Microbiology	2020-2023	7000265066
4	Madhuri	BSc (H) Microbiology	2020-2023	9650953531
5	Rakshita Yadav	BSc (H) Microbiology	2020-2023	8800424416
6	Meet Makwana	BSc (H) Microbiology	2020-2023	8511833315
7	Tanisha garg	BSc (H) Microbiology	2020-2023	8700614348
8	Nandini	BSc (H) Microbiology	2020-2023	8393051218
9	Bhawana Sharma	BSc (H) Microbiology	2018-2021	9319126710
10	Anurag Singh	BSc (H) Microbiology	2018-2021	8540955956
11	Himanshu Sehrawat	BSc (H) Microbiology	2018-2021	7011677103

12	SimranPreet Kaur	BSc (H) Microbiology	2018-2021	8130445522
13	Pritika Baranwal	BSc (H) Microbiology	2019-2022	8447026321

4. Title: Screening of in vitro antimicrobial activity of Indian Plants against ESKAPE Pathogens (sanction letter No. CRG/RLA/04/2019)

Principal Investigator: Dr. Nidhi S Chandra

A total of fourteen students received research training under the project

Outcome of the Project

Over the course of the project we tested antimicrobial activities of Methanol, Chloroform, n-Hexene and Water extracts from *Linum usitatissimum* and *Rauwolfia serpentina*. *Rauwolfia serpentina* extracts exhibited antibacterial activity against *Escherichia coli* and *Staphylococcus aureus*, whereas extracts from *Linum usitatissimum* (flex seed) did not show inhibitory action against *E. coli* and *S. aureus*.

Publication from this project

Bhatia P, Sharma A, George AJ, Anvitha D, Kumar P, Dwivedi VP, Chandra NS. Antibacterial activity of medicinal plants against ESKAPE: An update. *Heliyon*. 2021 Feb 20;7(2):e06310. doi: 10.1016/j.heliyon.2021.e06310. PMID: 33718642; PMCID PMC7920328.

Grant received: Rs. 50,000/-

Source: College Research Grant provided by Ram Lal Anand college

Student participants:

S. No.	Name of Student	Course	Batch
1	Pragya	B.Sc. Hons. Microbiology	<u>2017-2020</u>
2	Priya Bhatia	B.Sc. Hons. Microbiology	2018-2021
3	Abhilash J George	B.Sc. Hons. Microbiology	2019-2022
4	D. Anvitha	B.Sc. Hons. Microbiology	2019-2022
5	Shelja Agarwal	B.Sc. Hons. Microbiology	2020-2023
6	Shagun	B.Sc. Hons. Microbiology	2020-2023
7	Deepansha Raina,	B.Sc. Hons. Microbiology	2020-2024
8	Ashita Khasa,	B.Sc. Hons. Microbiology	2020-2024
9	Gaurav	B.Sc. Hons. Microbiology	2020-2024
10	Devansh Kumar	B.Sc. Hons. Microbiology	2020-2024

11	Kalash Handoo	B.Sc. Hons. Microbiology	2020-2024
12	Rakhi Kumari	B.Sc. Hons. Microbiology	2020-2024
13	Sneh Priya	B.Sc. Hons. Microbiology	2020-2024
14	Azra Fayaz	B.Sc. Hons. Microbiology	2020-2024

5. Project CRG/RLA/06/2019

Title of Project: An Epidemiological Study of Emotional and Physical Health of College Students in Delhi

Details of the Investigators:

Principal Investigator: Dr M Salome John & Co-Investigator Dr Rita Jain

Four students participated in the study.

Conclusions of Project:

- Over 60% of respondents were physically active and actively engaging in sports, as against 20% pursuing yoga
- Anxiety levels were high across all categories during the pandemic
- Engaging in physical activity, having a fixed routine, upskilling using online courses, pursuing a hobby, and reaching out to peers and siblings were the most reported ways of dealing with stress
- Normal weight and overweight students spending more than 3 hours on social media/day were found to have a significant amount of depression and anxiety

Publication:

Jain Rita, Das Deboshree, & John M. Salome. (2022). Body Mass Index as an Indicator of Depression and Stress-induced Eating Disorders among College Students in Delhi, India. *Asian Pacific Journal of Health Sciences*, 9(3), 184–187. <https://doi.org/10.21276/apjhs.2022.9.3.37>

Grant received: Rs. 50,000/-

Source: College Research Grant provided by Ram Lal Anand college

Student participants

S. No	Name of the student	Course and Sem	Mobile no.	Email ID
1.	Sahil Raina	BSc(H)Microbiology (2021)	9911468221	sahilraina@gmail.com
2.	Raajvi Khurana	BSc(H)Microbiology (2022)	8010367162	raajvi18k@gmail.com
3.	Siddharth Sharma	BSc(H)Statistics (2022)	7830130546	siddharths854@gmail.com
4.	Swastika Mohapatra	BSc(H)Statistics (2022)	9650036295	swastikamohapatra2@gmail.com

6. Project CRG/RLA/07/2019

Title of Project: Environmental Consciousness Survey of College Campus and various other States
PI- Dr Arvind Patel; CO-PI- Dr Parul Lau Gaur

Outcomes:

The study aims to determine the environmental consciousness among students of RLA and community members of the society representing various states based on the questionnaire of different parameters such as water management, energy conservation, waste management, environmental justice, plantation, participation in environment management.. A comparative study was undertaken specifically of the population group which included the students enrolled at RLA and students of other states (SOS). The finding suggests that SOS had better awareness regarding parameters in water management, renewable energy conservation, environmental justice, plantations, and participation in the environment management activities. While students of RLA showed a high level of environmental consciousness with regards to solar energy conservation and efforts to promote plantations. The respondents from RLA exhibited deep understanding of waste management such as Biowaste and Vermicompost, Bio-Hazardous waste management but SOS performed better as far as cleanliness drives were concerned.

Grant received: Rs. 30,000/-

Source: College Research Grant provided by Ram Lal Anand college

Student participants

S. No.	Name of Student	Course	Batch
1	Ansh Bhatnagar	BA Program	<u>2021-2024</u>
2	Vidit Misra	BA Program	<u>2021-2024</u>
3	Shivam Yadav	BA Program	<u>2021-2024</u>
4	Rishi Rai	BA Hons History	<u>2021-2024</u>
5	Prateek Singh Yadav	BA Hons Statistics	<u>2021-2024</u>
6	Prakhar	BA Hons Mathematics	<u>2021-2024</u>

After the successful completion of the proposals granted under the First call of College Research Grant (2020-2022), College invited research proposals through the Research and IPR cell under the second call of College Research Grant (2023-2024) from the faculty members and students.

After careful evaluation of the nine research proposals received by the committee, the proposals with any deficiencies were sent back to the Principal Investigators for revisions. After repeated revisions in the proposals all the received final revised proposals were carefully evaluated and recommended for further approval and release of a total grant amounting to Rs. 745000/- . The details of the proposals recommended for approval are as follows:

	Title	PI and co-PI	Budget (Rs.)
1	Examining the stress and stressors among undergraduate students: cross- sectional study in University of Delhi	Dr. Anurag Sharma Dr. Kuldeep S. Chauhan	15000

2	Implications of Vedic wisdom for youth in 21 st Century	Dr. Krishan G. Tyagi Dr. Parul Lau Gaur	30000
3	Isolation and screening of azithromycin resistant bacteria from Yamuna river in Delhi	Dr. Swagata Karmakar Dr. Prerna Diwan	100000
4	Exploring the plastic degradation potential of microbial consortium isolated from landfill sites in Delhi	Dr. Sunila Hooda Dr. Swagata Karmakar	100000
5	<i>Bacopa monnieri</i> and <i>Parmotrema perlatum</i> extract: LC MS analysis to quest compounds having inhibitory activity against ESKAPE bacterial pathogens	Dr. Shalini Swami Dr. Sunila Hooda	100000
6	Evaluating <i>Parmotrema perlatum</i> extracts for the presence of antifungal bioactives	Dr. Salome John Dr. Shalini Swami	100000
7	Assessment of groundwater quality and associated human-health risk in the area around Bhalaswa landfill site, Delhi, India	Dr. Virendra B Singh Dr. Prerna Diwan	100000
8	Repurposing drugs through phenotypic screening against Methicillin Resistant <i>Staphylococcus aureus</i> (MRSA)	Dr. Vandana Gupta Dr. Nidhi S Chandra	100000
9	Evaluation of anti ESKAPE potential of <i>Rauwolfia serpentina</i> and <i>Terminalia chebula</i>	Dr. Nidhi S Chandra Dr. Vandana Gupta	100000

All the selected proposals were funded by the college under the second call of CRG (2023-2024) and were implemented as per the guidelines prepared by the Research and IPR cell from 1st June 2023- 30 May 2024.

Summer Internships offered to the students:

First call

A new initiative was introduced to facilitate the faculty members to take students for the summer internships to inculcate research culture in the college in line with the NEP, during the academic session 2022-2023 call was initiated and 12 proposals were received, out of these the following 8 proposals requiring grant of upto Rs. 10000/- were technically approved and were carried out by the faculty members.

Name of the faculty member	Department	Title of the project	Estimated budget and justification for the budget
Prof Prerna Diwan	Microbiology	Analysis of oral microbiome of betelnut chewers and non chewers	Not required
Dr. Rajesh Sachdev	Statistics	Will discuss	Not required
Dr Rita Jain	Statistics	Social media, personal values and its impact on political participation	Rs. 10000/-
Vandana	Microbiology	Scientific writing and communication	5000 (stationery and printing)
Dr. Sunila	Microbiology	Data analysis and literature review on biodegradation of plastics	Access to printers for printing of articles may be required. No separate budget requirement.
Dr. Shalini Swami	Microbiology	Structural homology of SARS CoV-2	NA

Ms. Dikscha Sapra	Computer Science	In-Silico Methods for prediction and prognosis of Leukimia	Rs 10,000/- for printing and accessing research papers, travelling for visiting advisor etc.
Dr. Mukta Datta Mazumder	Statistics	Survey on Entrepreneurship and Innovative mindset among students	Rs. 5000 (Questionnaire Preparation, travel, printing etc)

Second call for summer internships for RLAC students:

After successful completion of the first call, proposals were invited for the second call for summer internships initiated for the summer 2023. This year we saw an overwhelming response to the call for the conduct of summer internships by our esteemed faculty members. Below is the summary of the proposed summer internships. College sanctioned a total grant of Rs. 109,000/- for the conduct of the following technically approved Summer internships.

	Faculty member	Dept.	Tentative dates	Title of the project	Estimated budget and justification for the budget	remarks
1	Srijana Singh	BMS along with Enactus	10-06-23 to 20-07-23	Sustainability initiatives in the IT and FMCG sector	Rs. 8500/- : stationery, printing and field visits because when it comes to sustainability the practical aspect of the companies or in general NGOs can be studied.	8000/-
2	Sakshi Taresh Khanna, Dikscha Sapra	Computer Science	02-06-23 to 02-08-23	Impact Assessment of OTT Platforms using Artificial Intelligence Techniquess	Rs. 10,000/- for publication of research paper / conference presentation/ printing certificates	10,000/-
3	Dikscha Sapra, Saakshi Taresh Khanna	Computer Science	10-06-23 to 15-08-23	Computer Aided discovery of biomarkers for Gastric Cancer	10,000 (printing, publication free etc)	10,000/-
4	Shikha Verma	Computer Science	19-06-23 to 19-07-23	Cloud based healthcare applications and platform security	Rs. 10,000/- - For stationery/books/software and other misc. expense	10000/-
5	Arun Kumar Gautam	Computer Science	19-06-23 to 19-07-23	Secure Data Storage and Privacy preservation in cloud	Rs. 10,000/- : stationery / software purchase/books/etc.	10000/-
6	Sakshi	Computer Science	06-07-23 to 03-08-23	Develop methodology for authentication and Verification in IoT Digital Forensics	Rs.7000/- : Purchase of hardware devices, connection wires, board setup for initialization of devices and miscellaneous)	7000/-
7	Manisha Wadhwa	Computer Science	19-06-23 to 19-07-23	UAVs and Simulation	Rs. 7000/ : Books/Software/Stationery	7000/-

8	Dr. Suneyana Sharma	Economics	15-06-23 to 15-07-23	Literature review writing	Rs.7000/-, Stationery, printing, bindings of project reports and small refreshments for the 7-8 students during group meetings (2-3 times)	5000/-
9	Megha Yadav	Economics	15-06-23 to 15-07-23	Development Economics	₹7000/-: stationery , printouts, bindings and refreshments of the students (2-3 times)	5000/-
10	Dr. Debashree Das	Economics	12-06-23 to 10-07-23	Public policy formulation- studying feasibility through the behavioural economics approach	₹7000/- (Fieldwork: Travel/Logistics, Survey Preparation; Study material: Printing & Binding, Source Material, Books, Journals, Software, Data Sets; Refreshments)	5000/-
11	Riyanka Jain	Management Studies	05-06-23 to 20-07-23	Impact of ESG score on financial performance of the companies	NA	
12	Siddharth Gupta	Management Studies	05-06-23 to 20-07-23	Impact of ESG score on Financial performance of the companies	NA	
13	Basant Kumar Mishra	Mathematics	15-06-23 to 10-07-23	Mathematical Tools for Research	INR 7000/- for printing of certificates, High tea for Valedictory session and under contingency fund	7000/-
14	Dr. Shalini Swami	Micro-biology	21-06-23 to 07-07-2023	Prediction and Interpretation of 3D structures of novel proteins targets using Alphafold.	Rs.5,000/- for the printing, internet, stationery and binding of reports	5000/-
15	Dr Sunila	Micro-biology	20-06-23 to 19-07-23	Isolation of Cyano-bacterial strains for heavy metal remediation	Rs. 5000/-: Sample collection from the identified sites and media requirements	5000/-
16	Prof. Vandana Gupta	Micro-biology	12-06-23 to 20-07-23	Scientific writing and communication, writing book chapters and review articles	Rs. 10,000/- printing certificates/ stationery/printouts/ google drive space/grammarly subscription/biorender subscription	10,000
17	Dr Nidhi Yadav	Political Science	10-06-23 to 10-07-23	Fiscal Policy, Transparency, and Issues of Governance: A case study of the Indian Democratic Framework	Rs.10,000/- for providing stationery, printing, photocopy to the students of BA Honours Political Science II Year	5,000/-

18	Dr. Dipti Gupta	Management Studies	05-06-23 to 20-07-23	Impact of Digital Marketing on purchase decision of youth in Delhi NCR	NA	NA
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In addition to these activities Research and IPR cell also conducted a webinar entitled “Intellectual Property Rights: A plethora of opportunities in association with the Department of Microbiology. The guest speaker Ms. Perna Vij is working as a patent consultant in Canada and she gave a global perspective on the opportunities in the field of IPR as a researcher and also as a patent attorney.

Report Prepared and Submitted by



PROF. VANDAN GUPTA
Co-ordinator
Research and IPR Cell